



CENTRE FOR DISTANCE EDUCATION

Business Economics

Paper-I

For

B. Com. Part-I

Semester - I

Unit-1
Introduction to Business Economics

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1.1 Objectives

1. To study business economics.

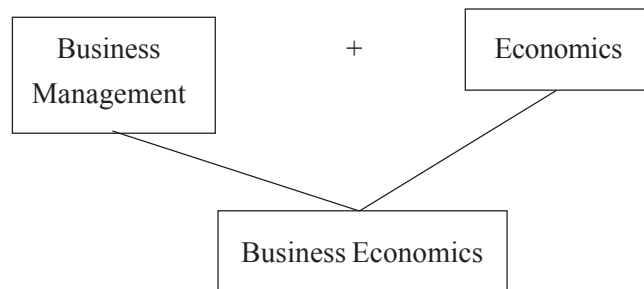
2. To study the nature and scope of business economics.
3. To study importance of business economics in practical market.
4. To understand how firm gets maximum profit.

1.2 Introduction :

Business Economics is playing an important role in our daily economic life and business practices. In actual practice different types of business are existing and run by people so study of Business Economics become very useful for businessmen. Since the emergence of economic reforms in Indian economy the whole economic scenario regarding the business is changed. Various new types of businesses are emerged, while taking the business decisions businessmen are using economic tools. Economic theories, economic principles, economic laws, equations economic concepts are used for decision making. On this ground students of commerce should know the importance of basic theories in actual business application. Hence the introduction of Business Economics becomes important to the students.

In 1951 Joel Dean published a book entitled "Managerial Economics." The the subject Managerial Economics has gained popularity. Managerial Economics reveals that how economic analysis is used to formulate the economic policies in respect to the business firms.

Managerial Economics was formerly known as "Business Economics." It is also called as "Applied Economics". The world Business Economics is formed from the two worlds Business and Economics.



In the world 'Business Economics' "Business" means a state of being busy. It means any activity continuously undertaken by a man in order to earn income.

In other words Business if referred to commercial activities aimed at making profit. The word Management is formed from the word 'to mangae.' The meaning of the word "to manage" is to get the work done through others. Management is what brain is to the human body. Hence

Business Management means any activity undertaken to earn profit, run by a person and managed with the help of economics. Therefore Managerial Economics is also called Business Economics.

In Managerial Economics the concepts, principles and theories in pure economic science are applied to any business activities. Therefore it is also called as Applied Economics. A manager of business firm manages the business with the help of economic theories. So it plays a vital part in running the business activities.

1.3 Definitions :

The subject Business Economics is defined by many eminent scholars as follows.

1) According to 'E. T. Brigham' and 'J. L. Pappas', "Managerial Economics is the application of Economic theory and methodology to business administration practice."

This definition throws light on the application of principles and theories of economics in practice to run successfully the business.

2) 'McNair and Meriam' defined it as "Managerial Economics consists of the use of Economic modes of thought to analyse business situations."

This definition stresses on how manager of business firm uses the economic thoughts and concepts to solve the problems prevailing in business activities. Everyday business manager has to face different problems, while running the business. They would be solved with the help of economic theories.

3) 'M. H. Spencer' and 'L. Siegelman' defined as "Managerial Economics is the intergration of economic theory with business practice for the purpose of facilitating decision making and forward planning."

This definition enlightens the process of business decision making with the help of economic theories. Manager intergrates the economic theories with the business practices and takes decision as well as plans the activities of his business firm.

It is clear from the above definitions that Business Economics deals with the economic aspects of managerial decisions, which can be used by managers, while running the business activities. It is a midway between Economics and Business Management and serves as a link between the two.

In Business Economics, economic theories and principles are put in relation to the real business behaviour and prevailing conditons. Analytical techniques in economic theory builds

economic models by which we arrive at certain assumptions and conclusions. With the help of these assumption and conclusions, with the help of economic concepts of profit and costs, one can use the financial data more effectively to cope up with the needs of decision making and advance planning. Thus, Business Economics attempts to have conciliation between economic concepts and accounting concepts.

By using the economic concepts like elasticity of demand, cost and output etc. and their previous data business forecasts could be made.

Economics studies the concepts like business cycles, fluctuations in national income and governement policies related to taxation, labour relations, anti-monopoly measures, foreign trade, licensing policies, price control etc.

The manager of a business firm has to see the relevance and effects of the external forces on business activities.

Thus Business economics is related with the study of economic analysis applied to the real business activities in practice.

1.4 Features of Business Economics :

Followig are the main characteristic features of Business Economics which consitute the nature and subject matter.

1) Business Economics means the application of economic concepts, theories and principles to the business activities.

2) Business Economics is related with the micro-economics. It is micro in nature. It is mainly related with the problems of individual unit.

3) Also it deals with the macro-economics. Manager of the farms has to study the macro economic concepts like National Income, Business Cycles, Labour Relations, Government Policies on taxation, budget, monetary issueses and international trade etc. By studying these macro economic concepts Manager of a business firm takes the decisions in respect of his firm.

4) Managerial economics deals with the theory of firm which is pure theory of economics. Economic principles of this theory are applied to his firm to decides profit. It means that managerial economics deals with the theory of distribution.

1.5 Nature and Scope of Business Economics :

The subject matter of Business economics deals with the economic aspects of managerial decisions. These economic decisions are based on the economic contents. Thus managerial

economics is a body of knowledge techniques and practices based on those economic concepts which are useful in deciding the business strategy. Managerial behaviour involves planning motivation, co-ordination or control for which economic considerations are required. It forms the subject matter of Business economics.

According to 'J. L. Pappas' and 'E. T. Brigham', Managerial Economics is designed to provide a rigorous treatment of those aspects of economic theory and analysis that are most useful for managerial decision analysis.

Therefore, Managerial Economics focuses on those tools and techniques which are useful in decision making.

Decision making is one of the main functions of every manager. His decisions depends entirely upon himself or sometimes on other factors. The problems before him may be simple or complex in nature. Also they may be major or minor. In order to solve these problems decision making and planning becomes the significant function of managerial person. Decision making is the process of selecting one course of action from two or alternative courses. It means that manager which solving the problems before his business firm, choses one alternative out of various available alternatives. e.g. suppose in order to increase the sale of his product among many competitions in market, a manager of business firm have various alternatives available as to reduce the cost of production, to impose lower price, to increase the quality of his product to give incentives to the consumers who purchase his products, implementation of advertising techniques etc. Among these various alternatives he choose one of the alternatives. The choice of one alternative increases the sale of his product in market is called the process of decision making.

After decision making he has the forward planning, it means establishing plants for the future, Both of these acts run one after the another.

Where in which the conditions, manager works and takes decisions which are based on uncertainty. The fact of uncertainty makes the decision making and planning function more complex. If there is any future knowledge, plans might have been so constructed so as to give perfection without errors and no changes could be expected. In reality, the manager has no knowledge about the future as regards the sales, cost of production, capital investments. Therefore, all decisions are formulated on past data available, current information and the estimates about the predicated future. For the fulfilment of plans requires a time, during such period more facts come to be known and so there is changes in the plan and the course is vitiated. In this way, at every stage, the manager goes on through unending series of decision, making with unknown and uncertain future and they have to adjust according to it.

Thus function of decision making under uncertainty conditions, the managers uses the economic theory with considerable advantage economic theory has following concepts and principles relating to profit, demand, cost, pricing, production, competition, business cycles, national income. By using the Economic concepts and principles along with accounting, statistics and mathematics, it leads to solve the problems of business management. Thus, managerial economics means the solving business problems through economic analysis.

Scope of Business Economics :

Scope of any subject means the area of it's study. Business Economics has it's roots in economic theory. But it's scope is different from economic theory. Business Economics provides management with a strategic planning tool. Thus the perspective of business world would be calarified in regards to it's working. Business Economics is mainly concerned with the application of economic principles and theories. The scope of Business economics covers two areas of decision making.

- 1) Operational or Internal Issues.
- 2) Environmental or External Issues.

Manager of any business firm faces various problems in his daily working. These problems are divided into two types. First kind of problems are related with the internet issues of business firms and another kind of problems are related with environmental issues of the business firms. Hence they are referred as operational or internal issues and environmental or external issues respectively.

1) Operational or Internal Issues :

The manager of business firm faces the problems, which are related to the internal issues of the firm. They are controlled by the manager with the help of economic theories and principles. They are as follow.

- i) What to produce? i. e. Problem of choice of commodity.
- ii) How to produce? i. e. what techniques are to be used? Either capital intensive or labour intensive techniques.
- iii) What capital-labour ratio is to be used?
- iv) What price is to be levied?
- v) How to invest? And at what quantity?
- vi) How to sale? At what price? How to compete?
- vii) How the capital and the profit can be managed in order to make the best use of it?

Such types of problems are faced by every manager of business firm which are solved with the aid of economics. These problems are related to the economic theories and principles as follows.

1. Demand Analysis : The manager thinks about the demand for his firm's product. A firm can survive if it is able to cater the demand for its product in market at the proper time and in the right quantity. A firm can economically stand in the market, when its goods are continuously demanded and sold in the market. Manager looks to the market demand of his firm's product. He makes the accurate estimate of demand and makes the decisions. Before he come to the final conclusions manager of every business firm can study the basic concepts and theories of demand analysis in economics as law of demand, demand forecasting, elasticity of demand and their variant factors. It provides the basis for analysing the market influences on his product. Demand analysis also throws light on the factors affecting the demand for the business firm. Thus, demand analysis helps to manager in estimating and manipulating the market demand for his product.

2. Theory of production : Theory of production is also called as the theory of firm. Along with the cost of production it also consists the firm's revenue. It includes the relationship between various factors of production, input-output analysis, capital - labour ratio, optimum production, break even analysis etc. These economic concepts help to business manager in solving the problems related with the production.

3. Cost-Analysis : Cost of production is very significant factor in the process of production. Therefore every manager must to possess a good knowledge of cost analysis it includes various kinds of costs, which are very essential in decision making. The various factors responsible for the variation in cost estimates must be given due weightage. These cost estimates are necessary in future planning. There is uncertainty in regards to cost due to unknown factors. Cost estimates are very essential for most sound profit planning. Hence to find out the firms cost of production the knowledge of cost analysis is very essential for business manager. It includes various costs concepts cost output analysis, economies of scale, production function, cost control etc.

4. Pricing theories : Managerial economics deals with the pricing theories. Pricing of a product incurs income to the firm. The success of the firm can be comprised in a sound pricing policy of its product, how the price is to be determined in various forms of market such as perfect competition, monopoly, monopolistic competition, oligopoly, duopoly etc. What conditions are affecting on the pricing process in different markets should be known by the manager of a business firm. Therefore he has to possess the good knowledge of market forms with the help of this knowledge he can form a sound pricing policy. It means that knowledge of pricing theories helps him to formulate good pricing policy and it further assists to decision making.

5. Theory of profit : Profit maximisation is a aim of business firm making profit in long run is a sign of successful entrepreneur. Profit depends on various factors such as internal factors and external factors. These factors are many in number e. g. demand for product, input prices, factor prices, competition, economic policy, business risks and the amount of investment etc. Knowledge of sound profit earning policy and techniques of profit planning are also important to business manager. Economic theory provides this knowledge.

6. Resource Allocation : Managerial economics also deals with the problem of optimum allocation of resources. Resources are scarce, so they should be allocated efficiently to different uses by the manager. In order to solve the problem of resource allocation the manager should possess the knowledge of input-output analysis, linear programming etc. With the help of these economic analysis methods manager arrives to the final conclusions in respect of his decision making.

7. Capital-Investment Analysis : Capital is scarce and fundamental factor of production. It is foundation of business. Large amount of capital is invested in big firms. So many problems come up before management. In order to solve these problems enough time and labour are required. In brief, the capital budgeting involves planning and control of capital expenses. This topic consists of cost of capital, rate of return. selection of project, Cost-benefit analysis etc. The knowledge of Capital Theory helps to take investment decisions.

8. Inventory Management : Every firm requires raw material. It would be stored in inventories. What would be the ideal stock of inventories? How the stock of inventories should be maintained and controlled? These are some of the problems which the manager has to solve. Knowledge of this stock inventory is achieved from economic theory.

9. Advertising : Advertising is the heart of modern business practices. It is one of the features of modern marketing system. It helps to increase the scale of a product. Therefore every businessman can follow these techniques. How much amount is spent on advertising expenditure? it increases the cost of production of a commodity as well as sales. The advertising expenditure affects the cost and sales. More the advertising expenses, more is the cost and the sales and vice versa. Thus economic theory helps to businessmen in solving their problems and to arrive at definite conclusions.

2) Environmental or External Issues :

These issues are related to the general business environment in which the firm or business operates. These are social, economic and political environments, economic environment includes kinds of economic systems, situations existing in the field of production, income, employment, prices, saving and investment, financial institutions as banks, financial corporations, Insurance

companies, trends in international trade. It also includes the conditions prevailing in labour and capital markets, government policy, industrial policy, monetary policy consumer's co-operatives etc. Political environment is related to state activities. It includes the state's attitude towards business firms. Managerial Economics takes the cognizance of all types of environments affecting the business activity.

These external or environmental issues in managerial economics are related with the Macro-Economics. Thus, the scope of managerial economics reaches in the sphere of micro as well as macro economic theories.

1.6 Difference between Economics and Business Economics :

Economics	Business Economics
1) It is a pure Economics.	1) It is applied Economics.
2) In consists of economic theories and principles.	2) Managerial economics applies economic theories and principles to solve the business problems.
3) Economics has similar emphasis on both Micro and Macro economics.	3) Managerial economics relatively give more stress on micro economics than macro economics.
4) Micro economics part of Economics considers both Individual consumer as well as firm.	4) It's micro economic part considers only individual firm.
5) It's micro economic analysis deals with rent, Interest, wages and profit.	5) Micro Economic part of managerial Economics is related only with profit.

1.7 Business Economics and Decision making :

Decision-making and forward planning are two very important functions of the managerial economist. He makes the correct decisions, prepare future plans and implements them to earn expected profit.

Decision making is essentially a process of selecting the best out of alternative opportunities open to the firm. Every manager of a business firm has to face the various kinds of business problems. They are simple or complex in nature. So the most important function of the managerial economist is the decision making and forward planning of a business firm. According 'Louis A. Allen.'

"Decision making is the work which a manager performs to arrive at conclusion and judgement." It means that before taking the decision the manager examines the relationship between various factors and then come to the conclusion. This act is referred as decision making.

George Terry defined it as, "Decision making is the selection based on some criteria from two or more possible alternatives."

'D. E. Macfarland' calls it as, "A decision is an act of choice wherein an executive forms a conclusion about what must be done in a given situation. A decision represents behaviour chosen from a number of possible alternatives."

'Herbet Simon' opines that "Decison making comprises, three principles phases finding occasions for making decisions, finding possible courses of action and choosing among courses of action."

All above definitions clarify the meaning of decision making. Decision making comprises the points viz.

- 1) Decision making is a process of selecting the best alternative out of available alternatives.
- 2) It is an intellectual work, which manager has to perform before arriving at any conclusion.
- 3) It is an act of choosing from different alternatives.

Thus, process of decision making consists of four phases. They are as follows.

- 1) Determining and defining the objective.
- 2) Collection of information in respect of social, political and technological environment and forecasting on them.
- 3) Inventing, developing and analysing possible courses of action.
- 4) Selecting a particuar course of action, from available alternatives.

In the process of decision making the management of a company can apply the theories and tools of economic analysis. Economic theories express the functional relationship between two or more economic variable, under certain given conditons. Application of the economic theories to the problems of business influences decision making process in three ways.

- 1) It offers clarity of various economic concepts viz. demand, price, cost of production, externalities etc.
- 2) It helps in ascertaining the relevant variables and specially reveals the relevant data.
- 3) Economics expresses the relationship between various economic variables and provide consistency in analysis. It helps in drawing the accurtae conclusions. Thus applications of

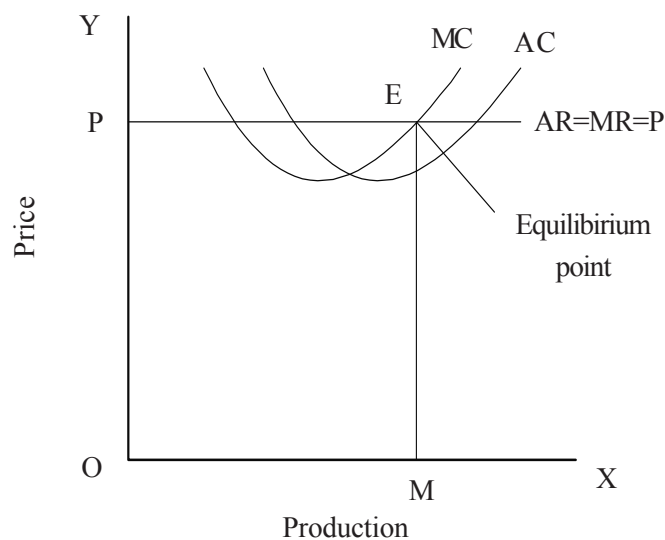
economic theories to the problems of business firms guides, assists and streamlines the decision making process, as well as it contributes to the valid decisions.

Economics helps to the business manager in various ways. By the application of economic theories and principles manager of a firm solves the various problems in business sector. Internal problems are sloved with the help of micro-economic analysis like demand, Production, costs, price, profit, investment, resource allocation etc. Also the external problems are solved with the helps of macro economic theories like, national income, fiscal policy, economic policy, monetary policy, employment, business cycles, international trade, inflation, defilation etc.

By using the micro and macro economic theories managerial economist arrives at final conclusions and business decisions are to be taken. Thus economic theories helps to manager to analyse the problems, to derive the conclusiions, to take the decisions, and to solve the business problems. Thus decision making and forward planning is prime functions of managerial economist.

1.8 Business Economics bridges the gap between theoretical Economics or Prescriptive science :

Business Economics is a prescriptive science, as doctor. Suggests a medicine to cure from a disease similarly Business Economics suggests various solutions to solve various problems to Business Manager. It provides various economic concepts, principles, theories to business managers with the help of these he analyses the business problems and search out the solutions. In order to solve the business problems Business Economics provides two types of techniques, i) Principle of Optimality and ii) Equilibrium principle. First Principles helps to business manager in decision making e. g. How much to produce? This problem is solved with the micro economic



principle that where firm's Marginal cost becomes equal to the marginal revenue ($MC=MR$) the firm gets maximum profit hence business manager should produce until the achievement of equilibrium point of $MC=MR$. The production produced at the equilibrium point is called optimum production. Here he gets maximum profit. The price is determined according to the average cost occurred at optimum production. In such a way business manager fixes the price of his product and gets profit. Thus, he solves the problem how much to produce with these economic principles. Following diagram shows equilibrium point of optimum production.

In the above diagram AC and MC are average cost and marginal cost curves, AR, MR and Average revenue, Marginal revenue and price curves. MC curve intersects MR curve at point E from below. Hence, E is the equilibrium point, where firm produces OM output and fixes OP price. Thus, E is the equilibrium point at this point firm gets maximum profit ahead the OM output firm gets losses. So it can't produce ahead the optimum production so, OM is the optimum production. Thus with the help of equilibrium of firm business manager can solve the problem before him how much to produce?

Economics is of two types, i) Positive Economics and ii) Normative Economics. Positive Economics deals with the rules, principles and theories of Economics. On the other hand Normative Economics helps to solve the particular economic problems and formulation of economic policies. e. g. concept of elasticity of demand is used to determine the price of a product, as well as to impose the tax on a commodity.

Thus, Business Economics helps to formulate the economic policy, Taxation policy, credit policy. Import-Export policy etc. Business Economics is an applied science in which micro and macro economics principles and theories are applied to solve the problems before the business manager in daily business practice. Thus, it bridges the gap between the economic principles and business practice. So, Business Economics is called the prescriptive science. So, it is a bridge which connects the Theoretical economics and business decisions.

1.9 Objective of business Firm :

Traditionally, the business firm is known as economic unit. So profit maximization is a main objective of business firm. This view was later replaced by stating that besides profit maximization, sales maximization, revenue maximization, growth maximization etc. are the other objectives to be achieved.

According to Prof. Boulding, Bamoul, Higgins, Scitovsky, Melvin Rader, Peter Drucker, Joel Dean etc. Profit maximization is not only a sole objective of business firm but other objectives are also important which are performed by the firm.

Following are the main objectives of business firm -

1) Profit - Maximization :

The traditional goal of a business firm is profit maximization. It means that to achieve more and more amount of profit over a period of time in short and long run. Price of product of business firm is determined in market by demand and supply conditions. Price is determined at the point of equilibrium, where demand equals supply of a product. Business firm has to maximise its profit at this market price. In perfect competition firm is price taker and in imperfect competition it is price searcher. Because in imperfect competition the number of sellers is small so each seller has control over its selling price.

Profit is the difference between total Revenue and total cost. It can be calculated by deducting the total cost from total revenue.

$$\text{Profit} = \text{Total Revenue} - \text{Total cost.}$$

In order to maximise the profit there are two conditions which must be fulfilled in any form of market.

1) Marginal cost must be equal to marginal Revenue i. e. $MC = MR$.

This condition is called the necessary condition.

2) Marginal cost curve must intersect Marginal revenue from below.

i. e. $MC = MR$.

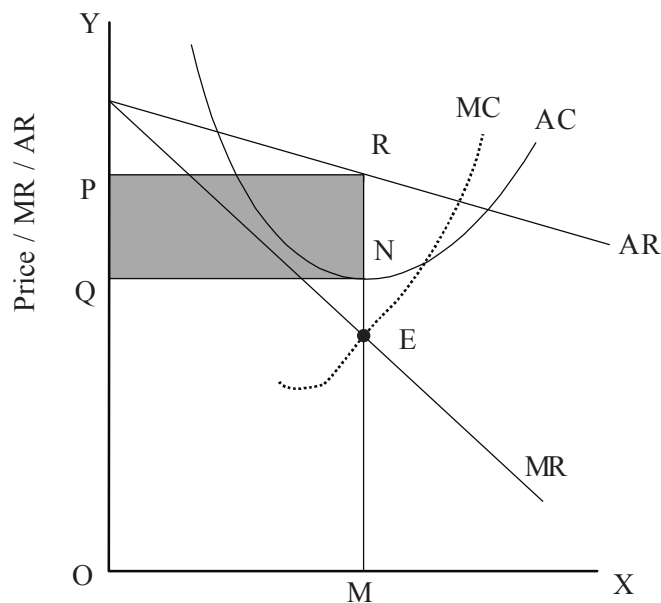


Fig. 1.1 Out put

This is secondary condition or sufficient condition.

Where these two conditions are to be fulfilled, the firm achieves maximum profit at this point. This marginal conditions of profit maximisation is illustrated as below.

In the figure 1.1 AR and MR are the Average and Marginal revenue curves slopping downwards to the right. AR curve lies above the MR curves. Such situation prevails in monopoly market. AC is average cost curve, it is U-Shaped. MC is marginal cost curve. It is rising from left to right upwards.

MC curve intersects MR curve from below at point E. Hence E is the equilibrium point. At the point E both conditions $MC=MR$ and MC curve intersects MR curve from below are to be fulfilled. Up to the OM level of output MR is greater than MC. Therefore monopolist will be in equilibrium at the point E. He produces OM level of output and determines OP price.

By selling OM output at OP price he will achieve profit equal to rectangular \square PQNR.

$$\begin{aligned}
 \text{Profit} &= \text{Total Revenue} && - \text{Total Cost} \\
 &= \text{Total output} \times \text{Average Revenue} && - \text{Total output} \times \text{Average cost} \\
 &= OM && \times OP && - OM && \times MN \\
 &= \square \text{ OPRM} && && - \square \text{ OQNM} \\
 &= \square \text{ PQRN}
 \end{aligned}$$

Hence monopolistic firm can achieve and maximise profit equal to \square PQNR.

1.10 Glossary :

1. Internal factors - Factors which are related to business and controlled by firm.
2. External factors - factors which are not under control of firm and business manager.
3. Business decision - Intellectual work before business action.

1.11 Question for Self Study :

State following statements true or false.

1. Commercial activity is one part of business.
2. Business economics is only theoretical science.
3. Business economics is applied science.
4. Social welfare is goal of business firm.

5. Deactivate phase is called business.

Answers : 1) true 2) false 3) true 4) false 5) false

1.12 Question for practice :

(A) Answer the following question.

1. State concept of business economics
2. State nature of business economics
3. State scope of business economics
4. Explain features of business economics
5. State profit maximization goal of firm.

(B) Write short notes.

1. Micro economics
2. Business economics and business decisions
3. Goal of business firm.

1.13 Books for Reading :

1. M. L. Ahuja - "Modern Economic Theory"
2. M. L. Seth - "Principles of Economics"
3. K. K. Dewtt - "Modern Economic Theory"
4. Dr. R. R. Doshi - "Business Economics"
5. Dr. M. N. Shinde - "Managerial Economics"



Unit-2
DEMAND FUNCTION

- 2.1 Objectives**
- 2.2 Introduction**
- 2.3 Demand - Function**
- 2.4 Law of Demand**
- 2.5 Exceptions**
- 2.6 Types of Goods**
- 2.7 Elasticity of Demand**
- 2.8 Measurement of Elasticity of Demand**
- 2.9 Income Elasticity of demand**
- 2.10 Cross - Elasticity of Demand**
- 2.11 Glossary**
- 2.12 Questions for Self Study**
- 2.13 Questions for practice**
- 2.14 Books for Reading**

2.1 Objectives

1. To understand the concept of demand.
2. To study the nature of demand
3. To study the types of goods
4. To understand the concept of elasticity of demand.

2.2 Introduction :

In our daily practice we use the word demand oftenly but in Economics this word having a particular meaning. In Economics demand is related to various factors especially with human wants. When the will to purchase commodity is supported by the money is called demand. Demand is depend upon various factors. Change in these factors affect demand, so it is necessary to find out the relationship between changes in these factors and change in demand. This relationship is called demand function. Other things being constant change in price causes the change demand is referred as law of demand. Also proportionate change in price causes the proportionate change in demand, is called Elasticity of demand. Thus in order to study the relationship between various factors and demand is important to the students.

The meaning of the term demand is commonly taken as the desire for a thing. In economics meaning of the word demand is different from the commonly used. In economics the word demand is always backed by the enough money to purchase a thing in market. Therefore the word demand is defined as below.

According to 'Stonier and Hague', "Demand in economics means to pay for the goods demanded". It means a consumer is willing to purchase a commodity and who is having sufficient money, thus the will to purchase a commodity is transformed into demand. Purchasing power therefore plays an important part in creation of demand.

'Benham' has defined it as "the demand for anything at a given price is the amount of it which will be bought per unit of time at the price."

This definition stresses on three aspects of demand viz. price, quantity demanded and time. Thus demand comprises the elements as purchasing power, price. quantity and time.

2.3 Demand - Function :

Demand Function shows the relationship between demand for a commodity and factors affecting it. It states the functional relationship between the demand for a commodity and it's

determining factors. These factors are as follows price of a commodity income, prices of substitutes and complementary goods, tastes and preferences of people, fashions, population etc. Therefore the functional relationship between these determinant factors and demand for a commodity is called as demand function. It is mathematically shown as follow.

$$D = F (a, b, c, d, e, \dots, n)$$

where,

- D = Demand for commodity
- F = Function
- a = price of commodity
- b = Income of people
- c = price of substitutes and complementaries
- d = population
- e = Tastes and preferences of people
- n = nth or last factor affecting the demand.

2.4 Law of Demand :

'Alfred marshall' stated the law of demand as "other things being constant, if price of a commodity increases it's demand decreases and if price decreases it's demand increases."

This law shows the inverse relationship between the two variables demand and price of a commodity. Other things means the income, prices of substitutes and complementaries, tastes and preferences of people, population etc. When all of these other factors remain constant, the Law of demand founds to be true.

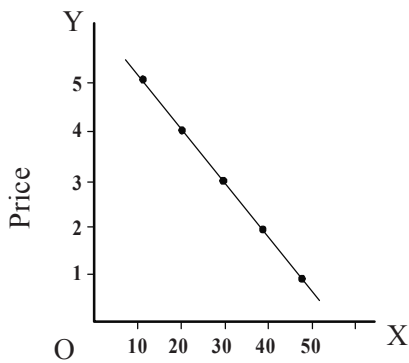
2.4.1 Demand Schedule :

Demand Schedule of a individual consumer reveals that when price falls as Rs. 5 to 4, 3, 2, 1 the quantity demanded will increase as 10, 20, 30, 40 to 50 units respectively. It shows the inverse relationship between price and demand of a commodity.

With the help of demand schedule, we can draw the demand curve as follows.

Demand Schedule 2.1

Price (Rs.)	Demand (units)
5	10
4	20
3	30
2	40
1	50



Demand Fig. 2.1

By taking the quantity demanded on x-axis and price on Y-axis. DD demand curve is drawn. It falls from left to right and shows the inverse relationship between price and demand of a commodity. Thus demand curve is downward sloping curve. Or falls from left to right downwards.

2.4.2 Market Demand Curve :

Market demand is a sum of the individual demand for a commodity in market. Different consumers purchase different quantity at various prices. So all the consumers demand for a particular price is to be summed up and market demand is computed at different prices. It provides that total market demand schedule.

T. 22

Price (Rs.)	'A's Demand	'B's Demand	Market Demand
5	20	10	30
4	25	15	40
3	10	20	50

This table 2.2 shows that there are two consumers A and B in market.

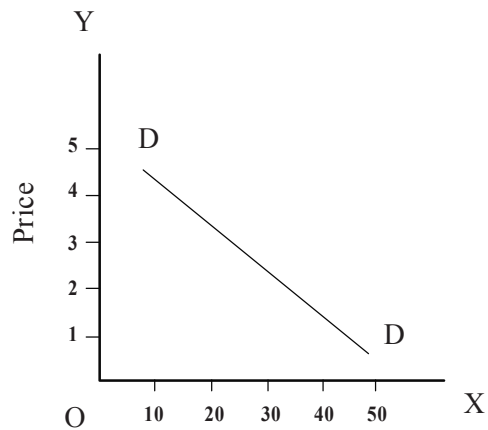
Quantities demanded by A and B consumers are as 20 + 10, 25 + 15 and 30 + 20 at the prices 5, 4 and 3 Rs. respectively. It shows the total market demand as 30, 40 and 50 units respectively at the above prices.

If this price-quantity demand relationship is plotted on a graph. We get the downward sloping demand curve. Which shows the inverse relationship between the price and quantity demanded of a commodity. As shown in following fig. 2.2.

Assumptions :

The Law of demand is based on following assumptions.

1. Consumer's tastes and preferences remain constant. i. e. There is no change in it.
2. Income remains constant.



Demand Fig. 2.2

3. Prices of substitutes and complementaries remain constant.
4. No substitute is available to the commodity.
5. Population remains constant.

Limitations :

All above assumptions are the limitations to the Law of demand. They are as follow.

1. Change in Income : If there is change in consumer's income. Law of demand doesn't operate.

2. Change in Tastes and Preferences : If the tastes and preferences of people may go on change, the law of demand could not be found true.

3. Change in prices of other goods : If prices of other goods i. e. substitutes and complementaries are changed, the law of demand doesn't show the inverse relationship between price and demand for a commodity.

4. Population change : If Population changes the law of demand does not found true.

5. Availability of close substitutes : If there is existence of close substitutes to consumer's goods, the law of demand doesn't fulfil the inverse relationship between price and demand.

2.5 Exceptions :

There are few exceptions to the law of demand. In some particular situations it will not be existed. Hence these situations are called exceptions, they are as below-

1. War : War period is exception to the law of demand. In this period scarcity of various goods is prevailing in the country. So people are purchasing goods more at higher prices also. It means that during the war period even though commodity prices remain high, people can demand more and more goods.

2. Economic Depression : The period of economic depression is also another exception to the law of demand. During this period commodity prices are existing at it's lowest level, till people do not demanding it in a large quantity. It means that during the period of economic depression price and demand both are remaining lower. Hence law of demand doesn't be operated.

3. Status symbol commodities : Precious commodities like diamonds, precious stones, old and scare pictures, idols etc. are the status symbols and it is always purchased by the rich people to confer social distinction. These commodities are not purchased for their intrinsic value but for the prestige they confer upon the possessor. Therefore as the price of these goods falls, demand also falls and vice versa.

4. Giffen goods : Giffen goods are the low priced or inferior goods. They are exception to the law of demand. A fall in its price tends to reduce it's demand and rise in price causes to increase the demand. This relationship was searched by Sir Robert Giffen. Hence, it is named as Giffen goods.

5. Essential goods : The goods which are necessary to life of human beings. A consumer doesn't reduce it's daily consumption as it's price rises or doesn't increase or price falls.

e. g. A family required 10 kg of rice per month, as price of rice rises family chief doesn't reduce it's consumption below 10 kg. If he does so, starvation would occur in his family. On the other hand price of rice falls, he can't consume 50 kg. of rice per month instead of 10 kg. Thus, the nature of life necessary goods is such that it's consumption can not be changed as price changes.

2.6 Types of Goods :

There are various types of goods as follows :

1. Consumer's Goods and Producer's Goods : The goods used in final consumption by the consumers is called consumer's goods. Human wants are fulfilled by these goods. Every person consumes these goods to remain efficient. So every person is consuming these goods. e. g. food, milk, coffee, fruits, TV, refrigerator etc.

The goods used by the Producer to produce the consumers goods i. e. Inputs are called producer's goods, e. g. Machinery, Raw material, Building, Vehicles etc.

The relationship between consumers goods and producers goods is directly proportional. As the demand for consumer's goods increases the demand for producer's goods also increases.

2. Perishable and Non Perishable Goods : The goods which are exhausted after consumption are called perishable goods. e. g. Food, Tea, Coffee, Fruits, Milk, Vegetables etc. All of these goods may go on exhaust after consumption. So they are called perishable goods.

The Goods which are used repeatedly in consumption is called nonperishable goods. e.g. vehicles, Motors, Bicycles, TV, Freeze, Mobile, Washing Machine, Cloths etc.

3. Autonomous Goods : The goods which are prime in consumption and they have independent demand they are called as Autonomous goods. e. g. House is prime good and Steel, Cement are secondary goods. Similarly Motor car and petrol etc.

4. Derived goods : The goods whose demand depends upon the demand for other goods are called derived goods. e. g. House, Sand, Cement and Steel. The demand for steel, Cement and sand depends upon the demand of house so, demand for sand, cement, steel is called derived demand and these goods are called Derived goods.

2.7 Elasticity of Demand :

Elasticity of demand refers to the rate of change of demand to the rate of change in price. Law of demand only expresses the inverse relationship between price and demand of a commodity. But it doesn't say about the proportionate change in demand to the proportionate change in price. Therefore the concept of elasticity of demand is developed, by 'Alfred Marshall'. Elasticity of demand is defined as "It is ratio of proportionate change in quantity demanded to the proportionate change in price of a commodity." It means that elasticity of demand shows the ratio of percentage change in demand to the percentage change in price. Thus, the elasticity of demand expresses the degree of correlation between demand and price. It is the rate at which quantity demanded varies with a change in price.

With the help of this definition elasticity of demand is expressed in mathematical term as :

$$e = \frac{\Delta q}{q} \div \frac{\Delta p}{p}$$

Where,

e = Elasticity of demand

q = Initial demand

Δq = Change in demand

p = Initial price

Δp = Change in price

e. g. Let us assume that price of a commodity is decreased, from Rs. 10 to Rs. 5 so that demand increased from 10 to 20 units. Therefore elasticity of demand is calculated as :

$$\begin{aligned} e &= \frac{\Delta q}{q} \div \frac{\Delta p}{p} = \frac{10}{10} \div \frac{5}{10} \\ &= \frac{10}{10} \times \frac{10}{5} \\ &= \frac{10}{5} \end{aligned}$$

= 2 Therefore elasticity of demand is equal to 2.

Elastic and inelastic Demand :

When the small change in price causes large change in demand, it is called as elastic demand e. g. Suppose rise in price by 2%, causes fall in demand by 10% it result into elastic demand. In regards to this elasticity of demand is calculated as $e = \Delta q / \Delta p = 10/2 = 5$. When the elasticity of demand is greater than, 1, ($e > 1$).

This type of change in demand is called elastic demand.

Inelastic demand : When a big change in price causes a small change in demand, it is referred as inelastic demand. e. g. If price falls by 5% and demand rises by 4%. It results into inelastic demand. $e = \Delta q / \Delta p = 4/5 = 0.80\%$. The elasticity of demand is less than 1. ($e < 1$).

Types of Elasticity of Demand :

There are three types of elasticity of demand.

- 1) Price elasticity of demand
- 2) Income elasticity of demand

3) Cross elasticity of demand

1) Price elasticity of demand : The concept of price elasticity of demand is concerned with the change in price to the change in demand. It shows the effect of change in price to the change in demand. "Marshall" was the first economist, who defined the price elasticity of demand as the ratio of percentage change in quantity demanded in response to a percentage change in price. Mathematically it is shown as :

demand increased from 10 to 20 units. Therefore elasticity of demand is calculated as :

$$\text{Price elasticity of demand} = \frac{\text{proportionate change in quantity demanded}}{\text{Proportionate change in price}}$$

$$e = \frac{\Delta q}{q} \div \frac{\Delta p}{p} \quad \therefore e = \frac{\Delta q}{\Delta p} \times \frac{p}{q}$$

Where,

e = Price elasticity of demand

Δq = Change in quantity demanded

q = Original quantity demanded

Δp = Change in price

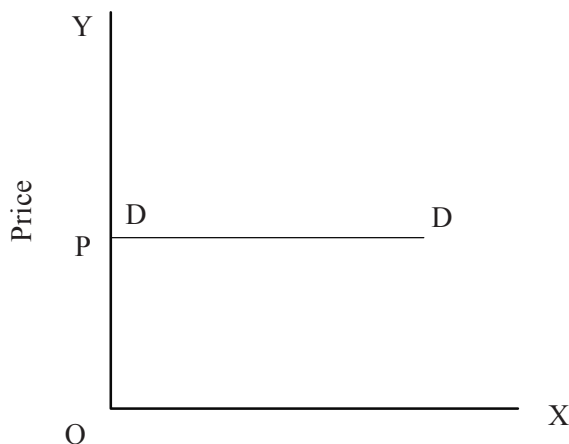
p = Original price

There are five cases of elasticity of demand.

- 1) Perfectly elastic or infinite elasticity demand
- 2) Perfectly Elastic demand
- 3) Relatively Elastic demand
- 4) Relatively Inelastic demand
- 5) Unit Elastic demand.

1) Perfectly Elastic or Infinite elastic demand :

When a small change in price leads to very large amount of change in demand, it is called as perfectly or infinitely elastic demand. It is diagrammatically represented as follows.



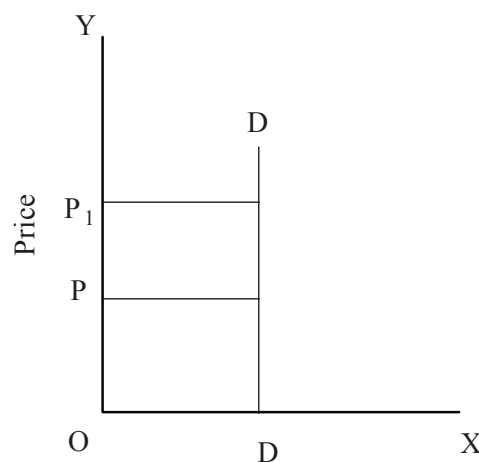
Demand Fig. 2.3

DD is horizontal straight line demand curve. It shows that small fall in price leads to an unlimited increase in demand. It is hyper sensitive demands and elasticity of demand is infinite.

2) Perfectly Inelastic demand :

When any change in price doesn't cause any change in price, it may be large or small doesn't cause any amount of change in demand. In this case demand remains constant to change in price. So it is called perfectly inelastic demand. It is diagrammatically shown as below.

DD is demand curve. It is vertical straight line curve parallel to Y axis. It shows there is no change in quantity demanded as price changes. Price changes from OP to OP₁, but demand remains OD i. e. same.

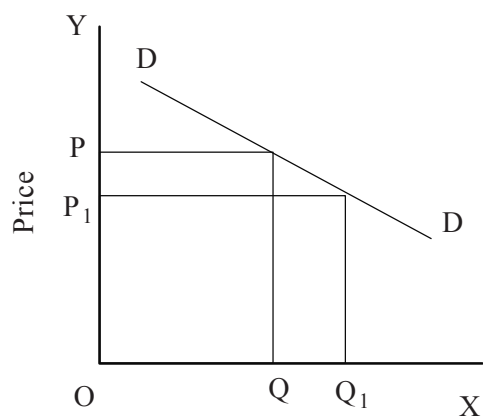


Demand Fig. 2.4

3) Relatively Elastic Demand ($e > 1$) :

When change in price is followed by big change in demand, it is called elastic demand. In other words, when the change in quantity demanded is greater than change in price is called relatively elastic demand. In this case elasticity of demand is greater, than 1. ($e > 1$). It is diagrammatically shown as follow -

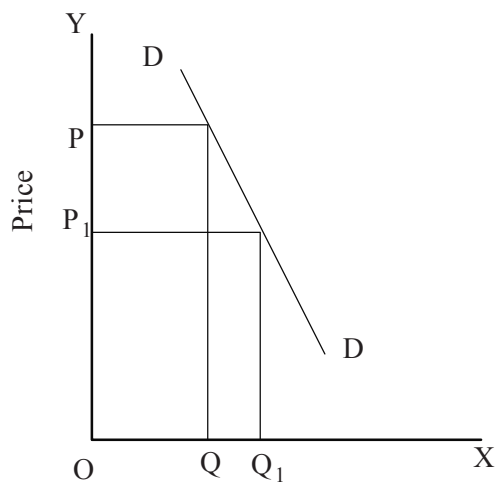
In the figure, change in price PP₁ is smaller than the change in demand QQ₁. Therefore, DD demand curve is flatter.



Demand Fig. 2.5

4) Relatively Inelastic demand ($e < 1$) :

When change in demand is smaller than change in price, it is referred as relatively inelastic demand i. e. Large change in price leads to smaller change in quantity demanded. Diagrammatically it is shown as follow.

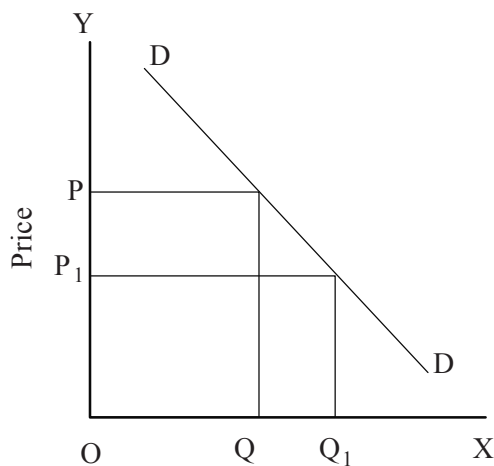


Demand Fig. 2.6

DD is downward sloping demand curve. It shows that change in price PP_1 is greater than change in quantity demanded QQ_1 . Hence, the demand is inelastic.

5) Unit Elasticity of demand ($e = 1$) :

When the change in price is exactly equal to the change in demand, it is referred as unitary elastic demand. Here, demand changes in equal proportion of change in price. Therefore elasticity of demand is equal to 1. It is diagrammatically shown as below.



Demand Fig. 2.7

DD is downward sloping demand curve. It shows that change in price PP_1 is greater equal to the change in quantity demanded QQ_1 .

Therefore price elasticity of demand is equal to 1, or it is called the unitary elastic demand.

2.8 Measurement of Elasticity of Demand :

There are three methods of measurement of elasticity of demand, viz,

- 1) Total Outlay Method
- 2) Proportional Method
- 3) Geometrical Method

1) Total Outlay Method or Total Expenditure Method :

In this method change in total expenditure on a commodity resulted due to the price change is compared and elasticity is measured. These changes are compared in three ways as below.

1. When change in price (rise or fall). doesn't lead to change in the total outlay on a commodity, it means that if price changes but total outlay on a commodity doesn't change or remains the same. It is referred as unitary elastic demand. or $e = 1$.

2. In this case, price rise is followed by decrease in total outlay or fall in price is resulted into rise in total outlay on a commodity. It is called as elastic demand In this case elasticity of demand is greater than 1. ($e > 1$).

3. If price rises, total outlay also rises or price falls, total outlay also falls. This type of elasticity is called as inelastic demand. Also it is referred as price elasticity of demand is less than one ($e < 1$).

This method is explained with the help of following table 2.3

T - 2.3

Price (Rs.)	Demand (unit)	Total Outlay (Rs.)	Elasticity of Demand
10	5	50	e = 1
5	10	50	
10	5	50	e > 1
5	20	100	
10	5	50	e < 1
5	7	35	

2) Proportional Method :

In this method the percentage change in price is compared with the percentage change in demand. The elasticity of demand is calculated with the help of formula as given below.

$$\text{Price Elasticity} = \frac{\text{Proportionate change in demand}}{\text{Proportionate change in price}}$$

$$\text{e.g. } e = \frac{\Delta q}{q} \div \frac{\Delta p}{p} \quad \text{i.g. } \frac{\Delta q}{\Delta p} \times \frac{p}{q}$$

1. Suppose, price of a commodity is decreased by 10% and it caused to rise in demand by 20%. The elasticity of demand is equal to $e = \Delta q / \Delta p = 20/10 = 2$. Therefore elasticity of demand is greater than 1 i. e. $2 > 1$, hence demand is elastic.

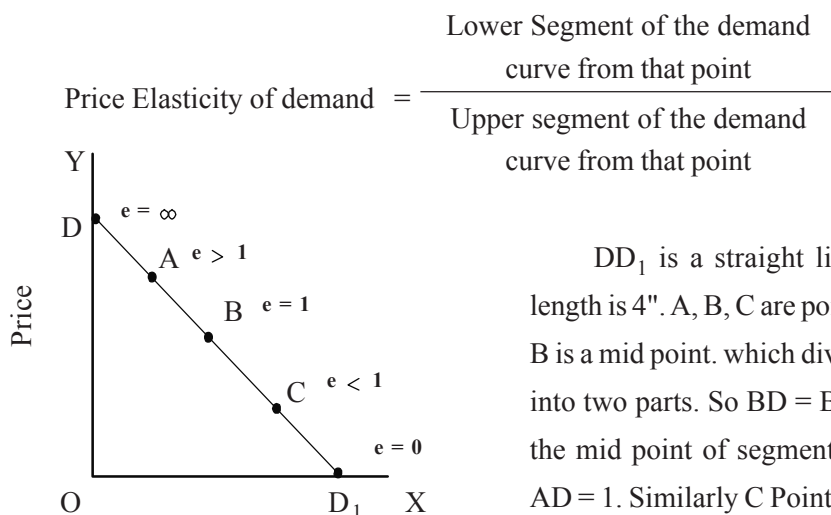
2. If price is decreased by 10% and demand is increased by 5%. In this case the elasticity of demand is $e = \Delta q / \Delta p = 5/10 = 1/2$ i. e. 0.5. The elasticity of demand is less than 1. Hence demand is inelastic.

3. When price falls by 10% and demand increases by 10%. Here the elasticity of demand is $e = \Delta q / \Delta p = 10/10 = 1$. The elasticity of demand is equal to 1, i.e. $1=1$. Hence the demand is unitary elastic.

3) Geometrical Method (Point Elasticity) :

In this method the elasticity of demand is measured at any point on demand curve. When the demand curve is a straight line demand curve. In order to measure elasticity of demand at any point on a demand curve, the formula used is as below.

Elasticity of demand at any point on demand curve is the ratio of lower part of the demand curve to the upper part of the demand curve, from that point, where elasticity of demand is to be measured.



Demand Fig. 2.8

DD_1 is a straight line demand curve. It's length is 4". A, B, C are points lying on that curve. B is a mid point. which divides DD_1 curve equally into two parts. So $BD = BD_1 = 2$. A point lies at the mid point of segment BD . Therefore $BA = AD = 1$. Similarly C Point lies at the mid point of segment BD . so $BC = CD_1 = 1$.

Elastic.....

$$\text{demand at point A} = \frac{AD_1}{AD} = \frac{3}{1} = 3$$

Hence elasticity of demand at point A is greater than 1.

$$\text{Elasticity of demand of point B} = \frac{BD_1}{BD} = \frac{2}{2} = 1$$

Therefore elasticity of demand at point B is equal to 1.

$$\text{Elasticity of demand of point C} = \frac{CD_1}{CD} = \frac{1}{3} = 0.999$$

The elasticity of demand at point C is less than 1.

$$\text{The elasticity of demand at point D : } D_1 = \frac{D_1}{DD_1} = \frac{0}{4} = 0. \text{ So the elasticity}$$

$$\text{The elasticity of demand at point D : } D = \frac{DD_1}{D} = \frac{4}{0} = \infty \text{ So the}$$

elasticity of demand at point D = ∞ .

In this way the elasticity of demand at the point curve is measured.

2.9 Income Elasticity of demand :

When person's income affects the demand for a commodity it results in to income elasticity of demand. As income changes, demand also changes. "The Ratio of change in income to the change in demand is referred as the income elasticity of demand." It measures the responsiveness of demand to changes, in income. Therefore it is defined as "Income elasticity of demand is to ratio of the percentage change in the quantity demanded to the percentage change in income."

Mathematically, it is put up as :

$$\text{Income elasticity of demand} = \frac{\text{Proportionate change in demand}}{\text{Proportionate change in income}}$$

$$E_y = \frac{\Delta q}{q} \div \frac{\Delta y}{y} = \frac{\Delta q}{\Delta y} \times \frac{y}{q}$$

Where, E_y = Income elasticity of demand

Δq = Change in quantity demanded

q = Original demand

ΔY = Change in income

y = Original income.

Income elasticity of demand could be zero, -ve, or +ve. If it is positive, it can be shown as $E_y = 1$, $E_y > 1$, or $E_y < 1$. When it is 1, Income elasticity is unitary, If it is greater than 1, demand is income elastic and when it is less than 1, demand is income inelastic.

2.10 Cross - Elasticity of Demand :

There are many substitutes or complementary goods available to any commodity in market. Therefore, if there is change in the price of substitutes, it affects the demand for a particular commodity. Therefore the concept of elasticity of demand is applied to the two commodities related to each other. The relationship between the two commodities can be either substitutive or complementary. In the context of these relationship, the term cross elasticity of demand is used.

Cross elasticity of demand is defined as "The ratio of proportionate change in quantity demanded of commodity A to a given proportionate change in the price of related commodity B."

In order to calculate the cross elasticity of demand following formula is used.

$$\text{Cross elasticity of demand} = \frac{\text{Percentage change in the quantity demanded of A}}{\text{Percentage change in the price of B.}}$$

Suppose, that A and B are two commodities substitutes to each other. If the price of B rises and the price of A remains constant, it causes to rise in the quantity demanded of commodity A. Because the consumers will substitute A for B. On the contrary if price of A rises and B's price remains constant. It leads to rise in demand of a commodity B. Because now consumers are preferring B for A.

The cross elasticity of demand may be infinity or zero. Also it may be positive, or negative. When goods are perfect substitutes to each other cross elasticity may be infinity. Where two goods are not substitutes to each other cross elasticity of demand will be zero. It means that change in price of one commodity doesn't affect the demand for another commodity. The cross elasticity varies between two extremes infinity and zero. It depends upon the degree of substitutability.

When the two goods are substitutes to each other, then the cross elasticity of demand is positive (+ve). When the two goods are complementary to each other, the cross elasticity is negative (-ve).

2.11 Glossary :

1. Consumer's goods - goods which used for final consumption.
2. Perishable goods - destroyable goods within short period.
3. Derived goods - goods whose demand depends upon another goods.
4. Elasticity of demand - % change in demand to % change in price.

2.12 Questions for Self Study :

State following statements true or false.

1. There is relation between demand and price.
2. Consumer's goods are used for consumption.
3. Milk and vegetables are perishable goods.
4. Steel and cement are derived goods.
5. Giffen goods are not exceptions for law of demand.

Answers : 1) true 2) true 3) true 4) true 5) false

2.13 Questions for practice :

(A) Answer the following questions.

1. What is demand function?
2. State concept of price elasticity demand.
3. Explain different types of goods.

(B) Write short notes.

1. Income elasticity
2. Cross elasticity
3. Perishable and non perishable goods
4. Producer's and consumer's goods.
5. Autonomous and Derived goods.

2.14 Books for Reading :

1. M. L. Ahuja - "Modern Economic Theory"
2. M. L. Seth - "Principles of Economics"
3. K. K. Dewtt - "Modern Economic Theory"
4. Dr. R. R. Doshi - "Business Economics"
5. Dr. M. N. Shinde - "Managerial Economics"



Unit-3
DEMAND FORECASTING

- 3.1 Objectives**
- 3.2 Introduction**
- 3.3 Meaning and Definitions**
- 3.4 Kinds of Demand forecasting**
- 3.5 Features of Scientific demand forecasts**
- 3.6 Methods of Demand Forecasting**
- 3.7 Importance of demand forecasting**
- 3.8 Glossary**
- 3.9 Questions for Self Study**
- 3.10 Questions for practice**
- 2.11 Books for Reading**

3.1 Objectives

1. To understand the concept of demand forecasting.
2. To study the various scientific methods of demand forecasting.
3. To study the various types of demand forecasting.
4. To understand the importance of demand forecasting.

3.2 Introduction :

Demand forecasting is an important concept in business Economics. Producer always makes various plans for production. In regards to expand his business he needs to take review of market. Some economical techniques are used by businessmen, one of them is demand forecasting. With the help of demand forecasting producer can design some plans for resource allocations, capital allocation, raw materials, arrangements of machinery and change in business administration etc. With the help of demand forecasting producer takes decisions regarding changes in production for that purpose he uses statistical data and tools. Demand forecasting can built-up a good platform to producer to judge changes and increase in future demand and production in the market.

3.3 Meaning and Definitions :

In Managerial economics information about the future demand, costs and capital budgetting is necessary to the business manager in decision making. They are determinant variables of decision making. A rough estimate of future demand helps to business firm in solving the problems of forecasting the demand for their products.

Demand forecasting means an estimate of future demand for the product of a business firm. Demand forecasting is defined by various economists as follow :

According to 'D. Gopal Krishna', "Forecasting means to know the trend or behaviour after a period of time."

Another definition states that "demand forecasting refers to an estimate of future demand for the product", or "It is an objective assessment of the future course of demand."

These definitions means that demand forecasting is an estimate of future demand in order to find out the future trend of demand for product. With the help of these estimates firms can determine the volume of it's future production, cost of production as well as capital budgetting decisions. Thus, demand forecasting is useful to business manager in decision making.

3.4 Kinds of Demand forecasting :

There are two main kinds of demand forecasting. It is classified on the basis of time period and planning requirements of firms. They are classified as :

- 1) Short term demand forecasting
- 2) Long term demand forecasting.

1) Short term demand forecasting :

This type of demand forecasting is a short period forecasting of demand, for the product of a business firm. They are generally made for the period of one year. It is related with sales, inputs, price and finances of the business firm. Short term forecasting are essential for the formulation of suitable price policy, cost policy, sales policy and financial policy of a business firm. If business manager expects a rise in input prices, he could buy it as early as possible. Also he can adopt a policy, which reduces the cost of production and helps to increase the sale of his product. Such policy also provides prior information about production and sales, which is necessary to raise the future capital. Thus, short term demand forecasting means the short period estimates of demand for a product of business firm.

2) Long - term Demand forecasting :

Every manager of business firm is interested in long term business forecasts of demand. These forecasts are made for the period of 5 years, 10 years, 20 years or more than that period. These forecasts are necessary for the expansion of the firm. Total demand for product of business firm can be estimated with the help of long term demand forecasts. Planning for a new plant and expansion of an existing plant depends upon long-term forecasting.

Long term demand forecasts are difficult to predict the demand, costs, sales, prices and competition. Because of very long time period. Various changes take place in economic variables. So, the forecasts made in one time can't be proved true in another time in long run.

3.5 Features of Scientific demand forecasts :

Following things are essential to predict more scientific, ideal and more correct demand forecasts.

1) The object of demand forecasts should be clearly stated. It would clearly mention the purpose of demand forecasting.

2) In order to make correct demand forecasts, there should be suitable method's for demand forecasting. Appropriate methods are to be applied for the demand forecasting.

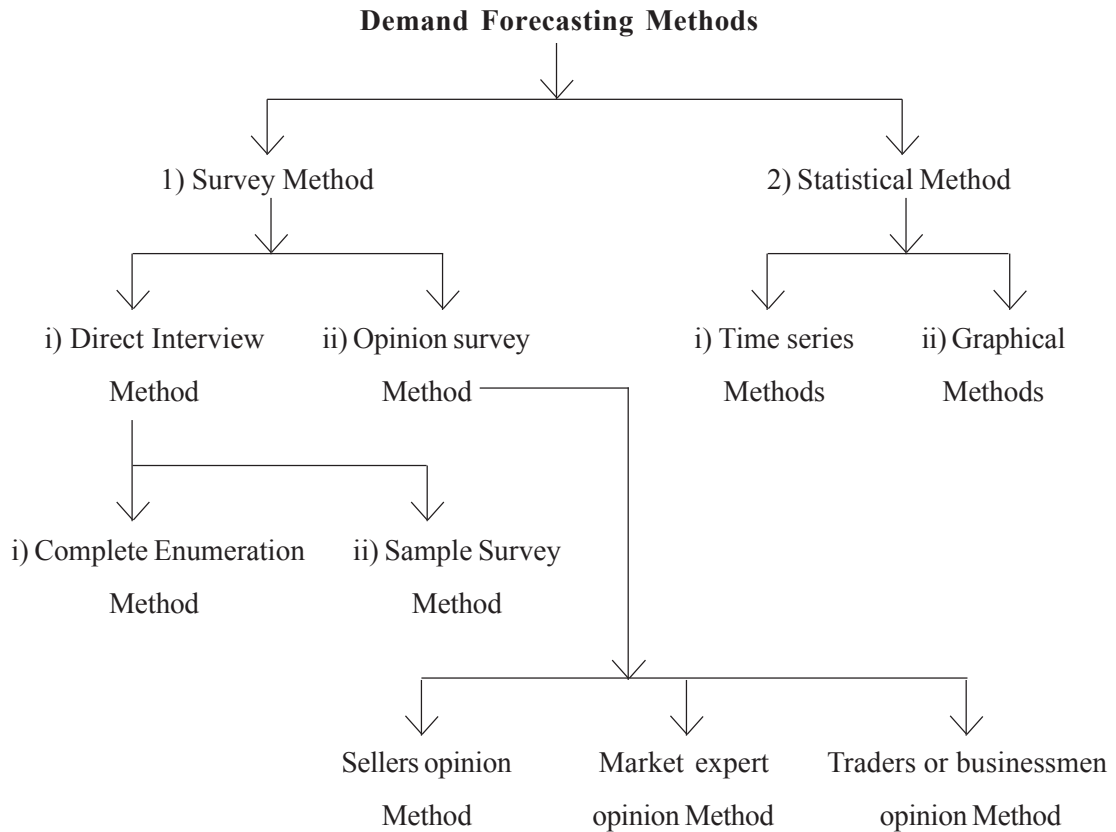
3) Information (Data) in respect of determinants of market demand is to be collected.

4) Collected data should be analysed with the help of various statistical methods to determine the interrelationship between various factors, affecting the market demand.

5) By analysis of the data, the inferences are drawn and demand forecasts are to be made.

3.6 Methods of Demand Forecasting :

There are two main methods of demand forecasting. They constitute various submethods as shown in following Chart.



1) Survey Method :

This method is used for the short term demand forecasting. In this method the desires and opinions of the consumers, market experts, sellers, businessmen etc. are collected. It is divided into three parts as i) Consumer's interview method ii) Market experts, traders, businessmen opinion survey method and iii) Sellers survey method.

i) Consumer's interview method : This method emphasizes on consumers interview. Contact with consumers are made, questionnaire is provided and interviewed personally. Enumerator provides questionnaire or asks oral questions to the consumers in respect of his product. He asks about their preferences, purchases, quality and future demand for product. Also consumers are to be asked about the proportion in which they may intend to buy. With the

help of information collected from the consumer's interview, Enumerator can forecast the demand. This method is most ideal method of demand forecasting. It gives first hand information about the demand for product.

This method has some limitations. They are as follows. This is very costly and difficult method. Because of the consumer's are numerous and scattered in all over the economy. So this method is expensive and not useful in practice. All consumers are interviewed, in this method so it is known as "complete enumeration method." Also it is known as comprehensive interview method. On the contrary when only few selected consumer's or representative are interviewed by this method it is known as "sample survey method." Sample survey is of two types, i) Random sampling ii) Stratified sampling. Sampling method is easy, less costly and very useful. On the otherhand complete enumeration method is not very useful in practice, because of the consumers plenty and scatteredness.

ii) Opinion survey method : It is another method, of assessment of the short term demand for a product. Under this method the opinions of the sales representatives, professional experts, market experts and consultants etc. are collected. These are the persons who have the market knowledge, from which information is collected firm asks it's sales representatives to assess the demand for the product in various areas, regions and cities. Sales representatives to assess the demand for the product in various areas, regions and cities. Sales representatives meet to these persons, they are close to the customers so, they provide the approximate information in respect of future demand for the product. The estimates of demand provided by the salesman from the different regions, areas and cities are added together, the probable demand for a product is computed.

Sometimes, firm can gather information from the professional market consultants and experts. These persons are experienced and experts in respect of market conditions. Through their experience and knowledge they can predict the future demand for a product of a firm. By using this method firm gathers the information in regards to its product and makes future estimate of the product demand. This method is also known as opinion poll method.

This method is easy and simple to collect the information about the demand for firm's product. But it has some limitations, as firstly, information provided by salesmen and market experts is not fully reliable. It is reliable to that extent of their skill. Secondly, the opinions are subjective and biased, so they are not satisfactory and reliable. Thirdly, these estimates having equal weightage to good and bad estimates over estimation and under estimation both opinions are equally treated.

2) Statistical Method :

In order to predict the long term demand forecasts the statistical methods are used. In this method statistical and mathematical techniques are used for the long term estimation of demand. These methods are relied on past data and future trends are traced out. Statistical methods are often used for making demand projections. They are : i) Trend projection method and ii) Regression method. Again two methods are used to project the trends as follows.

A) Graphical Method

B) Time series method or Trend Projection Method

A) Graphical Methods :

Under the Graphical method, annual data on sales of a product is collected. This data is plotted on graph. The predication about the demand forecasts are made, with the help of trends in graph. Following example explains the graphical method for demand forecasts. e.g.

Years	:	1990	1991	1992	1993	1994	1995	1996
Demand	:	1000	1500	2000	2500	3000	3500	4000

What will be the volume of demand in the year 1997?

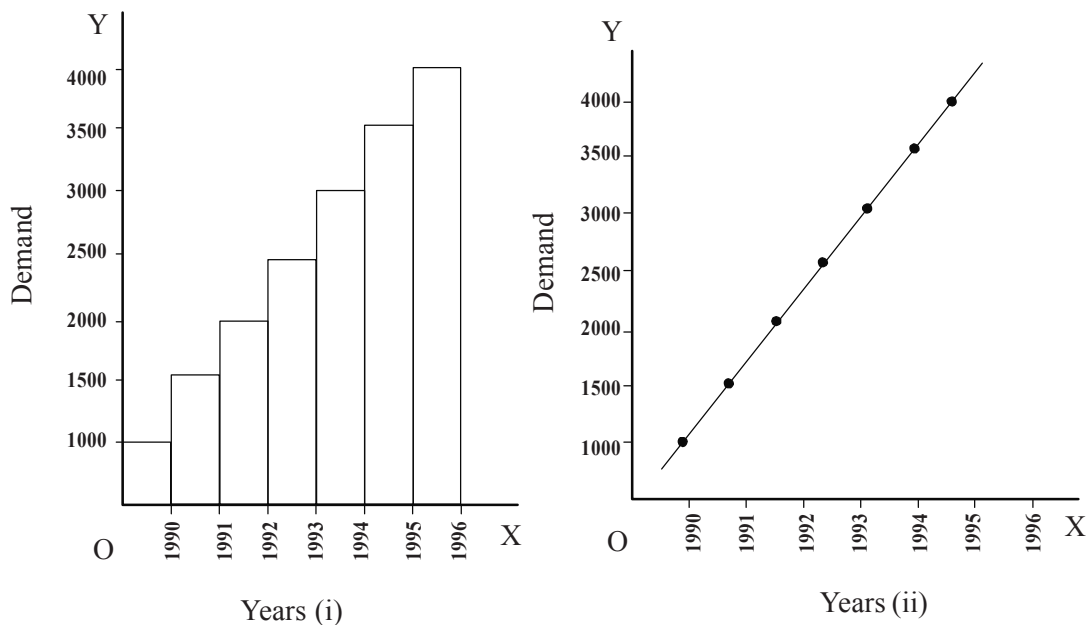


Fig. 3.21

Fig. (i) shows bar diagrams. When this method of bar diagrams is used in graphs the heights of each bar reveals the trend of future demand. In the figure (i) height of each bar looks increasing successively. Hence the demand for a product shows rising trend in study period, since 1990 to 1996. So it is judged as the demand will be rising during the future years also. These inferences are drawn with the help of figure (i).

The statistics of demand during the years 1990 to 1996 is plotted on a graph in figure (ii). Various points are drawn by plotting the demand to it's respective yerars. When we join these points, we will get a curve, which slopes upward from left to right. It shows the rising trend of demand during the years 1990 to 1996. Hence the inferences are made as the demand for firm's product will rise in future years. Such projection is made with the help of graphical method.

B) Time series Method :

In order to predict the trend of future demand time series analysis is used, in statistics. In this method past data is used to forecast the future demand. This method assumes that past data is useful to predict the future demand. Those factors determine the past trend of demand can determine the future trend in demand. Therefore, study of past data is useful in demand forecasting. Time series analysis comprises the four determinant factors, which are responsible for the changes in demand for a product these factors are as follows.

- 1) Secular trends
- 2) Seasonal components
- 3) Cyclical changes
- 4) Irregular changes.

First, kind of changes i. e. Secular trends are the regular changes in demand. They are regular rise or fall in demand for the product. This is general tendency to change. These changes are caused due to weather conditons like rain, winter and summer. These are the seasonal components affecting the demand for a product. Third type of changes are related with the cyclical components like economic prosperity and economic depression. When the changes in demand are associated with natural calamities like floods, famine, earth quakes etc. Which are unexpected calamities. Therefore, they are called upredictable or irregular components. According to the time series analysis, above four types of changes are responsible for the changes in demand. Time series analysis states that changes in demand are caused due to the multiplication or addition of these four variables. So this analysis has developed the multiplication model as well as summation model in respect of these variables.

Multiplication model is stated as.

$$Y = T \times S \times C \times I$$

Summation model is states as

$$Y = T + S + C + I$$

Where,

Y = Time series

T = Secular changes

S = Seasonal changes

C = Cyclical changes

I = Irregular changes

In time series analysis there is no any good method to calculate the seasonal, cyclical and irregular changes. Only secular changes are measured with the help of statistical methods. These methods are as follows.

- 1) Method of Freehand curve.
- 2) Method of Moving averages.
- 3) Method of Semi averages.
- 4) Least square Method.

1) Method of Freehand curve :

Under this method, annual data on sales are collected and analysed to determine the nature of existing trend. Then this data is protected to show the future trend, results are drawn and forecasts are made. The data is presented in tabular form.

The tabular data is used to plot a graph. The data related to a period of time, fluctuations may occur as a general tendency.

In this method past data of different years is used for drawing a graph. The points are connected and time series curve is drawn. Then a free hand line is so drawn as the total distance between the freehand line and the time series curve remain minimum. This is illustrated with the help of table below.

T. 3.4

Demand for Wheat

Years	Demand (Lacks Tonnes)
1971	50
1972	60
1973	55
1974	70
1975	65

The tabular data is plotted on graph by taking years on X-axis and demand for wheat on Y, axis, A free hand curve is drawn. AB time series curve is drawn to show the demand for wheat during the years 1971 to 1975.

Through these various scattered points a trend line AC is drawn so that it keeps the total distance between the freehand line AC and the various points on AB curve minimum. The trend line AC shows the upward trend, so freehand that past trend of demand for wheat is increasing. Hence the future trend of demand for wheat will be rising. In this way the time series analysis forecasts the future demand for firm's product.

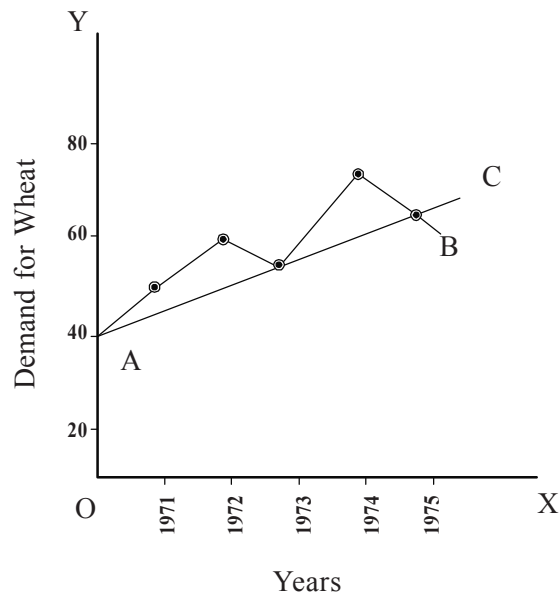


Fig. 3.22

2) Method of Moving Averages :

In this method Averages of 3, 5, 7, 9 etc. years are calculated and according to these averages forecasts regarding the demand is made. Suppose the trends of averages calculated is in an ascending order, demand forecasting is made as the future demand will be increasing and viceversa. The moving averages are calculated for the different years as 3, 5, 7, 9, 11, 13..... years and trends of future demand is determined. eg. g. suppose we have to calculate the 3 years moving averages following steps are taken.

1) Calculate the average of First 3 years by summing the value of first 3 years and divide it by No. of years i. e. 3. The value get is written ahead the middle one.

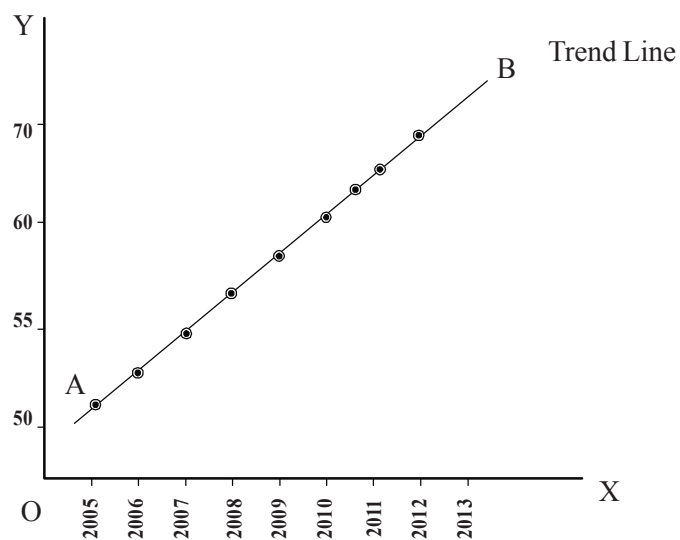
2) In such a way calculate the averages of every 3 years from the total item and represent it before the middle item.

3) See the trend of moving averages and forecasts the demand.

Following table explains this method.

Years	Demand	Sum of 3 years Demand	3 years moving Averages
2005	51	-	-
2006	53	160	53.33
2007	56	164	54.67
2008	55	169	56.33
2009	58	175	57.33
2010	62	181	60.33
2011	61	186	62.00
2012	63	188	62.66
2013	64	-	-

With the help of this table draw a trend line (graph). This Trendline AB shows increasing trend hence future demand will be increasing.



3.7 Importance of demand forecasting :

Forecasting of demand is very necessary process in managerial decision making. These forecasts are important to the entrepreneurs, producers, firms and industries. It is important in regards to the following points.

1) To under stand future quantitative demand : By analysing the past data we can find out the future demand in quantity. So it is essential for future planning to the firm and industries.

2) To predict supply of commodities : Demand forecasting shows the approximate future demand for a commodity in physical quantity. With the help of this future demand producer can decide future supply and production of his product.

3) To Predict the price of commodity : Demand forecasting helps to firm or producer to understand the future price of his product. With the rise and fall in future demand, he can forecast in respect of future price.

4) Useful for capital budgetting : Demand forecasting is also useful in capital budgetting. With the help of demand forecasts, producer gets the idea in respect of future demand for his product. If future demand remains high he forecasts that more capital is required to fulfill it. So he tries to search the different sources of capital accumulation.

5) Useful in resource Planning : Demand forecasting is useful to producer or firm in resource planning, i. e. in capital budgetting as well as in personal planning.

6) Firm can determine the sales targets : Demand forecasting also helps in determining the sales targets to the firm. Demand forecasts provides rough estimates of future demand. By using it firm can determine the target of future sales for it's product.

7) Useful in inventory management : It is useful to producer in inventory management. With the help of demand forecasts firm can decide the stock of raw material to fulfill the future demand, larger the future demand, large will be the demand for stock of raw material and vice versa.

8) Useful to industrial expansion : Demand forecasting helps to the firm and Industry to take the decision in regards to the expansion or contraction of their business. Higher future demand for firm's product leads to the expansion of it's business and vice versa.

3.8 Glossary :

1. Demand forecasting - future demand
2. Sample survey - survey of few
3. Market survey - survey of whole

3.9 Questions for Self Study :

State whether the following statements are true or false.

1. Demand forecasting is useful to consumer.
2. Demand forecasting is used in short and long run.
3. Graphical method is statistical method.
4. Moving Averages method is used for demand forecasting.

Answers : 1) false 2) true 3) true 4) true

3.10 Questions for practice :

(A) Answer the following questions.

1. What is demand forecasting? What are its types?
2. State an importance of demand forecasting.
3. Explain market survey method of demand forecasting.
4. State statistical methods of demand forecasting.

(B) Write short notes.

1. Graphical method
2. Importance of demand forecasting
3. Census method
4. Sample survey method

3.11 Books for Reading :

1. M. L. Ahuja - "Modern Economic Theory"
2. M. L. Seth - "Principles of Economics"
3. K. K. Dewtt - "Modern Economic Theory"
4. Dr. R. R. Doshi - "Business Economics"
5. Dr. M. N. Shinde - "Managerial Economics"



Unit-4

Production Function

(A) Production Function : Various Concepts

- 4.0 Objectives
- 4.1 Introduction
- 4.2 Production Function
- 4.3 Concepts
 - 4.3.1 Total Production
 - 4.3.2 Average Production
 - 4.3.3 Marginal Production
 - 4.3.4 Fixed Inputs
 - 4.3.5 Variable Inputs
 - 4.3.6 Production with one variable input
 - 4.3.7 Production with two variable inputs

(B) Production Function - Theories

- 4.0 Objectives
- 4.1 Introduction
- 4.2 Production Function

4.3 Short Run Production Function / Law of Variable Production

4.3.1 Definition

4.3.2 Assumptions

4.3.3 Explanation

1. First stage

2. Second stage

3. Third stage

4.4 Long Run Production Function / Law of Resturns scale

4.4.1 Table

4.4.2 Diagram

4.4.3 Business Decisions

4.4.4 Economies and Diseconomies of scale

(A) Internal Economies and Diseconomies

(B) External Economies and Diseconomies

4.5 Summary :

4.1 Introduction :

Production implies the conversion of inputs into goods and services. Production is the transformation of resources into commodities over a time and space. Production is the act of converting inputs into outputs. Production economies means creation of utilities and therefore it also includes the services along with the goods produced. Inshort, production means producing goods and services. In the production process, a firm combines various inputs in different quantities and proportions to produce different levels of outputs. Production is a flow concept. It is measured as rate of output per unit of time.

4.2 Production Function :

Production function is an engineering concept. But it is widely used in Business Economics for studying production behaviour. According to Stigler, "The production function is referred to as the relationship between a rate of inputs of productive services and the rate of output of product. It is the economist's summary of technical knowledge."

The factors of production such as land, labour, capital and entrepreneur are the traditional factors, while the factors like technology and knowledge have also been regarded as the important factors of production. "The technical relationship between the units of factors of production and the unit of production of commodity (services) is called as 'production function.' In short the functional relationship between the factors of production used (inputs) and the production (output) with reference to a unit of time. Thus, production function shows the functional relationship between physical inputs and physical output.

In mathematical terms the production function is stated as,

$$P = f(a, b, c, d \dots n)$$

where,

P = Output of goods produced per unit of time.

a, b, c, d n are the various factors of production used to produce output.

It shows the technical relationship between the given quantities of inputs combined together resulting in a certain quantity of output per unit of time.

Thus production function means a given technique of production output that can be obtained from various levels of factor inputs.

4.3 Concepts :

4.3.1 Total Production (TP) :

Total production means the total number of units of output produced per unit of time by all factor inputs. In the short run the total output obviously increases due to the change in variable factor inputs mathematically, it is shown as.

$$TP = f(QVF)$$

TP = Total Product

f = Functional Relationship

QVF = The Quantity of variable factor.

4.3.2 Average Production (AP) :

The average production means total production per unit of given variable factor. In short, by dividing the total product by the quantity of variable factors, we get average product, mathematically,

$$AP = \frac{TP}{QVF}$$

TP = Total Product

QVF = The quantity of variable factors

Suppose the total product of commodity is 500 units per day with 25 workers employed, then

$$AP = \frac{500}{25} = 20 \text{ units per workers}$$

This is called as average Production (AP).

4.3.3 Marginal Production (MP) :

The additional unit produced by the last variable factor is called as marginal production. In other words in total production change owing to the addition of a variable factor. All other factors being constant, the addition realised in the total product is technically regarded as marginal product (M.P.). Mathematically it is shown as,

$$MP = n - n - 1$$

where,

MP = Marginal product

n = Total output increased due to the addition of one unit of variable factor

n - 1 = Total No. of factors before the increase of Marginal unit

e.g. : Suppose 26 worker are employed in the total product which produced 550 units of commodity. When 25 workers were employed, the total production was 500 units. The marginal product of 26th workers is measured as below.

$$MP = TP_{26} - TP_{25} = 550 - 500 = 50 \text{ units}$$

It is explained that the marginal product is the rate of measuring the change in the total production in relation to a unit which change in the employment of variable factor. In mathematical terms it is as below.

$$MP = \frac{\Delta TP}{\Delta QVF} = \frac{550 - 500}{26 - 25} = \frac{50}{1} = \boxed{50} \text{ m.p.}$$

Where, Δ = in variables change

This ratio is also called as 'incremental product.'

4.3.4 Fixed Inputs - Definition : An input in the production of goods and services that doesn't change in the short run. A fixed input should be compared with a variable input, an input that does change in the short run. Fixed and variable inputs are most important for the analysis of short run production by a firm. e.g. fixed inputs are the factory building, equipments, or other capital used in production. The variable inputs would be the labour or workers who work in the factory or operate the equipment. In the short run a firm can vary the quantity of labour, but the quantity of capital is fixed.

4.3.5 Variable Inputs - Definition : An input whose quantity can be changed according to the change in production. It is referred as variable input. e.g. raw material, labour etc. A variable input provides the extra inputs that a firm needs to expand short run production. In contrast, a fixed input, like capital, provides the capacity constraint in production. As larger quantities of a variable input, like labour are, added to a fixed input like capital, the variable input becomes less productive. This is, by the way, the law of diminishing marginal returns.

4.3.5 a) Variable Inputs :

A variable input is an input whose quantity can be changed in short run. The most common e.g. of variable input is **labour**. A variable input provides the extra inputs that a firm needs to expand short run production. As larger quantities of a variable input, like labour, are added to a fixed input like capital, the variable input becomes less productive.

4.3.5 b) Fixed Inputs :

A fixed input is an input whose quantity can't be changed in the short run. The most common e.g. of a fixed input is capital. A fixed input, like a factory, building or piece of equipment, provides the 'capacity' constraint for the short run production of a firm.

The Short and Long Run :

The specification of inputs as either fixed or variable is intertwined with the distinction between short run and long run.

Short Run : The short run is a period of time in which at least one input used for production and under the control of the producer is variable and at least one input is fixed.

Long Run : The long run is a period of time in which all inputs used for production and under the control of the producer are variable.

The difference between long run and short run depends on the particular production activity. For some producers, the short run lasts a few days. For other, the short run can last for decades. Moreover, whether an input is fixed or variable depends on whether the period of analysis is the short run or the long run. The four concepts are closely related / connected.

4.3.6 Production with one variable input : The problem of optimal production will be approached in two ways. In this section it is assumed that the period of production is of such length that the rate of input of one factor of production is fixed. That is, the period is not long enough to change the input rate of that factor. The problem, then, is to determine the optimal rate of the variable input given the price of output, the price of the variable input and the production technology as described by the production function. In the next section, both inputs will be allowed to vary and the optimal rates of both variable inputs, capital and labour will be determined.

The period of time during which one of the inputs is fixed in amount is defined as the short run. In contrast, all inputs are variable in the long run. The period of time for the short run will vary among firms. For some firms, the short run may be a matter of days. For others, such as a electric utility company the short run may be a number of years - the period of time necessary to plan and build a new generation unit.

Generally, at any point in time, the firm is operating in the short run. i. e. the input rates of one or more factors are fixed. But most firms are continuously planning or considering changes in the entire scale of operation that would involve changes in all input rates. Thus it is said that the firm plans in the long run but operates in the short run. For e.g. an automobile manufacture may have six plants with maximum production capacity of 1.5 million vehicles per year. To build a new plant may take several years. At any particular time, the firm operates the existing plants a short - run decision, but based on current and projected demand conditions, the firm will plan to either augment or reduce plant capacity in the future - a long run decision.

4.3.7 Production with Two Variable Inputs : If both capital and labour inputs are variable a different set of analytical techniques must be applied to determine optimal input rates. There are three ways the firm may approach the problem of efficient resources allocation in production. They are (1) Maximize production for a given dollar outlay on labour and capital. (2) Maximize the dollar outlay on labour and capital inputs necessary to produce a specified rate of output, or (3) Produce the output rate that maximize profit. For the profit maximization case, it will be shown that for each input, the marginal revenue product will equal the input price.

The first two problems are called constrained optimization problems. In problems (1) The constraint is a fixed - dollar outlay for capital and labour. In problem (2) The constraint is a specified rate of output that must be produced. However, in problem (3) The firm seeks that output level that will maximize profit; there is no constrain on either the budget available for production or the output level to be produced. The firm is only constrained by the limits set by the production function itself.

In this section, the approach to solving each of these problems is presented. A standard managerial economics technique using the concept of production isoquants and production is costs used to determine efficient input rate combinations for given production rates.

Questions :

1. Explain various concepts of Production function.
2. State the law of variable proportions.
3. State the law of Returns to scale.
4. Write short notes :
 - (a) Production Function.
 - (b) Fixed Variables
 - (c) Variable Inputs
 - (d) Total Production (TP)
 - (e) Average Production (AP)
 - (f) Marginal Production (MP).

(B) Production Function - Theories :

4.0 Objectives :

Followings are the objectives of this study.

1. To study the concept of production function.

2. To study types of production function.
3. To study the Law of Variable Proportion.
4. To study the Laws of Returns to Scale.
5. To study Internal economies and diseconomies and External economies and diseconomies.
6. To study the concept of ISO-quants and its features.

4.1 Introduction :

Supply of goods and services is studied in the theory of production. There are various factors related with the production and supply of goods and services. i.e. Raw material, Machinery, factors of production etc. Supply of goods and services depends on cost of production and cost of production depends on the relationship between physical inputs and output and prices of factors of production. Production is related with the laws of relationship between physical inputs and output. Production in Economics means creation of utilities and therefore, it also includes the services along with the goods. Thus production means producing goods and services.

Production is returns to the units of a commodity goods and services produced in a given unit of time. The factors of production such as land, labour, capital, organisation etc. are the Traditionally known as factors while the factors like 'technology' and 'knowledge' have also been regarded as the important factors of production.

In this unit we have to study short run and long run production function, economies scale, economies and internal and external economies and diseconomies and ISO quants.

4.2 Production Function :

Production function is called as a theory of production. Production function can be defined as the functional relationship between physical inputs and physical outputs.

"The technical relationship between the units of factors of production and the unit of production of a commodity / services is called as 'Production Function'.

It explains the, Functional relationship between the factors of production used (inputs) and the production (output) with reference to a unit of time. Thus the production function can be defined as the functional relationship between physical inputs and physical outputs.

Stigler :

"The production function is the name given to the relationship between the rules of input of productive services and the rate of output of the product. It is the economics summary of the technical knowledge"

In mathematical terms the production function is stated as

$$P = F (a, b, c, d \dots\dots\dots n)$$

where, P = The output of goods produced per unit of time

F = Function

a = Land

b = Labour

c = Capital

d = Organisation

n = last factor of production

It shows the technical relation between the given quantities of inputs combined together resulting in a certain quantity of output per unit of time. It should be remembered that 'Production' is a 'Flow' concept. It means a continuous Flow of output and hence the quantity has to be measured in terms of a unit of time.

For example, if we say that a firm produces 20 units of commodity 'X' it may be at a certain rate per day, per week, per month and so on. Similarly, the units of factors of production have also to be used continuously and that also has to be measured with reference to a unit of time. In short, the 'Production Function' refers to the technical relationship between the rate of output and the rate of inputs used.

Thus, Production Function is a 'continuous' relationship. In any process, the factor combinations are always likely to change according to the state of technology. The production function would also depend upon the quantities and qualities of factors of production the process and subprocess used in production relative process of various inputs and so on. Among all the most important factor is the productive efficiency of the factors of production. In short the concept of production function defines the relationship, technically, between the output and the inputs quantitatively the unit of time. Production depends on land, labour, capital and organisation.

4.3 Short Run Production Function OR Law of Variable Proportions :

Short run is a period, in which fixed factors of production can't be changed, but variable factors are to be changed. So, by keeping one factor variable and other factors constant, the specific type of relationship between the inputs and output resulted, is called short run production function. Also it is called the law of variable proportions.

In short if one factor is kept constant with other factor variable the output also changes in a typical manner. This relationship is explained by the law of variable proportions. In the short

run firm uses changing quantities of variable factors with the fixed plant and machinery. To increase production, greater quantity of variable factors like workers, working hours, numbers of shifts and raw material etc. can be used with the fixed plant. It becomes necessary to see what happens to the total physical productive when larger and larger quantities of variable factors are used with the fixed plants and machinery. The answer to this question is given by the law of variable proportions. It is defined as follows :

4.3.1 Definitions :

1. Benham : "The proportion of one factor in combination of factors is invested after a point, first the marginal and then the average product of that factor will diminish."

2. Stigler : "Equal increments of one input are added, the inputs of other productive services being held constant, beyond a certain point the resulting increments of production will diminish, i. e. the marginal product will diminish."

It means that as the quantity of variable inputs changes by keeping the quantities of other inputs constant total production will increase with increasing rate and after specific output level it increases at decreasing rate. Thus, when the combination of one variable input with all other fixed factors, used in production, it leads to increase the total production initially with increasing rate and after a certain limit it rises with diminishing rate i.e. Marginal physical products first rises with increasing rate and after a limit it rises with decreasing rate. In this type of productive process total product, average product and marginal products beyond a limit are diminishing. So this is called law of diminishing returns. This law explains the effects of variations in factor proportion on output. So it is called law of variable proportions. In short the law of variable proportions can be stated as the following ,

"With some factors constant or fixed, if we use a particular factor or more and more, the marginal physical product of the variable factor eventually starts diminishing."

4.3.2 Assumptions of the Law :

1. The technology and technique of production are constant.
2. Some of the factors of production are kept fixed and one factor is variable.
3. Different factors of production can be combined in any proportion.
4. Factors of production are divisible.
5. Production process is particular period of time.

This law is illustrated with the help of following table.

Table No. 4.1

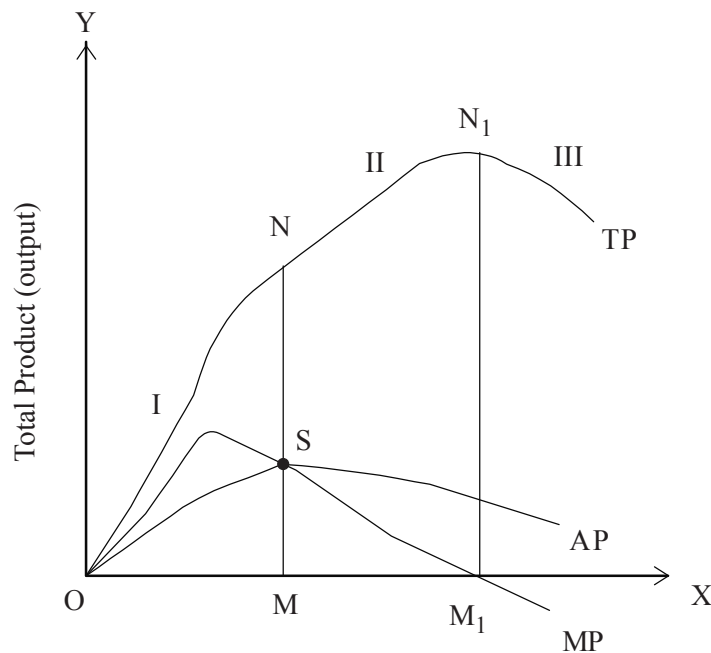
Laboures	Total Product (TP)	Average Product (AP)	Marginal Product (MP)	Stages
1	10	10	10	I - state
2	24	12	14	
3	42	14	18	
4	52	13	10	II - stage
5	58	11.60	6	
6	58	9.67	0	
7	57	8.14	-1	III - stage
8	55	6.87	-2	
9	52	5.77	-3	

Suppose that there is a land of 4 acres which is used as fixed factor in production. Labour is a variable factor which is successively increased in equal proportion as 1, 2, 3, 4, 5, 6, 7, 8, 9 and so on. While increasing the proportion of labour, total product (TP) increases as 10, 24, 42, 58, 58, 57, 55 and 52. It causes increase in both marginal and average products as 10, 14, 18, 10, 6, 0, -1, -2 and -3 and 10, 12, 14, 13, 11.60, 9.67, 8.14, 6.87 and 5.77 respectively. It shows that up to the employment of 3rd labour total product rises with increasing rate as 10, 14, 18. This is the 1st stage of this law which shows increasing trend.

The IInd stage begins from the employment of labour 4th to 6th. Total product (TP) increases but with a diminishing rat. i.e. 10, 6 and 0. So it is called as the stage of diminishing returns. In this stage marginal product (MP) becomes zero and total product reaches at its maximum level.

The IIIrd stage occurs from the 7th labour marginal increase in total product falls further. i. e. in this stage marginal product becomes negative as -1, -2 and -3. So it is called as the stage of negative returns. Generally a firm can't enter in this stage.

Out of these three stages firm or a producer is willing to remain in second stage, where total product remains highest. In this way, this table shows that by keeping land as a fixed factor and if a firm goes on employing more and more labours total product rises initially with increasing rate and beyond certain limit it increases with diminishing rate.



This law can be explained with the help of diagram.

This figure shows that, on OX axis quantity of variable factor and on Y axis total output is taken. TP is total product curve, MP is marginal product curve and AP is average product curve. The shape of these curves shows that it changes with the changes in quantity of variable input labour.

4.3.3 Explanation :

This figure reveals three stages as follow :

1. First Stage : In this stage, total product (TP) curve rises from left to right. Initially it becomes convex to Y - axis and finally becomes concave to X axis. It rises up to a point N_1 and then it falls. The TP curve rises from beginning, with increasing rate. MP and AP curves both are also rising, but MP curve rises with higher rate than AP curve. So, this stage is called as increasing returns. MP curve rises to its maximum and then falls. It cuts to AP curve at it's highest point, 'S', MP curve remains above the AP curve. The intersection point S is referred as the first stage of law of variable proportions, in which TP curve rises with increasing rate.

2. Second Stage : The TP curve, after N (NN_1 segment) shows the rising trend but with a diminishing rate. It's maximum point is N_1 . It falls after this point (N_1). In this stage TP is maximum but MP is zero. Both MP and AP curves are declining. The dereasing rate of MP

curve is greater than the rate of AP curve. This stage begins after the point of intersection S, AP and MP curves both are declining, but AP remains above the MP curve.

A very important thing here is, MP curve is declining and it intersects to X - axis at the point M_1 thereafter third stage begins. Thus the second stage lies in between the point MM_1 and NN_1 . This stage is called as the stage of diminishing returns. Each firm (produce) is willing to produce up to this stage because of the existence of maximum total product.

3. Third Stage : With point M_1 , this stage begins, where MP curve intersects to X - axis and after the TP curve's maximum point N_1 . In this stage employment of additional labour causes TP curve to decline. MP curve becomes negative, AP curve continuously falls but remains positive. This stage is called as stage of negative returns.

No any firm prefers to operate in 1st and 3rd stage. Because in the 1st stage total product is increasing with an increasing rate. So production is profitable and firm is willing to produce more. In the 3rd stage due to negative returns. It is uneconomical to the firm to operate in this stage.

4.4 Long Run Production Function OR Laws of Returns :

Long run is that time period in which a firm can make changes in all the factors of production. i. e. both fixed factors (land building, plant & machinery and top management) and variable factors like labour, few material and fuel etc. In other words long is the time period in which firm can change its scale of production. It is necessary to know what happens to the cost curves of a firm when its scale of production changes. The answer to this question is provided by the Law of Returns to Scale.

Under the law of variable proportions we keep some factors of production constant and make one factors variable. But under the law of returns to scale, we increase or decrease all the factors of production in the same proportion. This changes the scale of production or the production capacity of a firm. This is also called as the production function with two variable inputs. In the long run, firm changes all the factors of producing according to its requirement. We can study the relationship between inputs and output under the condition in which both the inputs labour and capital remain variable. The behaviour of output in response to the changes in the scale is considered. An increase in the scale means that all inputs are increased in the same proportions. When inputs are increased in equal proportion, total output increases, initially with increasing rate. Then the constant rate and finally with diminishing rate of returns. It is explained with the help of following table 3.2.

Suppose, Rice is produced in land labour and land proportion used in, the ratio of 1:2. This labour land ratio is successively increased as 1:2, 2:4, 3:6, 4:8, 5:10, 6:12, 7:14 and so on. When labour land ratio is increased in the above proportion, total returns may increased as 10, 25, 45, 70, 95, 120, 140 and 155 quintals. In the beginning with scale of production to the 1:2 labour capital ratio, total production (TP) is 10. When this scale of production is doubled, trebeled or four fold, total production (returns) will increase more than double, treble or four fold to the initial return as 25, 45, 70 and so on.

4.4.1 : **Table No. 4.2**

Factor Scale Labour : Land	Total Returns (output)	Marginal Returns (Product)	
1 : 2	10	10	} I Increasing Returns
2 : 4	25	15	
3 : 6	45	20	
4 : 8	70	25	} II Constant Returns
5 : 10	95	25	
6 : 12	120	25	
7 : 14	140	20	} III Diminishing Returns
8 : 16	155	15	

It was increasing returns to scale i. e. increasing marginal product as 10, 15, 20 and 25 quintals. Where the scale of production is increased further as 5:10, 6:12. Total returns increases as 95, 120. It reveals constant marginal returns as 25, 25 and 25 quintals. The increase in the scale of production further will tend to diminish rate of returns. Since the labour - land ratio 6:12, 7:14 and 8:16 it Follows the diminishing rate of return, marginal product at these ratio is 25, 20 and 15 quintals. It is called Law of diminishing returns. Thus when the scale of production is equally increased it follows initially law of increasing returns, then law of constant returns and lastly the law of diminishing returns. This law can be illustrated with the help of diagram as follows.

In this figure labour capital combination is shown on ox axis and marginal return (output) on oy axis. We get ABCD total returns (TP) curve. As we change the factor scale successively

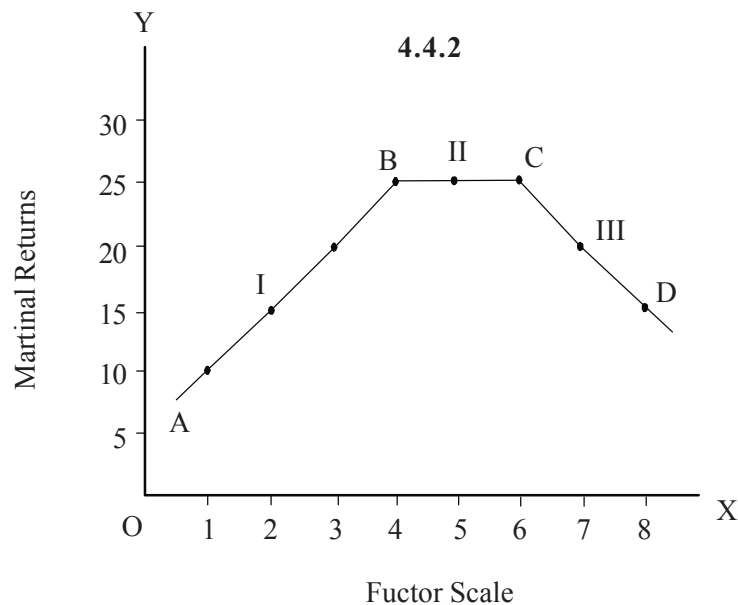


Fig. 4.2

total returns increases up to the point with increasing rate. So AB curve rises upwards from left to right. It shows first, stage of this law i. e. Law of increasing returns. Total returns rises with constant rate of returns in between the points B and C. So total product curve becomes parallel to X-axis in between the points B and C. After the point C it falls downwards from left to right and reveals diminishing rate of returns in between the points C and D. Thus it shows the third stage i. e. Law of diminishing returns in between the point C and D.

4.4.3 Business Decisions :

The Law of diminishing returns helps business community in regards to the decision making process. What to produce? How to produce? What quantity of factor ratio is used to produce profitability? etc. This law states that during the initial stage of this higher rate so as the labour - capital ratio is to be increased. The total production would be increased still the appearance of second stage. This stage is profitable from the point of view of the firm. Thus with the help of this law we can make decisions in respect of the utilisation of the labour and capital ratio. How many workers are to be employed against fixed capital to maximize the total production.

4.4.4 Economies and Diseconomies of Scale :

In the large scale of production the benefits accrued to the firm is called economies of scale. 'Dr. Marshall' classified economies of scale into two categories. (1) Internal economies and (2) External economies. There are also internal and external diseconomies. Where the size

of the firm increases it gives rise to internal economies as reduction in cost of production. Increase in total output, specification etc. Internal economies and diseconomies are operating to single firm or single factory as a result of its expansion. External economies and diseconomies are externally occurring to the firm expansion of the whole industry. These benefits do not remain to only single firm but they are conferred to all firms in industry.

4.4.4 (A) Internal Economies and Diseconomies :

When a firm increases all factors of production, its scale of production or size of its plant increases. The advantages which a firm gets by the increasing scale of production are known as internal economies of scale. The disadvantages a firm has to suffer from increase in the scale of production beyond limit are known as internal diseconomies of scale.

Internal Economies of scale :

Large Scale production gives rise to internal economies to a firm. When firm increases the factor scale, it leads to operate the laws of returns. The law of returns to scale is related with internal and external economies. The internal economies are classified as follows :

1. Technological Economies : Large scale production gives rise to technological economies. Use of modern technology leads to reduce cost of production, causes lower price. Large scale production increases the economic power of a firm so firm was superior techniques, large machines, utilizes its by products by installing by product plants. Also a firm is able to use division of labour with increased specialisation. It leads to increase the productive efficiency of the firm as well reduce the cost of production. In this way technological improvement is associated with internal economies.

2. Marketing Economies : Large scale firm also incurs the benefits of buying and selling of input and output, better quality of inputs, immediate delivery, transport concessions are occurred only to large firm. Marketing economies are associated with quality products, attractive packaging, advertisement, large distribution system etc. It is only possible to large firm to reap the marketing economies.

3. Managerial Economies : Larger firm can divide the excess of production into the various departments. It is only possible to large firm to apportion different personnels. Thus personnel specialisation is possible only to large firms, which helps to increase the productive efficiency of firm.

4. Financial Economies : Larger size of the firm leads to its financial efficiency, assets, income and good reputation. It is able to raise capital from capital market in the form of sales of

shares debentures, bonds issues. All these things to raise capital from different markets exclusively possible to large firms.

5. Research Economies : Large firm can get advantage of technological research. These firms can establish their own laboratories, utilise new technology, machinery, new raw material, new methods of production and distribution. It is used to increase production and to reduce the cost of production which leads to increase their profit.

6. Economies of Welfare : Big firm, having large resources, can better and large welfare facilities to their workers. It is able to small firms. Economies of welfare causes better working to workers and increases their working capacity and ultimately total output.

7. Risk Bearing Economies : Big firm possesses the large risk bearing capacity. There are existing various types of risks in demand and price, occurring loss, competitor's existence etc. is multiproduct firm. It produces different kinds of products and in different markets. If loss occurred in one market or in one is counter balanced by the gains from the another markets another products. This counter balancing is not possible to small firms. Only large firm can counter balance the loss from the various markets. e.g. TISCO, TELCO, Hindustan Lever, Reliance. Large firm can also purchase raw material in bulk and shoatages in future, it leads to reduce the possibility of raw materials in future as well as the occurance of losses.

Internal Diseconomies of Scale :

After a certain stage, scale of production leads to certain disadvantages. They are internal diseconomies of scale. Confusion and problems management are the main causes of such internal diseconomies the scale of production of a firm becomes too large, there are following diseconomies.

1. Number of managerial staff becomes very large as a result of which co-ordination among different managers becomes difficult.
2. The link and understanding (repport) between top management and lower level management becomes weak vague leading to misunderstanding and confusion.
3. There is too much of division of managerial functiions which again creates overtapping and uncertainty regerding timely and peoper decisions.
4. All these effects make efficient co-ordination of management difficult causing, duplication, wastage and interesting average cost of Production.

4.4.4 B) External Economies and Diseconomies :

When number of firms in a particular industry locate or concentrate in one particular place, it is known as location of industry. This location of industry as a whole gives rise to some advantages common and available to all the firms in the industry in that location. So, they are not internal to anyone firm. They are external to individual firms and as such they are known as external economies of scale. It means that when a firm transforms into industry, it has various benefits. They are external economies which are as follows :

1. Economies of concentration : Due to location of industry, all the firms in industry get various advantages, as external economies. These benefits are, availability of skilled labours, better transport facilities, electricity, water supply, benefits from development of subsidiaries etc. These economies cause to reduce the cost of production of all the firms in industry and benefit to them.

2. Economies of Information : Various research journals published by industry provides the information in regards to the new technology, new methods, new invention in business field market informations etc. This type of information helps to every firm in industry to reduce the costs and increase the production and productive capacity.

3. Economies of Specialization : Large scale production leads division of work into different sections. Experts and specialised personnels are appointed to supervise and performing the work in various divisions. It the benefits of specialization to whole in which helps to quick production and raise in quality of product it causes to reduce the costs, keeps lower prices and demand for product.

4. Development of Research Institute : The localization of stay in a particular, all the firms come together establish research institutes, which is beneficial to in future working. New technology, new methods of products machinery, new raw materials to be invented.

5. Establishment of Training Institutes : The concentration of industry to establishment of training institutions. These institutes provide technical education and training to workers. It helps to the skills of workers. Increased skills help to raise the productive capacity of workers.

External Diseconomies of Scale :

When localiation crosses a certain limit its, disadvantages are operating. These disadvantages of excessive locatization are known as external diseconomies of scale. They are,

1. Problems of transport congestion.
2. Problems of rising rents of buildings and industrial plots.
3. The problems of increasing wages of labour.
4. The problems of shortages and increasing prices of water.
5. The problems of increasing prices of raw material, rates of interest on capital etc.
6. Financial diseconomies leads to increase the production and becomes obstacles in production.
7. Increase in the cost rent and the factor prices.

All these problems increase the average cost of production.

4.5 Summary :

The production function is the name given to the relationship between the rates of input of product services and the rate of output of the product. It is the economics summary of the technical knowledge. There are two types of production function (1) Short run production function (2) Long run production function.

Short run production function is also called as Law of variable proportions. In short run some factors keep constant or fixed, if we use particular variable factor more and more, the marginal physical product of the variable factor eventually starts diminishing. We experience firstly increasing trend of production, then decreasing trend and lastly negative trend of the production.

In the long run a firm can make changes in all the factors of production i.e. both fixed factors (land, building, plant and machinery etc.) and variable factors like labour, raw material and fuel etc. If a firm increases all factors proportionately, firstly. Production increases at increasing rate, then remain constant and lastly stands decreasing.

In the large scale of production, the benefits occurred to the firms is called economies of scale. Dr. Marshall classified economies of scale into two categories i.e. 1. Internal economies and 2. External economies. Internal economies include (1) Technical economies (2) Marketing economies (3) Managerial economies (4) Financial economies (5) Risk bearing economies (6) Research economies and (7) Economies of welfare.

Localization or centralisation of industries gives rise to some advantages common and available to all firms in the industry in that location are called as External economies of scale.

These are (1) Economies of concentration (2) Economies of information (3) Economies of specialisation (4) Development of Research Institute (5) Establishment of training Institute.

After a certain stage of production there are also Internal diseconomies and External diseconomies. Internal diseconomies include (1) Financial diseconomies (2) Technical diseconomies (3) Late decisions (4) Lack of spirit in workers (5) Decisions made by low level authority etc. On the other hand External diseconomies include (1) Financial diseconomies (2) Transport diseconomies (3) Increase in rent and cost of production (4) Increase in wage rate (5) Increase in the price of inputs etc.

Glossary :

1. Production function = Functional relationship between physical inputs and outputs.
2. Short run production function - Law of variable proportions or short run production process.
3. Long run production function - Laws of returns to scale or Long run production process.
4. Internal economies or diseconomies - The economies/diseconomies accrued due to expansion of size of a firm.
5. External economies or diseconomies - The external economies or diseconomies accrued due to localization or centralization of industry.

Questions for self study :

(A) Fill in the blanks.

1. Short run production function is called as
2. The third stage of short run production function is
3. Long run production function is called as
4. The second stage of long run production function is
5. Increase in of a firm is called as internal economies.
6. accrued external economies to the firm.

Answers :

(1) Law of variable proportions, (2) Negative stage, (3) Theory of production, (4) Constant stage, (5) Size, (6) Localization or centralization.

(B) State True or False.

1. The first stage of short run production function is increasing function.

2. The first stage of long run production function is negative function.
3. Technical economies are internal economies of a firm.
4. The large scale of production leads to external diseconomies of a firm.
5. Transport problem is not a external diseconomies.

Answers :

- (1) True, (2) False, (3) True, (4) True, (5) False.

Questions for practice :

(A) Questions for practice.

1. Explain the law of variable proportions.
2. State what is the Long run production function.
3. State internal and external economies of scale.
4. State internal and external diseconomies.

(B) Write short Notes :

1. Production Function
2. Short run production function
3. Long run production function
4. Internal economies
5. External economies
6. Internal and external diseconomies.

Books for additional reading :

1. K. K. Dewitt : Modern Economic Theory
2. M. L. Seth : Principles of Economics.
3. Dr. Patil, Deshmukh, : Business Economics
Sahra budhe and Kakade
4. Dr. M. N. Shinde : Managerial Economics.

