

INTRODUCTION TO BUSINESS ECONOMICS

MEANING

Business Economics is also called as Managerial Economics. It involves application of economic theory and practice to business. In business, decision making is very important. Decision making is a process of selecting one course of action out of available alternatives. Thus business economics serves as a link between economic theory and decision-making in the context of business. Following are few definitions of Business Economics.

Spencer and Siegelman:

It is "the integration of economic theory with business practice for the purpose of facilitating decision making and forward planning by management. Henry and Hayne:

"Business Economics is economics applied in decision making. It is a special branch of economics. That bridges the gap between abstract theory and managerial practice."

Salvatore:

"Business Economics refers to the application of economic theory and the tools of analysis of decision science to examine how an organisation can achieve its objectives most effectively."

SCOPE OF BUSINESS ECONOMICS

Scope is nothing but the subject matter of business economics. Scope of Business Economics is very wide.

1. **Market Demand and Supply-** In economics both demand and supply are the important forces through which market economy functions. Individual demand for a product is based on an individual's choice / Preferences among different products, price of the product, income etc. Individual demand is nothing but desire backed by individual's ability and willingness to pay. By summing up the demand of all the consumers or individuals for the product we get market demand for that particular product. Individual Supply is the amount of a product that producer is willing to sell at given prices. By summing up the supply of all the producers for the product we get market supply for that particular product. The market price where the quantity of goods supplied is equal to the quantity of goods demanded is called as equilibrium price. Existence, growth and future of business or firm depends on what price market determines for its product.
2. **Production and Cost Analysis**
Knowledge of business economics helps manager to do production and cost analysis. Production analysis helps to understand process of production and to make optimum utilisation of available resources. Cost analysis on the other hand helps firm to identify various costs and plan budget accordingly. Both production and cost analysis will help firm to maximize profit.
3. **Market structure and Pricing Techniques**
Markets are very important in business economics. Study of markets such as perfect completion, monopoly, oligopoly,

monopolistic market etc. is very significant for producers. It is very imperative for manager or producer to identify type of market that will be there for their products. Knowledge of markets and competition will help them to take better decision regarding pricing of the product, marketing strategies etc. Pricing techniques, on the other hand, helps the firms to decide best remunerative price at different kinds of markets.

4. Forecasting and coverage of risk and uncertainty.

Knowledge of business economics helps manager to forecast future. For example Demand forecasting. It means estimation of demand for the product for a future period. Demand forecasting enables an organization to take various decisions in business, such as planning about production process, purchasing of raw materials, managing funds in the business, and determining the price of the commodity. Likewise forecasting future helps firm to take important decisions and cover risk and uncertainty associated with those decisions.

5. Inventory Management

Knowledge of business economics will help producer to reduce costs associated with maintenance of inventory such as raw materials, finished goods etc.

6. Allocation of resources

Business Economics provides advanced tools such as linear programming which helps to achieve optimal utilisation of available resources.

7. Capital Budgeting

Capital budgeting or investment appraisal is an official procedure used by firms for assessing and evaluating possible expenses or investments. It is a process of planning of expenditure which involves current expenditure on fixed/durable assets in return for estimated flow of benefits in the long run. Investment appraisal is the procedure which involves planning for determining whether firm's long term investments such as heavy machinery, new plant, research and development projects are worth the funding or not. Knowledge of business economics helps producer to take appropriate investment decisions with the help of capital budgeting.

IMPORTANCE OF BUSINESS ECONOMICS

1. Knowledge of business economics helps business organization to take important decisions as it deals with application of economics in real life situation.
2. It helps manager or owner of firm to design policies suitable for their firm or business.
3. Business economics is useful in planning future course of action.
4. It helps to control cost and monitor profit by doing cost benefit analysis.
5. It helps in forecasting future for taking important decisions in present.

6. It helps to set appropriate prices for various products by using available pricing techniques.
7. It helps to analyse effects of various government policies on business and take appropriate decision.
8. It helps to degree of efficiency of firms by using various economic tools.

Opportunity cost

Individuals face Trade-offs in day to day life. It is a conflicting situation where people have to make decision or make choices among available alternatives. The moment selection takes place, the counterpart becomes opportunity cost. Opportunity lost is nothing but opportunity cost. If you decide to attend lecture, then you have to sacrifice on time that you could have spent otherwise. If you plant potatoes in your field, you must forego the chance of planting another crop because your resources are limited. Opportunity cost plays very important role in decision making. Doing one thing excludes doing something else. In other words, when we select something, we pay a cost, which is the cost of not being able to do the next best thing.

Marginalism

Rational decision makers will always think in terms of marginal quantities. One should compare the cost of an additional chocolate with the benefits of an extra chocolate in order to decide whether to have it or not. If the additional revenue that the producer is going to get by producing one more car is greater than the cost of producing the extra car, only then the seller will produce an extra car.

Let us take one example, an additional car sells for Rs. 10 lacks while it costs only Rs. 8 lakhs to produce the additional car. Clearly, a rational producer will decide to produce the car because he will make profit of Rs. 2 lakhs per car. On the other hand, if the price of car falls to Rs.7 lakhs while the cost of producing it remains Rs. 8 lakh, it will not make sense to produce the additional car since the cost surpasses the revenue to be earned from it. The cost of producing the extra car is called as marginal cost while the revenue obtained from selling an extra car is called as marginal revenue. If marginal revenue exceeds marginal cost, it obviously makes sense to produce the extra car. If the marginal revenue is less than marginal cost, it not advisable to produce the extra car.

Let us take another example from your day to day life. Suppose you may score 10 additional marks in economics by

studying for entire night. Getting the additional 10 marks is important because it makes you feel happy and proud. But suppose staying up for entire night makes you feel really sleepy in the morning hence makes you feel dull and unhappy. In this case, whether you should study for entire night depends upon whether the happiness that you get from the 10 additional marks in economics overshadows the unhappiness caused by the additional sleeplessness. In this way individuals can make use of marginalism principal in their day to day life for making appropriate decisions.

Incrementalism

Marginalism represents small unit change in the concerned variables. But many times in real life situations changes takes place in chunks or batches. For example firm producing car will not generally increase its production by one unit, but by a batch of additional units. Here we use concept of incrementalism instead of marginalism and decision will be taken by comparing incremental cost and incremental revenue.

BASIC ECONOMIC RELATIONS - FUNCTIONAL RELATIONS: EQUATIONS- TOTAL, AVERAGE AND MARGINAL RELATIONS

The Relationship between Total, Average and Marginal can be explained with the help of concepts like utility, cost, revenue etc. Here we will take example of revenue concepts.

Where, P = Price & Q = Quantity TR =
Total Revenue
AR = Average Revenue MR =
Marginal Revenue

Quantity	Price	TR	AR	MR
1	30	30	30	30
2	28	56	28	26
3	26	78	26	22
4	24	96	24	18
5	22	110	22	14
6	20	120	20	10
7	18	126	18	6
8	16	128	16	2
9	14	126	14	-2
10	12	120	12	-6

Total revenue is calculated by multiplying price and quantity. As quantity increases TR increases initially then it decreases. AR is same as price. MR decreases constantly and becomes negative eventually.

Important concepts

1. Variables

A variable is magnitude of interest that can be measured. Variables can be endogenous and exogenous variables. Variables can be independent and dependent.

2. Functions

Function shows existence of relationship between two or more variables. It indicates how the value of one variable depends on the value of another one. It does not give any direction of relation.

3. Equations

An equation specifies the relationship between the dependent and independent variables. It specifies the direction of relation.

4. Graph

Graph is a geometric tool used to express the relationship between variables. It is a pictorial representation of data which shows how two or more sets of data or variables are related to one another.

5. Curves

The functional relationship between the variables specified in the form of equations can be shown by drawing line or outline which gradually deviates from being straight for some or all of its length in the graph.

6. Slopes

Slopes show how fast or at what rate, the dependant variable is changing in response to a change in the independent variable.

MARKET DEMAND AND MARKET SUPPLY

MARKET DEMAND, MARKET SUPPLY AND EQUILIBRIUM PRICE

In economics both demand and supply are the important forces through which market economy functions. Individual's demand is desire backed by his / her ability and willingness to pay. There is an indirect or negative relationship between price and quantity demanded. Individual Supply is the amount of a product that producer is willing to sell at given prices. There is a direct or positive relationship between price and quantity supplied.

Market Demand

Individual demand for a product is based on an individual's choice / Preference among different products, price of the product, income etc. Individual demand is nothing but desire backed by individual's ability and willingness to pay. By summing up the demand of all the consumers or individuals for the product we get market demand for that particular product.

Price	Demand of Individual A	Demand of Individual B	Market Demand (Demand of Individual A + Demand of Individual B)
10	5	7	12
20	4	6	10
30	3	5	8
40	2	4	6
50	1	3	4

The above table 2.1 represents demand schedule of individual A, individual B and Market Demand. Same schedule can be represented with the help of a graph.

Diagram 2.1 Market Demand Curve

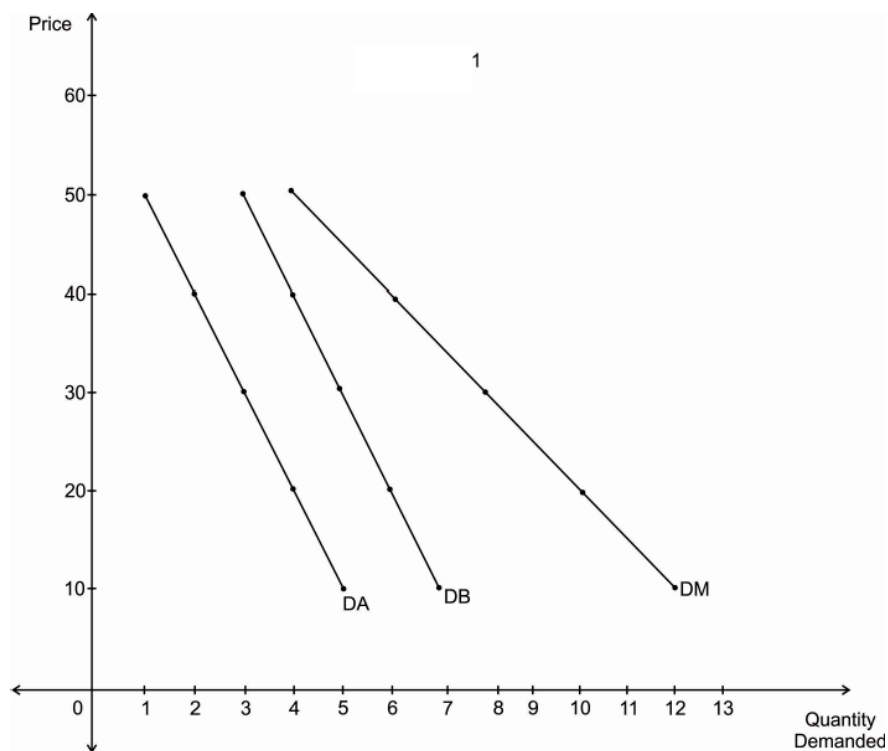


Diagram 2.1 represents demand curve of individual A, individual B and Market Demand. DA is a demand curve of individual A. DB is the demand curve of individual B. DM is the market demand curve. All curves are downward sloping indicating negative relationship between price and quantity demanded.

Market Supply

Individual Supply is the amount of a product that producer is willing to sell at given prices. By summing up the supply of all the producers for the product we get market supply for that particular product.

Table 2.2 Market Supply Schedule

Price	Supply of Producer A	Supply of Producer B	Market Supply (Supply of Producer A + Supply of Producer B)
10	1	3	4
20	2	4	6
30	3	5	8
40	4	6	10
50	5	7	12

The above table 2.2 represents supply schedule of producer A, producer B and Market supply. Same schedule can be represented with the help of a graph.

Diagram 2.2 Market Supply Curve

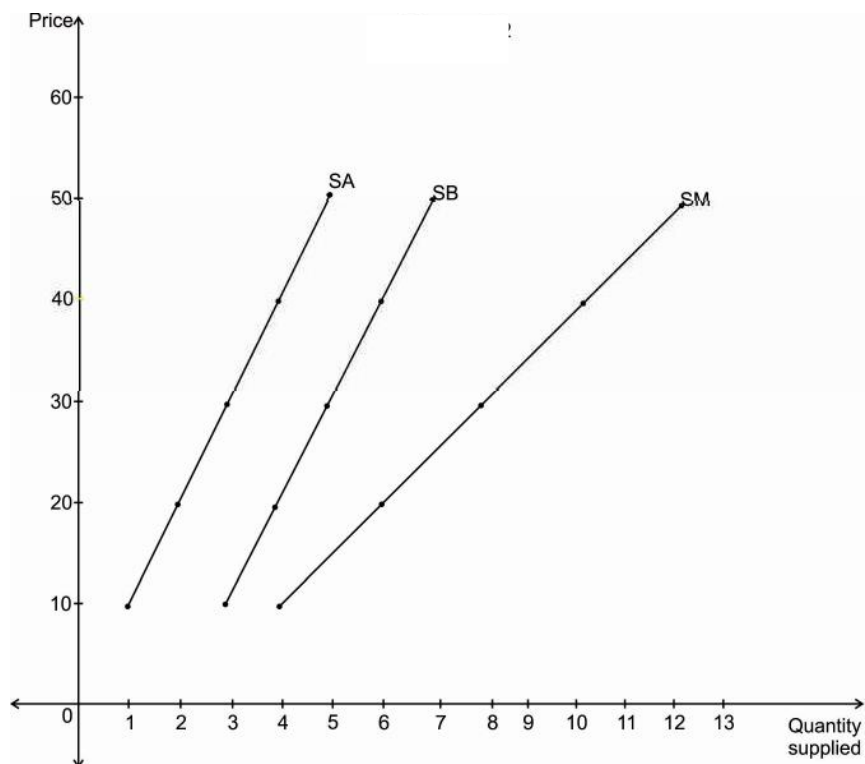


Diagram 2.2 represents supply curve of producer A, producer B and Market supply. SA is a supply curve of producer A. SB is the supply curve of producer B. SM is the market supply curve. All curves are upward sloping indicating positive relationship between price and quantity demanded.

Equilibrium Price

The market price where the quantity of goods supplied is equal to the quantity of goods demanded is called as equilibrium price. This is the point at which the market demand and market supply curves intersect.

Table 2.3 Equilibrium Price Schedule

Price	Market Demand	Market Supply
10	12	4
20	10	6
30	8	8
40	6	10
50	4	12

The above table 2.3 represents schedule of equilibrium price. Same schedule can be represented with the help of a graph to locate equilibrium price. Even in the table itself it is very clear that 30 is equilibrium price as at this price, market demand is equal to market supply i.e. 8 units.

Diagram 2.3 Equilibrium Price.

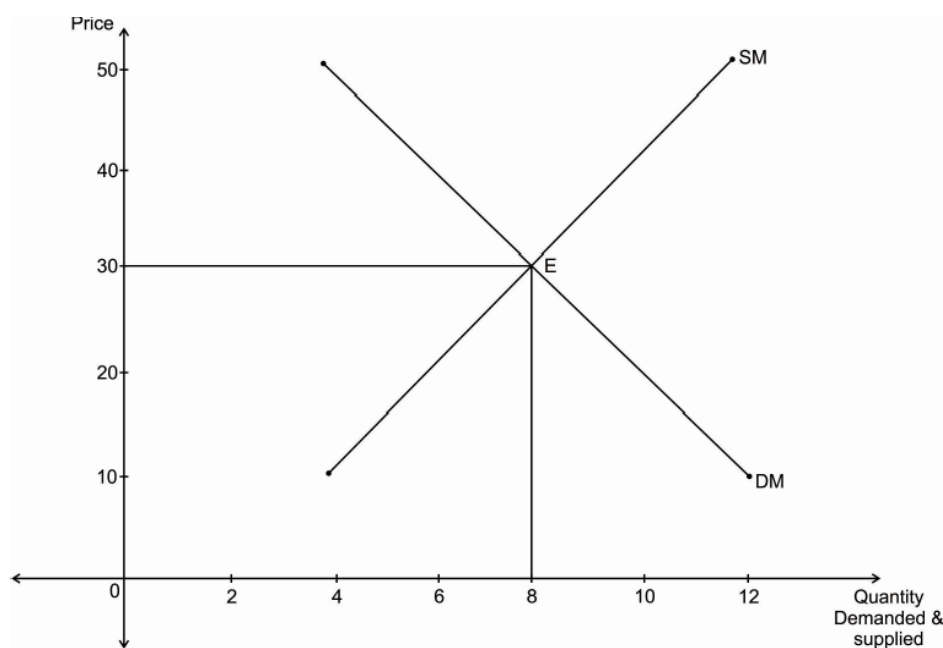
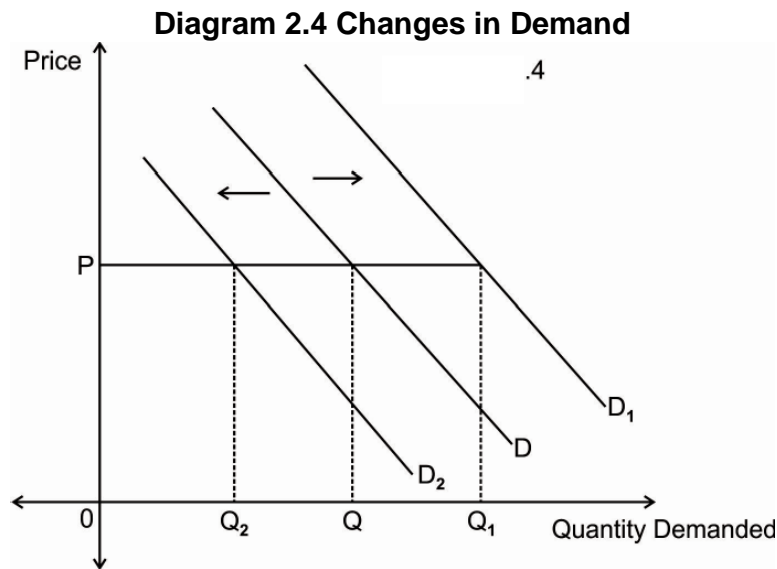


Diagram 2.3 represents Equilibrium Price. DM is the market demand curve. DM is downward sloping curve indicating inverse or negative relationship between price and quantity demanded. SM is the market supply curve. SM is upward sloping curve indicating direct or positive relationship between price and quantity supplied. DM and SM curves intersect each other at point E where equilibrium price is 30 and equilibrium quantity demanded and supplied is 8 units.

SHIFTS IN DEMAND AND SUPPLY CURVES AND EQUILIBRIUM

SHIFTS / CHANGES IN DEMAND :

Shifts in demand takes place due to changes in non-price factors such as income, population, government policies, tastes, preferences, habits, fashion etc. Whenever there are favourable changes in these factors then the demand curve shifts outward. It is also known as Increase in Demand. Whenever there are unfavourable changes in these factors then the demand curve shifts inward. It is also known as Decrease in demand.

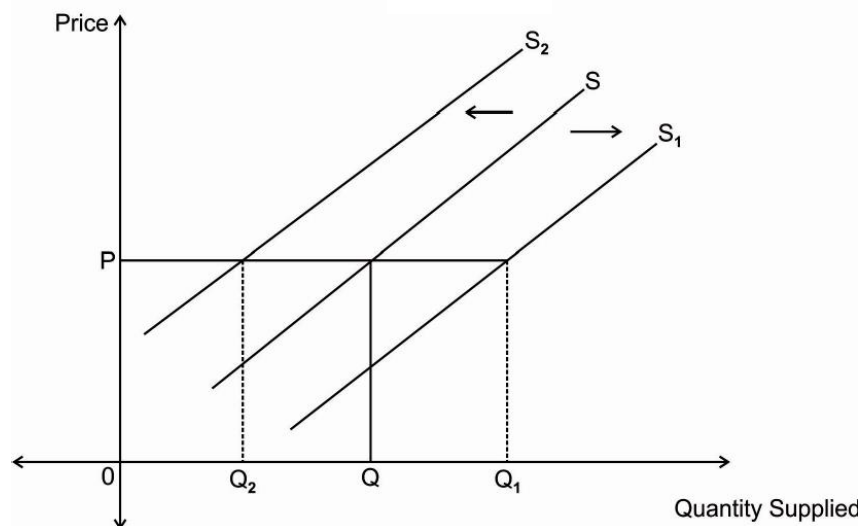


In the above diagram D is the original demand curve. At price P, OQ quantity is demanded. If there are favourable changes in the non-price factors affecting demand then the demand curve shifts outward and becomes D1. Here we can see that at same price P, now more quantity i.e. OQ1 quantity is demanded. If there are unfavourable changes in the non-price factors affecting demand then the demand curve shifts inward and becomes D2. Here we can see that at same price P, now less quantity i.e. OQ2 quantity is demanded. Shift from D to D1 is known as Increase in Demand and shift from D to D2 is known as Decrease in Demand.

SHIFTS / CHANGES IN SUPPLY

Shifts in supply takes place due to changes in non-price factors such as cost of production, government policies, state of technology etc. Whenever there are favourable changes in these factors then the supply curve shifts outward. It is also known as Increase in supply. Whenever there are unfavourable changes in these factors then the supply curve shifts inward. It is also known as Decrease in supply.

Diagram 2.5 Changes in Supply

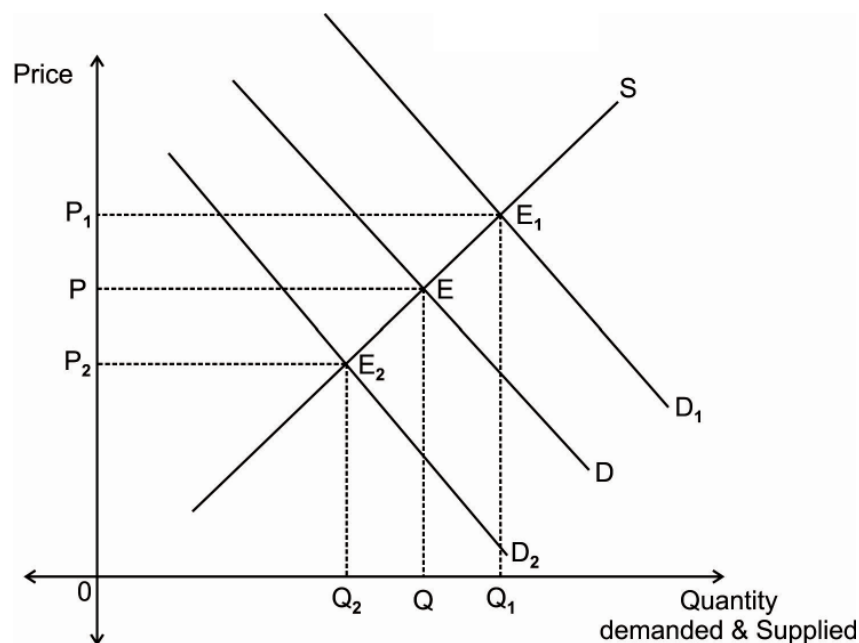


In the above diagram S is the original supply curve. At price P, OQ quantity is supplied. If there are favourable changes in the non-price factors affecting supply then the supply curve shifts outward and becomes S1. Here we can see that at same price P, now more quantity i.e. OQ1 quantity is Supplied. If there are unfavourable changes in the non-price factors affecting supply then the supply curve shifts inward and becomes S2. Here we can see that at same price P, now less quantity i.e. OQ2 quantity is supplied. Shift from S to S1 is known as Increase in Supply and shift from S to S2 is known as Decrease in Supply.

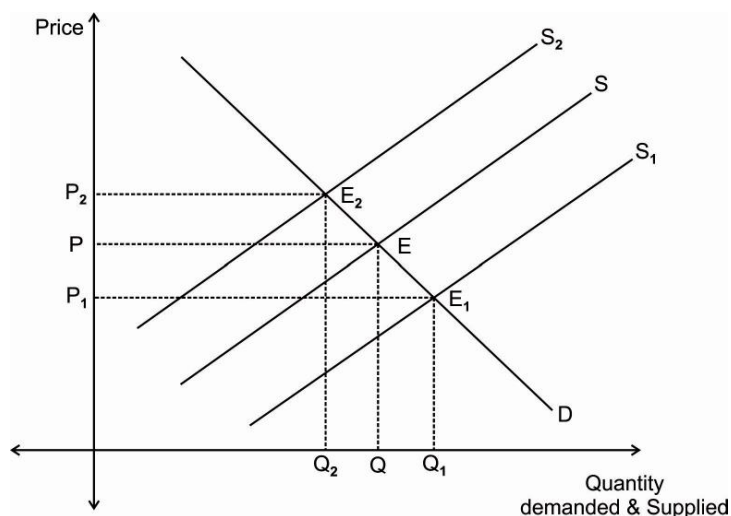
SHIFTS IN EQUILIBRIUM

The market price where the quantity of goods supplied is equal to the quantity of goods demanded is called as equilibrium price. This is the point at which the market demand and market supply curves intersect. Whenever there are changes in demand and supply, position of equilibrium will change.

Diagram 2.6 Effects of Changes in Demand on Equilibrium



In the above diagram D is the original demand curve and S is the original Supply curve. At equilibrium E , equilibrium price is P and equilibrium quantity demanded and supplied is OQ . If there are favourable changes in the non-price factors affecting demand then the demand curve will shift outward and become D_1 . Now the new equilibrium is at E_1 . At E_1 , equilibrium price is P_1 and equilibrium quantity demanded and supplied is OQ_1 . If there are unfavourable changes in the non-price factors affecting demand then the demand curve will shift inward and become D_2 . Now the new equilibrium is at E_2 . At E_2 , equilibrium price is P_2 and equilibrium quantity demanded and supplied is OQ_2 . Thus increase in demand leads to higher price and decrease in demand leads to lower prices.

Diagram 2.7 Effects of Changes in Supply on Equilibrium

In the above diagram D is the original demand curve and S is the original Supply curve. At equilibrium E , equilibrium price is P and equilibrium quantity demanded and supplied is OQ . If there are favourable changes in the non-price factors affecting supply then the supply curve will shift outward and become S_1 . Now the new equilibrium is at E_1 . At E_1 , equilibrium price is P_1 and equilibrium quantity demanded and supplied is OQ_1 . If there are unfavourable changes in the non-price factors affecting supply then the supply curve will shift inward and become S_2 . Now the new equilibrium is at E_2 . At E_2 , equilibrium price is P_2 and equilibrium quantity demanded and supplied is OQ_2 . Thus increase in supply leads to lower price and decrease in supply leads to higher prices.

DEMAND ANALYSIS

INTRODUCTION

In economics both demand and supply are the important forces through which market economy functions. The demand function shows the relationship between the quantity demanded and its various determinants. In this chapter we will explain the demand function in detail and the nature of demand curve under different market situation. We will also explain the relationship between elasticity of demand and revenue concepts.

DEMAND FUNCTION

Demand function is an arithmetic expression that shows the functional relationship between the demand for a commodity and the various factors affecting it. This includes the income of a consumer and the price of a commodity along with other various determining factors affecting demand. The demand for a commodity is the dependent variable, while its determinants factors are the independent variables.

The demand for a commodity depends on various factors which determines the quantity of a commodity demanded by various individuals or a group of individuals. The following equation shows the demand function which expresses the relationship between the quantity demanded of a commodity X and its determinants.

$$Qd_x = f [P_x, Y, P_y, T, A]$$

Where,

Qd_x = Quantity demanded of commodity X.

P_x = Price of commodity X.

Y = income of a consumer.

P_y = Price of related commodities.

T = Taste and Preference of an individual consumer.

A = Adverting expenditure made by producer.

DETERMINANTS OF DEMAND

The important determinants of demand for a commodity are explained below:

1. **Price of commodity (P_x):** The price of commodity is very important determinants of demand for any commodity. Other things remaining same, the rise in price of the commodity, the demand for the commodity contracts, and with the fall in price, its demand expands. So, the quantity demanded and price shows an inverse relationship in the case of normal goods. In other word changes in price brings changes in the consumer's demand for that commodity.
2. **Income (Y):** Another important determinant of demand for a commodity is consumer's income. Change in consumer's income also influences the change in consumer's demand for a commodities. The demand for normal goods increases with the

increasing level of income and vice versa. it shows a direct relationship between income and quantity demanded.

3. **Price of related commodities (P_y):** The demand for a commodity is also affected by the price of other commodities, especially of substitute or complementary goods. A good may have some related goods either substitute or complementary. The relation between two may be different.

Substitute Goods: Substitute Goods are those goods which can be substituted from each other. For Instance Tea & Coffee. When the rise in the price of Tea causes rise in demand for Coffee because there is no change in price of coffee such goods are called as substitute goods. In other words the relation between two substitute goods are positive. An increase in the price of one commodity increases the demand for other.

Complementary Goods: Complementary goods are those goods which are purchased together. For Instance Car & Petrol. when there is a rise in price of Petrol leads to fall in demand for Car such goods are called complementary goods. In other words, the relation between two complementary goods are negative. An increase in price of one commodity leads to decrease in demand for other.

4. **Taste and Preference (T):** The demand for a commodity also depends on the consumer's taste and preferences such as change in fashion, culture, tradition etc. As the consumer's taste and preference for a particular commodity changes the demand for that particular commodity also changes. Therefore, Taste and Preference of a consumer plays an important role.
5. **Advertising expenditure (A):** Advertising expenditure by a firm influences the demand for a commodity. The advertisements by the manufacturer and sellers attract more customers towards the commodity. There exists a positive relationship between advertising expenditure and demand for the commodity.

MEANING OF DEMAND

The demand in economics means the desires to purchase the commodity backed by willingness and the ability to pay for it.

Demand = Desire + Willingness to buy + Ability to pay

THE LAW OF DEMAND

The law of demand was propounded by the famous economist Alfred Marshall in early 1892. Due to the general

observation of law, economists have come to accept the validity of the law under most situations. The law of demand states that other thing being equal the relationship between the price and the quantity demanded of a commodity are inversely related to each other. In other words, when the price of a commodity rises the quantity demand for the commodity falls. The law of demand helps to explain the consumer's choice behaviour due to change in the price of a commodity.

Assumptions:

The law of demand is based on the following assumption given below:

1. **No change in consumers income:** There should not be any change in the consumer income while operating under the law of demand. If income of a consumer increases the consumer may buy more goods at the same price or buy the same quantity even if price increases. The income is assumed to be constant, as it may lead to enticement to the consumer to buy more goods and raise the demand for a commodity despite an increase in the price of commodity.
2. **No change in the price of other goods:** The price of substitute goods and complimentary good should remain the same. If any of the price changes may lead to change in the demand for the other commodity and it will change the consumer preference will affect the law of demand.
3. **No change in taste and preference:** The law assumes that the consumer's taste and preference for a commodity remains the same. If there is a change in consumer's taste and preferences there will be a change in the demand for the commodity.
4. **No expectation of change in the future price:** The law of demand remains valid if there is no change in future expectation about price of commodities. If consumer is expecting rise in price in future, he will buy more quantities even at a higher price in present time and vice-versa.
5. **No change in the size and composition of population:** The law also assumes that the size and composition of the total population of a country should not change. That means, the population must neither increase nor decrease. Because a rise in the populations would increase the demand for commodities. Along with the size of population, composition of population also matters. If number of senior citizens is more then the demand for medical care will be more. If female population is more then the demand for cosmetics will be more.
6. **No change in government policies:** The law assumes that there is no change in the government policy which will either increases or decreases the demand for the commodity.

Demand Schedule and Demand Curve:

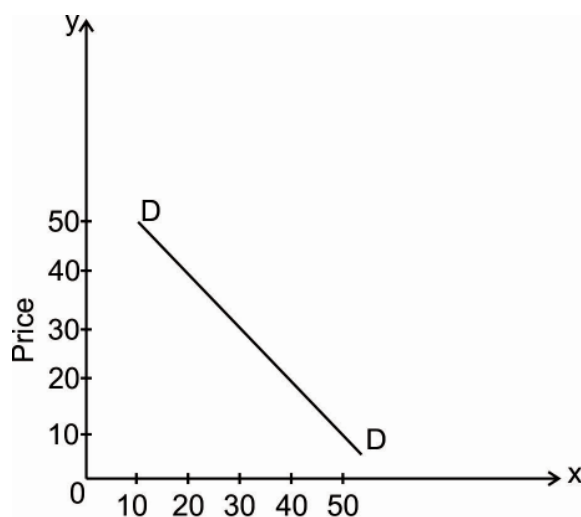
The law of demand can be simply explained through a demand schedule and demand curve. The demand schedule is a tabular representation of the law of demand which is shown below:

Demand Schedule: Table 3.1

Price (₹)	Quantity demanded of a commodity 'X' (Units)
50	10
40	20
30	30
20	40
10	50

Representation of table:

It can be seen from the above table, that when the price of a commodity 'X' is ₹ 50 per unit, the consumer purchases 10 units of the commodity. Further when the price of the commodity falls to ₹ 40, he purchases 20 units of commodity. Similarly, when the price falls further the quantity demand by the consumer goes on increasing by 30 units as so on. This demand schedule shows the inverse relationship between the price and quantity demanded of a commodity.

Demand curve:**Quantity Demand
Diagram 3.1**

The demand schedule can also be explained through demand curve in a simpler way. The demand curve is a graphical representation of the quantities of good demanded by the consumer at various possible price in a period of time. The Diagram shows quantity demanded on X-axis and the price of a commodity

on Y-axis. If the demand schedule is plotted on the demand curve, we get the various price-quantity combination points and if we join these points, we get the downward sloping demand curve. Thus, the downward sloping demand curve according to law of demand shows, the inverse relationship between price and quantity demanded.

Exceptions to the Law of Demand: The law of demand is generally valid in most of the cases but there are few cases where the law is not applicable. Such cases are explained below:

1. **Goods having prestige value (Veblen effect):** This exception to the law of demand was propounded by an economists Thorstein Veblen in his work 'conspicuous consumption'. According to him, some consumer measures the utility of a commodity by its price i.e., the higher the price of a commodity, the higher its utility. For example, People sometimes buy certain expensive or prestigious goods like diamonds at high prices not due to their intrinsic value but only because it has snob value. On the other hand, as price falls, they demand less due to the loss of its snob value. This effect is called as Veblen effect or Snob value.
2. **Giffen goods:** Another exception to the law of demand was put forwarded by the economists Sir Robert Giffen. There is a direct price – demand relationship in case of giffen goods. When with the rise in the price of a giffen goods, its quantity demand increases and with the fall in its price its quantity demand decreases, the demand curve will slope upward to the right hand side and not downward.
3. **Price Expectations:** When the consumer expects there is rise in price of a commodity in future, he/she may purchase more of commodity at present. Where the law of demand is not applicable.
4. **Emergencies:** During the time of emergencies such as natural and man-made calamities, the law of demand becomes ineffective. In such circumstances, people often fear the shortage of the necessity goods and hence demand more goods and services even at higher prices.
5. **Change in fashion and taste & preferences:** The change in taste and preferences of the consumers denies the effect of law of demand. The consumer tends to buy those commodities which are in trends in the market even at higher prices. On the other hand, when a product goes out of fashion, a reduction in the price of the product may not increases the demand for it.

NATURE OF DEMAND CURVE UNDER DIFFERENT MARKETS

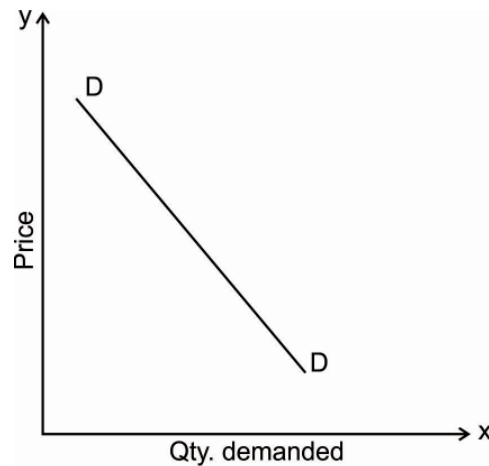
Economist have classified the various markets prevailing in a capitalist economy into (a) perfect competition or pure competition, (b) monopolistic competition, (c) oligopoly and (d) monopoly. According to Cournot, a French economist, "Economist understand by the term market not any particular market place in which things are bought and sold but the whole of any region in which buyers and sellers are in such free interaction with one another that the price of the same good tends to equality easily and quickly". The type of different market depends on number of factors. Accordingly, the nature of demand curve is different in different market. The nature of demand curve under various market structure are as follows:

Demand Curve in Perfect Competition:

Perfect competition is said to prevail when there are large number of producers (firms) producing and selling homogenous product. The maximum output produce by the individual firm is very small relatively to the total demand to the industry product so that firm cannot affect the price by varying its supply of output. The seller is the price taker he accepts the price determined in the market by market demand and market supply. Thus, the individual price under perfect competition is determine by the market demand and market supply.

Market Demand Curve: The market demand curve under perfect competition is downward sloping. Because price and quantity demand are inversely related to each other as the price of a commodity increases the demand for that good decreases. The market price at which the firms will sell their commodity is determined by the interaction of market demand and market supply. Once the market determines the price for the commodity all firms will fix their price equals to market price as they are price taker

under the perfect competition. Thus, the individual demand curve is equal to the equilibrium price of the market. The Diagram 3.2. shows the market demand curve which is downward sloping and P_0 is the equilibrium market price which is followed by all the individual firm and the individual firm is facing the horizontal demand curve.



Market Demand Curve
Diagram 3.2

Individual Firm demand curve: Demand curve facing an individual firm working under perfect competition is perfectly elastic i.e. a horizontal straight line parallel to X axis at a given price which is determined by the market demand and market supply. The Diagram 3.3 shows Qty demanded on X axis and Price of the commodity on Y axis. Where OP_1 is the price determined by the interaction of market demand and market supply curve. It shows if firm tries to lower the price, he will get negative profit.

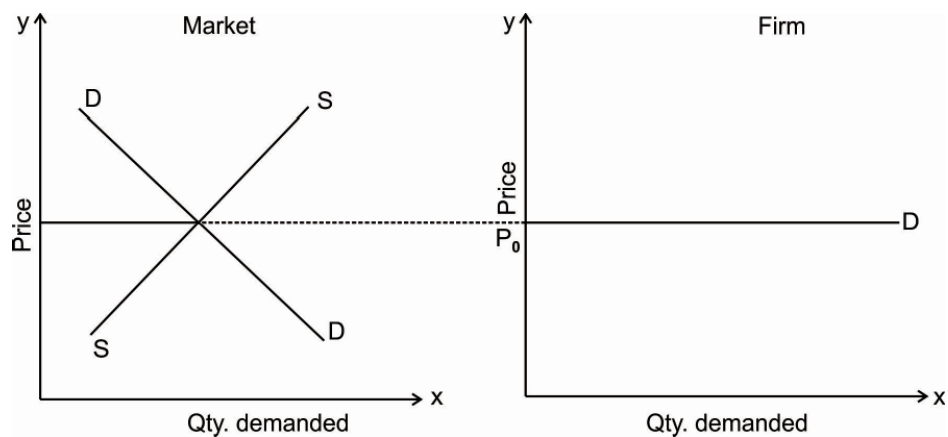


Diagram 3.3

Demand Curve under Monopoly: Monopoly is a market where there is single firm producing and selling product which has no close substitute. As being the single seller monopoly has a control on supply and he can also decide the price of a commodity. But however, a rational monopolist who aim at maximum profit will

control either price or supply. As monopolists is the only single seller in the market, he constitutes the whole industry. Therefore, the demand curve under monopoly market is downward sloping and has a steeper slope as shown in the Diagram 3.4. below:

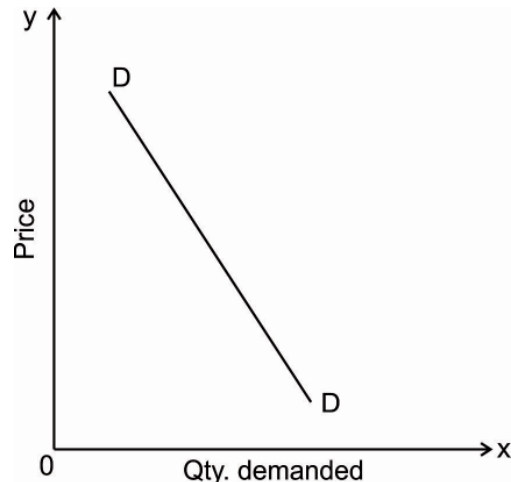


Diagram 3.4

Thus, in monopoly there is a strong barrier to entry new firm in the industry. If the monopolist firm wants to increase the sale in the market, he has to lower the price of its commodity.

Demand curve under Monopolistic competition: In the monopolistic market there is a large number of firms producing or selling somewhat differentiated product which have close substitute. As a result, demand curve facing a firm under monopolistic competition is sloping downward and has a flatter shape which is highly elastic and this indicates that a firm enjoys some control over the price of a commodity. The demand curve facing an individual firm under monopolistic competition is shown in the following Diagram 3.5.

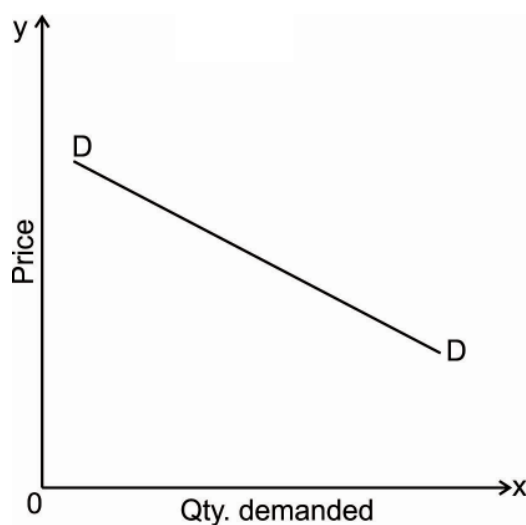


Diagram 3.5

Demand curve under oligopoly market : Oligopoly is a market where there are few firms or sellers producing or selling differentiated products. The fewness of firm ensures that each of them will have some control over the price of the product and the demand curve facing each other will be downward sloping which indicates the price elasticity of demand for each firm will not be infinite. As there are interdependence of firm. Any decision regarding change in the price of output attracts reaction from the rival firms. Therefore, the demand curve for an oligopoly firm is indeterminate, i.e. it cannot be drawn accurately as exact behaviour pattern of a producer with certainty. The demand curve faced by the firm under oligopoly is shown in the following Diagram 3.6:

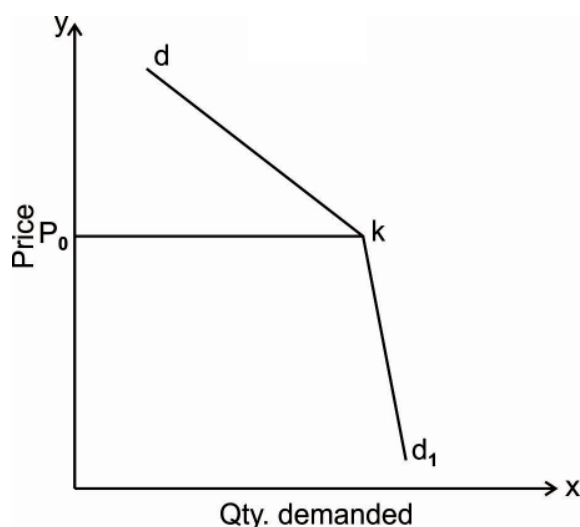


Diagram 3.6

The demand curve facing an oligopolist is kinked in nature. The kink is formed at a prevailing level the point K because the segment of the demand curve above the prevailing price level i.e. Kd is highly elastic and the segment the segment below the prevailing price level i.e. Kd_1 is inelastic. This is due to different reaction of the different firm.

ELASTICITY OF DEMAND

Elasticity of demand helps us to estimate the level of change in demand with respect to a change in any of the determinants of demand. The concept of elasticity of demand helps the firm or manager in decision making with respect to pricing, promotion and production policies. It has a very great importance in economic theory as well for formulation of suitable economic policy.

Meaning of elasticity:

Elasticity is the measure of the degree of responsiveness of change in one variable to the degree of responsiveness change in another variable.

$$\text{Thus, Elasticity} = \frac{\% \text{ change in A}}{\% \text{ change in B}}$$

The concept of elasticity of demand therefore refers to the degree of responsiveness of quantity demanded of a good to the change in its price, consumers income and price of related goods.

PRICE ELASTICITY OF DEMAND

Price elasticity of demand shows the degree of responsiveness of quantity demanded of a good to the change in its price, other factors such as income, prices of related commodities that determines demand for the commodity which are held constant. In other words, price elasticity of demand is defined as the ratio of the percentage change in quantity demanded of a commodity to a percentage change in price of the commodity. Thus,

$$e_p = \frac{\text{Percentage change in quantity demanded}}{\text{Percentage change in price}}$$

The demand curve for most of the commodities, is downward sloping due to the inverse relationship between quantity demanded and price of the commodity, the value of the price elasticity of demand will always be negative. While interpreting the price elasticity of demand the negative sign is ignored or omitted. This is because we are interested in measuring the magnitude of responsiveness of quantity demanded of a good to changes in its prices.

FACTORS AFFECTING PRICE ELASTICITY OF DEMAND

The price elasticity of demand depends upon number of factors which affects its elasticity. They are as follows:

- a. **Nature of goods or commodity:** The elasticity of demand for a commodity depends upon the nature of the commodity, i.e., whether the commodity is a necessary, comfort or luxury good. The elasticity of demand for a necessary commodity is relatively small. For example, if the price of such a good rise, its buyers generally are not able to reduce its demand as its necessity commodity. The elasticity of demand for a luxury good is usually high. This is because the consumption of a such good, unlike that of a necessary commodity, can be delayed. That is why if the price of such a commodity increase, the demand for the good can be significantly reduced.
- b. **Availability of Substitute Goods:** The price elasticity of demand also depends upon the substitution of goods. If there is a close substitute for a particular commodity in the market, then the demand for such commodity would be relatively more elastic. For example, since tea and coffee are close substitute for each other in the commodity market, a rise in the price of coffee will result in a considerable fall in its demand and a consequent rise in the demand for tea. Therefore, a demand for coffee will be relatively more elastic because of the availability of tea in the market.
- c. **Alternative and Variety of Uses of the Product:** as we know that the resources have an alternative use. The demand for such goods has many uses. The more the alternative and variety of uses of a good, the more would be its elasticity of demand. For example, Electricity is used for many purposes such as lighting, heating, cooking, ironing and also use as a source of power in many industries & households. That is why when the price of electricity increases, its demand will decrease and vice versa.
- d. **Role of Habits and custom:** if the consumer has a habit of something, he will not reduce his consumption even if the price of such commodity increases the demand for them do not decreases considerably and so their elasticity of demand will be inelastic. Ex; Alcohol, Cigarettes which are injurious for health but people still consume it because of their habit.

- e. **Income Level of the consumer:** The elasticity of demand differs due to the change in the income level of the households. Elasticity of demand for a commodity is low for higher income level groups than the people with low incomes. This is because rich people are not influenced much by changes in the price of goods. Poor people are highly affected by the increase or decrease in the price of goods. As a result, demand for the lower income group is highly elastic in demand.
- f. **Postponement of Consumption:** if the consumer postponed the consumption of commodity in future the demand is relatively elastic. For example, commodities whose demand is not urgent, have highly elastic demand as their consumption can be postponed if there is an increase in their prices. However, commodities with urgent demand like medicines have inelastic demand because it is an essential commodity whose consumption cannot be postponed.
- g. **Time Period:** Price elasticity of demand is related to a period of time. The elasticity of demand varies directly with the time period. In the short run the demand is generally inelastic and in long-run it becomes relatively elastic. This is because consumers find it difficult to change their habits, in the short run, in order to respond to the change in the price of the commodity. However, demand is more elastic in long run as their other substitutes available in the market, if the price of the given commodity rises.

MEASUREMENTS OF PRICE ELASTICITY OF DEMAND

There are various methods of measuring price elasticity of demand some of the important methods are explained below:

- A. **Percentage method:** This method is associated with the name of Dr Alfred Marshall. This method is known by various names such as Proportionate method, Ratio method, Arithmetic method, and Flux method. The price elasticity of demand in this method is measured by dividing percentage change in quantity demanded by the percentage change in the price. In other words it is the ratio of the percentage change in quantity demanded of a commodity by the percentage change in the price of the commodity itself.

Thus,

$$E_p = \frac{\text{Percentage change in quantity demanded}}{\text{Percentage change in price}}$$

$$\text{Symbolically, } E_p = \frac{\frac{\Delta q}{q}}{\frac{\Delta p}{p}} = \frac{\Delta q}{\Delta p} \times \frac{p}{q}$$

Where, q = original quantity demanded.

p = original price.

Δq = change in quantity demanded.

Δp = change in price.

As mentioned above, the price elasticity of demand has a negative sign this is due to inverse relationship between price and quantity demanded. But for simplicity in understanding the magnitude or the degree of responsiveness we ignore the negative sign and take only numerical value of elasticity.

B. Point method: Prof. Marshall devised a geometrical method for measuring the elasticity of demand at a point on the demand curve. In other word, the point elasticity of demand measures the elasticity of demand at the point on the demand curve.

This can be illustrated by the following given example:

Table 3.2

Price of commodity X	Quantity demanded of X	Point
20	60	A
15	90	B

The above table is represented in the following Diagram 3.7.

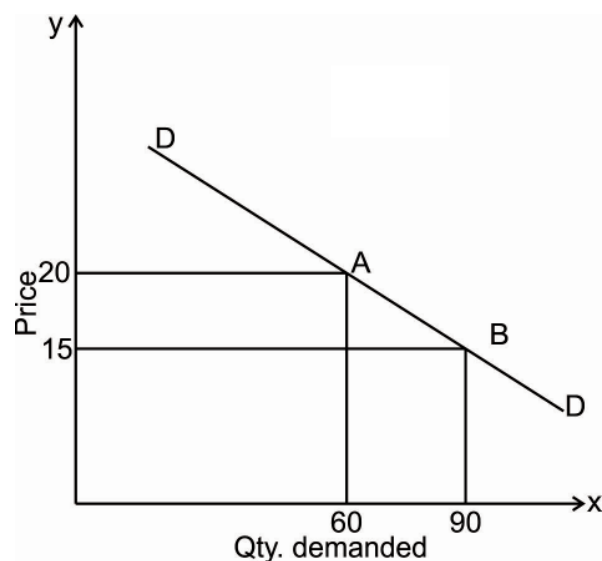


Diagram 3.7

C. Arc elasticity of demand: In the above measure we have studied the measurement of elasticity at a point on a demand curve. When elasticity is measured between two points on the same demand curve, it is known as arc elasticity. According to Prof. Baumol, "Arc elasticity is a measure of the average responsiveness to the change in price exhibited by a demand curve over some finite

stretch of the demand curve". Any two points on the same demand curve make an arc shows the arc elasticity of demand. In other words, arc price elasticity of demand measures elasticity of demand at two points on the demand curve.

D. Geometrical measure of elasticity of demand: If there is a linear demand curve the point elasticity of demand is measured by geometrical method i.e. it is the ratio of lower segment of the demand curve below the point to the upper segment of the demand curve above the point.

Symbolically,

$$E_p = \frac{\text{Lower segment of the demand curve below the point}}{\text{Upper segment of the demand curve above the point}}$$

The geometric method can be explained through the Diagram 3.8 given below:

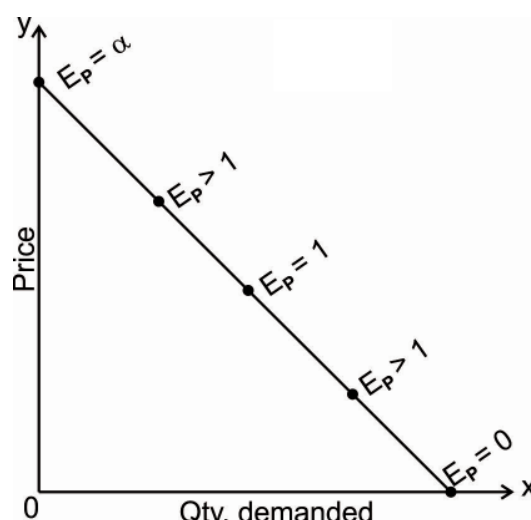


Diagram 3.8

DEGREES OF ELASTICITY OF DEMAND

Different commodities have different elasticities of demand. Some commodities have more elastic demand than others, while other commodities have relative elastic demand. The elasticity of demand ranges from zero to infinity ($0-\infty$). It can be equal to zero, one, less than one, greater than one and equal to unity.

“The degree of responsiveness to the change in demand in a market for a commodity is great or small, as the amount demanded increases much or little for a given fall in price and diminishes much or little for a given rise in price of the commodity”.

The various level or the degree of elasticity of demand is explained in brief below:

- 1. Perfectly elastic demand ($E_p = \infty$):** The demand is said to be perfectly elastic, if slight change in price leads to infinite change in the quantity demanded of the commodity. In other words, it is the level of responses where the consumer is able to buy all the

available commodity at a particular price where the demand is elastic. The demand curve under this situation is horizontal straight line parallel to X axis shown in the Diagram 3.9 below. This type of demand curve is relevant in perfect competition. But in the real world, this case is exceptionally rare and are not of any practical interest.

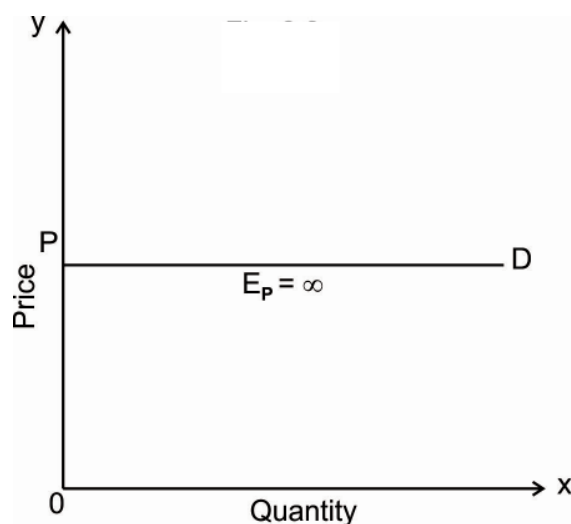


Diagram 3.9

2. **Perfectly inelastic demand ($E_p = 0$):** The demand is said to be perfectly inelastic, if the demand for a commodity does not change with a change in price of the commodity. In other words, the perfectly inelastic demand of a commodity is opposite to the perfectly elastic demand. Under the perfectly inelastic demand, a rise or fall in price of a commodity the quantity demanded for a commodity remains the same. The elasticity of demand will be equal to zero. The demand curve is vertical straight line parallel to Y-axis shown in the Diagram 3.10.

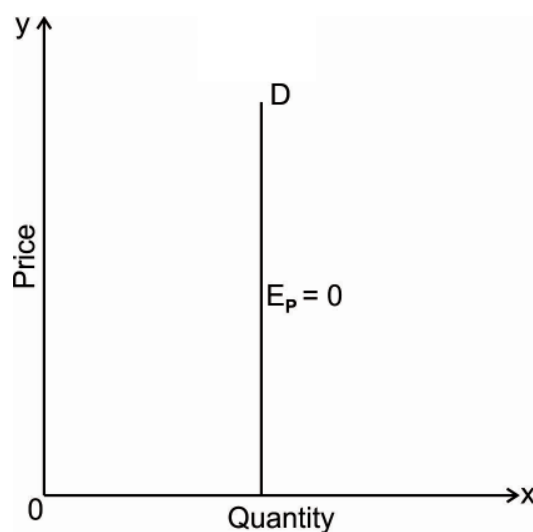


Diagram 3.10

3. **Unitary elastic demand ($E_p = 1$):** Demand is said to be unitary elastic when the percentage change in the quantity demanded for a commodity is equal to the percentage change in its price. The numerical value of unitary elastic of demand is exactly equal to one i.e. Marshall calls it as unit elastic. The demand curve is rectangular hyperbola shown in the Diagram 3.11.

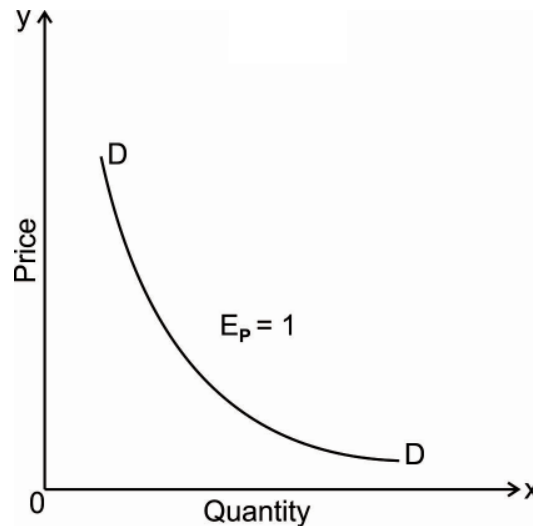


Diagram 3.11

4. **Relatively Elastic demand ($E_p > 1$):** Demand is said to be relatively elastic, when the percentage change in quantity demanded of a commodity is greater than the percentage change in its price. In other words, it refers to a situation in which a small change in price leads to a great change in quantity demanded. The demand curve under this situation is flatter as shown in Diagram 3.12. Such demand curve is seen under monopolistic competition.

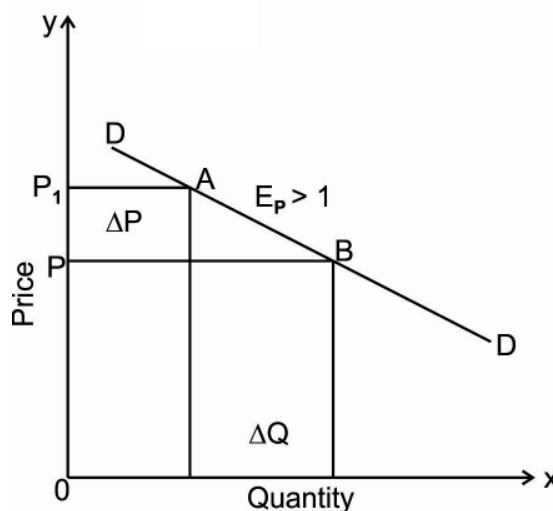


Diagram 3.12

- 5. Relatively Inelastic demand ($E_p < 1$):** Demand is relatively inelastic when the percentage change in the quantity demanded of a commodity is less than the percentage change in the price of the commodity. The demand curve under this situation is steeper shown in Diagram 3.13. Such demand curve is observed under monopoly market.

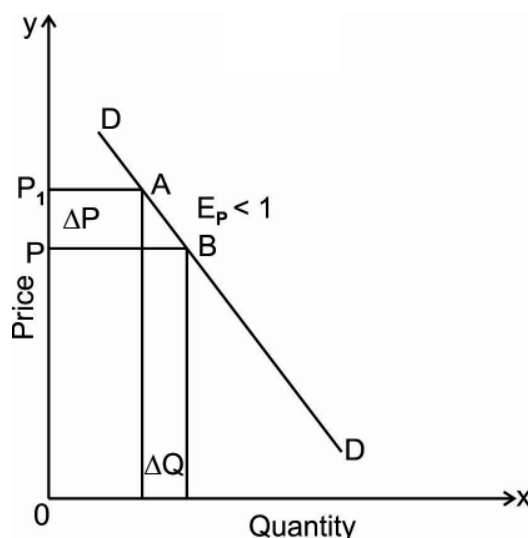


Diagram 3.13

INCOME ELASTICITY OF DEMAND

As we have discussed earlier the factor which determines elasticity of demand for a commodity. The consumer's income is one of the important determinants of demand for a commodity. The demand for a commodity and consumer's income is directly related to each other, unlike price-demand relationship.

Income elasticity of demand shows the degree of responsiveness of quantity demanded of a commodity to a small change in the income of a consumer. In other words, the degree of responsiveness of quantity demanded to a change in income is measured by dividing the proportionate change in quantity

demanded of a commodity by the proportionate change in the income of a consumer.

$$\text{Income Elasticity} = \frac{\text{Percentage change in purchases of a commodity}}{\text{Percentage change in income}}$$

MEASUREMENT OF INCOME ELASTICITY OF DEMAND

The income elasticity of demand can be calculated by either point method or arc method.

Income elasticity of demand being zero is a great significance. It implies that a given increase in the income of a consumer does not at all lead to any increase in quantity demanded of a commodity or expenditure on it.

Classification of goods based on income elasticity of demand: We can broadly classify the various goods on the basis of value of income elasticity of demand.

1. **Normal Goods:** Normal goods are those goods which are usually purchased by consumer as his income increases. In other words, normal good means an increase in income causes an increase in the demand for a commodity. It has a positive income elasticity of demand. Normal goods are further classified as:
 - a. **Necessity goods:** A good with an income elasticity less than one and which claims declining proportion of consumers income as he becomes richer is called a necessity good. Necessity goods are those goods where an

increase in income of a consumer leads to less than proportionate increases in the demand for a commodity. For example, daily used goods, basic goods etc. the income elasticity of demand for such goods positive and less than unity. i.e. $E_y < 1$.

- b. **Luxuries goods:** A good having income elasticity more than one and which therefore bulks larger in consumers budget as he becomes richer is called a luxury good. Luxuries goods are those goods where a change in income leads to direct and more than proportionate change in quantity demand for a commodity. For example, diamonds, expensive cars, etc. Thus, income elasticity of demand for such goods is positive and greater than one i.e. $E_y > 1$.
- c. **Comfort goods:** Comfort goods are those goods where change in income leads to direct and proportionate change in quantity demanded. For example, semi-luxury goods and comfort items. Income elasticity of such goods are positive and unity. i.e. $E_y = 1$.
2. **Inferior goods:** Inferior goods are those goods are where consumer buys less of goods as his income increases. Goods having negative income elasticity are known as inferior goods. As income of a consumer increases his demand for goods shifts from inferior to superior. The income elasticity for such goods are $E_y < 0$.
3. **Neutral goods:** when a change in income of a consumer brings no change in the quantity demanded of a commodity. For example, salt, rice, pulses etc. elasticity for such goods are $E_y = 0$.

CROSS ELASTICITY OF DEMAND

Sometimes we find two goods are inter-related to each other either they are substitute goods or complementary goods. Cross elasticity of demand measures the degree of responsiveness of demand for one good in response to the change in the price of another good.

$$E_c = \frac{\text{Percentage change in quantity demanded of commodity 'X'}}{\text{Percentage change in the price of commodity 'Y'}}$$

Classification of goods based on value of cross elasticity of demand:

- a. **Substitution:** If the value of elasticity between two goods are positive the goods are said to be substitute to each other. For example, Tea and coffee, if the price of tea increases the demand for coffee increases.
- b. **Complementary:** if the value of elasticity between two goods are negative the goods are said to be complementary. For example, car and petrol, if the price of petrol increases the demand for car decreases.
- c. **Unrelated:** if the value of elasticity between two goods are zero then the goods are said to be unrelated to each other. For example, table and car, if the price of table increases there is no change in the demand for car.

PROMOTIONAL ELASTICITY OF DEMAND

It is also known as 'Advertisement elasticity'. In modern times an increase in expenditure on advertisement or promotion leads to an increase in the demand for a commodity. Promotional elasticity of demand is the proportional change in quantity demanded due to proportionate change in promotional expenditure. In other words, percentage change in the quantity of demand for a commodity divided by the percentage change in promotional expenditure shows the promotional elasticity of demand.

$$E_A = \frac{\text{Percentage change in quantity demanded}}{\text{Percentage change in advertisement expenditure}}$$

The greater the elasticity of demand, its better for a firm to spend more on promotional activities. The promotional elasticity of demand is usually positive.

CONCEPTS OF REVENUE

The term revenue refers to the income obtained by a firm or a seller through the sale of commodity at different prices. The revenue is classified as:

1. **Total revenue:** The total revenue or income earned by a firm or producer from the sale of the output he produced is called the total revenue. Thus, the total revenue is the price multiply the quantity of output.

$$TR = P \times Q$$

Where,

TR = Total Revenue.

P = Price of a commodity.

Q = Total Output sold.

Thus, Total revenue is the sum of all sales, receipts or income of a firm in the market.

2. **Average revenue:** The average revenue refers to the revenue obtained by the firm by selling the per unit of output of a commodity. It is obtained by dividing the total revenue by total unit of output sold in the market.

$$AR = \frac{TR}{Q}$$

Or

$$AR = P$$

Where, AR= Average revenue.

The average revenue curve shows that the price of the firm's product is the same at each level of output. In other words, the average revenue curve of a firm is also the demand curve of the consumer.

3. **Marginal revenue:** Marginal revenue is the additional revenue earned by selling an additional unit of the commodity. In other words, Marginal revenue is the change in total revenue due to the sale of one additional unit of output. Thus, marginal revenue is the addition commodity made to the total revenue by selling one more unit of the commodity. In algebraic terms, marginal revenue is the net addition to the total revenue by selling n units of a commodity instead of n – 1.

Thus, $MR_n = TR_n - TR_{n-1}$

Or

$$MR = \frac{\Delta TR}{\Delta Q}$$

Relationship between price elasticity and total revenue:

Elasticities of demand can be divided into three broad categories: elastic, inelastic, and unitary. An elastic demand is one in which the elasticity is greater than one, indicating a high responsiveness to changes in price. Elasticities that are less than one indicates low responsiveness to price changes and correspond to inelastic demand. Unitary elasticities indicate proportional responsiveness of either demand or supply, as summarized in the following table:

Total revenue	Change in price	Elasticity	Reasons
Increase Decrease	Fall Rise	$E_p > 1$	Percentage change in quantity demanded is greater than the percentage change in price.
Decrease Increase	Fall Rise	$E_p < 1$	Percentage change in quantity demanded is smaller than percentage change in price.
Unchanged Unchanged	Fall Rise	$E_p = 1$	Percentage change in quantity demanded is equal to percentage change in price.

Table 3.3

The relationship between the price elasticity and total revenue shows the following analysis from the above table.

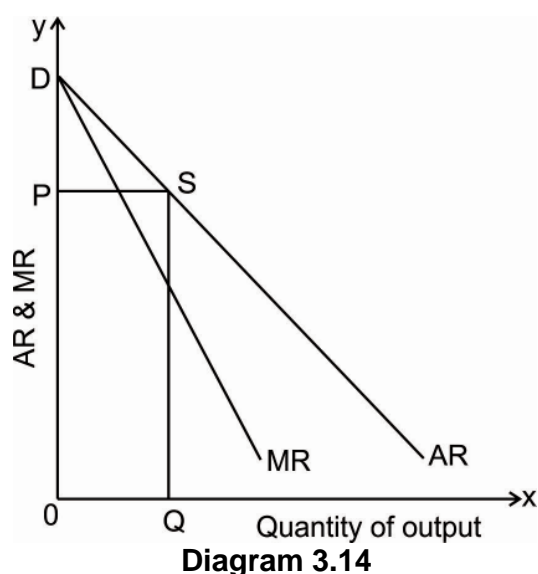
- A. When demand is elastic, price and total revenue move in opposite directions.
- B. When demand is inelastic, price and total revenue moves in same direction.
- C. When demand is unitary elastic, total revenue remains unchanged with the price changes.

This relationship can be easily understood by the following diagram: 3.14

Relationship between price elasticity and Average revenue and Marginal revenue: The relationship between AR, MR and elasticity of demand is very useful to understand at any level of output.

This relationship is also very useful to understand the price-determination under different market conditions. It has been discussed that average revenue curve of a firm is the same thing as the demand curve of the consumer for the product of the firm under market.

This relationship can be explained with the following diagram: 3.14



DEMAND ESTIMATION AND FORECASTING

INTRODUCTION

Business is a serious job. Manager or the business firms has to take certain decision to run their business smoothly without any disturbance in his business. Demand forecasting play a vital role in business planning. Business enterprises need to plan their activities. Most of the business decisions of a firm under an organization are made under the conditions of risk and uncertainty. Demand forecasting is a systematic process that involves anticipating the demand for the product and services of an organization in future under a set of uncontrollable and competitive forces in the economy. Demand forecasting helps the business firms to take appropriate decision about the production and the use of factors of production to fulfil the future demand of the commodity.

MEANING

Demand forecasting means estimation of demand for the product for a future period. Demand forecasting enables an

organization to take various decisions in business, such as planning about production process, purchasing of raw materials, managing funds in the business, and determining the price of the commodity. A business organization can forecast demand for his product by making own estimations called guess or by taking the help of specialized consultants or market research agencies.

SIGNIFICANCE OF DEMAND FORECASTING

Demand forecasting plays an important function in the management of various business decision. Forecasting help the business firm to know what is likely to happened in future and to reduce the degree of risk and uncertainty in business and to make various business policy decision and action of the future. Thus, a demand forecasting is meant to guide business policy decision.

The significance of demand forecasting are as follows:

- 1) **Fulfils the subjective:** Demand forecasting implies that every business unit starts with certain pre-determined objectives. Demand forecasting helps in fulfilling these objectives. An organization estimates the current demand for its products and services in the market and move forward to achieve the set goals. For example, an organization has set a target of selling 60, 000 units of its products. In such a case, the organization would make demand forecasting for its products. If the demand for the organization's products is low, the organization would take remedial actions, so that the set objective can be achieved.
- 2) **Production planning:** Demand forecasting is important to forecast the future production plan of business firm. There is a gestation period between production of goods and services and demand for it. Demand forecasting help to eliminate those gaps between demand and supply of goods preventing shortages and surplus.
- 3) **Distribution and avoidance of wastage of resources planning:** The business firm has to take decision regarding the distribution of capital, machinery, raw material in the production process. So that if there is any shortage of those resources can be arranged prior through estimation. Making a right and correct estimation of using resources reduces the usage of it.
- 4) **Sales distribution policy:** Sales of goods and service gives revenue to the firm's demand. Forecasting is nothing but estimating the sales of the product. To formulate realistic sales targets and to make arrangements for the movement of production for the movement of product region wise, demand forecasting is very essential. This can help to formulate an effective sales policy, and therefore, to increase sales revenue.

- 5) **Price policy:** The firm has to make decision regarding the price of goods and services which is a critical job. The firm has to make appropriate price policy so that there is no price fluctuation in the future.
- 6) **Reduce business risk:** Every business has certain risk. Demand forecasting help the business firm to make appropriate business decision to reduce such risk and uncertainty to a certain extent.
- 7) **Inventory planning:** Inventories are goods and raw materials held by the firm future sale. Demand forecasting helps in devising appropriate inventory management policies.

STEPS IN DEMAND FORECASTING

The demand forecasting finds its significance during large- scale production of goods and services. During such period of time firms may often face difficulties in obtaining a fairly accurate estimation of future demand. Thus, it is essential for a firm to forecast demand systematically and scientifically to arrive at desired objective. Therefore, the following steps are to be taken to facilitate a systematic demand forecasting:

1. **Determining the objective:** The very first step in demand forecasting is to determine its objective of forecasting. The objective for which the demand forecasting is to be done must be clearly specified. The objective of forecasting may be defined in terms of; long-term or short-term demand, the whole or only the segment of a market for a firm's product, overall demand for a product or only for a firm's own product, firm's overall market share in the industry, etc. The objective of the demand must be determined prior in the process of demand forecasting begins as it will give direction to the whole research.
2. **Nature of forecast:** After determining the objective of forecasting the second important step is to identified the nature of demand forecasting. Its based on the nature of forecasting.
3. **Nature of commodity:** While forecasting it is important to understand the nature of the product whether it is consumer

goods or producer goods, perishable goods or durable goods. If the good is perishable the forecasting is to be done in a short period of time and for durable goods it may be done in long run.

4. **Determinants of demand:** Determinants of demand play an important role in determining the forecasting as different commodity have different factor determination of demand which depends upon the nature of commodity and nature of forecasting. The important determinants are price of the commodity, price of related goods, income of a consumer etc.
5. **Identifying the relevant data:** Necessary data for the forecasting are collected, then tabulated, analysed and cross- checked by the firm. The data are interpreted by applying various statistical or graphical techniques, and then to draw necessary deductions there from. The forecaster has to decide whether to choose primary or secondary data. The primary data are the first-hand data which has never been collected before. While the secondary data are the data already available. Often, data required is not available and hence the data are to be adjusted, even manipulated, if necessary, with a purpose to build a data consistent with the data required. Then after collecting the relevant data from different sources and proceed for the further step.
6. **Selecting the method:** After collecting the relevant data the firm choose the appropriate method of forecasting the demand. Appropriate method of sales forecasting is selected by the company considering the relevant information, purpose of forecasting and the degree of accuracy required. The choice of method has to be appropriate and logical. If the required data is not available toward the method, the forecaster may force to use less reliable method. The forecaster should use a method which should not be too time consuming and it should be reliable for long term.
7. **Testing accuracy:** After making a choice of method the forecaster needs to test the accuracy of it. There are various methods choose to test the accuracy. This testing helps to reduce the margin of error and thereby helps to improve its validity for the purpose of decision making
8. **Evaluation and conclusion:** the last and final step are to evaluate the forecasting and to draw a conclusion from it.

METHODS OF DEMAND FORECASTING

The main challenge to the forecaster while forecasting the demand is to select an effective technique or method. Broadly speaking methods of demand forecasting are classified into Qualitative methods and Quantitative methods. Which can also be

classified as Survey method and Statistical method. The forecaster may choose any of the method depending upon the data which is available. Under these two broad categories, there are other specific methods which is been choose to analysis the data. These two methods will be discussed below:

- A. Survey method:** This method is also called as qualitative method of demand forecasting. This method is one of the most common and direct method of demand forecasting in the short run. In this method the future purchase plans of the consumers and their aims are included. An organization conducts these surveys with consumers to determine the demand of their existing products and services and forecast the future demand of their product accordingly.

The forecaster may undertake the following survey methods:

- a) Expert's opinion:** This method is based on the opinion of expert who predict the demand for a product based on his experiences and his knowledge in the particular specialised field. The expert may be from the same organisation or may be hired from outside. They may be salesman, sales manager, marketing expert, market consultant etc they act as experts who can assess the demand for the product in different areas, regions, or cities. This method involves the opinion of three or four experts. Each expert will be asked about his opinion regarding the demand for the product and the expert through his personal experience give his opinion for the product and forecast the demand. This method is very simple to use and it requires less statistical work. Due to expert's personal views the time for forecasting is short and the cost involve is also low. On the other side as its expert's personal opinion or guess where its likely to be biased.
- b) Delphi method:** Delphi method is a group decision-making technique of forecasting demand. In Delphi method, a group of experts gives their opinion on the demand for the products of individual firm in future based on questions which have been asked by the firm. These questions are repeatedly asked until a result is obtained. In addition, each and every expert is provided information regarding the estimates made by other experts in the group, so that he/she can revise his/her estimations with respect to others' estimates. In this way, the forecasters cross check among experts to reach more accurate decision making. The main advantage of this method is that it is time and cost effective as a number of experts are approached in a short time without spending much time on other resources. However, this method may lead to appropriate decision making. This method allows the forecaster to solve the problem to the experts at once and have instant response. But the success of this method depends upon the skills, experience, knowledge, and aptitude of the expert.

- c) **Consumer survey method:** In this method, the consumers are directly approached to unveil their future purchase plans. This method is the most direct method because forecasting is done by interviewing all consumers or a selected group of consumers out of the relevant population through various other methods of survey. The firm may choose for complete enumeration method, sample survey method and end use method for sample surveys depending upon the nature of forecasting. The following methods are described in brief below:
- i. **Complete enumeration method:** Under the Complete Enumeration Survey, the forecaster undertakes the survey of the whole population who demand for the commodity. The firm may go for a door to door survey by making questionnaire to get the data requires. This method has an advantage of first hand data, unbiased information, yet it has its share of disadvantages also. The major limitation of this method is that it requires lot of resources, manpower and time period. There may be a chance where the consumer or the population may give false statement or may deliberately misguide the investigators due to which there may be chance of data error. In this method, consumers may be unwilling to reveal their purchase plans due to personal privacy or commercial secrecy.
 - ii. **Sample survey method:** This method is also known as test market. In this method the forecaster selects the samples of consumer from the relevant population instead of considering the whole population. If sample is the true representative of data, there is likely to be no significant difference in the results obtained by the survey. Apart from that, this method is less tedious and less costly than the complete enumeration method. A sample survey technique is a variant of test marketing. Product testing basically involves employing the product with a number of users for a set of periods of time. Their reactions to the product are noted after a period of time and an estimate of likely demand is made from the result. These are suitable for new products or for completely modified old products for which there is no prior data available. It is a more scientific method of estimating like demand because it stimulates the national launch in a very closely defined geographical area. There can be a sampling error in this method as the size of sample is small
i.e. smaller the size of sample larger the sampling error.
 - iii. **End-use method:** This method is quite useful for industries which are mainly producer's goods and when a product is used for more than one use. In this method, the sale of the product is projected on the basis of demand survey of the industries which are using this product as an intermediate product, that is, the demand for the final product is the end user demand of the intermediate product which are used in the production of this final product is considered. The end use method of demand estimation of an intermediate product may involve many final

good industries using this product at home and abroad. It helps us to understand inter-industry' relations. The major efforts required by this type of method are not in its operation but in the collection and presentation of data. This will help the forecaster to manipulate the future demand. This policy helps the government to frame many of its policies. Its major limitations are that it requires every firm to have a plan of production correctly for the future period.

d) Market experiments: This method involves collecting necessary information regarding the current and future demand for a product in the market. This method carries out the studies and experiments on consumer behaviour under actual market conditions. In this method, some areas of markets are selected with similar features, such as income level, population, cultural and political background, and tastes of consumers. The market experiments are carried out with the help of changing prices and expenditure, so that the resultant changes in the demand are recorded. These results help in forecasting future demand.

- i. **Actual market experiment:** This method is conducted in the actual market place in several ways. One method is to select several market or stores with similar characteristics. This method is very useful in the process of introducing a product for which no other data exist.
- ii. **Simulated market experiment:** This method is also called as consumer clinic or laboratory experiment. Under this method the firm make a set of consumers and give them a sum of money and asked them to shop in a stimulated store. While shopping the consumer reaction towards the change in price of a product, packaging, advertisement etc are taken into consideration.

B. Statistical methods: This method is also called as quantitative method. Statistical method is most useful in demand forecasting. In order to key objectivity, that is, by consideration of all implications and viewing the problem from an external point of view, the statistical methods are used to forecast the demand of the product to get the accurate solution to the problems. The following are some statistical methods which are been used now a day:

- i. **Trend method:** A firm existing for a long time will have its own data regarding sales for past years. Such data when arranged in a chronologically manner will yield what is referred to as 'time series'. Time series method shows the past sales with effective demand for a particular product under normal conditions. Such data can be given in a tabular or graphic form for further analysis. This is the most popular method among business firms, partly because it is simple

and cheap and partly because time series data often show a persistent growth trend. Time series has got four types of components namely, Secular Trend (T), Secular Variation (S), Cyclical Element (C), and an Irregular or Random Variation (I). These time elements are expressed by the equation $O = TSCI$. Secular trend refers to the long run changes that occur as a result of general tendency. Seasonal variations refer to the changes in the short run weather pattern or the social habits. Cyclical variations refer to the changes that occur in industry during a depression and boom period. Random variation refers to the factors which are generally able such as wars, strikes, natural calamities such as flood, famine and so on. When a prediction is made the seasonal, cyclical and random variations are removed from the observed data. Thus, only the secular trend is left. This trend is then projected. Trend projection fits a trend line into a mathematical equation. The trend can be estimated by using any one of the following methods:

(a) The Graphical Method: Graphical method is the simplest technique to determine the trend analysis. All values of output or sale of product for different years are plotted on a graph and a smooth free hand curve is drawn passing through as many points as possible on the graph. The direction of this free hand curve is either upward or downward and shows the possible trend.

(b) The Least Square Method: Under the least square method of forecasting, a trend line can be fitted to the time series data with the help of statistical techniques such as least square method of regression. When the trend in sales over time is given by straight line, the equation of this line is in the form of: $y = a + bx$. Where 'a' is the intercept and 'b' shows the impact of the independent variable. We have taken two variables i.e. the independent variable x and the dependent variable y. The line of best fit establishes a kind of mathematical relationship between the two variables v and y. This is expressed by the regression y on x.

In order to solve the equation $v = a + bx$, we have to make use of the following normal equations:

$$\sum y = na + b \sum X$$

$$\sum xy = a \sum x + b \sum x^2$$

- II. Regression method:** regression methods attempts to assess the relationship between at least two variables (one or more independent and one dependent), the purpose is to predict the value of the dependent variable from the specific value of the independent variable. The foundation of this

prediction generally is historical data. This method starts from the assumption that a basic relationship exists between two variables. An interactive statistical analysis computer package is used to formulate this mathematical relationship.

SUPPLY AND PRODUCTION DECISIONS

MEANING OF PRODUCTION

The term 'production' is very important and broader concept in economics. To meet the daily demand of a consumer production is essential part. Production is a process by which various inputs are combined and transformed into output of goods and services, for which there is a demand in the market. In other words, Production is a process of combining various material inputs and immaterial inputs in order to make something for consumption. The essences of production are the creation of utilities and the transformation of inputs or resources into output. Inputs are the

resources used in the production of goods and services the important resources or input in production are land, labour, capital, and entrepreneur. Production process creates economic well-being into the nation. Thus, production is a process which creates utility and value in exchange.

The theory of production function is concern with the problem in the production process in a certain level of output. It analyses the relation between cost and output and help the firm to determine its profit. All firms that aims at maximising their profit must make their decision regarding production on the bases of the following three decision:

- a. How much output to produce and supply in the market?
- b. How to produce the product, i.e. which technique of production or combination of production to used have to be decided?
- c. How much quantity of input is demanded to produce the output of the product?

Thus, the above three decisions are interrelated and have to be taken by the firm during the production process.

PRODUCTION FUNCTION

In economics, a production function is the functional relationship between physical output of a production process to physical inputs or factors of production. In other words, production function denotes an efficient combination of input and output. The factors which are used in the production of goods and services are also called as agents of production. Production function of a business firm is determined by the state of technology. More specifically, production function shows the maximum volume of physical output available from a given set of inputs, or the minimum set of inputs necessary to produce any given level of output.

Definition: With the above statements we can define the production function as: “A production function refers to the functional relationship, under the given technology, between physical rates of input and output of firm, per unit of time”.

Mathematically, production function can be express as: $Q = f(N, L, K, E, T, \text{etc.})$

TYPES OF PRODUCTION FUNCTION

- I. The production function can be broadly categorised into two based on the time period** i.e. a) Short run production function and b) long run production function.

A) Short run production function: The short run is defined as the period during which at least one of the input is fixed. According to the following short-run production function, labour is the only variable factor input while the rest of the inputs are regarded as fixed. In other words, the short run is a period in which the firm can adjust production by changing variable factors such as materials and labour but cannot change fixed factors such as land, capital, etc. Thus, in short-run some factors are fixed and some are variable.

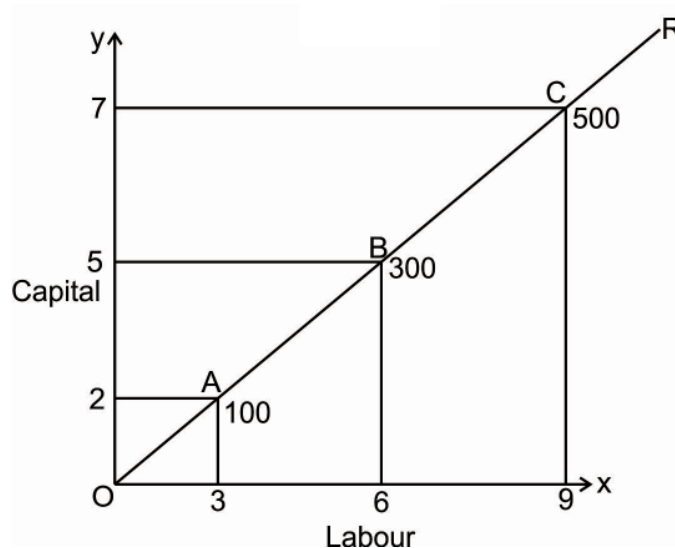
B) Long run production function: The long run production function is defined as the period of time in which all factors of production are variable. In the long run there is no distinction between the fixed or variable factor as all factors in the long run are variable.

II. The production function can also be classified on the basis of factor proportion i.e.

a) Fixed proportion production function and b) Variable proportion production function.

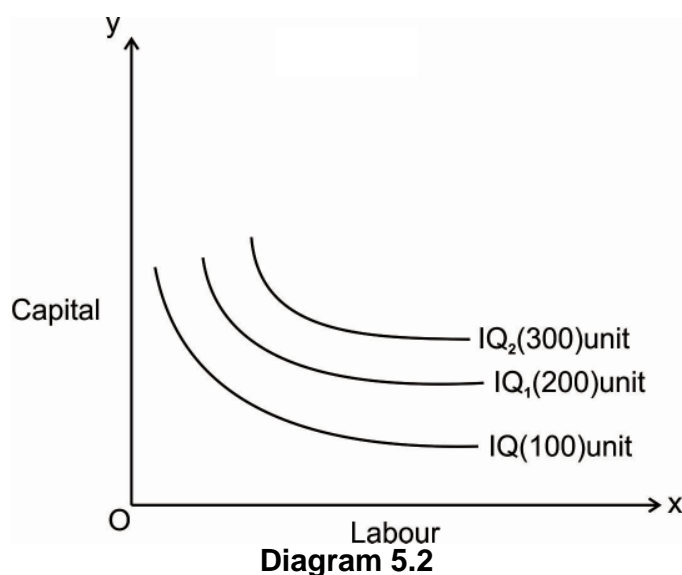
A. Fixed proportion production function: The fixed proportion production function, also known as a Leontief Production Function which implies the fixed factors of production function such as land, labour, raw materials are used to produce a fixed quantity of an output and these factors of production function cannot be substituted for the other factors. In other words, in such factors of production function fixed quantity of inputs is used to produce the fixed quantity of output. All factors of production are fixed and cannot be substituted for one another. The concept of fixed proportion production function can be further explained with the help of a **Diagram 5.1** as shown below:

Diagram 5.1



B. Variable proportion production function: The variable proportion production function supposes that the ratio in which the factors of production such as labour and capital are used in a variable proportion. Also, the different combinations of factors can be used to produce the given quantity, thus, one factor can be substituted for the other factor. In the case of variable proportion production function, the technical Coefficient of production function is variable, i.e. the important quantity of output can be achieved through the combination of different quantities of factors of production, such as these factors can be varied by substituting one factors to the other/ factors in its place.

The concept of variable proportion production function can be further explained from an isoquant curve, as shown in the **Diagram 5.2** below:



In the above diagram, the isoquant curves show that the different combinations of factors of technical substitution shows that it can be employed to get the required amount of output in the production process. Thus, for the production of a given level of product, the input factors can be substituted from another factor input.

LAW OF VARIABLE PROPORTION

The law of variable proportion is a short run production function theory. This law plays a very important role in the economic theory, which examines the production function with which one variable factor keeping the other factors input fixed. This law is explained by the classical economists to explain the behaviour of agricultural output. In other words, it examines the

behaviour of the production in the short-run when the quantity of one factor is varied, keeping the quantity of another factor's constant. Thus, the law of variable proportion is the new name for the famous theory "The Law of Diminishing Marginal Returns" of classical economist.

Alfred Marshall, had discussed the law in relation to agriculture, according to him, "an increase in the capital and labour applied in the cultivation of land causes in general a less than proportionate increase in the amount of product raised unless it happens to coincide with an improvement in the art of agriculture". Marginal productivity of labour in agriculture is zero.

Assumptions: The law of variable proportion is based on the following assumptions:

- a. The state of technology is assumed to be given and constant.
- b. There must be some inputs whose quantity must be kept as fixed or constant. Such input factors are called fixed factors.
- c. All units of variable factors inputs are homogenous.
- d. The law is based upon the possibility of varying the proportions in which the various factors can be combined to produce the level of output. Let us assume the labour is the variable factor in our explanation.

Change in output due to increase in variable factors can be explain with the table given below:

Units of Variable factor (LABOUR)	Total Product (TP)	Average Product (AP)	Marginal Product (MP)
0	0	0	-
1	5	5	5
2	12	6	7
3	27	9	15
4	48	12	21
5	75	15	27
6	80	13.33	15
7	91	13	11
8	98	12.5	7
9	98	10.8	0
10	92	9.2	-6

Explanation of the table:

In the above table the labour is considered as a variable factor and all other factors are assumed to be constant according to the law. With the increase in the variable factor i.e. labour there is a change in the level of TP, AP, and MP.

Total product: The total product is the total amount of output produced by using all the variable input in a fixed proportion in production. The total product increases with the increase in the unit of labour and reaches to the maximum and then declines with further increase in the variable factor.

Average product: The average product is the per unit of product produced by the firm with the per unit of variable factor inputs. It is obtained by dividing the total product by the unit of total variable factor. The average product increases initially and then declines.

Marginal product: Marginal product is the additional output produced by an additional unit of variable factor. Marginal product increases and thereafter falls when TP becomes maximum MP becomes zero and further becomes negative.

Diagram: the law of diminishing marginal returns can be explained with the following diagram:

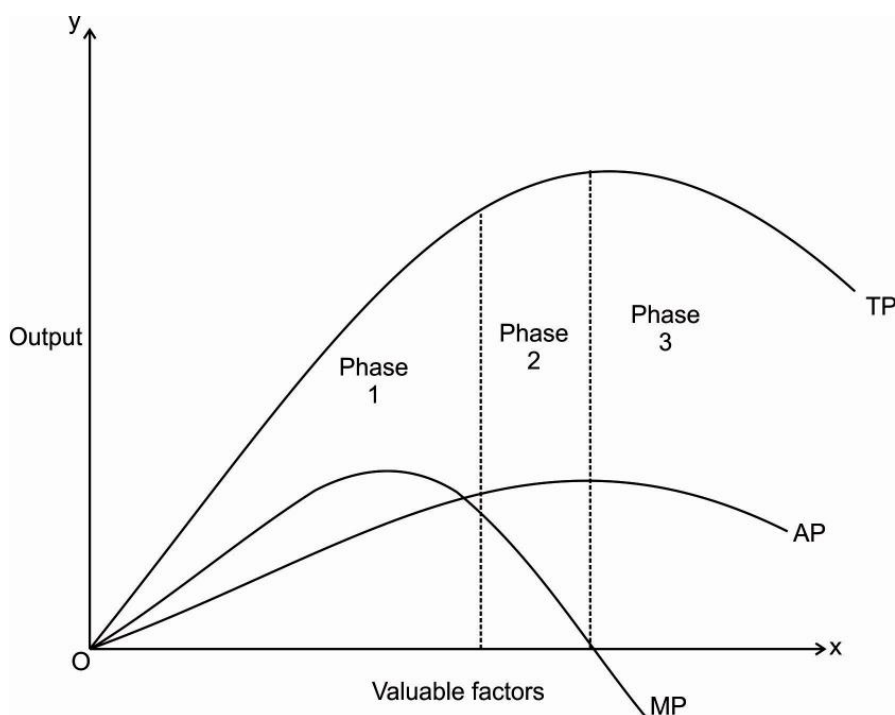


Diagram 5.3

The above diagrams show three phases with the changes in the output can be explained below:

Phase 1: In phase 1 the total product is increasing at increasing rate where average product is also increases at a diminishing rate and reaches at its maximum and marginal product increases initially and then decreases.

Phase 2: In phase 2 the total product increases at a diminishing rate and reaches its maximum point. Where the average product is starts declining and the marginal product diminishes and become zero.

Phase 3: In this phase total product starts declining. Where average product is continuously declining and marginal product becomes negative.

LAW OF RETURNS TO SCALE

As the law of variable proportion is a short run production function theory, law of returns to scale is a long run production function theory. In this theory all factors of production are variable no factors are fixed. With the change in the factors of production scale of production will change accordingly.

According to Koutsoyiannis "The term returns to scale refers to the changes in output as all factors change by the same proportion."

Types of return to scale:

The concept of returns to scale assumes only two factors of productions i.e. capital and labour this analysis enables us to understand the change or scale in production due to change in the factors of production in terms of isoquants or equal product curves.

Increasing returns to scale: Increasing returns to scale means an increase in a level of output more than the increase in the inputs. For example, if an output increases by 35% with an increase in all inputs by only 15% increasing returns to scale prevails. In other words, a proportionate change in output brings about less proportionate change in inputs it is called increasing returns to scale. Where, $OA > AB > BC$.

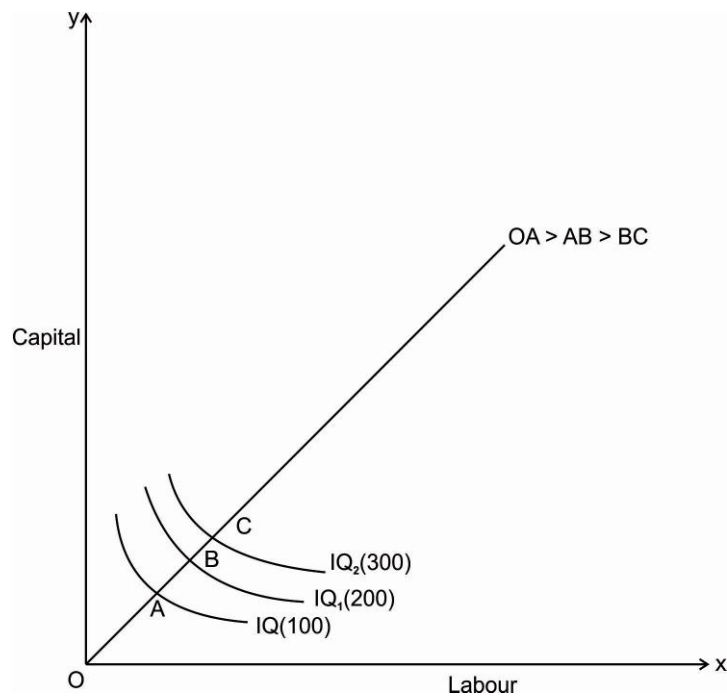


Diagram 5.4

Decreasing returns to scale: Decreasing returns to scale means an increase in a level of output less than the increase in the inputs. For example, if an output increase by 25% with an increase in all inputs by 35% decrease in returns to scale prevails. In other words, a proportionate change in output brings more proportionate change in inputs it is called decreasing returns to scale. Where $OA < AB < BC$.

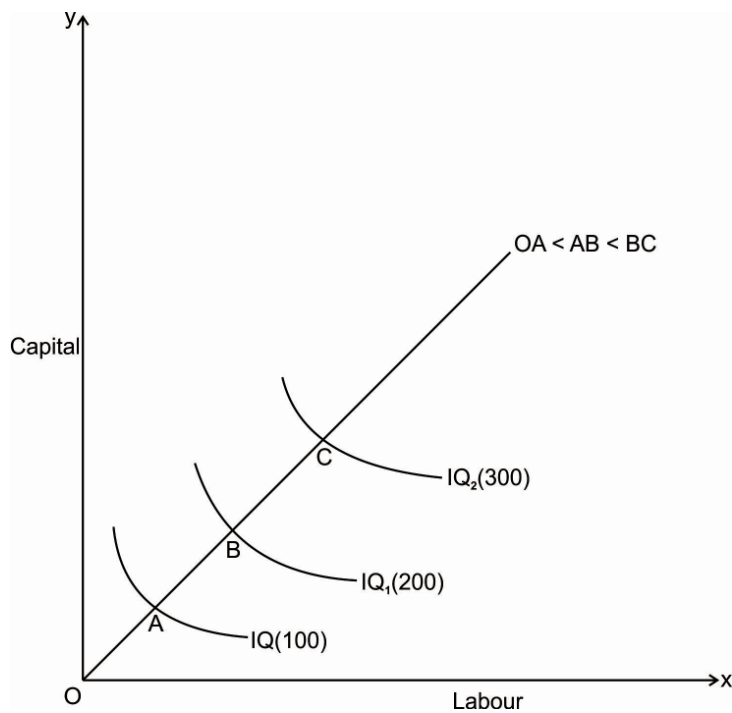
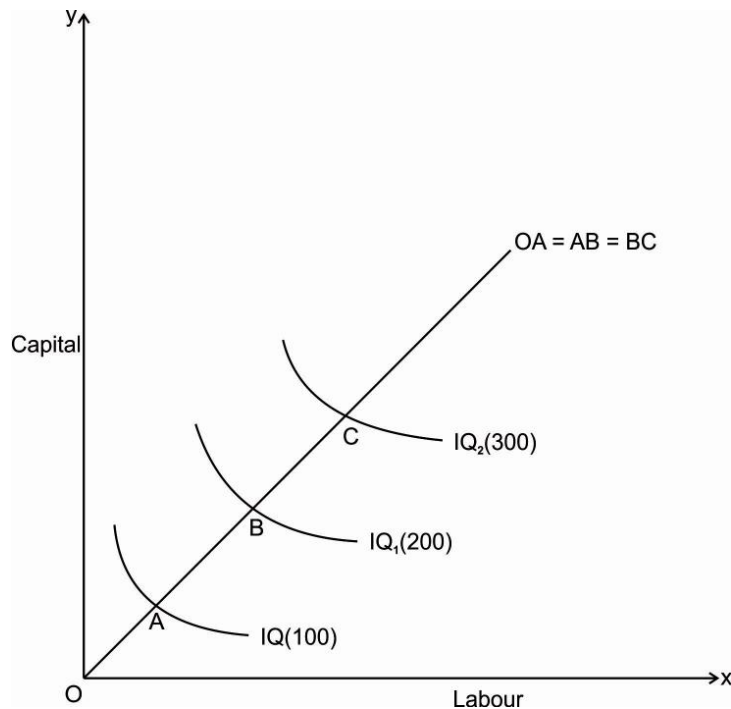


Diagram 5.5

Constant returns to scale: Constant returns to scale means an increase in a level of output is constant that the increase in the inputs. For example, if an output increase by 25% with an increase in all inputs by 25% constant in returns to scale prevails. In other words, a proportionate change in output brings constant change in inputs it is called constant returns to scale. Where $OA=AB=BC$.



ISOQUANTS

Meaning: The term “iso-quants” is derived from Greek word iso means “equal” and quants means “quantity”. Thus, iso-quant means equal quantity. An iso-quant is also known as iso-production curve, iso-indifference, equal production curve by various economists. The isoquants have its properties which are similar to those generally assumed for indifference curve theory of the theory

of consumer's behaviour analysis. Iso-quant is defined as "a locus of all the combination of two factors of production that yields that yield the same level of output."

Thus, an iso-quant is a combination of any two factor inputs that represents and produce the same level of output. Any two combinations of input factors e.g. Labour and capital are used in which one factor is increased by decreasing the other factor of input to maintain the same level of production.

Iso-quant can be explained with the schedule and graph given below:

Factor combinations to produce a given level of output.

Factor combination	Labour	Capital	Output
A	1	150	500
B	2	100	500
C	3	75	500
D	4	50	500
E	5	25	500

Table 5.2

The above table shows the five combination of inputs i.e. Labour and Factor unit which yield the same level of output of 500 units. Which says any point on the iso-quant will give the same level of output. To show this we draw the iso-quant drawn below:

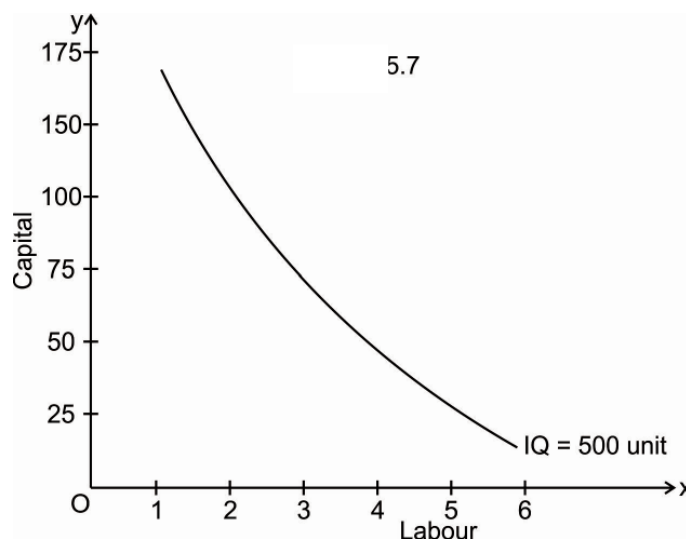
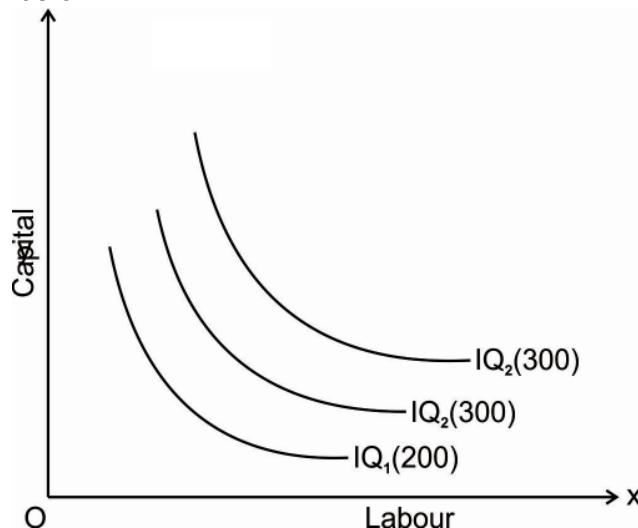


Diagram 5.7

Iso-quant map:

An iso-quant map represents a set of iso-quant curves shows the combination of input factor at the various level of output. A higher level of iso-quant represents the higher level of output. Thus, in simple word, iso-quant map is a family of iso-quant representing the various iso-quant curve at a particular level of output. The iso-quant map can be represented with the diagram given below:

**Diagram 5.8**

The fig above shows the various iso-quants representing the various level of output at different combination of input factors. IQ_1 , IQ_2 and IQ_3 shows the iso-quant which produces 100, 200 and 300 units of output respectively with the various combination of input factors which provides the same level of output at different level of Iso-quant. as we had said higher the Iso-quant represents higher the value of output.

PROPERTIES OF ISO-QUANTS

1. **Iso-quant curve slopes downwards:** The iso-quant curve slopes downwards from left to right i.e. it has a negative slope. The slope is downward because it operates under law of MRTS, when we increase labour as a factor, we have to decrease capital factor to produce a same level of output. The downward sloping iso-quant curve can be explaining the help of following Diagram 5.9.

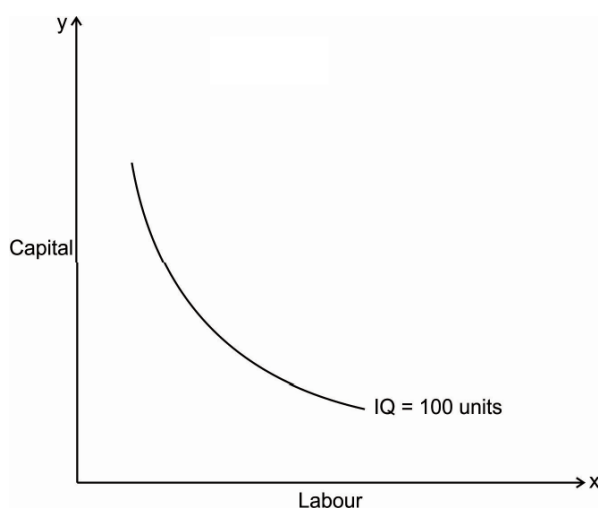


Diagram 5.9

Thus, the iso-quant can be downward sloping from left to right. There can't be an upward sloping iso-quant curve because it shows that a given product can be produced by using less of both the input factor. Similarly, an iso-quant cannot be horizontal or vertical because it also doesn't represent the equilibrium position of a firm. Only the downward sloping supply curve represents the characteristics of iso-quant.

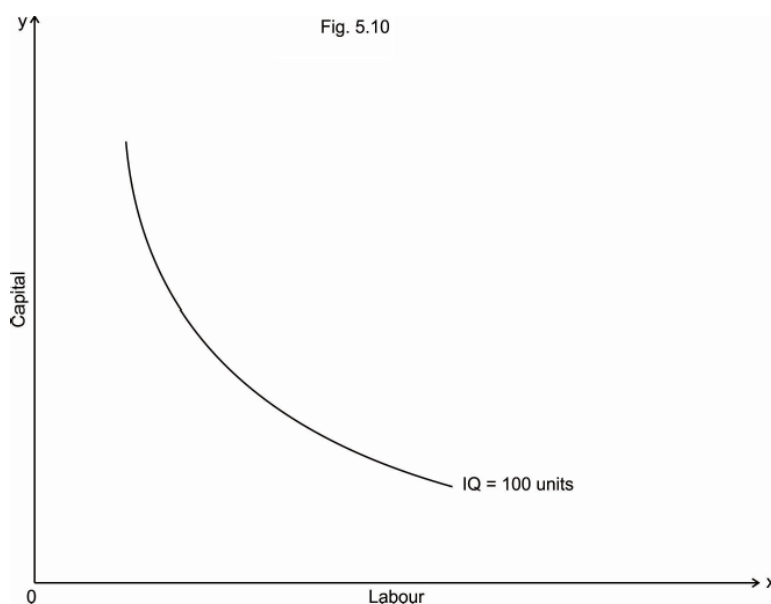
2. Iso-quant are convex to the origin: As we had discussed in the above property that the iso-quant curve is downward sloping and it has a negative slope and it operates under law of Marginal rate of Technical Substitution (MRTS). It says that it equals the ratio of the marginal product of labour and marginal product of capital i.e. one factor is given up to get one additional unit of other factor to produce the same of output which creates a convexity of iso-quant curve.

Thus, the slope of iso-quant can be represented by,

$$\frac{\Delta K}{\Delta L} = MRTS = - \frac{MP_L}{MP_K}$$

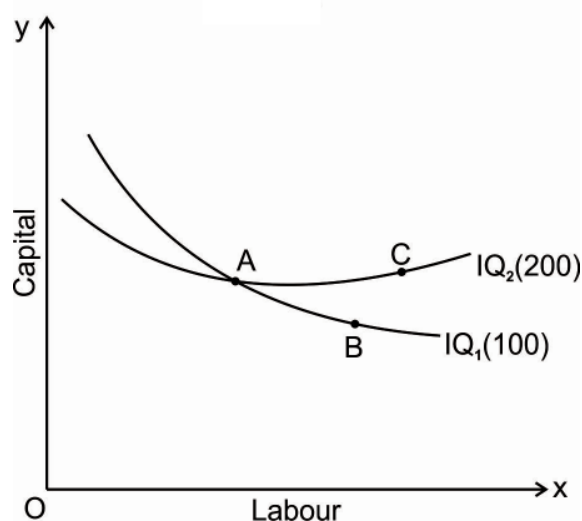
The above equation represents ratio of change in capital and labour should be equal to the ratio of the marginal rate of technical substitution of labour and capital which is equal to the ratio of marginal product of labour and capital.

The convexity of iso-quant means that as we move down the curve less and less of capital given up for an additional unit of labour so to produce the same level of output. The convexity of iso-quant can be observed from the Diagram 5.10. Given below

**Fig 5.10**

Thus, the iso-quant can be convex to the origin but not the concave because it would mean that MRTS will increase instead of decreasing i.e. labour will increase at a constant rate the amount of capital given up will goes on increasing.

3. Iso-quant do not intersect: The properties of iso-quant say that two iso-quant will never intersect each other. To explain this, we will take a help of following Diagram 5.11:

**Diagram 5.11**

The above fig represents two different iso-quant IQ_1 and IQ_2 , where it represents the level of output 100 and 200 units respectively. Point a represents 100 units of output on IQ_1 and point c represents 200 units of output on IQ_2 . The point b shows the intersection of both the iso-quant where is logically not possible to identify the level of output.

4. **Iso-quant cannot touch either of the axis:** an iso-quant cannot only touch x axis or y axis or any either axis because it will represent that the iso-quant only produce goods by using one factors of production either by using only capital or only labour which is practically not possible and which is unrealistic.

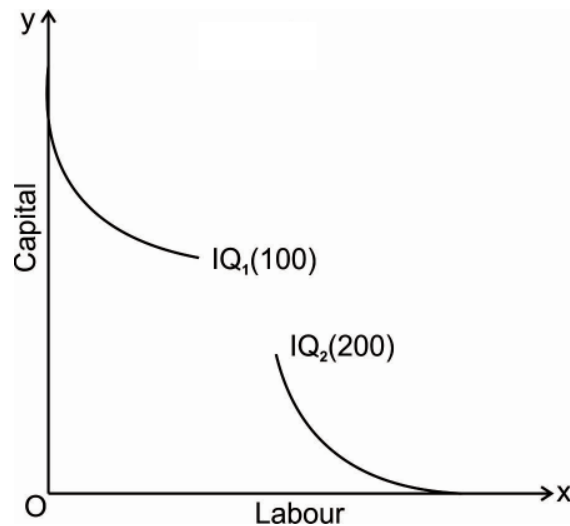


Diagram 5.12

5. **Higher the iso-quant higher the level of production:** if there is a multiple iso-quant showing different level of production in one diagram. Where the higher the iso-quant i.e. the iso-quant far from the origin indicates higher level of output and the iso-quant close to the origin indicates lower level of output.

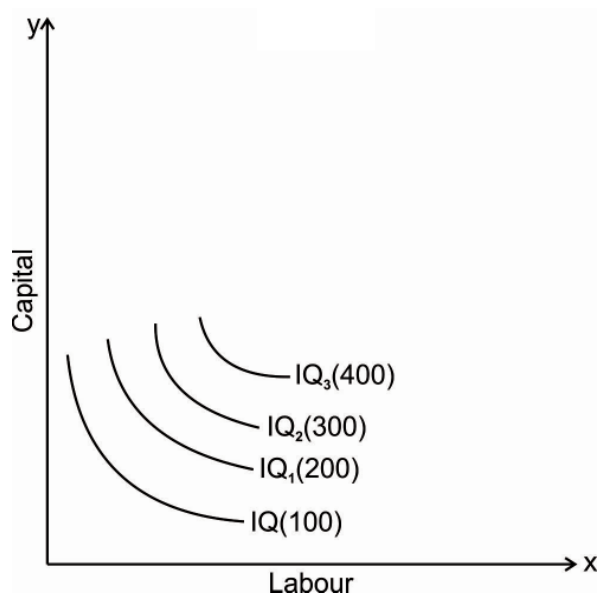


Diagram 5.13

TYPES OF ISO-QUANT

The iso-quant have various shapes which depends upon the degree of substitutability of factors in production. On the bases of that the types of iso-quant are derive. The following are the various types of iso-quant based on the degree of substitutability of substitution:

1. Liner iso-quant: if the iso-quant is liner one i.e. downward sloping straight line it assumes that there is a perfect substitutability of the factors of productions. It means that capital and labour can be easily substitute from each other. i.e. the rate at which labour can be substituted for capital in production (i.e. $MRTS_{LK}$) is constant. This can be seen from the following Diagram 5.14 given below:

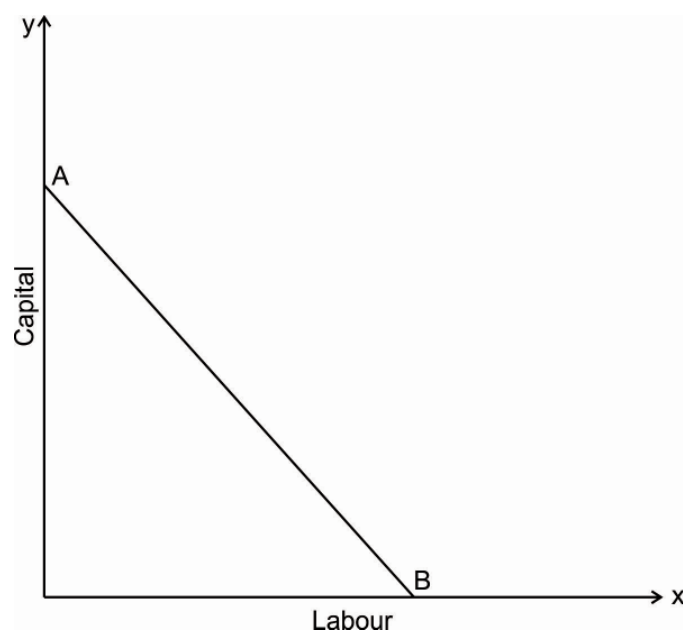


Diagram 5.14

The above diagram shows that there is a perfect substitutability of labour and capital at the points A & B where point A on iso-quant represents the level of output can be produce with capital alone i.e. without using any labour on the other hand point B represents the same level of output can be produce with labour alone i.e. without any use of capital. This in reality is not possible because no production can be done with using any of the factor alone.

2. Right angled iso-quant: if the iso-quant is right angled it assumes that there is a perfect complementarily i.e. it assumes that there is a perfect substitutability of factors of production. This shows that there is only one method is used for production of the

commodity. In this type the iso-quant is formed as right angled as shown in the following fig. which shows labour and capital are used in a fixed proportion i.e. output can be increased by increasing labour and capital in fixed proportion. This type of iso-quant is known by many names such as input-output iso-quant and Leontief iso-quant.

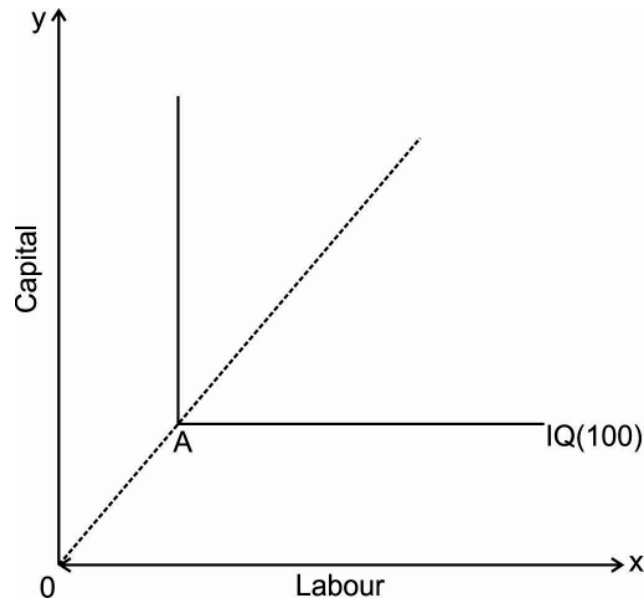


Diagram 5.15

3. Kinked iso-quant: This type of iso-quant assumes only limited substitutability only at the kinked of the iso-quant. That means the substitutability of labour and capital is only possible at the kinked of the iso-quant in the production. i.e. in the fig. the substitutability is possible at the point A, B, C and D. This type of iso-quant is also called as 'liner programming iso-quant' and it is used in liner programming.

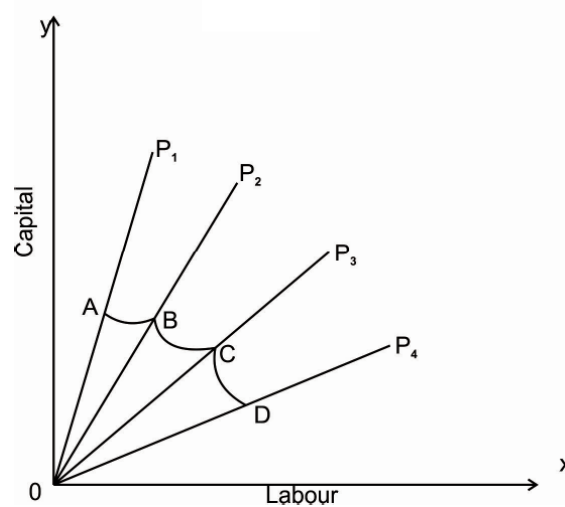


Diagram 5.16

4. Smooth convex iso-quant: The classical economic theory has adopted this type of iso-quant for analysis as its simpler to understand. This iso-quant assumes the continuous substitutability of labour and capital over a certain range beyond which there is zero substitutability of factors in production. This iso-quant fulfils all the criteria of iso-quant. The derivation of this smooth convex iso-quant is explained below:

To explain the derivation of iso-quant we assume that there is a various combination of factor inputs of labour and capital used to produce 100 units of output. The combination is a such where one factor is increased by reducing the other factor input to produce the same level of output in production. All this combination is technically efficient in production.

Various combinations of labour and capital to produce 100 units of output.

Factor combination	Labour	Capital
A	10	60
B	20	50
C	30	40
D	40	30

Table 5.3

If we plot all this combination on a graph, we get an IQ curve

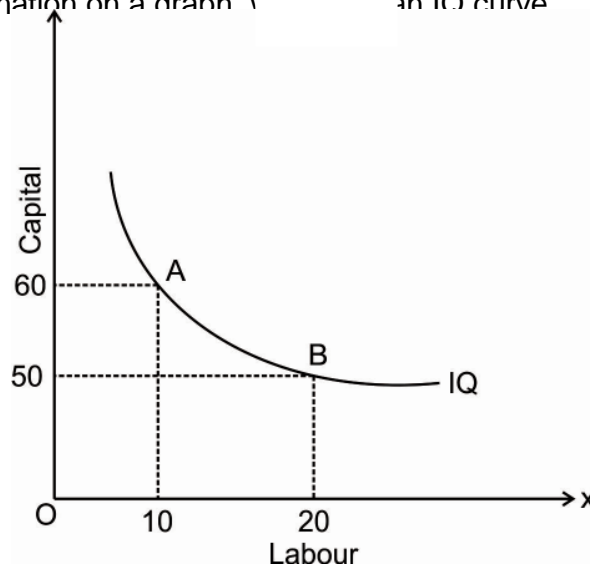


Diagram 5.17

RIDGE LINES

The ridge lines are the locus of points of an iso-quants where the marginal product of factors is zero. An isoquant is oval-shaped as shown in diagram but its area of rational operation lies between the ridge lines. The firm will produce only in those segments of isoquants which are convex to the origin and lie between the ridge lines. The ridge lines are the locus of points of isoquants where the marginal products (MP) of factors are zero. The upper ridge line implies zero MP of capital and the lower ridge line implies zero MP of labour. Production techniques are only efficient inside the ridge lines. The marginal products of factors are negative and the methods of production are inefficient outside the ridge lines. The ridge lines can be explained through the help of following diagram:

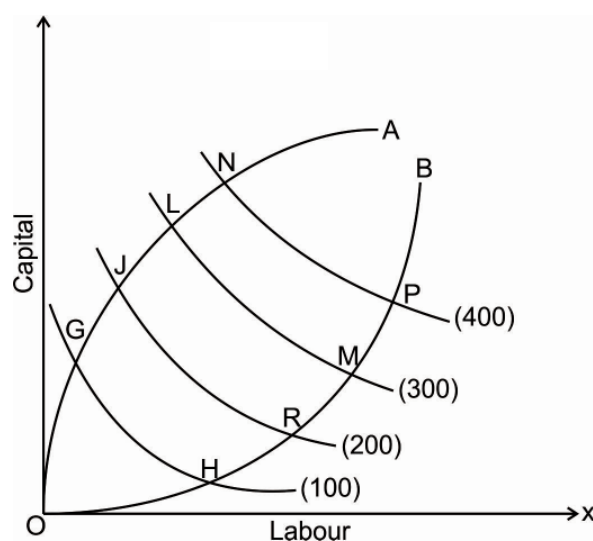


Diagram 5.18

In the above Diagram curves OA and OB are the ridge lines on the oval-shaped iso-quants and in between these lines on points G, J, L and N and H, K, M and P economically feasible units of capital and labour can be employed to produce 100, 200, 300 and 400 units of the product.

For example, OT units of labour and ST units of the capital can produce 100 units of the product, but the same output can be obtained by using the same quantity of labour OT and less quantity of capital VT. Thus, only an unwise producer will produce in the dotted region of the iso-quant 100.

The dotted segments of isoquants form the uneconomic regions of production because they require an increase in the use of both factors with no corresponding increase in output. If point

G, J, L, N, H, K, M and P are connected with the lines OA and OB, they are the ridge lines. On both sides of the ridge lines, it is uneconomic for the firm to produce while it is economically feasible to produce inside the ridge lines.

PRODUCER'S EQUILIBRIUM

Producer's equilibrium is also known as least cost combination of inputs and optimal combination of inputs. The main aim of any firm or a producer is to maximise his profit either by increasing the level of output or sale or by producing the output at lower cost. A firm by analysing its production function can choose the combination of factors inputs which cost him least in his production which is technically efficient. In this way a firm can maximise its profit. There are two ways to determine the least cost combination of factors to produce the given output. i.e.

- a) Finding the Total cost of Factor combinations.
- b) Geometrical method.

a) Finding the Total cost of factor combination: This method helps the producer to choose the combination by finding the total cost of production. The cost of each factor combination is found by multiplying the price of each factor by its quantity and then summing it for all inputs. The firm will choose those combination of inputs of which total cost is least. To explain this in detail we will explain it with the help of following illustration.

Least cost production technique

Method	Labour (units)	Capital (units)	Labour cost (100 per unit)	Capital cost (200 per unit)	Total cost
A	8	10	$8 \times 100 = 800$	$10 \times 200 = 2000$	2800
B	6	15	$6 \times 100 = 600$	$15 \times 200 = 3000$	3600

Table 5.4

The above table shows two methods of production A and B. There are two factors of production labour and capital. The producer has to choose any to the combination or method where the cost of labour per unit is 100 Rs and cost of capital per is 200 Rs. If the firm choose method A where he can use 8 units of labour and 10 units of capital where the total cost of production is 2800 Rs. And if he chooses method B where he can 6 units of labour and 15 units of capita to produce the same level of output and where the cost of production is 3600 Rs. It is efficient for the firm to choose method A then B because the same level of output can be produced at a leaser cost with method A.

b) Geometrical method: Another important method to determine the least cost combination of factors is geometrical method. It is the easiest method to explain with the help of iso-quant map and iso- cost line. We explain both this method in detail below:

Iso-quant map: As we have already explained what iso-quant map is. It shows all the possible combination of factors that can be produce at different level of output. This is shown in fig. higher the iso-quant represents higher the level of output. In other words, iso- quant closer to the origin denotes a lower level of output.

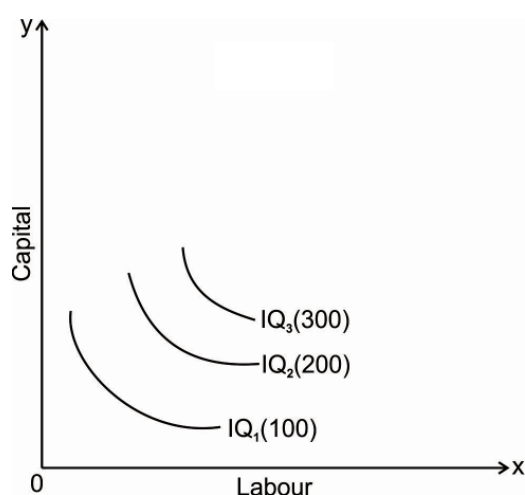


Diagram 5.19

Iso-cost line: The iso-cost line is similar to as budget line or price line of consumer theory. Iso-cost line may be defined as the line which shows different possible combinations of labour and capital that a producer can afford to buy given his total expenditure to be incurred on these factors and price of the factors. In other, it is the line which shows the various combinations of factors that will result in the same level of total cost. It refers to those different combinations of two factors that a firm can obtain at the same cost. Iso-cost line can be explained with following Diagram 5.20

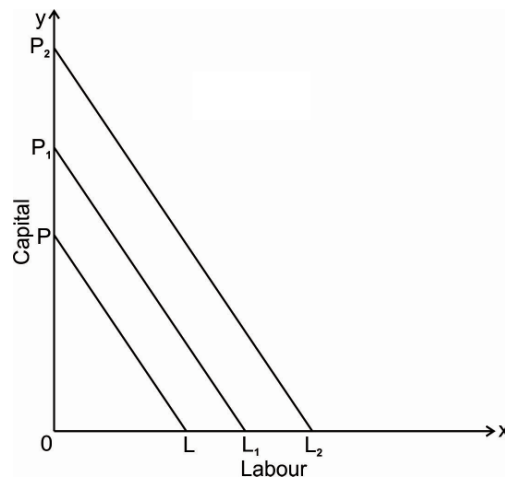


Diagram 5.20

In the above fig the line AB is the iso-cost line which shows a firm can hire OA of capital OB of labour or any combination of capital and labour on AB curve. Thus, iso-cost line is the locus of all those combinations of labour and capital which, given the prices of labour and capital, could be brought for a given amount of money. The slope of the iso-cost line is equal to the ratio of the factor

prices, that is, the slope of the iso-cost line $\frac{P_K}{P_L}$.

Where, P_L is the price of labour and P_K is the price of capital.

If the money to be spend on the factors increases the iso- cost line will shift to the right and it denotes that, with the given factor prices, the firm could buy more of the factors. The iso-cost lines closer to the origin show a lower total cost outlay.

Optimal input combination for minimising cost:

If the firm has to produce a product with the given output by the minimum cost, he will choose optimal minimising cost method. In this method the firm will minimise its cost at the point where the iso quant is tangent to the iso cost line. To explain this, we will take a help of the following Diagram 5.21 given below:

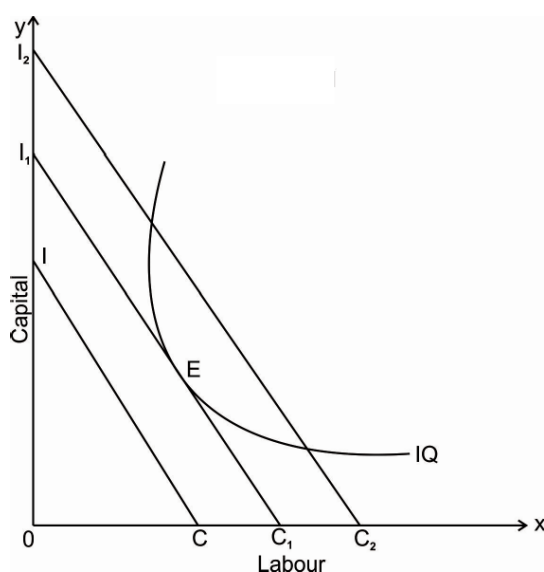


Diagram 5.21

Explanation of the diagram:

Labour is taken on X axis where the capital on Y IC, I1C1, and I2C2 are the family of Iso-cost lines. IQ denotes the single iso-quant which produces the desired level of output. The iso cost line having a same slope because the factor price is assumed to be constant. The firm minimises its cost at the point 'E' where the iso-quant IQ and Iso cost I1C1 are tangent. It shows the producer can produce the given output by using minimum quantity of input at minimum or least cost.

Thus, at the point 'E' at the point of tangency the ratio of the marginal product of two factors i.e. labour and capital is equal to the ratio of their factor prices. To illustrate,

$$\frac{MPL}{MPK} \square \text{ Slope of isoquant.}$$

$$\frac{PL}{PK}$$

$$\square \text{ Slope of iso-cost line}$$

$$\frac{PL}{PK}$$

Optimal input combination for maximisation of output:

In this method the firm has to maximise its output for a given cost. The equilibrium condition in this method is the same as the minimisation method of output. But the maximisation of output method is conceptually different than the minimisation method. The following concept can be explained by the given diagram below:

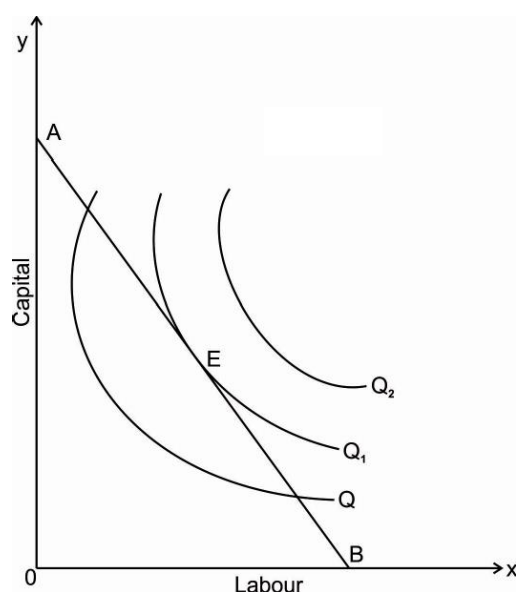


Diagram 5.22

Explanation of the diagram:

Labour is taken on the X axis and capital on Y axis. AB is the firm's Iso-cost line. Q, Q₁, Q₂ is the iso-quant.

The maximum level of output a firm can produce is at the point 'E' where the iso-quant Q₁ is tangent to the iso-cost line AB. The point above the 'E' will be on the Iso-quant Q₂ which is higher but not attainable for the firm and iso-quant below the point 'E' is less productive.

Thus, the above two analysis minimisation output and maximisation of output helps the firm to maximise their profits according to the factor cost or factor prices.

EXPANSION PATH

Expansion path is also called scale line. The expansion path is so called because if the firm decides to expand its operations, it would have to move along this path. The expansion path in simple word is defined as the locus of the points of tangency between the isoquants and iso-cost lines. The expansion paths show how a business firm tries to expand his output in the long run with the given factor prices and the given various factor combinations. This can be explained with the following diagram given below:

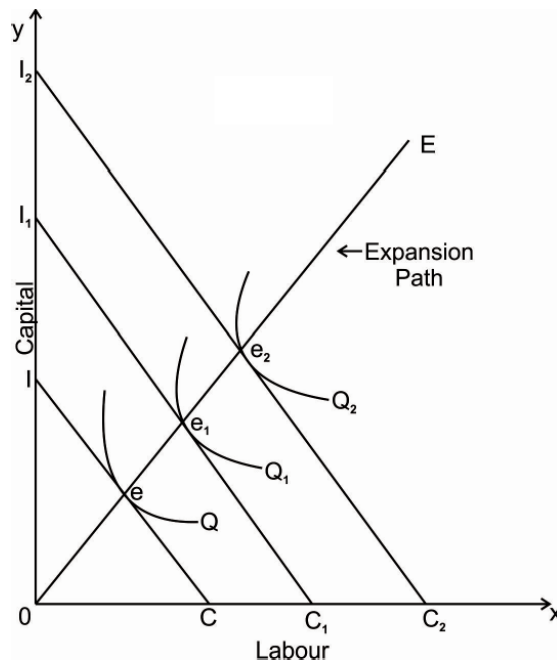


Diagram 5.23

Explanation of the diagram:

X axis examines Labour and Y axis Capital. IC, I₁C₁ and I₂C₂ are the iso-cost line parallel to each other which shows factor prices are assumed to be constant. Q, Q₁ and Q₂ are the Iso-quant. 'e' is the point of tangency which shows a firm can produce Q level quantity of output with least cost and least combination of factors of production. Similarly, if firms want to increase his level of output, he will be on point e₁ and point e₂ for the maximum level of output at minimum cost and minimum level of factor inputs. If we join all this tangency point E, E₁ and E₂ we will get a line OE called as expansion path or scale line. It is important to note that at the tangency point e, e₁ and e₂ the marginal rate of technical substitution of labour for capital is equal to the ratio of factor prices. Expansion path helps the business firm to find the cheapest way to produce each level of output with given factor price. It helps the firm to produce those level of output with the least cost and by using the least factor combination of input.

ECONOMIES OF SCALE AND DISECONOMIES OF SCALE

INTRODUCTION

Adam Smith in his famous book 'Wealth of the Nation' 1776 analyse the advantages of Division of labour which is capable of generating economies of scale in static as well as in dynamic sense. Economies of scale is a real phenomenon to the real-world situation which helps to understand the real situation in the world economy. In microeconomics, economies of scale is a cost advantage method of production where the firm operates its level of output by producing the scale of operation with cost per unit of output decreases with the increasing scale of output. Where the diseconomies of scale are the opposite of economies of scale.

ECONOMIES OF SCALE

According to Alfred Marshall Economies of scale are broadly classified into Internal economies of scale and external economies of scale. In the large-scale production, the cost of production should be low which is called as economies of scale. A firm enjoys internal economies of scale when he expands his size or scale of

production in economy by making changes in the internal factors of production. Where on the other hand a firm enjoy internal economies of scale when he expands his size of production in economy by making changes in the external factors of production. So now we will explain both internal and external economies of scale in details.

INTERNAL ECONOMIES OF SCALE

Internal economies of scale are an increase in the scale or size of production or output of a firm these are solely enjoyable by firm independently by making changes in the input factors of production into his business. The internal economies of scale have various different types which are as follows:

- 1) **Labour economies:** Adam smith in this book “An inquiry into the nature and causes of the wealth of the nation” 1776 emphasised on the division of labour. Economies of labour also implies the benefit which is arising in the scale of economy due to division of labour. Division of labour increases the efficiency in production which leads to increase in the size of output. Division of labour bring specialisation in labour skills and also saves time which in turn increases the level or scale of output. Thus, with the specialisation of division of labour the firm produces large scale of production.
- 2) **Technical economies:** technique of production also increases the scale of production. In other words, technical economies refer to increase in the scale of production due to change in technical or methods of production which reduces the cost of production. Technical economies increase the dimension of firms where the average cost of production decreases and average revenue will be high.
- 3) **Managerial economies:** Manager plays an important role in managing business activities. Managerial economies refer to the specialisation of managerial function which increases the level of output. It is a managers duty to carry out all the managerial decision efficiently and effectively in the business organisation. Division of managerial activities increases the management of the business efficiently.
- 4) **Financial economies:** finance plays an important role in process of production. It is one of the important and essential factors of production. It is always observed that the large firms enjoy the benefit of better credit facility from banks then the small- scale firm. They also get the credit quickly and easily then the small firm or producer.

5) Marketing economies: marketing economies deals with the process of buying raw materials and selling of finished goods. A large firm have a great bargaining power. By using firm raw material at cheaper cost because it buys in bulk then the small firm. This in turn helps him to produce more at less cost and sell large amount of output in the market than the small firm.

6) Transport and storage: The large-scale firm have its own transport and storage facility which reduces his transportation and storage cost. This reduces the average cost of large-scale firm and increase the scale of output or revenue. Where the small-scale firms hire or pay rent for the use of transport and storage facility.

INTERNAL DISECONOMIES OF SCALE

If the firm is unable to manage the level of output or the scale of operation diseconomies of scale occurs. If firm do not understand the importance of the specialisation of division of labour and specialisation of division management activities the level of output or scale of operation decreases leads to diseconomies of scale in economy. Suppose a firm take huge amount of loan from a financial institution or banks to expand his level of output. Such loan increases the burden on firm to prove their credit leads to financial diseconomies of scale.

EXTERNAL ECONOMIES OF SCALE

External economies of scale refer to those economies which provides benefits and facilities to all firms of given industry. It is an economy which is enjoyed by all firms of industry irrespective of their size of operation. External economies of scale are also of various types which are follows:

1) Localisation economies: when a number of firms are located on one place with an objective of deriving the mutual benefits of training of skilled labour, provision of better transport facility etc. all these advantage helps the firm to reduce cost of production. Thus,

localisation economies refer to concentration of a particular industry in one area which results in the development of conditions of industry which will reap the mutual benefits of all firms in the economy.

2) Disintegration economies: disintegration means firms splitting up its operation and the process of manufacture and handing over the specialised agency and institution is called economies of disintegration. There are two types of disintegration such as vertical and horizontal disintegration of economies. The firm which operates on disintegration of economies of scale will be able to get economies of scale when it operates on a large scale.

3) Information economies: proper information in economy plays an important role for the producer to grow his economy. Networking with each other enables firms to make marketing and technical information easily.

4) By-product economies: to manufacture by-products a large-scale firm make use of waste material. This will help all the firm in the industry to reduce the waste in the economy and make efficient use of resources. This will ultimately reduce the cost of production and increase the level of output.

EXTERNAL DISECONOMIES OF SCALE

External diseconomies of scale results when there is an increasing in the total cost of production beyond the control of a company and it reduces the level of output. The increase in costs can be due to increase in the market price of factors of production. The external diseconomies are not suffered by a single firm but by whole firms operating in a given industry. These diseconomies arise due to much concentration and localization of industries beyond a certain stage. For example, Localization may lead to increase in the demand for transport and, therefore, transport costs rise and it leads to diseconomies of scale in the economy.

ECONOMIES OF SCOPE

Economies of scope refer to a situation where in the long-run a firm tries to reduces average and marginal cost of production by producing large varieties of output. In other words, economies of means a firm produces multiple products instead of producing one single product to increases his scope of output by using the same equipment's and machine as a result of this average cost decreases.

Economies of scope is different from economies of scale, in that where the former means producing a variety of different products or multiple of product together to reduce costs while the latter means producing more of the same product in order to reduce the costs by increasing the efficiency in production.

Economies of scope can arise from the co-production relationships between the final products or the actual products. In economic terms these goods are complements in production. This is when the production of one good automatically produces another good as a by-product or a kind of side-effect in the production process. Sometimes one product might be a by-product of another, but have value for use by the producer or for sale. Finding a productive use or market for the co-products can reduce costs or increase revenue.

For example, dairy farmers separate milk into whey and curds, with the curds going on to become cheese. In the process they also end up with a lot of whey, which they can use as a high protein feed for livestock to reduce their feed costs or sell as a nutritional product to fitness enthusiasts and weightlifters for additional revenue. Another example of this is the black liquor produced by the processing of wood into paper pulp. Instead of being just a waste product that might be costly to dispose of, black liquor is burned as an energy source to fuel and heat the plant, saving money on other fuels, or can even be processed into more advanced bio-fuels for use on-site or for sale. Producing and using the black liquor saves costs on producing the paper.

COST CONCEPTS

CONCEPTS OF COST

A firm who wants to maximize their profit concentrates on revenue and cost of the firm. Profit of the firm can be increased either by increasing revenue or by reducing cost. Firm generally cannot influence revenue because it is determined by the market forces but it is possible for the firm to reduce cost by producing maximum output or by increasing efficiency of the organization.

For managerial decision-making, cost is very important because it helps to decide price for the commodity. It also helps to decide whether to increase the production or not. Therefore, understanding of cost concepts is very important.

a. Private cost and Social cost:

Costs which are directly incurred by the individual or firm producing good or service is called private cost. This cost gives private benefit to an individual or firm engaged in relevant activity. Some of the examples of private cost are firm's expenditure on purchase of raw material, payment of rent, wages and salaries, interest, insurance, depreciation etc. Similarly company's expenditure for its labor, advertising cost for the promotion of

goods, transportation cost to carry goods from company to the market are also considered as private cost.

Social cost on the other hand is bared by the society as a result of production of commodity. Even though social cost occurs due to production of a commodity it is not bared by the producer. It consists of external cost. E.g.: If a factory is located in a residential area causes air pollution. Due to pollution as the health of the people living in that area affects, they have to spend money on medical facilities. Even though this cost occurs due to the factory, it is passed on to the society at large.

Externalities are included in the social cost.

b. Historical cost and Replacement cost:

The original money value spent at the time of purchasing of an asset is called historical cost. Most of the assets in the balance sheet are at the historical cost. One of the advantages of historical cost is that records maintained on the basis of historical cost are considered to be reliable, consistent, comparable and verifiable. Historical cost does not reflect current market valuation.

The amount which has to be spent at the time of replacing of the existing asset is called the replacement cost. This cost reflects the current market prices. If we consider an increase in prices over the years, replacement cost will be greater than historical cost. If we consider fall in prices over the years, replacement cost will be less than historical cost and if we consider prices to be constant over the years, replacement cost and historical costs are the same.

c. Fixed cost and Variable cost:

Fixed cost refers to the firm's expenditure on fixed factors of production. Even if no output is produced, fixed cost needs to be paid. Even if output increases in the short run, fixed cost remains constant. E.g.: If a businessman borrows money from a bank to start his business. Initially even if his output is zero, he has to pay the interest on borrowed capital. Rent on land, insurance premium, tax payment are some of the examples of fixed cost. Addition of all fixed cost gives Total Fixed Cost.

Variable cost on the other hand refers to the firm's expenditure on variable factors of production. When no output is produced, variable cost is zero. As output increases, variable cost also increases. Payment for raw material, wages and salaries of the workers are some of the examples of variable cost. Addition of all variable costs gives the Total Variable Cost.

d. Total cost, Average cost and Marginal cost:

Total cost (TC) – Firms total expenditure on all fixed and variable factors for producing a commodity is called the Total cost of production.

Therefore $TC = TFC + TVC$

For zero level of output there is some total cost. It increases with an increase in the level of output.

Average Cost (AC) or Average Total Cost (ATC) – It refers to the per unit cost of producing a commodity. It is calculated by the following formula

$$AC = TC/Q$$

Where AC = Average cost TC = Total cost Q = Number of units produced

Average cost can also be calculated by using following formula-

$$AC \text{ or } ATC = AFC + AVC$$

Where AC- Average Cost AFC- Average Fixed Cost
AVC- Average Variable Cost

Average Fixed Cost (AFC)- It is the per unit fixed cost of production. It can be calculated by the following formula

$$AFC = TFC/Q$$

Where TFC= Total Fixed Cost Q = Number of units produced

Average Variable Cost (AVC) - It is the per unit variable cost of production. It can be calculated by the following formula

$$AVC = TVC/Q$$

Where TVC= Total Variable Cost Q= Number of units produced

Marginal Cost (MC) - It is the addition made to the total cost. Or cost of producing an additional unit of output is called as the marginal cost. It can be calculated by using following formula

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

Where, ΔTC = Change in Total Cost

ΔQ = Change in Output

OR

$$MC = TC_n - TC_{n-1}$$

Eg: If total cost of producing 2 cars is Rs. 3, 00,000 and the total cost of producing 3 cars is Rs. 4, 50,000. Then the marginal cost is Rs. 1, 50,000 i.e. the cost of producing an additional unit of output.

e. Sunk Cost and Incremental Cost:

In order to enter in to the market certain costs are incurred by the firm. These costs are known as Sunk cost. It includes the cost by the firm for setting up the business, advertisement etc. These costs cannot be recovered by the firm if they decide to exit the market.

Incremental cost refers to a change in total cost as a result of policy change or a change in managerial decision. The concept of incremental cost is broader as compared to marginal cost.

Marginal cost considers a change in total cost due to a unit change in output whereas incremental cost considers a change in total cost due to an introduction of new product, change in advertising strategy, additional batch of output etc. The concept of incremental cost is more relevant as compared to marginal cost because the firm increases its output in batches and not by unit only.

f. Implicit Cost and Explicit Cost:

Implicit cost refers to the cost of all own factors which the entrepreneur employs in the business. It includes salary and wages for the service of entrepreneur, interest on capital invested by the entrepreneur etc. Implicit costs are also called indirect cost because direct cash payment is not made to own factors of production.

If entrepreneur sold these services to others, he would have earned money. Therefore, implicit cost is also the opportunity cost of factors owned by him.

Explicit cost on the other hand is the direct cash payment made by the firm for purchasing or hiring of various factors of production. E.g. rent paid for hiring of land, money spent for purchasing raw material, wages and salaries paid to the employees, expenditure on transport, power, advertising etc.

g. Accounting and Economic Cost:

Accounting cost includes only explicit cost i.e. the firm's expenditure on purchasing of various factors of production. For financial purpose and tax purpose, accounting cost is important.

Economic cost on the other hand includes both explicit and implicit cost. This cost is important for managerial decision making.

Therefore an economist who wants to take any decision considers both explicit and implicit cost.

COST AND OUTPUT RELATIONSHIP IN THE SHORT RUN AND IN THE LONG RUN

Relationship between TFC, TVC and TC in the short run

TFC is the firm's total expenditure on fixed factors of production. For zero level of output TFC is zero. It remains constant for all the levels of output.

TVC on the other hand is the firm's total expenditure on variable factors of production. For zero level output TVC is zero. It increases with an increase in the level of output.

Total cost is the additional of Total Fixed Cost and Total Variable Cost. In the following table relationship between TFC, TVC and TC is discussed for different units of output

Table 7.1			
Output	TFC	TVC	TC
0	50	0	50
1	50	20	70
2	50	35	85
3	50	45	95
4	50	65	115
5	50	95	145
6	50	140	190
7	50	200	250
8	50	280	330
(All Costs in Rupees)			

Explanation – In table 7.1 First column shows various levels of output starting from zero units to 8 units. Second column shows TFC. As fixed factors of production are constant for certain level of output TFC is also constant for all level of output. For zero level of output also TFC is Rs. 50. Third column shows TVC which is zero for zero level of output. With an increase level of output TVC initially increases at decreasing rate then increases at an increasing rate. This is because of the law of variable proportions. Forth column shows TC which is the addition of TFC and TVC. TC increases with an increase level in the output. TC increases in the same proportions as increased in TVC.

This relation between TFC, TVC and TC can be explained with the help of following diagram.

Two curves are parallel to each other.

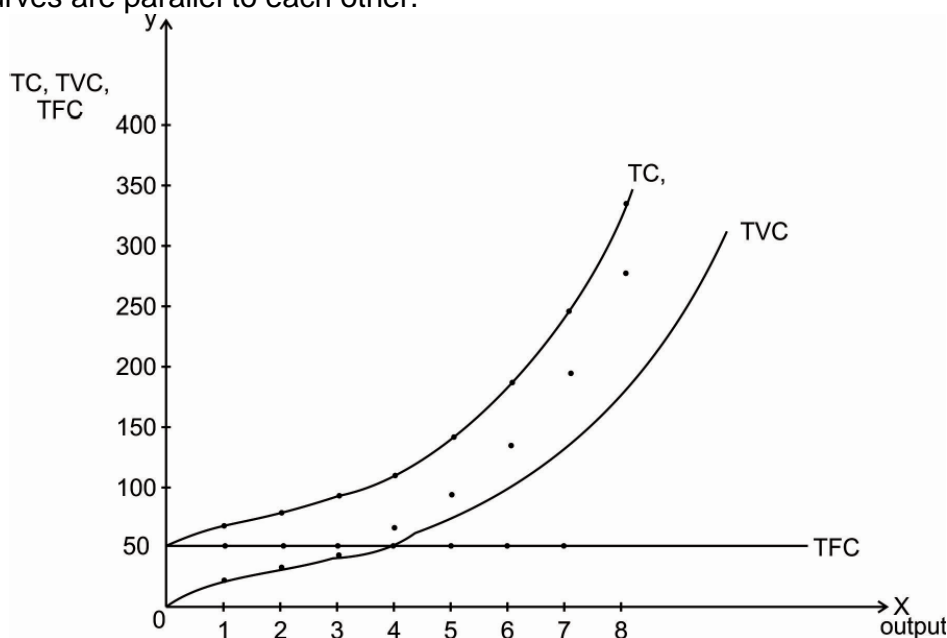


Diagram 7.1

By plotting different combinations of output and TFC, TVC and TC, we have TFC curve, TVC curve and TC curves.

Diagram shows that TFC curve is a straight-line curve parallel to X axis. This is because when output is zero, some fixed cost has to be paid and this cost remains constant for all the levels of output. TFC curve is horizontal.

TVC curve starts at the point of origin because when output is zero, TVC is also zero. TVC curve initially increases at a diminishing rate with an increase in the level of output and then increases at an increasing rate.

As TC is the addition of TFC and TVC, TC curve is above TFC and TVC curves. The shape of TC curve is same as the TVC curve. The gap between TC and TVC curve measures TFC.

Cost and output relationship:

Cost Function

Production function gives the functional relationship between the level of output and the various factor inputs (land, labor, capital and entrepreneur). The cost of production depends on the level of output produced, nature of technology used, prices of factors of production. Thus, the cost function is derived from the production function. The cost function is given as-

$$C = f(Q, T, Pf)$$

Where C = total cost Q = Level of output produced T = Technology Pf =
Prices of factors f = Functional relationship

If we assume that technology, prices of factors are constant, total cost increases with an increase in the level of output i.e. $C = f(Q)$.

Any change in production function will shift cost function either up or down. E.g. Use of better techniques of production, use of better-quality raw material, use of efficient labors etc. will improve the production function and thus reduce the cost function. Similarly use of poor-quality raw material, inefficient techniques of production, unskilled labor will shift the production function up.

The relationship between cost and output needs to be studied in the short run and in the long run.

SHORT RUN COST- OUTPUT RELATIONSHIP

As the name suggests short run is a very short period where the firm produces its output by changing only variable factors of production. This is because in the short run fixed factors of production remain constant for all the levels of output. Following table shows the behavior of output and various costs in the short run.

(Table 7.2)							
Output	TFC	TVC	TC	AFC	AVC	AC	MC
0	50	0	50	-	-	-	-
1	50	20	70	50	20	70	20
2	50	35	85	25	17.5	42.5	15
3	50	45	95	16.66	15	31.66	10
4	50	65	115	12.5	16.25	28.75	20
5	50	95	145	10	19	29	30
6	50	140	190	8.33	23.33	31.66	45
7	50	200	250	7.14	28.57	35.71	60
8	50	280	330	6.25	35	41.25	80

(All costs in Rupees)

In the above table output is shown in the (1st) column, which increases from 0 units to 8 units. For all the levels of output TFC in column (2) remain constant i.e. Rs. 50. TVC in the (3rd) column is zero for zero level of output. And then increases with an increase in the level of output. In column (4) TC is calculated by adding TFC and TVC.

AFC in column (5) is calculated by using the formula TFC/Q . As TFC remain constant for all the levels of output, AFC continuously declines with an increase in the level of output.

AVC in column (6) is calculated by using formula TVC/Q . Initially AVC declines. At third level of output it reaches to the minimum and then increases with an increase with an increase in the level of output.

AC in column (7) is calculated by using the formula TC/Q . AC also declines initially reaches to the minimum point at 4th unit of output and then increases with an increase in the level of output.

MC in column (8) is the cost of producing an additional unit of output. It is calculated by the formula $\frac{\Delta TC}{\Delta Q}$ or $\frac{\Delta TVC}{\Delta Q}$. This is

because TC increases by the same amount as increase in TVC.

MC initially declines, reaches to minimum and increases thereafter.

Diagrammatic relationship between AFC, AVC, AC and MC is as follows-

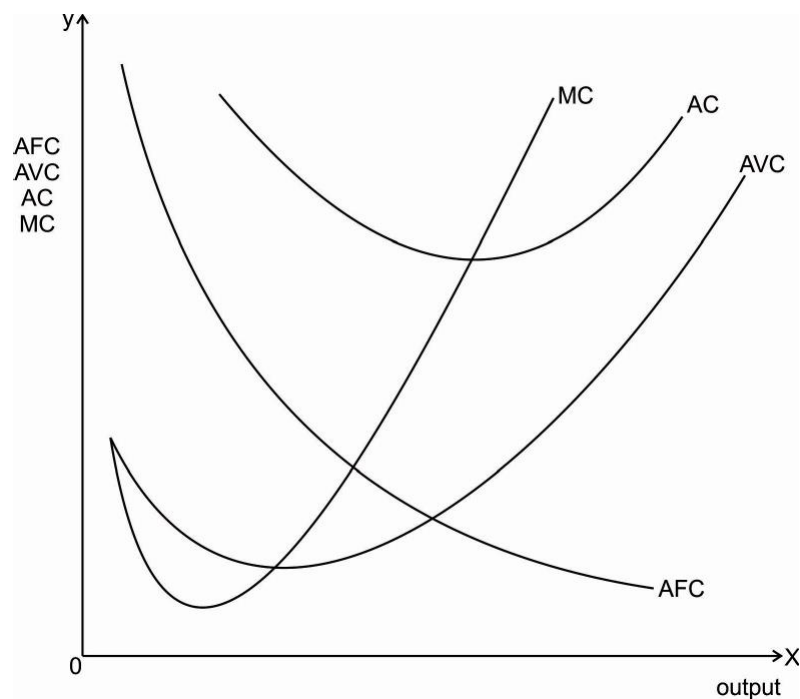


Diagram 7.2

Explanation:

1. As AFC is continuously declining. AFC curve slopes downward from left to right.
2. Initially AVC curve is declining, reaches to a minimum and then increases with an increase in the level of output. AVC curve starts increasing after a normal capacity level of output is produced. More intensive use of various factors of production leads to an increase in AVC.
3. AC curve lies above AFC and AVC curves because AC is the addition of AFC and AVC. AC curve initially declines due to fall in AFC curve. AC curve reaches to minimum point and then increases due to an increase in AVC curve. AC curve is a U-shaped curve.
4. MC curve is also a U-shaped curve. MC curve also falls in the beginning, reaches to the minimum and then increases. When MC curve starts rising, it intersects the AVC curve and AC curve at their minimum point.

Relationship between AC and MC:

AC is the per unit cost of production and marginal cost is the cost of producing an additional unit of output. Relationship between AC and MC can be discussed with the help of following diagram.

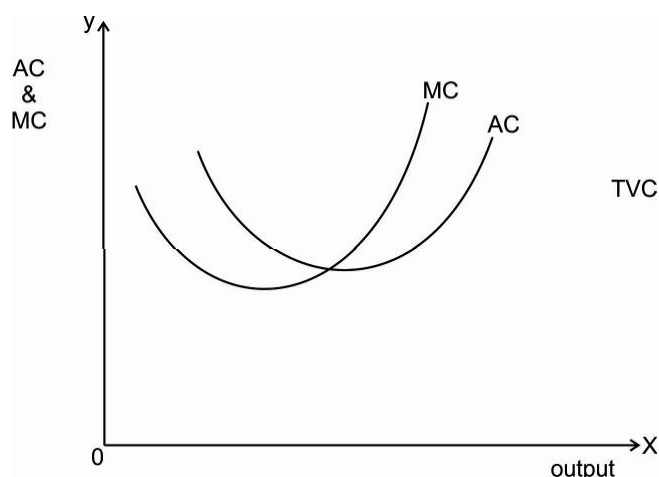


Diagram 7.3

- For initial levels of output AC and MC both curves are declining, but MC is less than AC. When MC is less than AC it means that cost of producing an additional unit of output is less than per unit cost of production. As $MC < AC$, new AC must be less than old AC. Therefore, AC curve is declining.
 - At a certain level of output (optimum level of output) AC is minimum. At this point MC curve intersects AC curve. Thus $AC = MC$. It means that cost of producing an additional unit of output is exactly equal to the average cost of production. As $AC = MC$, new AC must be equal to the old average cost.
 - At higher levels of output AC and MC both are increasing but $MC > AC$. It means that the cost of producing an additional unit of output is greater than the average cost of production. As $MC > AC$, new average cost must be greater than old average cost. Therefore, AC curve is rising.
- From the above explanation we can conclude that when
- $MC < AC$, MC pulls the AC curve down.
 - $MC = AC$, AC curve is flat as MC pulls AC horizontally.
 - $MC > AC$, MC pulls the AC curve up.
 - Long run cost and output relationship

As the name suggests long run refers to a sufficiently long period. As the long period is available, firm can make necessary change in all factors of production as per the changes in demand. Thus, in long run all factors of production are variable. Hence there are no fixed cost in the long run. Depending on the type of industry the length of long run can differ. For a firm producing a particular product, long run may be years.

In the long run firm can make proper planning and build that size of plant which will minimize the cost of production for producing optimum level of output. Once the particular plant has been built, the firm operates in the short run. This means that even though firm operates in the short run, it plans in the long run.

LONG RUN AVERAGE COST CURVE

Different plant sizes are available to the firm to operate in the long run. For a specific level of output, the plant of specific size is more suitable. For every size of plant there will be a specific average cost and thus a specific average cost curve. In the long run different short run average cost curves are available for different sizes of plant. The firm has to choose the specific size of plant for its operation.

Derivation of Long run average cost curve with a number of short run average cost curves can be discussed with the help of following diagrams-

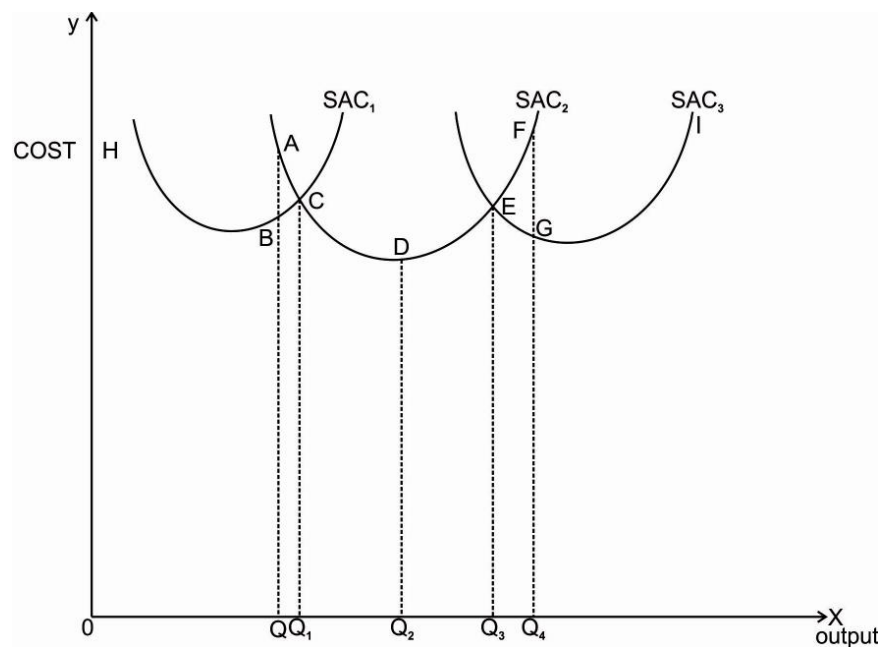


Diagram 7.4

Here we assume that there are three sizes of plant.

Above figure shows that there are three plants available to the firm and are shown by three different cost curves- SAC1, SAC2 and SAC3. For a particular level of output, a specific plant is most suited.

Above diagram shows that for producing OQ level of output on plant SAC1, cost is BQ and on plant SAC2 cost is AQ. This shows that OQ level of output can be produced with lower cost QB with SAC1 as compared to plant SAC2.

If the firm wants to produce OQ1 level of output, it can be produced either with plant SAC1 or SAC2. But it is better for the firm to go with plant SAC2 because as shown in the diagram higher level of output OQ2 can be produced with much lower cost on SAC2. With plant SAC2, output greater than OQ1 and less than OQ3 can be produced at lower average cost.

For output greater than OQ3 firm will use plant SAC3 because the average cost with SAC2 will be greater as compared to average cost with SAC3.

Derivation of LAC

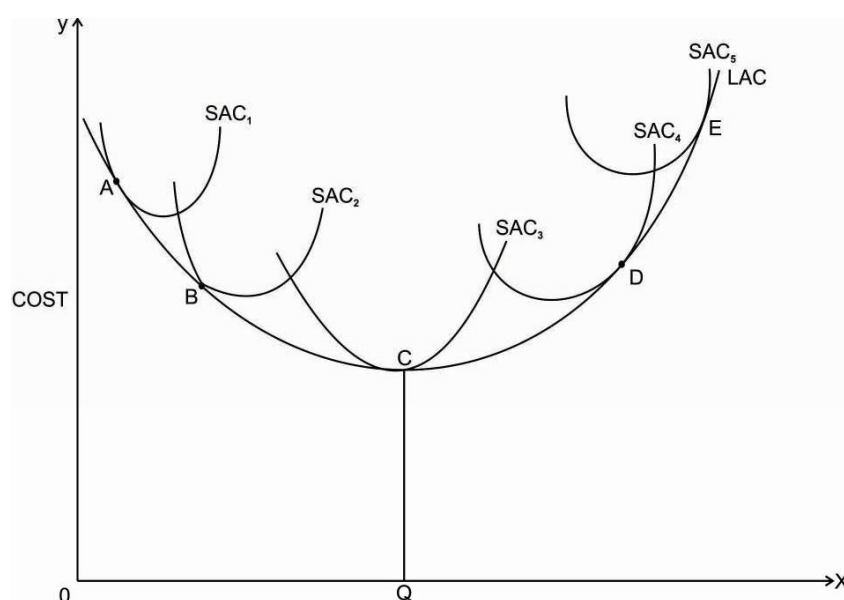


Diagram 7.5

From the above explanation it is clear that in the long run the firm has alternative plant sizes available for the production and the firm will choose that plant size which gives minimum average cost for producing a given level of output. Accordingly (Fig 7.4) with three short run average cost curves the Long run Average Cost curve is HBCEGI.

If we assume that there are infinite plant sizes available, there are number of short run average cost curves corresponding to

each plant size. Therefore, the LAC will be a smooth U-shaped curve as shown in (Diagram 7.5) above.

As LAC curve is a locus of points of the lowest average cost of producing different levels of output. Every point of LAC will have a tangency point with SAC curve. It can be seen from the above diagram that LAC curve is tangent to the minimum point of SAC3 curve only at the optimum level of output OQ. Plant SAC3 is considered as the optimum size of plant because it produces optimum level of output OQ with minimum cost CQ.

For any output less than OQ, LAC curve is tangent to SAC curve on its declining part i.e. at point A and B on SAC1 and SAC2. For any output greater than OQ, LAC curve is tangent to SAC curve on its increasing part i.e. At point D and E on SAC4 and SAC5.

It can be seen from (Diagram 7.5) that LAC curve initially declines, reaches to minimum and again increases with an increase in the level of output. LAC curve is much flatter than SAC curves. LAC curve declines due to economies of scale and increases due to diseconomies of scale.

As the LAC curve includes the family of short run average cost curves, it is called an **Envelop curve**. In the long run firm can also plan to increase its scale of production and therefore LAC curve is also called the **Planning Curve**.

Learning curve:

The learning curve shows an inverse relationship between an average cost of production and the level of output. This means that as firm produces more and more output, its average cost of production declines. Therefore, the learning curve slopes downward from left to right. Following diagram explains the learning curve effect.

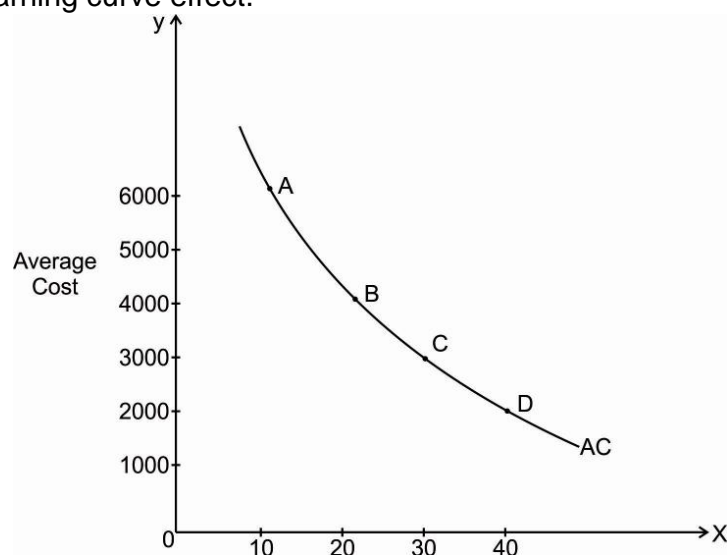


Diagram 7.6

In the above diagram X axis represents total output and Y axis represents the average cost. It shows that average cost is RS.6000 for producing 10 units of output. As output increases to 20, 30 and 40 units, average cost declines to 4000, rs. 3000 and rs. 2000 respectively. Points P, Q, R and S shows different combinations of output and average cost.

Learning curve effect is a result of an experience which the firm gains during the process of production. When the firm is new, it takes time for the firm to produce the output. Thus, the costs are high. As firm becomes older, it learns to use new techniques of production, efficient way of using raw material and skills. Workers also become efficient over a period of time. All this will help to reduce the average cost of production. Firm learn to reduce cost through experience. Therefore, learning curve is also called an **Experience curve**. The effect of learning curve applies to the manufacturing and service sector.

As shown in the diagram learning curve initially declines faster and then declines at a slower rate. This means that when the production process is new, average cost declines much faster as compared to the old production process.

SUMMARY

This unit studies the cost function which is being derived from the production function. It discusses different concepts of costs with examples and explains the behaviour of cost curves in the short run and long run. It also includes calculations of various costs like TFC, TVC, TC, AFC, AVC, AC and MC.

This unit explains how firm learns to reduce their average cost of production through experience over a period of time through the concept of learning curve or experience curve.

EXTENSION OF COST ANALYSIS

CONCEPT OF BREAK-EVEN POINT

Break-even analysis studies the relationship between total cost, total revenue, total profits and losses over a range of output. Break-even point is a point where the total revenue of the firm is equal to total cost. Therefore, at break-even point there is no profit, no loss.

Break-even analysis technique is used in the business to determine the level of production or sales volume which is necessary for the business to cover its cost of doing a business. In financial analysis the concept of break-even point is most commonly used. The concept of break-even point can be explained with the help of following table-8.1

Output	TR	TC	Profit/ Loss
0	0	1200	-1200
1	1000	1500	-500
2	1400	1800	-400
3	2000	2000	0
4	2600	2200	400
5	3500	3000	500

Table 8.1

Above table shows that break-even level of output is 3 units because, firms TR and TC are equal at 3 units of output and therefore there is no profit, no loss.

Break-even point can also be explained with the help of following diagram

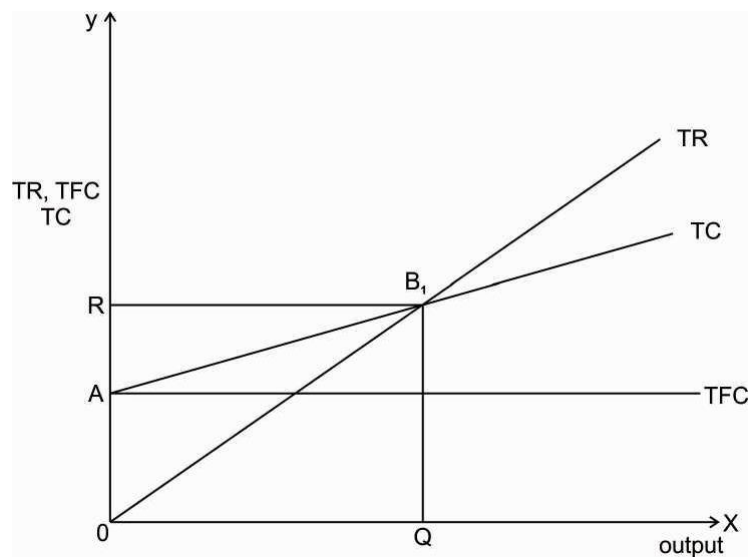


Diagram 8.1

Above diagram is drawn on the basis of the assumption that TR and TC curves are linear i.e. TR and TC increases at a constant rate with an increase in the level of output. Therefore, TR and TC curves are straight lines.

For initial levels of output total cost is greater than total revenue therefore the firm is making loss. At output OQ, firm stops making loss, $TR=TC$ therefore there is no profit no loss. Thus, OQ is the break-even output and B1 is the break-even point. After OQ level of output total revenue is greater than total cost and thus firm starts making profit.

When TR and TC curves are linear, there is only one break- even point. According to above diagram entire output after break- even output gives profit. However, this may not be true because of changes in price and cost.

If we do not consider constant change in TR and TC, TR and TC curves are non-linear. In this case we have more than one break-even point as shown in the following diagram-

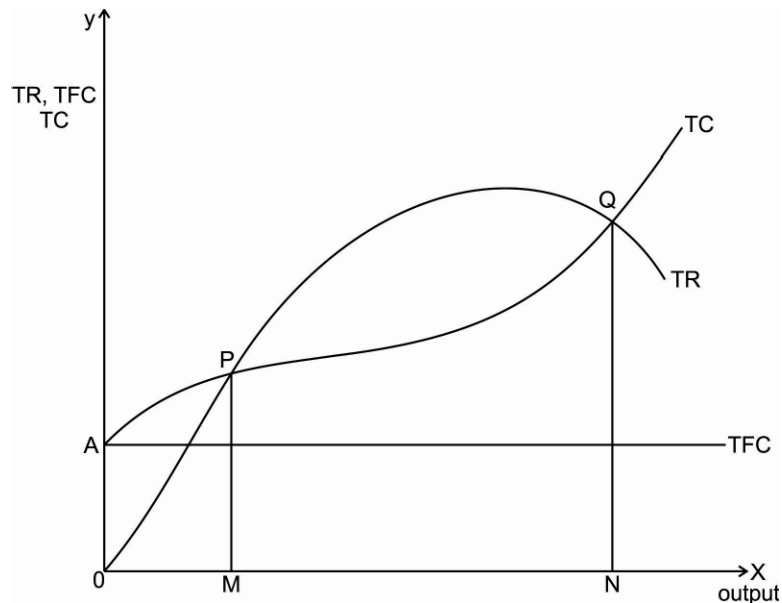


Diagram 8.2

In the above diagram on the Y axis we measure cost and revenue and on the X axis we measure output.

In case of non-linear TR and TC curves there two break- even points P and Q, indicating lower level of output OM and higher level of output ON respectively. For any output less than OM and greater than ON, firm makes losses because $TC > TR$. Between the range of output M and N, $TR > TC$ and thus firm makes profit.

CHANGES IN BREAK- EVEN POINT DUE TO PRICE, FIXED COST AND VARIABLE COST

Break-even point or break-even quantity changes due to change in following factors-

- Changes in price
- Changes in fixed cost
- Changes in variable cost

Changes in break-even quantity and break-even point due to above factors can be discussed with the help of following example-

- Changes in price

Any change in price will have an effect on total revenue and therefore also on break-even point.

If we consider the same example 1 and consider an increase in price to Rs.17, and keep fixed cost and average variable cost constant, break-even quantity is-

$$\begin{aligned} QB &= FC / P - AVC \\ &= 4000 / 17 - 7 \\ &= 4000 / 10 \\ &= 400 \text{ units.} \end{aligned}$$

If we consider fall in price to Rs. 12, keeping fixed cost and average variable cost constant, break-even quantity is-

$$\begin{aligned} QB &= FC / P - AVC \\ &= 4000 / 12 - 7 \\ &= 4000 / 5 \\ &= 800 \text{ units.} \end{aligned}$$

This shows that with an increase in price, break-even quantity falls and with a fall in price, break-even quantity increases.

Effect of changes in price on break-even point and break-even quantity can be explained with the help of following diagram.

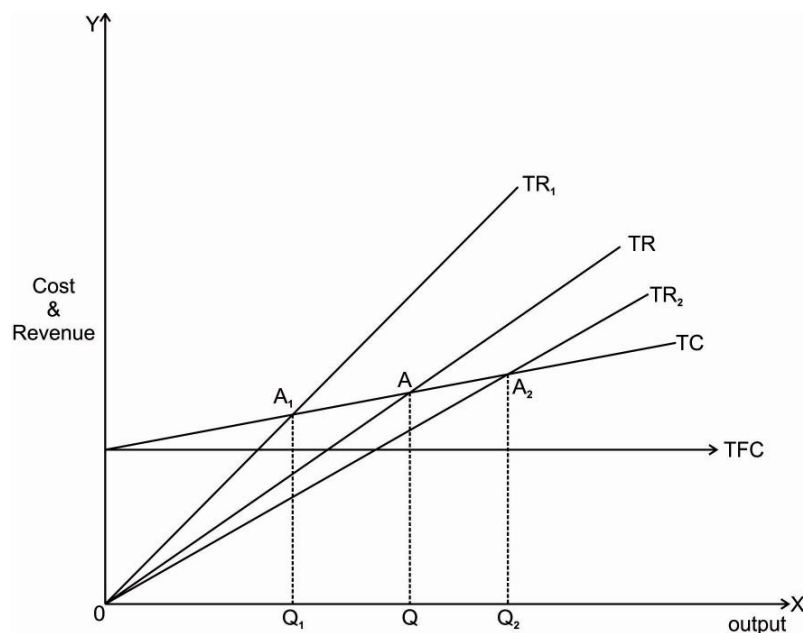


Diagram 8.3

In the above diagram X axis measures output and Y axis measures cost and revenue. With an initial TR and TC curves A is the break-even point, where TR and TC curves intersect. If price increases, TR curve shifts upward from TR to TR1. This will bring down the break-even point from A to A1. Similarly, with a fall in

price, TR curve shifts downward to TR_2 and thus break-even point also shifts to A_2 .

- Changes in fixed cost

For the same mathematical example 1 if we change the fixed cost and keep price and average variable cost constant, we have changes in breakeven quantity.

Suppose fixed cost increases to Rs. 5000, break-even quantity is-

$$\begin{aligned} QB &= FC/P-AVC \\ &= 5000/15-7 \\ &= 5000/8 \\ &= 625 \text{ units.} \end{aligned}$$

If fixed cost falls to Rs. 3600, break-even quantity is- $QB = FC/P-AVC$

$$\begin{aligned} &= 3600/15-7 \\ &= 3600/8 \\ &= 450 \text{ units.} \end{aligned}$$

This shows that with an increase in fixed cost, break-even quantity increases and with a fall in fixed cost, break-even quantity falls.

Changes in break-even point due to changes in fixed cost can be explained with the help of following diagram-

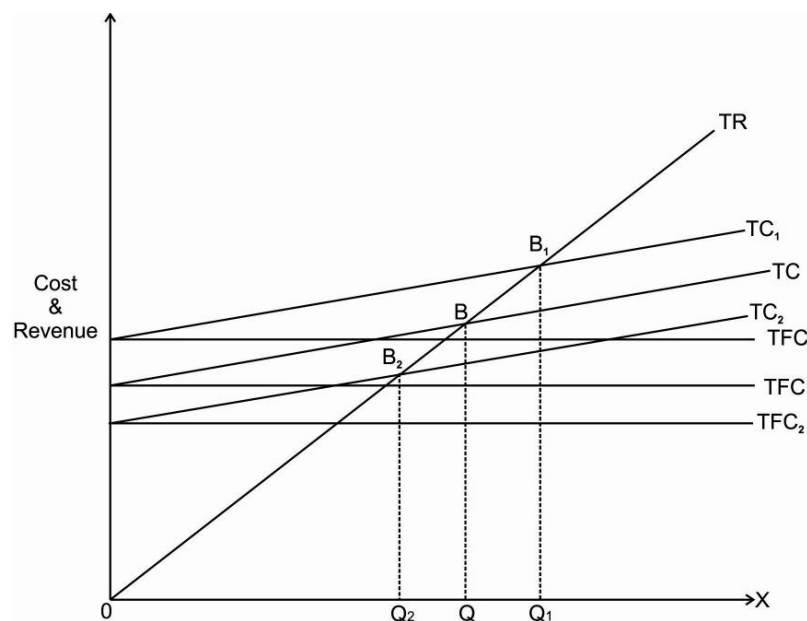


Diagram 8.4

On the X axis we measure output and on the Y axis we measure cost and revenue. With an initial TR and TC curves initial break-even point is B initial break even quantity is OQ if fixed cost

increases, TFC curve shifts upward to TFC₁. As total cost is the addition of TFC and TVC, TC curve will also shift upward to TC₁. This shifts the break-even point at higher level to B₁. Break even quantity has also increased from OQ to OQ₁.

On the other hand, if TFC falls, TFC curve will shift downward to TFC₂. This will shift the TC curve down to TC₂. Therefore, new break-even point is B₂ & new break even quantity falls from OQ to OQ₂.

- Changes in variable cost per unit

Using the same mathematical problem if we keep price and fixed cost constant and change the variable cost per unit, we have a change in break-even quantity.

Suppose the average variable cost per unit increases to Rs.10, break-even quantity is $QB = FC/P - AVC$

$$\begin{aligned} &= 4000/15 - 10 \\ &= 4000/5 \\ &= 800 \text{ units.} \end{aligned}$$

If variable cost per unit falls to Rs. 5, break-even quantity is $QB = FC/P - AVC$

$$\begin{aligned} &= 4000/15 - 5 \\ &= 4000/10 \\ &= 400 \text{ units.} \end{aligned}$$

This shows that with an increase in per unit variable cost, break-even quantity increases and with a fall in average variable cost, break-even quantity falls. This can be discussed with the help of following diagram-

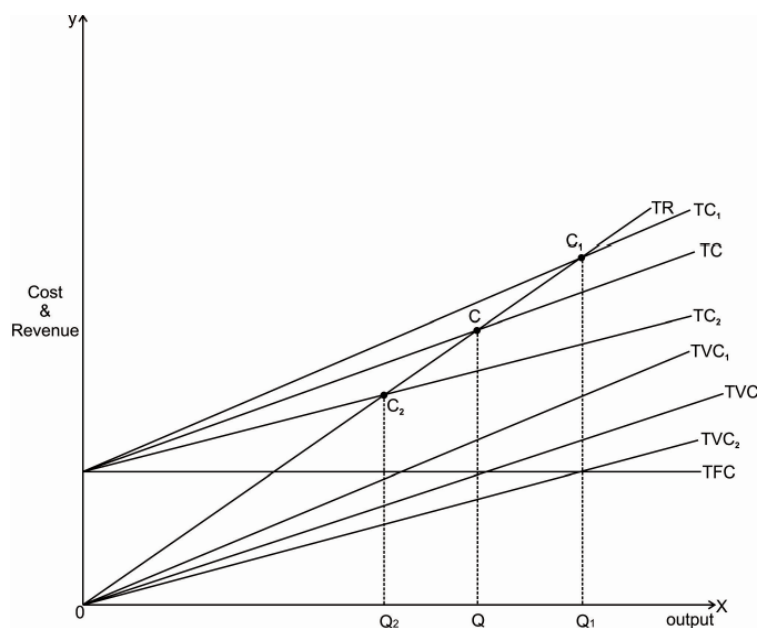


Diagram 8.5

In the above diagram X axis measures output and Y axis measures cost and revenue. Initial break-even point is C where TR and TC curves intersect. Initial break even quantity is OQ. With an increase in TVC, TVC curve shifts to TVC₁. This also shifts TC curve to TC₁. TVC₁ and TC are parallel to each other. Thus, the new break-even point shifts upward to C₁ & break even quantity increases from OQ to OQ₁.

With a fall in TVC, TVC curve shifts to TVC₂, shifting down TC curve to TC₂. Thus, the new break-even point also shifts down to C₂. Again, TVC₂ and TC₂ are parallel to each other. New break even quantity falls from OQ to OQ₂.

APPLICATION OF BREAK-EVEN ANALYSIS

Business firms are interested in understanding break-even analysis because it helps to determine that level of output which will help the firm to cover its entire cost and thus to make profit. Break- even point is the point where the firm starts making profit. Break- even analysis is used in the business for following purposes.

- **Targeting profits-** Firm has to target the level of profit for short run and long run. Break-even point gives the level of output where the firm starts making profit. Thus, for setting profit targets, break-even analysis is important.
- **Recovery of cost-** At break-even point firm covers its entire cost of production (including fixed and variable cost). Understanding of break-even can help the firm to manage its

costs in a better manner ie. the firm can try to reduce cost in order to have early break-even.

- **Helps in deciding techniques of production-** different techniques of production are available to the firm. Each technique differs in efficiency and cost. Break-even analysis helps in deciding a proper technique of production.
- **Effects of changes-** in order to be competitive, firm needs to make changes in their pricing, marketing and other policies. Any change in this policy will have an effect on revenue and cost of the firm and thereby on break-even point. Any change in break-even point will finally have an effect on profitability of the firm.
- **Deciding sales and marketing policies-** it is possible for the firm to lower break-even point by using new marketing strategies. But an increase in marketing cost will increase the cost of production and thus will increase the break-even point. Therefore, it is necessary for the firm to find proper sales and marketing policies to achieve its break-even point.
- **Utilization of capacity-** it is possible for the firm to reduce its average cost when it uses its full capacity and thereby reduces wastages and improves efficiency of resources. This will help to reach break-even point quickly.
- **Capital raising capacity-** once the break-even point is reached, it is possible for the firm to raise capital for its future expansion. Possibility of making profit for those firms is high who have reached their break-even and therefore financial institutions are also ready to give loans to these firms. On the other hand, firms who have not reached their break-even finds it difficult to raise loans from the financial institutions.

LIMITATIONS OF BREAK-EVEN ANALYSIS

Various limitations of break-even are as follows-

- Linear TR and TC curves gives wrong impression that the entire output after break-even point is profitable. But this is not always true.
- In case of single product unit, break-even analysis can be applied. But in case of multiple or joint products it is difficult to apply break-even analysis as long as cost cannot be determined for each of the product.
- The data required for break-even analysis including costs, price etc. is generally historical. If historical data is not proper for estimating future costs and prices, break-even analysis cannot be usefully applied.

- If it is possible to clearly classify costs as fixed and variable costs, break-even analysis is more useful. But sometimes it is not possible to have such classification of costs.

Even though there are various limitations of break-even analysis, it is useful in production planning if proper data is obtained.

PERFECT COMPETITION

Unit Structure :

- 9.0 Objectives
- 9.1 Meaning
- 9.2 Features of perfect competition
- 9.3 Profit Maximisation
- 9.4 Perfect Competition in the Short Run
- 9.5 Long run equilibrium of a firm
- 9.6 Equilibrium of a firm and industry under perfect competition
- 9.7 Summary
- 9.8 Questions

9.0 OBJECTIVES

- ☐ To understand the meaning and features of perfectly competitive market.
- ☐ To study the concept of profit maximisation of firm under perfect competition.
- ☐ To understand the short run and long run equilibrium of a firm.
- ☐ To understand the equilibrium of a firm and industry under perfect competition.

9.1 MEANING

The theory of perfect competition has originated in the late-19th century. The first laborious definition of perfect competition and resultant some of its main results was given by Léon Walras. Then later in the 1950s, the theory was further redefined by Kenneth Arrow and Gérard Debreu. But in reality, markets are never perfect.

A perfectly competitive market is a hypothetical in nature. In this market producers are large in number; however, they may face many competitor firms selling highly similar types of goods, in which case they often act as price takers. Agricultural markets are commonly used as an example.

A perfectly competitive firm is also known as a price taker because the pressure of competing firms in the market forces other firms to accept the price prevailing in the market. If a firm in a perfectly competitive market try to raise the price of its product in the market it will lose all of its shares in the market. The market price in the perfect competition is determined by the market supply and market demand in the entire market and not by the individual firm or seller in the market. Further in this chapter we will try to discuss the price determination and equilibrium of the firm and industry under perfect competition.

9.2 FEATURES OF PERFECT COMPETITION

Perfect competition can be generally understood by its following important features:

1. **Large number of buyers and sellers:** The very first important feature of perfect competition is its number of participants i.e. number of buyers and sellers. Both buyers and sellers are large in number under perfect competition. The existence of these large number of buyers and sellers makes no influence over price of the product. Therefore, the individual firm under perfect competition is a price taker because he has no influence over the price. Whatever price the market demand and market supply collectively decide every firm is expected to follow the same.
2. **Homogeneous or Similar products:** The second important feature of perfect competition is the commodity which is being sold in the market. It means that the product or commodity which is sold in perfect competition is similar or identical in nature. As the product are identical or similar in nature the firm has no control over the price of the product because products are perfect substitute for one another. No firm can try to charge different price to consumer than the market price due to homogeneous factor of product.
3. **Free entry and exit of firm:** There are no restriction to the entry and exit of firm in the market. The condition of free entry and free exit of a firm applies only in the long run, in short run firms can neither change the size of their plants, nor new firms can enter or old firm can leave the market. If the existing old firm earns super normal profit in the short run will attract the new firm to enter in the market in the long run.
4. **Complete market information:** It is assumed that there is a perfect knowledge about the market situation to both buyers and seller in the perfect competition. A perfect knowledge or complete information about the market demand and market supply, price etc. This allows the firms and buyer to take appropriate decision to influence the market demand and supply collectively.

5. **Perfect mobility of factors of production:** Under perfect competition the factors of production are assumed to be freely mobile. Factors of production such as labour and capital are assumed to be mobile. The mobility of factors helps the firm to adjust the market demand with the change in market supply.
6. **No transportation cost:** It is assumed that there is no transportation cost under perfect competition. It applies when the production area and sales market take place in a small geographical area or in the same area. For example, agriculture products are sold in the same village or town which requires no transportation cost.

PROFIT MAXIMISATION

Profit is the main objective of any firm into business. Each and every firm tries to make maximum possible profit into the business. A firm earns profit when Total revenue which has been earned is subtracted from the Total cost which it has borne for the production.

To state

$$\pi = TR - TC$$

Where

π = Profit, TR = Total Revenue, TC = Total Cost.

Total revenue (TR) is the total revenue a firm earns after the sale of its product. To state

$$TR = P \times Q$$

Where, TR is Total Revenue, P = Price per unit, Q = Quantity per unit sold.

Total Cost (TC) is the total cost which a firm spends to produce the product. We obtain it by multiplying the quantity of output produced by the average cost.

$$TC = Q \times AC$$

Average revenue (AR) is the revenue generated by selling per unit of output.

$$AR = \frac{TR}{Q}$$

Where AR is the Average Revenue. Hence if, $P \times Q = \frac{TR}{Q} = AR$

Therefore, we can say that, $P = AR$

Therefore, we say that the price under perfect competition is equal to the average revenue which a firm earns in a market.

A firm in a perfectly competitive market tries to maximize his profits. In the short-run, it is possible for a firm to earn profits which can be positive, negative, or zero. Economic profits which the firm earns will be zero in the long-run.

In the short-run, if a firm earns negative economic profit, it is said that he should continue to operate his business if its price exceeds its average variable cost and he should shut down if its price is below its average variable cost.

The marginal revenue (MR) is the change in total revenue from an additional unit of output sold in the market for which the firm bears Marginal cost.

$$MR = \frac{\Delta TR}{\Delta Q}$$

Marginal Cost (MC) is the additional cost which a firm spends to produce the additional unit of output.

$$MC = \frac{\Delta TC}{\Delta Q}$$

In order to maximize the profits in a perfectly competitive market, the firms set the price where the marginal revenue equal to marginal cost ($MR=MC$). The MR curve is the slope of the revenue curve, which is also equal to the demand curve (DD), price (P) and the Marginal and Average Revenue curve. Therefore, In the short- term, it is possible for a firm to earn economic profits to be positive, zero, or negative. When price is greater than average total cost, the firm is making a profit. When price is less than average total cost, the firm is making a loss in the market.

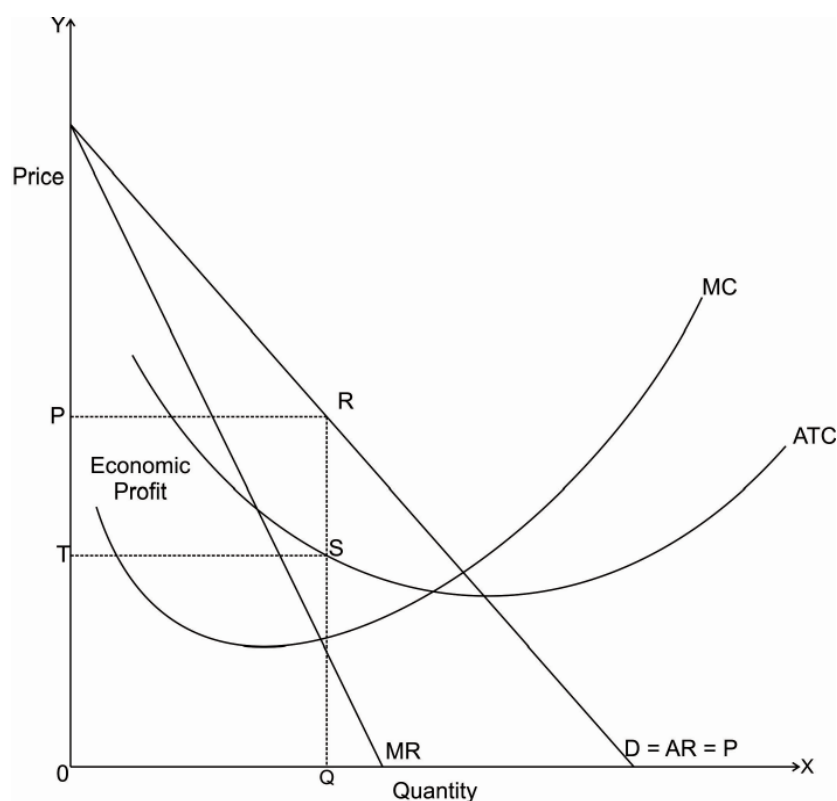


Diagram 9.1

Perfect Competition in the Short Run: In the short run, it is possible for an individual firm to make an economic profit. This state is shown in the above Diagram 9.1, as the price or average revenue, denoted by P , is above the average cost denoted by AR .

In the long-run, if firms try to earning positive economic profits, more and more firms will enter into perfectly competitive market, which will shift the supply curve to the right of the original place. As the supply curve shifts to the right, the equilibrium price of the firm will go down. As the price goes down, the economic profits will decrease until they become zero.

When the price is less than the average total cost of the production, at that time the firms are making a loss. In the long-run, if firms in a perfectly competitive market are earning negative economic profits, then more firms will leave the market and which in turn will shift the supply curve left of the diagram. As the supply curve shifts to the left, the price will rise. As the price rises, the economic profits will increase until they become zero.

In the long-run, companies that are engaged in a perfectly competitive market will earn zero economic profits. The long-run equilibrium point for a perfectly competitive market occurs where the demand curve (price) (P) intersects the marginal cost (MC) curve at the minimum point of the average cost (AC) curve.

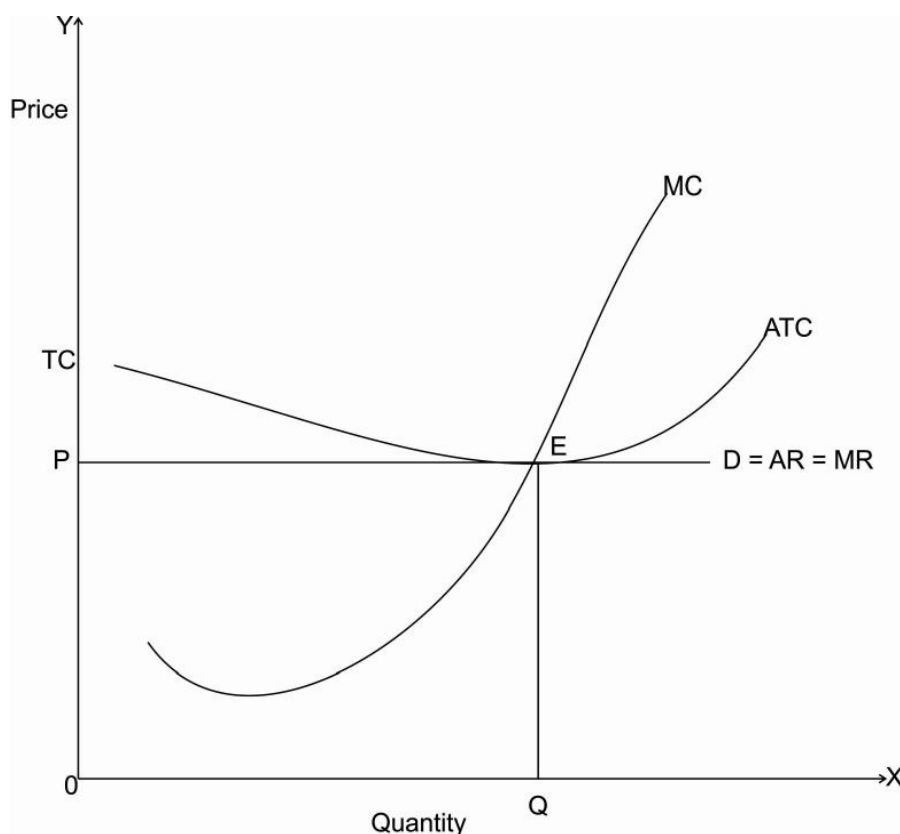


Diagram 9.2

Perfect Competition in the Long Run: In the long-run, economic profit cannot be constant. The entry of new firms in the market will cause the demand curve of each individual firm to shift the demand curve downward, bringing down the price, the average revenue (AR) and marginal revenue curve (MR). In the long-run, the firm will make zero economic profit. Its horizontal demand curve will touch its average total cost curve at its lowest point (E).

The firm is at equilibrium at the point (E) where Marginal revenue (MR) is tangent to Marginal cost (MC).

SHORT-RUN EQUILIBRIUM OF A FIRM UNDER PERFECT COMPETITION

The short run is a period of time within which the firms can change their level of output only by increasing or decreasing the amounts of variable factors such as labour and raw material, while fixed factors like capital equipment, machinery, etc. remains unchanged.

In other words, short run is the conceptual time period where at least one factor of production is fixed in amount while other factors are variable.

A firm in short run is in equilibrium at a point where Marginal Revenue (MR) is equal Marginal Cost (MC) i.e. $MR=MC$ and where MC is increasing at the point or MC is cutting MR from below.

The firm under perfect competition operates under the U- shaped cost curve. Since marginal revenue is the same as price or average revenue under perfect competition, the firm will equalise marginal cost with price to attain the equilibrium level of output.

A firm under perfect competition in short run being in equilibrium does not necessarily earn profit. The firm determines the equilibrium level of output and price and tries to earn excess profit, normal profit or may even incur loss. The Diagram 9.3 which is given below will explain the firm's equilibrium situation in the short run.

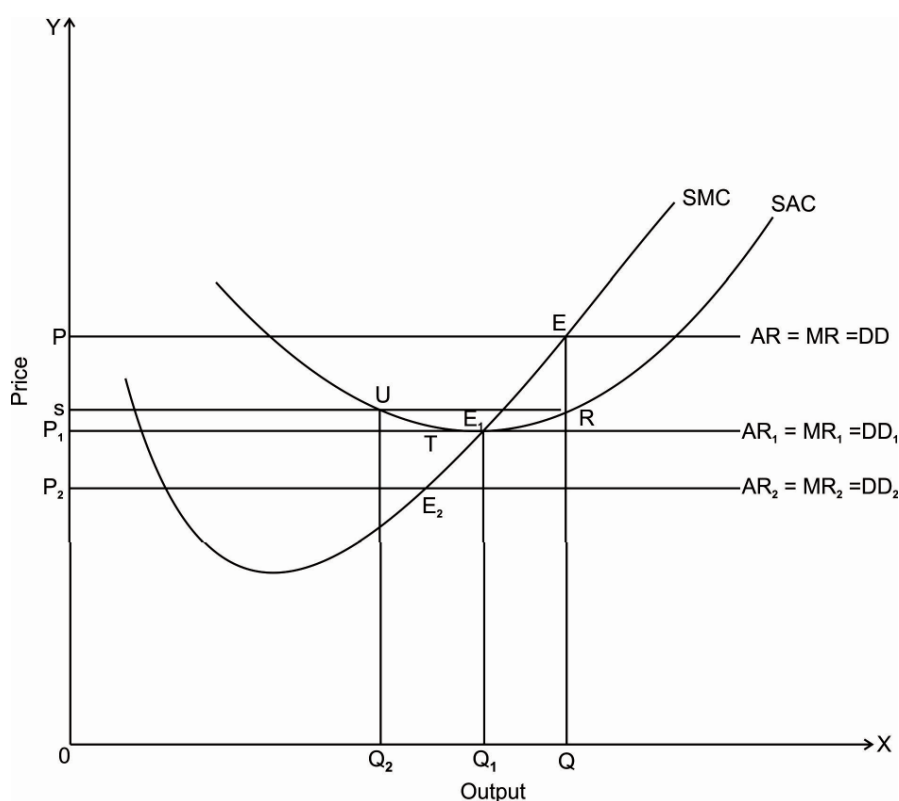


Diagram 9.3

In the above fig Level of output is determined on the X axis and price on the Y axis.

The firm may face excess profit, normal profit or even loss can be understood by the given fig above.

1. **Excess Profit:** OP is the price at which the firm sell its OQ level of output. Where, E is the equilibrium point where

Marginal Cost is equal to Marginal Revenue ($MR=MC$) and where MC is increasing which fulfils the condition.

Now to determine the firm's level of profit we calculate:

$$\text{Profit} = TR - TC$$

$$\text{Where, } TR = P \times Q$$

Where, TR is the total revenue which a firm earns by selling the output, P, is the price per unit sold and Q is the quantity sold.

So, in the above fig,

$$TR = OP \times OQ = OQEP.$$

$$TC = Q \times \text{Revenue/ Cost}.$$

Where, TC is the total cost

$$TC = OQ \times OQRS$$

Therefore,

$$\begin{aligned} \text{Profit} &= TR - TC \\ &= OQEP - OQRS \\ &= \text{SREP} \end{aligned}$$

Thus, the firm in the short run when the price is OP is at the equilibrium and earns SREP amount of profit which is the excess profit which is also called as super normal profit.

2. **Normal Profit:** the perfect competitive firm may also earn normal profit in the short run if he fails to earn the super normal profit. In the above fig 9.3 if the firm is in equilibrium at the point E1 where OP1 is the price and OQ1 is the level of output. The firm is at the position where he earns normal profit.

$$\text{Profit} = TR - TC$$

$$\text{Where, } TR = P \times Q$$

$$= OP1 \times OQ1$$

$$= OQ1E1P1$$

$$TC = Q \times \text{Revenue/ Cost}$$

$$= OQ1 \times E1P1$$

$$= OQ1E1P1$$

Therefore,

$$\begin{aligned} \text{Profit} &= TR - TC \\ &= OQ1E1P1 - OQ1E1P1 \\ &= \text{Normal Profit.} \end{aligned}$$

Thus, the firm at price OP1 earns Normal profit.

Normal profit is the profit which a firm must get to survive into the business where he can produce the same level of output in future with the amount of revenue he earns. It is a situation of no profit no loss. If the firm unable to make a normal profit he may go into loss.

3. **Loss or Sub-normal profit:** when a firm fails to earn even normal profit and still continue to operate his business by incurring into loss. Such situation can be explained as flow:

The firm is equilibrium at the point E2 where OP2 is the market price and OQ2 is the level of output.

$$\text{Profit} = \text{TR} - \text{TC}$$

$$\text{Where, TR} = P \times Q$$

$$= \text{OP2} \times \text{OQ2}$$

$$= \text{OQ2E2P2}$$

$$\text{TC} = Q \times \text{Revenue/ Cost}$$

$$= \text{OQ2} \times \text{US}$$

$$= \text{OQ2US}$$

$$\text{Loss} = \text{P2E2US}$$

4. **Shut down point:** When the firm not even able to earn variable cost he better tries to shut down his business or stops operating for that particular time.

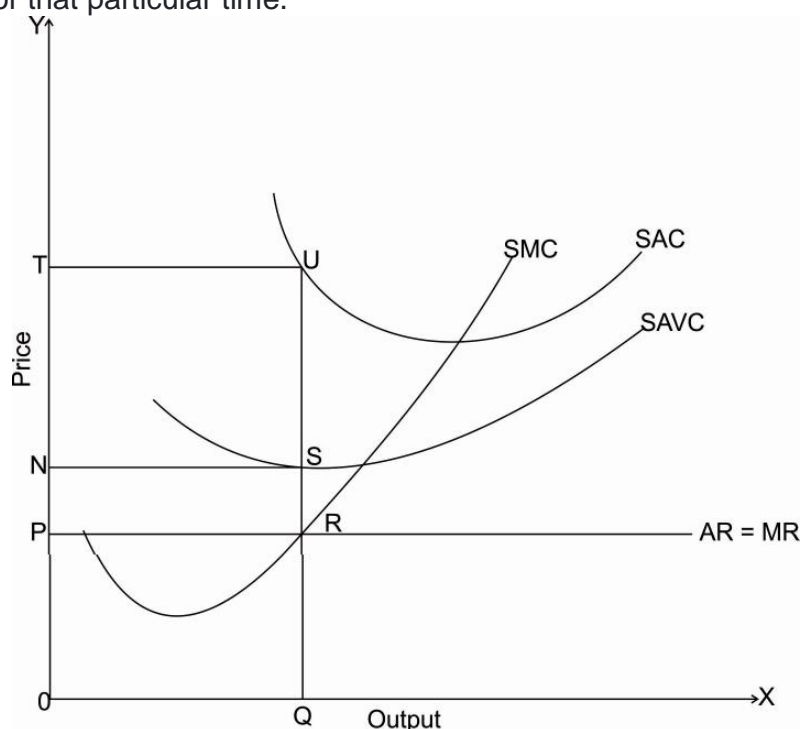


Diagram 9.4

In the above Diagram 9.4 when the price is OP, the firm produces the equilibrium level of output which is OQ at that price and at that volume of output the firm total revenue (TR) is OQRP and his Total Variable Cost (TVC) is OQSN so the loss which firm gets in terms of variable cost is PRSN. His total loss is PRUT of which PRSN is variable cost and NSUT is the fixed cost. At this time, it is better for a firm to either shut down his business or to wait for a time when the price goes up for his commodity where at least he can cover up his Total Variable Cost. It is because that variable cost enables the firm to operate in his business.

LONG RUN EQUILIBRIUM OF A FIRM

The long run is a period of time which is sufficiently long to allow the firms to make changes in all factors of production. Therefore, it is said that in the long run, all factors of production are variable and no factors are fixed. So in the long run the firms, can increase or decrease their output by changing their capital equipment; they may expand or contract their old plants or replace the old lower-capacity plants by the new higher-capacity plants or add new plants in the business or the firms can contract their output level by reducing their capital equipment; they may allow a part of the existing capital equipment to wear out without replacement or sell out a part of the capital equipment

Besides, in the long run, new firms can enter the industry to compete the existing firms. Moreover, the firms can leave the industry in the long run. The long-run equilibrium then refers to the situation when free and full adjustment in the capital equipment as well as in the number of firms has been allowed to take place. It is therefore long-run average and marginal cost curve which are relevant for deciding about equilibrium output in the long run. Moreover, in the long run, it is the average total cost which is of determining importance, since all costs are variable and none fixed.

As explained above, a firm is in equilibrium under perfect competition when marginal cost is equal to price i.e. $MC = P$. But for the firm to be in long-run equilibrium, besides marginal cost being equal to price, the price must also be equal to average cost ($P = MC$).

For, if the price is greater or less than the average cost, there will be tendency for the firms to enter or leave the industry. If the price is greater than the average cost, the firms will try to earn more than normal profits. These supernormal profits will attract the new firms to enter into the industry.

With the entry of new firms in the industry, the price of the product will go down as a result of the increase in supply of output and also the cost will go up as a result of more intensive competition for factors of production will be generated. The firms will continue entering the industry until the price is equal to average cost so that all firms are earning only normal profits.

These can be explained with the help of the following Diagram 9.5 given below:

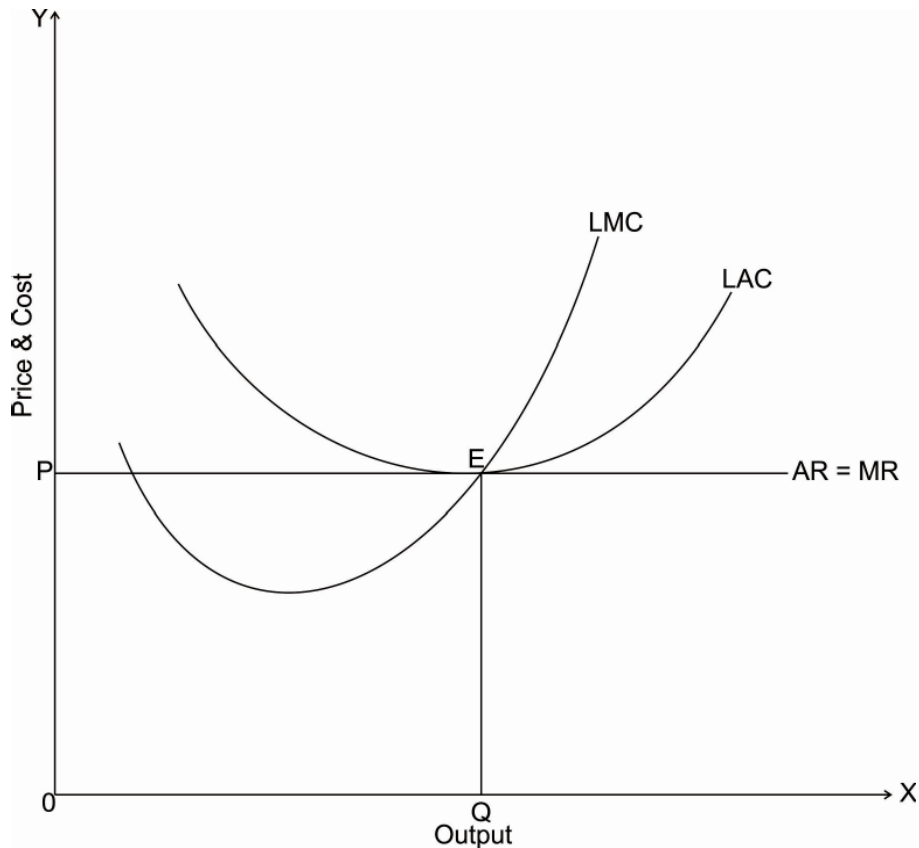


Diagram 9.5

Diagram 9.5 represents the equilibrium condition of a firm under perfect competition. The firm in the long-run equilibrium is at a price OP and quantity of output is OQ where the equilibrium point is E . At the equilibrium point $MR = MC$. As said the firm earns normal profit in the long run so,

$$\begin{aligned}\text{Profit} &= TR - TC \\ &= OQEP - OQEP\end{aligned}$$

Therefore, the firm earns normal profit in the long run where, $P = AR = MR = AC = MC$.

EQUILIBRIUM OF A FIRM AND INDUSTRY UNDER PERFECT COMPETITION

As we have already studied the equilibrium conditions of both firm and industry. A firm is in equilibrium when it has no tendency to change its level of output. It needs neither expansion nor contraction. It wants to earn maximum profits in by equating its marginal cost with its marginal revenue, i.e. $MC = MR$. An industry is in equilibrium only in the long run. The following Diagram 9.6 will explain the condition of the equilibrium of a firm and industry.

The MC curve must equal the MR curve ($MC=MR$). This is the first order and necessary condition. But this is not a sufficient condition which may be fulfilled yet that the firm may not be in equilibrium. The second order condition says that under perfect competition, The MC curve must cut the MR curve from below and after the point of equilibrium it must be above the MR. the MR curve of a firm coincides with the AR curve. The MR curve is horizontal to the X-axis. Therefore, the firm is in equilibrium when $MC=MR=AR$ (Price).

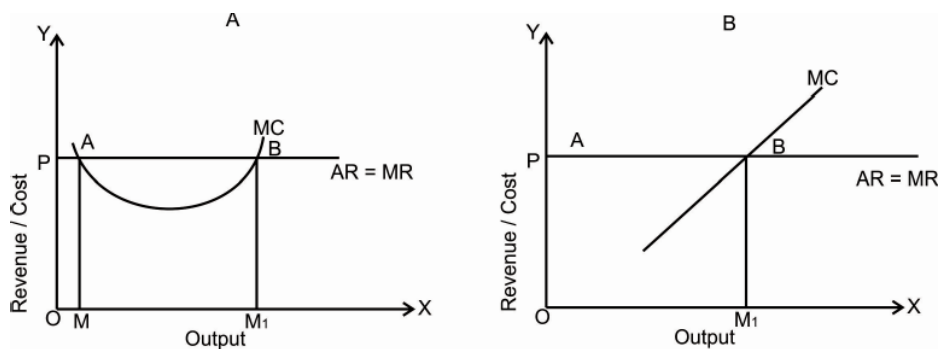


Diagram 9.6

In Diagram 9.6 (A), the MC curve cuts the MR curve first at point A. It satisfies the condition of $MC = MR$, but it is not a point of maximum profits because after point A, the MC curve is below the MR curve. It does not pay the firm to produce the minimum output OM when it can earn larger profits by producing beyond OM.

Point B is of maximum profits where both the conditions are satisfied. Between points A and B., it pays the firm to expand its output because it's $MR > MC$. It will, however, stop further production when it reaches the OM1 level of output where the firm satisfies both the conditions of equilibrium.

If it has any plans to produce more than OM1 it will be incurring losses, for its marginal cost exceeds its marginal revenue

beyond the equilibrium point B. The same conclusions hold good in the case of a straight-line MC curve as shown in Diagram 9.6. (B)

MONOPOLY

MEANING

The word monopoly has been derived from the combination of two words i.e., 'Mono' and 'Poly'. Mono refers to a single and poly to control. Monopoly market is said to exist when one firm or a single firm is a sole producer or seller of a product in a market which has no close substitutes.

Prof. Bober rightly remarks, "The privilege of being the only seller of a product does not by itself make one a monopolist in the sense of possessing the power to set the price. As the one seller, he may be a king without crown"

According to Koutsoyiannis "Monopoly is a market situation in which there is a single seller. There are no close substitutes of the commodity it produces, there are barriers to entry". -

A seller in a monopoly market is known as monopolist. A monopolist is a price maker not a price taker in the market where he is the only or a sole seller in the market, where he has control over it. A monopolist can control both the price as well as the supply of a commodity to earn profit. But it is said that if a firm is a rational monopolist, he will control only one at a time.

FEATURES OF MONOPOLY

The following are some features of monopoly market:

1. **Single Seller and Large Number of Buyers:** As said above monopoly market is run by a single seller known as monopolist. The monopolist's firm is the only firm in the market; it is an industry as well. But the number of buyers is assumed to be large.
2. **No Close Substitutes:** Another important feature of monopoly market is that there shall not be any close substitutes for the product sold by the monopolist in the market. The cross elasticity of demand between the product of the monopolist and others must be negligible or zero.
3. **Difficulty of Entry of New Firms:** There are either natural or artificial restrictions on the entry of firms into the monopoly market.
4. **Price Maker:** Under the monopoly market, the monopolist has the full control over the supply of the commodity. But due to large number of buyers, demand of any one buyer constitutes an infinitely small part of the total demand. Therefore, buyers have to pay the fixed amount of price fixed by the monopolist.
5. **No distinction between the firm and industry:** Under monopoly market firm being the single seller is the firm as well as industry. So there is no need to understand the firm and industry separately.

SOURCES OF MONOPOLY POWER

The monopoly has numerous factors which gives monopoly power to the monopolist.

1. **Natural monopoly power:** Some monopolist gets monopoly power naturally by the product they produce which is naturally available to them. A natural monopoly is a type of monopoly that exists due to the high start-up costs of conducting a business in a specific industry. A company with a natural monopoly might be the only provider of a product or service in an industry or geographic location in the whole market which gives him the monopoly power naturally. Natural monopolies are allowed when a single company can supply a product or service at a lower cost than any potential competitor in the market.
2. **Product differentiation:** The product which is being sold in the monopoly market is differentiated product which has no close substitute in the market. In a perfectly competitive market, every product is perfectly homogeneous and a perfect substitute for any other product in the market. With a monopoly, there is great to

absolute product differentiation in the sense that there is no available substitute for a monopolized good. The monopolist is the sole supplier of the commodity in the market.

3. Legal protection: Legal is an artificial power which a firm has to protect this product from various market competition and make a product unique or different. Legal protection is in the form of copy rights, patent rights, trade marks etc. which gives the firm the monopoly power and make his product different from the other product in the market.

4. Barriers to Entry: Barriers to entry are factors and circumstances that prevent entry into market by would-be competitors and limit new companies from operating and expanding within the market. Monopolies have relatively high barriers to entry due to its natural and artificial barriers. The barriers must be strong enough to prevent or discourage any potential competitor from entering into the market.

5. Control over the resources: As the firm is the only seller in the market, he has sole control over the resources which is use for production of the product. The source of control comes either from the natural or legal power.

EQUILIBRIUM OF A MONOPOLY FIRM

The Equilibrium condition of a firm under Monopoly is the same as those under perfect competition. Where the marginal cost (MC) is equal to the marginal revenue (MR) and the MC curve cuts the MR curve from below. We will understand Equilibrium of Monopolies in short run and in long run in detail.

Short run equilibrium condition: There are two possibilities for a firm's Equilibrium in Monopoly. These are:

The firm earns normal profits or excess profit – If the total cost < the total revenue

It incurs losses – If the total cost > the total revenue

Normal Profits or Excess Profit: At Excess profit the firm is in equilibrium at the point E where the Marginal Cost is equal to Marginal Revenue ($MR = MC$). At this equilibrium point OP is the Price and OQ is the level of Output. Firms profit is determined when,

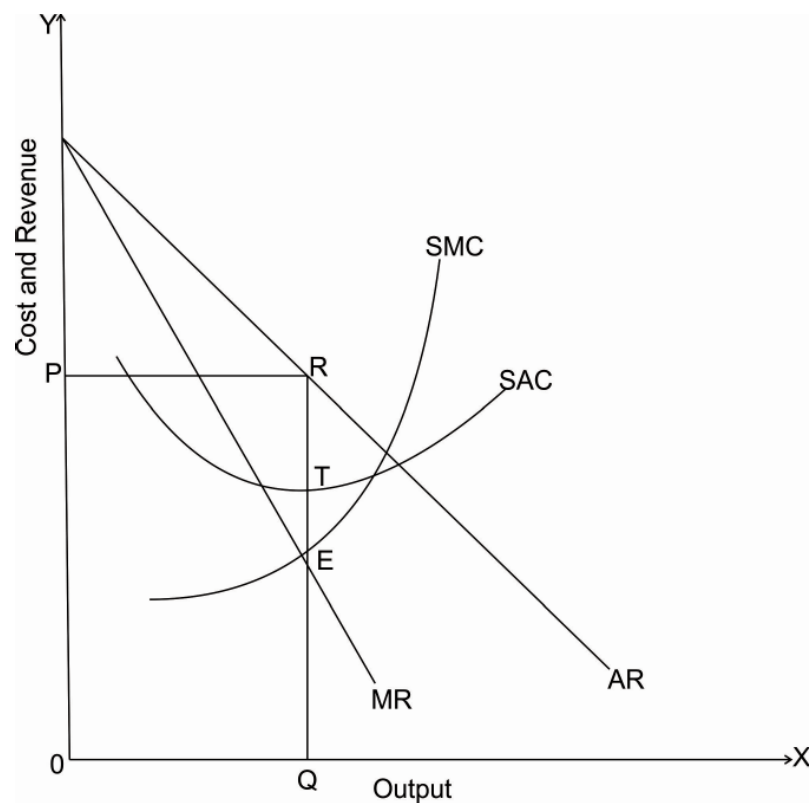


Diagram 10.1

$$\text{Profit} = \text{TR} - \text{TC}$$

$$\text{Where, TR} = P \times Q$$

$$= \text{OP} \times \text{OQ}$$

$$= \text{OQRP}$$

$$\text{TC} = Q \times \text{AC}$$

$$= \text{OQ} \times \text{QT}$$

$$= \text{OQTS}$$

$$\begin{aligned} \text{Therefore, Profit} &= \text{OQRP} - \text{OQTS} \\ &= \text{STPR} \end{aligned}$$

Thus, the firm earns the excess profit. $\text{TR} > \text{TC}$

Loss condition: A firm under monopoly may also face a problem of getting loss. As in perfect competition even in monopoly the cost of the firm is divided into fixed cost and variable cost. It is essential for a firm to receive at least the variable cost to function in the market. The loss condition of a monopoly firm can be explained below with the help of the fig 10.2.

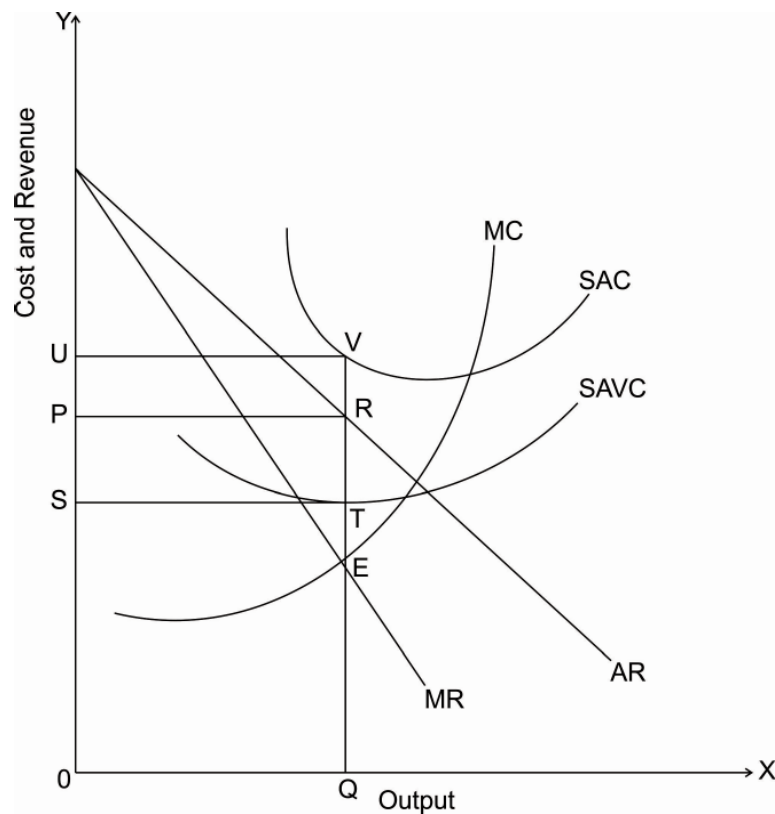


Diagram 10.2

$$\text{Profit} = \text{TR} - \text{TC}$$

$$\begin{aligned} \text{Where, TR} &= P \times Q \\ &= OP \times OQ \\ &= \text{OQRP} \\ \text{TC} &= Q \times AC \\ &= OQ \times VU \\ &= \text{OQVU} \end{aligned}$$

$$\begin{aligned} \text{Therefore, Loss} &= \text{OQRP} - \text{OQVU} \\ &= \text{PRVU} \end{aligned}$$

Thus, the firm earns the excess profit. $\text{TR} < \text{TC}$

Long run equilibrium condition: In the long-run, a monopolist can contrast all the inputs. Therefore, to determine the equilibrium of the firm, we need only two cost curves – the AC and the MC. Further, since the monopolist exits the market if he is operating at a loss, the demand curve must be tangent to the AC curve or lie to the right and intersect.

A monopolist usually earns excess profit in the long run. This can be understood by the following fig 10.3.

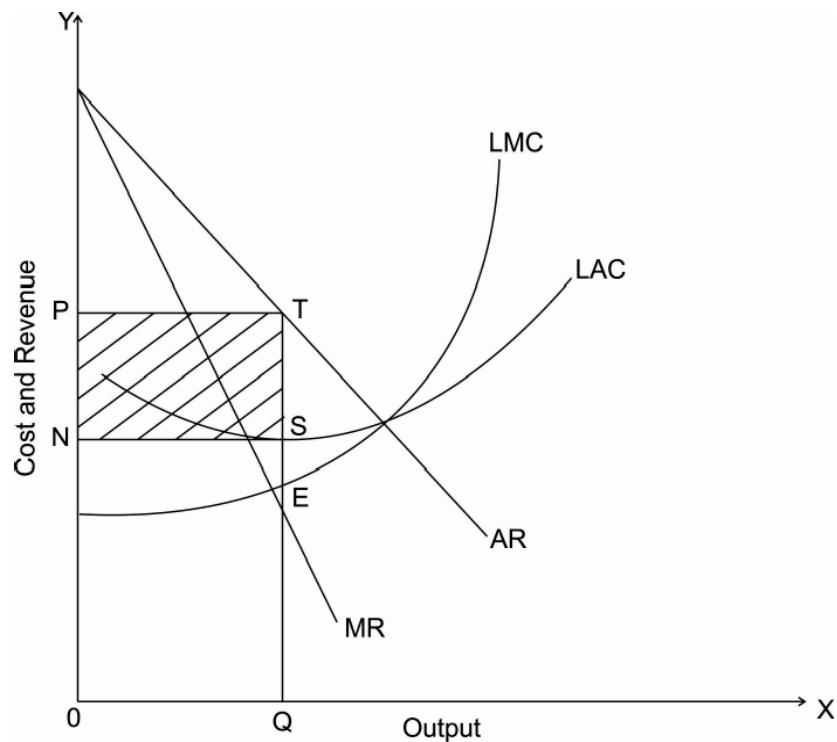


Diagram 10.3

$$\begin{aligned}
 \text{Profit} &= \text{TR} - \text{TC} \\
 \text{Where, TR} &= P \times Q \\
 &= OP \times OQ \\
 &= OQTP \\
 \text{TC} &= Q \times AC \\
 &= OQ \times QS \\
 &= OQSN
 \end{aligned}$$

$$\begin{aligned}
 \text{Therefore, Profit} &= OQTP - OQSN \\
 &= NSTP
 \end{aligned}$$

Thus, the firm earns the excess profit. $\text{TR} > \text{TC}$ in the long run.

MONOPOLISTIC COMPETITION

FEATURES OF MONOPOLISTIC COMPETITION

Perfectly competitive market and monopoly market are extreme and therefore not easy to find in real world.

In the real world the market that we find either have many sellers selling variety of products (such as toothpaste, textile or cloth market) called monopolistic competition. Or few sellers having dominant position in the market (such as airlines, mineral water) called oligopoly market.

Monopolistically competitive market is the market which has some characteristics of perfect competition and some of monopoly. Even though there are many sellers under monopolistic competition, each seller has its monopoly but still there is a competition due to product differentiation. Prof. Edward Chamberlin introduced the concept of monopolistic competition in his book Theory of Monopolistic Competition.

Features of monopolistic competition

- **Fairly large number of sellers-** In monopolistic competition there are many sellers. Therefore an individual seller cannot influence the market. Every seller to a certain extent follow an independent policy in price and output.
- **Fairly large number of buyers-** There are fairly large number of buyers in a monopolistically competitive market.
- **Close substitute products-** Under monopolistic competition sellers sold products which are close substitutes of each other. For eg. Soaps, pens etc.
- **Free entry and exit-** There are no restrictions on entry and exit of the firm under monopolistic competition. If existing firms are making supernormal profit, new firms can enter in to the market but they have to enter with a close substitute product. Similarly firms who are making loss can leave the market. Therefore in the long run firm who remains in the market will make only normal profit.
- **Selling cost-** As close substitute products are available in monopolistic competition, firms have to spend money for increasing sale of their product in the market. This cost is called as selling cost. It includes all expenditures of the firm which can increase their sale. It is in the form of T.V, newspaper advertisement, hoardings, exhibitions, distribution of free samples, discounts offered on products etc.
- **Product differentiation-** As goods are close substitutes of each other, it is necessary to have an independent identity of each product. Variety of factors on which goods can be differentiated are brand name, design, size, color, packing, taste, advertisement policy, after sales services etc. Due to product differentiation, firm can have some degree of monopoly.
- **Nature of demand curve-** The demand curve of a monopolistically competitive firm is more elastic. ie demand curve is flatter than it is under monopoly. This is because of the availability of close substitute products, where an increase in price of one commodity reduces its sale by a greater amount. Following diagram explains the shape of demand curve under monopolistic competition.

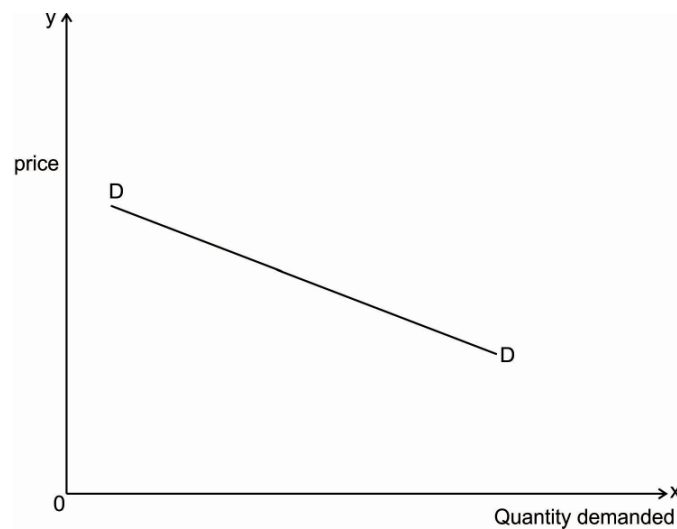


Diagram 11.1

- **Concept of group-** Prof. E. Chamberlin introduced the concept of group under monopolistic competition. Group includes those products which are close substitutes in economic and technical sense. The group will be in equilibrium in the long run when all firms in the group make normal profit.

Product differentiation

Product differentiation is one of the characteristics of monopolistic competition. Products are close substitutes of each other due to small differences in them. In case of products like soaps, garments, tooth paste etc. variety of products are available but each product is different from another due to following factors.

- **Brand name-** Brand name develops loyalty of public towards the product. Firms name itself is the name of its product. Raymond cloth, LG TV, Colgate toothpastes are some of the examples of branded products. Brand name helps to differentiate between the products.
- **Design-** On the basis of design products can be differentiated. Fridge, cars, furniture are some of the products which are purchased on the basis of design.
- **Size-** Firm produces their product in different sizes so that consumers can consume their most preferred size. Various sizes of product include economy size, family size, extra-large etc.
- **Color-** Customers would like to purchase various products on the basis of their color. Products like fridge, cupboard, tooth brush etc. are consumed on the basis of their color.
- **Taste and perfume-** Products like soaps, toothpaste, face powder, shampoo etc. are purchased on the basis of their taste and perfume.

- **Salesmanship-** People prefer products of a particular company because of the positive attitude of the salesman, their good behavior, their cooperation etc.
- **After sales services-** Customers consider after sales services while consuming a product. This is because products like TV, fridge, water purifier have a warranty period during which company provide free services to their customers. Thus the quality of after sales services is very important.

Due to above factors consumers have some loyalty to their products. Loyalty towards product gives some degree of monopoly to the firm. Product differentiation allows firms to charge different prices for their products. Under monopolistic competition it is necessary for the firm to maintain monopoly power over loyal customers.

EQUILIBRIUM OF A FIRM UNDER MONOPOLISTIC COMPETITION IN THE SHORT RUN AND IN THE LONG RUN

Short run equilibrium of a firm under monopolistic competition:

Monopolistically competitive firm can operate with supernormal profit, normal profit or loss in the short run. Following diagrams explains all the three cases.

- **Excess profit**

Given the demand curve and cost curves of a firm, firm would produce profit maximizing level of output at that point where $MR=MC$. This is the equilibrium level of output for the firm.

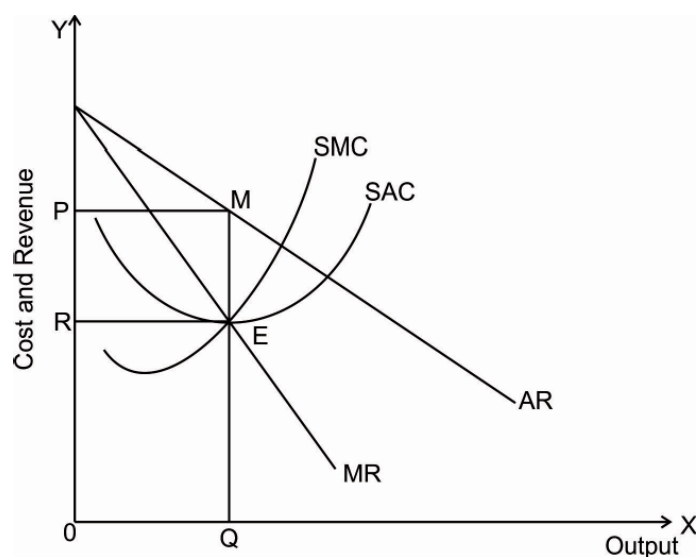


Diagram 11.2

On the X axis we measure output and on the Y axis we measure cost and revenue. AR and MR are the average and marginal revenue curves which are more elastic or flatter. SAC and SMC are the short run average and marginal cost curves. Firms equilibrium point is E and equilibrium level of output is OQ. Thus the price determined is OP or QM.

In the above diagram with price OP and output OQ, $TR = OQMP$, $TC = OQER$. As $TR > TC$, Excess profit = $REMP$ ($OQMP - OQER$)

- **Normal profit**

Condition for normal profit is very rare. Due to change in demand and cost conditions, sometimes it is possible for the firm to just cover its cost of production ie the case of normal profit.

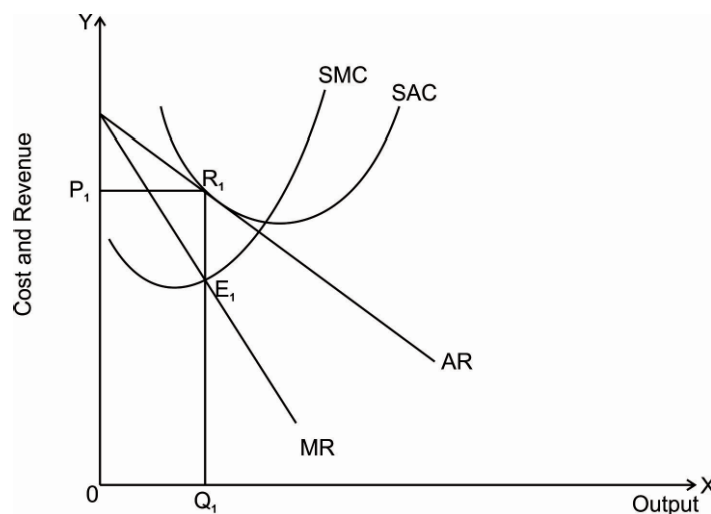


Diagram 11.3

With given revenue and cost curves firm is in equilibrium at point E1, with the intersection of MR and MC curves. Output= OQ_1 , Price= OP_1 , $TR = OQ_1R_1P_1$, $TC = OQ_1E_1P_1$. As $TR = TC$, the firm will make normal profit.

- **Loss**

Due to demand and cost conditions it is also possible that firm may operate with loss. With the help of following diagram we can explain the case of loss.

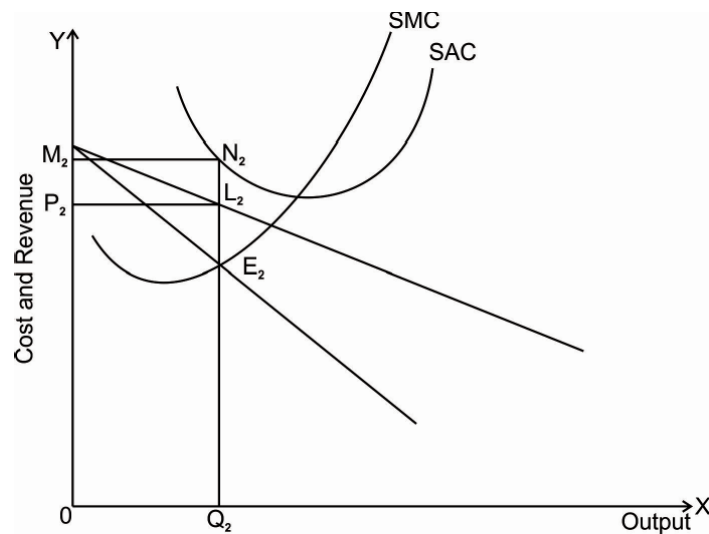


Diagram 11.4

With given revenue and cost curves, firm is in equilibrium at point at point E₂, where MR and MC curves intersect.

Equilibrium output = OQ_2 and equilibrium price = OP_2 . $TR = OQ_2L_2P_2$, $TC = OQ_2N_2M_2$. As $TC > TR$, firm will make loss. $Loss = P_2L_2N_2M_2$

In the short run when the firm incurs loss, it has to decide whether to continue with the business or not. As long as the firm is able to cover its total variable cost, it will continue with the business and when $TR < TVC$, firm should stop its operations.

Long run equilibrium of a firm under monopolistic competition:

In the long run it is possible for the firm to make all necessary changes in its fixed factors of production. As all costs are variable, firm cannot continue to operate with loss. As there is free entry and free exit, due to supernormal profits earned by the existing firms, more firms will enter the market and firms which cannot cover the cost of production will leave the market. More firms who are entering the market reduces the share of existing firms and therefore in the long run all firms will make only normal profit. The case of normal profit can be discussed with the help of following diagram.

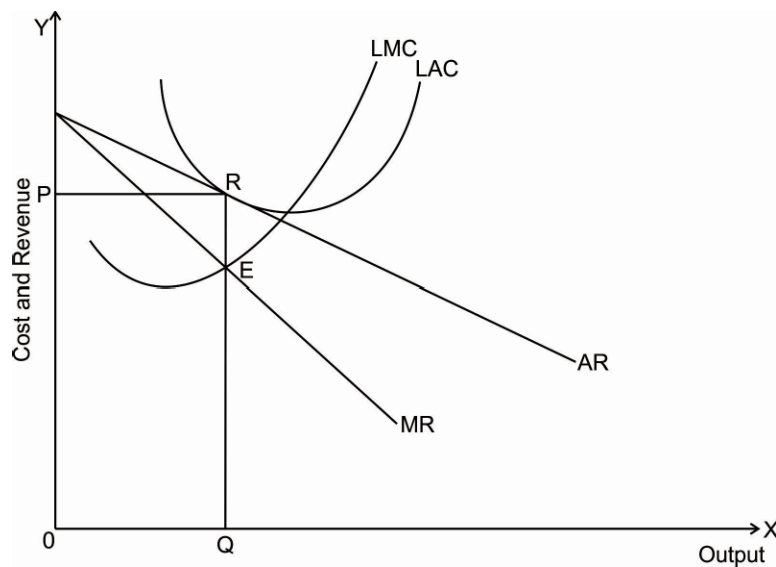


Diagram 11.5

With given revenue and cost curves, equilibrium point is E where MR and MC curves intersects. Equilibrium output= OQ, price= OP TR= OQRP TC= OQRP. As TR=TC, there is a normal profit.

PRODUCTION COST AND SELLING COST

Production cost includes all those expenditures incurred by the firm to produce a commodity and to reach to shops. It includes rent on land, wages and salaries paid to workers, interest on capital. Depreciation charges, taxes etc. The objective of production cost is to produce a commodity.

On the other hand the purpose of selling cost is to increase the sale of its product in the market. Due to the availability of substitutes, selling cost is very important for the firm under monopolistic competition. Through selling cost firms try to spread the message regarding how their product is better than the other products available in the market.

Selling costs are incurred in various forms like T.V advertisement, newspaper advertisement, pamphlets, hoardings, distribution of free samples, gifts, discounts offered on products, exhibitions, after sales services etc.

The concept of production and selling cost can be explained with the help of following diagram.

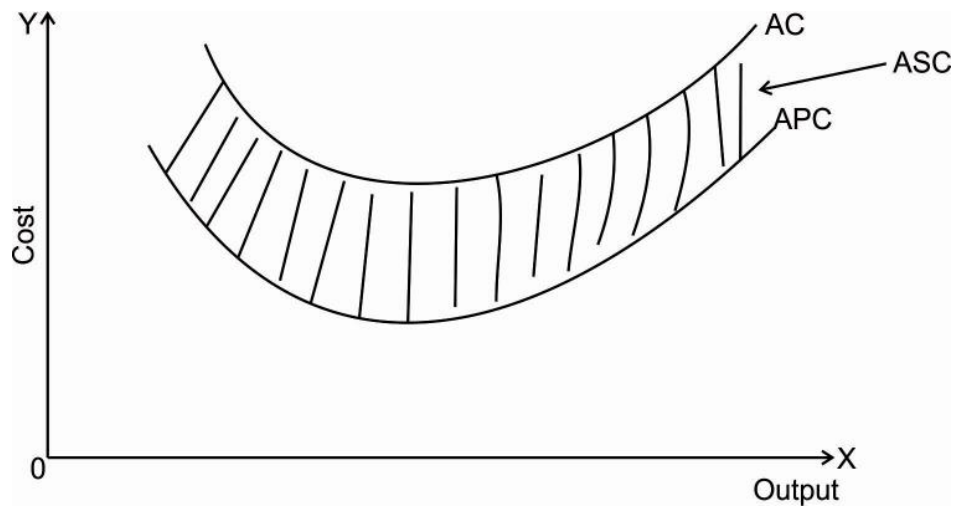


Diagram 11.6

As shown in the diagram, the difference between Average Cost (AC) and Average Production Cost (APC) is the Average Selling Cost (ASC).

Selling cost:

Selling cost is one of the important features of monopolistic competition. Under perfect competition, as there are homogeneous goods there is no need for selling cost. Similarly under monopoly due to the absence of substitute products, selling cost is not required. But in case of monopolistic competition as close substitute products are available, firm has to incur selling cost. Thus the cost incurred by the firm to promote their product in the market or to increase the demand for the product in the market is called the selling cost. Various forms of incurring selling cost are as follows-

- **Advertising-** this is the main form of selling cost. Through advertisement the firm is trying to show how their product is superior to other products that are available in the market. Advertisement can be through T.V, radio, newspaper, hoardings, distribution of pamphlets etc.
- **Exhibitions-** exhibitions can be held at local, state, national and an international level. The purpose of exhibition is to increase the sale of the product.
- **Window dressing-** various products like garments, electronic items, and other consumer durables are displayed to the consumers to provide some idea about the product and also to attract the consumers.
- **Free samples-** in case of goods like soaps, tea, biscuits, oil, hand wash etc. Companies distribute free samples to attract the large number of customers.

- **Gifts**- various gifts are offered by the companies on purchase of a specific amount.
- **Discounts**- another way of attracting large number of customers is to offer them large discounts. Once the market for the product is established, the discount may be withdrawn.
- **After sales services**- good after sales services play an important role in gaining goodwill of the customers. Along with better after sales services, warranty period, relation with customers etc. are also important to have greater sale of their product in the market.

Effects of selling cost

Selling cost affects the consumers demand. It makes people aware of the existing commodity and also inform them how their product is better than substitutes available in the market. Effect of selling cost on demand can be explained with the help of following diagrams.

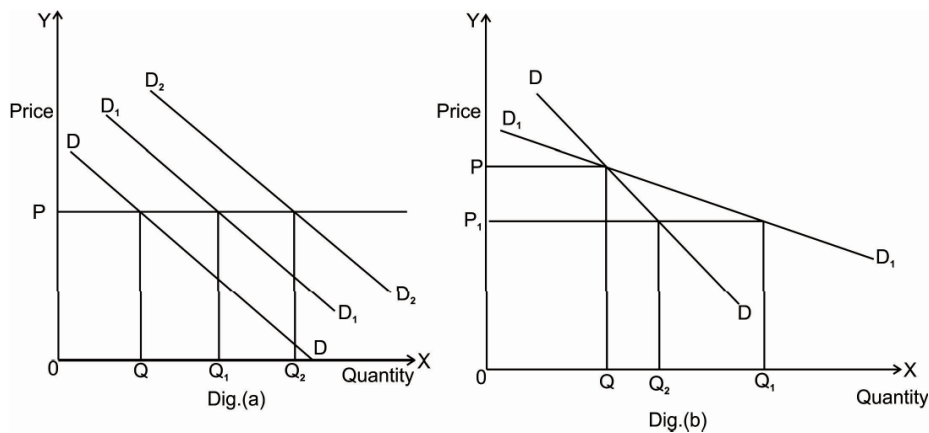


Diagram 11.7

In the above diagrams X axis measures quantity demanded and Y axis measures price. In the first diagram DD is the initial demand curve with price OP and output OQ . Due to selling cost demand curve shifts to the right to D_1D_1 and further to D_2D_2 . The producer is able to sell more quantity OQ_1 and OQ_2 at the same price OP .

Second diagram shows that DD is the original demand curve without selling cost with price OP and quantity OQ . If selling cost is incurred, demand curve will become more elastic, i.e. D_1D_1 . If firm reduces price to OP_1 , its demand will increase to OQ_2 . But at the same time firm incurs the selling cost, it will be able to sell more i.e. OQ_1 at price OP_1 .

Effect of selling cost on profit

Effect of selling cost on profit can be explained with the help of following diagram

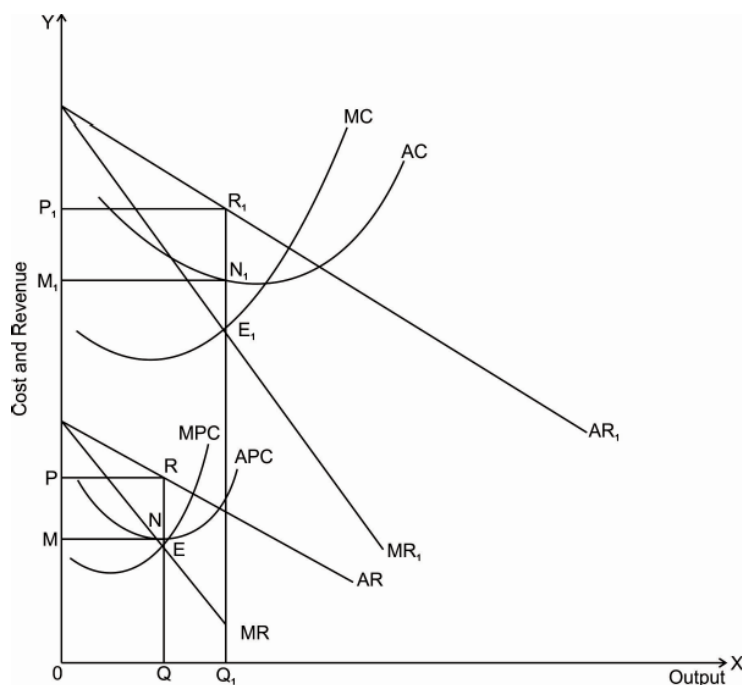


Diagram 11.8

In the above diagram X axis represents output and Y axis represents cost and revenue. If we consider a case without selling cost, AR and MR are the downward sloping curves starting at a lower side of Y axis. APC and MPC are the average and marginal production curves. Initial equilibrium point is E where MPC curve and MR curves intersect. Equilibrium output = OQ and price = OP, $TR = OQRP$, $TC = OQNM$ as $TR > TC$, profit = MNRP.

If the firm incur selling cost, demand for goods will increase and therefore AR curve shifts upward to AR_1 . Correspondingly MR curve will also shift to MR_1 . Adding selling cost in production cost we have the average and marginal cost curves. New equilibrium point is E_1 . Output = OQ_1 , price = OP_1 , $TR = OQ_1R_1P_1$, $TC = OQ_1N_1M_1$. $TR > TC$, therefore profit = $M_1N_1R_1P_1$.

This shows that due to selling cost demand for commodity increases from OQ to OQ_1 . An increase in demand raises the price from OP to OP_1 . And therefore profit after selling cost is also greater than the level of profit before selling cost.

ROLE OF ADVERTISEMENT

Due to the availability of close substitute products, advertisement or selling cost plays an important role under monopolistic competition. These advertisements are undertaken

through exhibitions, T.V, hoardings, discounts, distribution of free samples etc. The purpose of selling cost is to increase the sale of commodity in the market. It also encourages competition among the firms producing close substitute products.

There are many advertisements which gives an information about the availability of various products in the market and also inform them about quality and uses of the product. Advertisement also specifies the benefits of using a particular product. Such advertisements are called informative or educative advertisement. On the other hand there are some advertisements who distort consumer's preferences by misleading them to purchase certain commodities. Such advertisements are called manipulative or competitive advertisement.

There are debates over its role which is discussed as follows-

Arguments for advertisement or benefits of advertisement:

- Advertisement creates awareness amongst the consumers about the availability of various products, their advantages and disadvantages, price of the product etc.
- Advertisement generally increases the demand for the product and thereby increases the level of investment and employment.
- Successful advertisement which leads to increase in demand will lead to increase in production of the firm and thereby greater benefits of economies of scale.
- Advertisement directly provides information to the consumers and thus eliminates middlemen.
- If the advertisement is genuine and people are happy with the quality of the product, firms will succeed in building a brand loyalty among the consumers.

Arguments against advertisement or disadvantages of advertisement:

- Advertisement creates temptation to spend money on those goods which are sometimes not required.
- In order to attract consumers, sometimes producer explains false qualities of their product where the consumers do not have any source of verifying. In this way advertisement misleads the consumers.
- Advertising costs are added to the production cost of the firm and therefore price of the product will also be high.
- Advertising cost leads to psychological dissatisfaction to many poor people for whom it is not affordable to consume advertised product.

- If an advertisement is not successful in increasing demand for a product, advertisement expenditure will be considered as wastage.
- Posters on wall for advertisement spoils the beauty of specific areas.
- Due to attractive advertisement many people consume food items (junk food) in large quantity.
- Advertisements by the financial institutions offering loans at a concessional rate for consumption of specific goods divert peoples mind to consume such goods. But at the time of repayment of loan if they face some problem, it leads to stress, family problems etc.
- In most of the advertisements female models are shown. In some cases there is an exploitation of these models.

WASTAGES UNDER MONOPOLISTIC COMPETITION

There are different types of wastages under monopolistic competition. These are discussed below.

1. **Excess capacity-** Excess capacity is created under monopolistic competition the equilibrium of a firm under monopolistic competition is attained at a less than optimum level of output. This means that the resources are not fully utilized and therefore this underutilization of existing capacity leads to excess capacity. Following diagram explains the case of excess capacity.

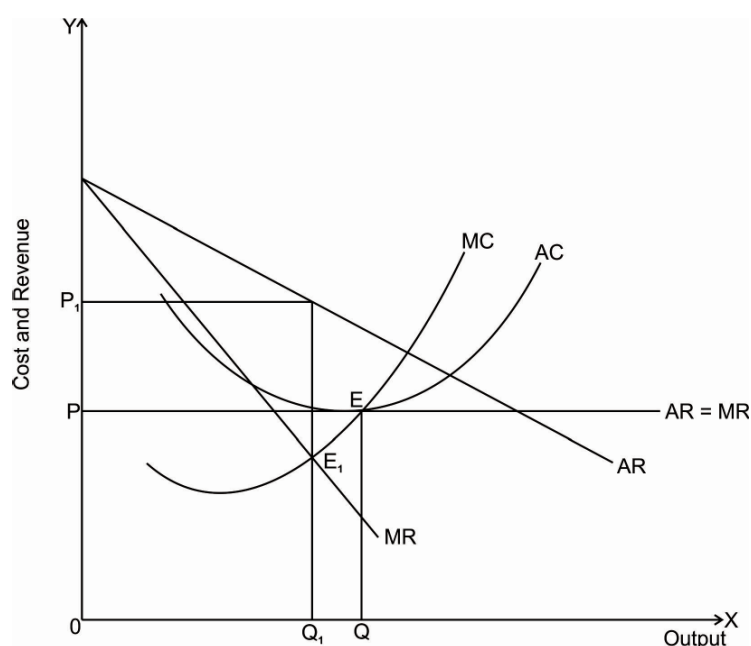


Diagram 11.9

In the above diagram horizontal AR and MR curve indicates perfect competition and downward sloping AR and MR curves indicates monopolistic competition. It is clear from the diagram that equilibrium under perfect competition is attained at point E with price OP and output OQ. Whereas equilibrium under monopolistic competition is attained at point E₁, with price OP₁ and output OQ₁. This shows that firm under perfect competition produces optimum level of output (OQ) with minimum cost and thus charges lower price (OP). On the other hand under monopolistic competition produces less than optimum level of output (OQ₁) and sells at a higher price (OP₁). As firm produces less than optimum level of output, Q₁Q capacity of the firm is unused. This is the excess capacity of the firm under monopolistic competition.

- As there is underutilization of a capacity, it leads to the problem of unemployment.
 - If the firm is not successful in increasing demand for their product in the market, all firms expenditure in the form of selling cost will be a wastage.
 - Heavy expenditure on advertisement will increase the prices of goods and services and therefore there is an exploitation of the consumers.
- 2. Unemployment-** as the production capacity of a firm is not fully utilized under monopolistic competition, the problem of unemployment occurs in case of monopolistic competition.
 - 3. Exploitation of the consumer-** Due to product differentiation, firm has to incur selling cost under monopolistic competition. Therefore the consumers have to pay higher price for the product and this leads to exploitation of the consumers.

4. **Selling cost**-Under monopolistic competition firm undertakes huge expenditure on advertising their product in order to increase the sale of their product in the market. If the firm is not successful in increasing the sale of their product in the market, this expenditure is considered as the wasteful expenditure.
 5. **Lack of specialization**- as there are many firms, producing close substitute products, there is a very little scope for specialization. Thus the advantages of large scale production are not possible.
-

OLIGOPOLISTIC MARKET

OLIGOPOLY MARKET CAN BE WELL UNDERSTOOD WITH THE HELP OF FOLLOWING CHARACTERISTICS-

- **Few sellers**- In case of oligopoly market there are few sellers. The number of sellers is not more than 10. In case if there are more than ten sellers, few sellers are dominant and others are insignificant.
- **Homogeneous or differentiated products**- goods which are sold under oligopoly are either homogeneous or differentiated. Differentiation is in the form of brand name, design, color etc.
- **Entry is possible but difficult**- In case of oligopoly a new firm can enter the market but in reality, it is difficult because of the technological, financial and other barriers
- **Interdependence**- as there are few firms under oligopoly, a single firm is not in a position to take any decision about price and output independently. Any decision taken by one firm has the reactions from the rival firms or competitive firms. Different firms will have different decisions. Thus the firms are interdependent. Therefore it is necessary for the firm to take in to consideration the possible reactions of the rival firms.
- **Uncertainty**- as the firms are interdependent for deciding the price and output, it creates the atmosphere of uncertainty. If one

seller increases his output to capture large share of the market, others will react in the same way. If one seller increases the price of his product, others will not follow him due to the fear of losing the market. On the other hand if one seller reduces the price, others will also reduce their prices. But how much price reduction they will do is uncertain. This means that an oligopolist is uncertain about the reactions of the competitive firms.

- **Indeterminateness of the demand curve-** in case of perfect competition price is determined in the market with demand and supply factors and the firm is a price taker therefore demand curve of the firm is perfectly elastic (parallel to x axis). In case of monopoly a single seller decides the price for his commodity and accordingly sells his output. Thus the demand curve of the monopolist slopes downward. And the demand curve is steeper as the substitute products are not available. Under monopolistic competition as close substitute products are available, demand curve is downward sloping and more elastic or flatter. This means that under perfect competition, monopoly and monopolistic competition there is a definite shape of the demand curve.

In case of oligopoly due to interdependence of firms and the uncertainty aspect

Demand curve do not have a definite shape. It loses its determinateness.

The demand curve under oligopoly is kinky as shown in the following diagram.

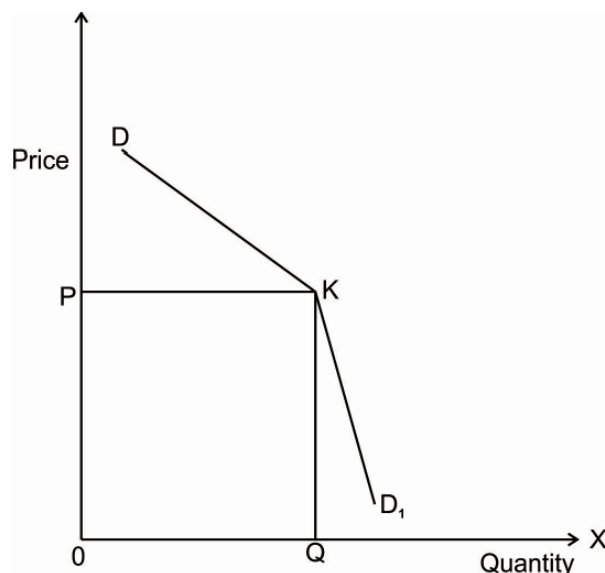


Diagram 12.1

COLLUSIVE AND NON- COLLUSIVE OLIGOPOLY

The oligopoly market faces the problem of price determination because of the continuous reactions of the rival firms. Due to differentiate products, competition in the oligopoly market is also high. An oligopoly can be collusive or non -collusive.

Non collusive oligopoly

In case of non- collusive oligopoly, firms behave independently, even though they are interdependent. interdependence of the firm leads to stiff competition among the rivals. In this case the behavior of the Seller depends on how he thinks his competitors will react to his decision making. In case of non-collusive oligopoly firm while deciding price for its product assumes that rival firms will keep their price and output constant and will not react to any change in price and output introduced by the firm. A very good example of non - collusive oligopoly is sweezy's kinked demand curve model.

Collusive oligopoly- collusive oligopoly prevails when the firms working under oligopoly market enter into an agreement regarding uniform price and output policy to avoid uncertainty arising due to interdependence of the firm and to avoid high level of competition.

The agreement may be either formal (open) or tacit (secret). As the open agreement to form monopolies are illegal in most of the countries agreements between the oligopolists are tacit.

Collusions are of two types:

- a. Cartel and b. price leadership

In case of collusive oligopoly, price fixing takes place when all firms in the market try to control supply, to achieve a monopoly

like situation. In this type of oligopoly, firms aim at maximizing collective profit rather than individual profit.

Collusive and non- collusive models are discussed below.

Price rigidity- kinked demand curve model (non- collusive oligopoly model)

Kinky demand curve model or kinked demand curve hypothesis was given by an American economist Paul M. Sweezy and Oxford economist Hall and Hitch.

Interdependence and uncertainty aspect of oligopoly leads to indeterminateness of the demand curve. In case of oligopoly price is rigid or inflexible because oligopolists are not interested in changing their price even though economic conditions undergo a change.

In order to explain price and output determination under oligopoly with product differentiation economists often used kinked demand curve model. This model is explained by taking an example of extremely limited case of oligopoly i.e. Duopoly, where there are only two firms. Therefore there are two demand curves as shown in the following diagram.

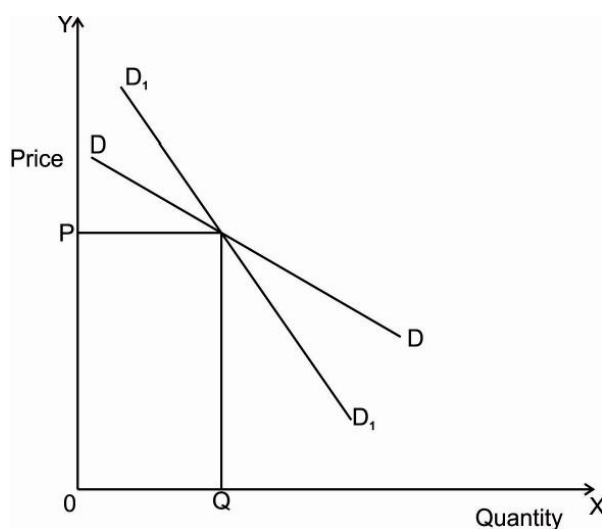


Diagram 12.2

As shown in Diagram 12.2 above there are two demand curves DD of firm A and D_1D_1 of firm B. Demand curve DD is more elastic where as demand curve D_1D_1 is less elastic. These two demand curves intersect at point K. Thus the prevailing price is OP and quantity is OQ. As shown in the diagram the demand curve faced by an oligopolist is DKD_1 . This demand curve has a kink at point K because the upper segment of demand curve (segment DK is more elastic) and the lower segment of the demand

curve (segment KD_1) is less elastic. This difference in elasticities is because of the reactions of the competitive firms.

An oligopolist believes that if he reduces the price below prevailing price, his competitors will also reduce their prices and if he increases the price above prevailing price, his competitors will not increase their prices.

- **Increase in price-** If an oligopolist increases the price above prevailing price his competitors will not increase their price. Therefore, demand for his goods will fall substantially. This is because due to increase in price his customers will go to his competitors who have not increased their prices. Due to this the demand curve above prevailing price is more elastic.
- **Reduction in price-** If an oligopolist reduces the price below prevailing price, his competitors will follow him and also reduce their prices due to the fear of losing their customers. Due to quick reactions of the oligopolists, whoever reduces the price, demand for his goods increases by a very little amount. Therefore the demand curve below prevailing price is less elastic.

Therefore DKD_1 is the kinked demand curve under oligopoly. Due to differences in elasticity, a demand curve has a kink at point K. Thus the demand curve under oligopoly is called kinky demand curve.

Rigid price- With an increase in price, there is a fear of losing the market and there is a very little benefit by reducing the price. Therefore an oligopolist is not interested in changing their price. Thus price remains rigid or sticky under oligopoly.

Equilibrium of a firm

Equilibrium of a firm occurs when $MR = MC$. In case of oligopoly the demand curve or the average revenue curve has a kink at a particular prevailing price. Therefore the MR curve of the firm has a discontinuous portion as shown in the following diagram.

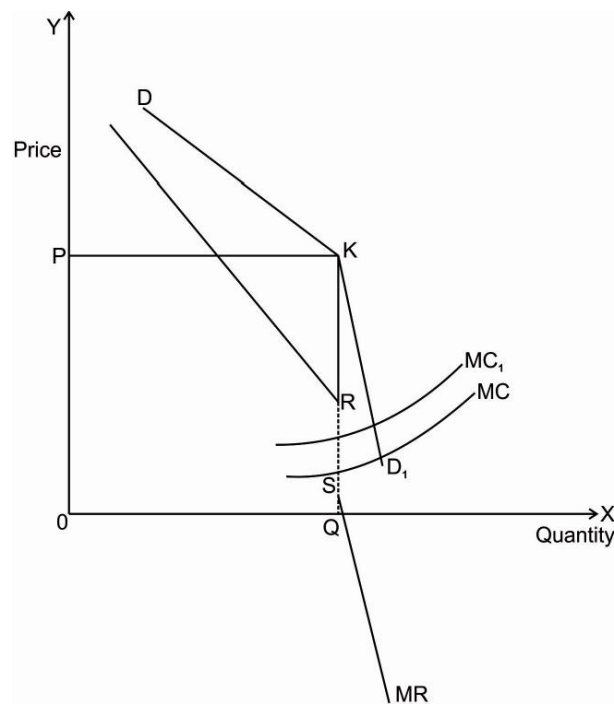


Diagram 12.3

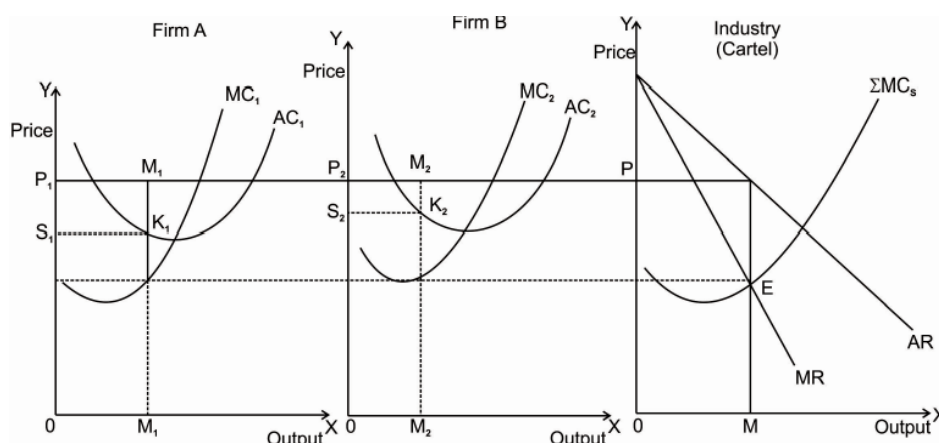
In the above diagram DKD_1 is the kinked demand curve under oligopoly. The demand curve has the kink at point K. Therefore MR curve which lies half way between AR curve and Y-axis has a discontinuous portion RS. MR curve is discontinuous because of the Kink to the demand curve. Discontinuous portion of the MR curve depends on the difference in elasticities. Larger is the difference in elasticities, longer will be the discontinuous portion of the MR curve. MC is the marginal cost curve which passes through discontinuous portion of the MR curve. Equilibrium of the oligopoly form is achieved at a point where $MR=MC$. Therefore equilibrium output is OQ and price is QK or OP. If MC increases or decreases, there will be upward or downward Movement in the marginal cost curve over the discontinuous portion of the MR curve. This will keep price and output level constant at OP and OQ respectively.

Therefore the price remains rigid. If an oligopolistic increases price over DK portion of the kinked demand curve, the Rivals will not follow due to the fear of losing the market. Due to this oligopolists will not increase price above OP. Similarly, no oligopolist is interested in reducing the price because in this case due to the continuous reactions of the rivals, demand increases by a very small amount. Thus the demand curve is inelastic.

Collusive oligopoly models:

In case of oligopoly, there is interdependence of the firms and there is also, uncertainty. In order to avoid uncertainty arising out of interdependence, firms generally enter into an agreement to follow a uniform price and output policy. This type of agreement

helps firms to avoid price wars and also stiff competition. The agreement may be either formal (open) or tacit (secret). Open agreements are illegal in most of the countries. Thus, the agreements to form monopolies are in the form of tacit agreements. This type of oligopoly is called collusive oligopoly. OPEC (Organization of Petroleum Exporting Countries) is the best example of this type of oligopoly. There are two types of collusions. They are- a. cartel and b. price leadership Cartel- Cartel is an agreement among the competitive firms to earn higher profits. Cartels are formed in oligopoly market where the number of sellers is few and they are selling homogeneous or differentiated products. In this agreement, the member firms may agree on price fixing, market share division of profits etc. The cartels are of two types - centralized cartel and market sharing cartel. In case of centralized cartel there is a common Sales Agency which alone undertakes the selling operations for all the forms who are party to the agreement. Here the Central Administrative agency decides the product price, distribution of output, profit sharing for all the firms. All firms agree to surrender their rights to Central Administrative Agency for earning maximum joint profits. This is known as perfect cartel. Agreement under centralized cartel can be discussed with the help of following diagram.



firm A and B and third diagram explains the case of industry. Formation of cartel leads to Monopoly power and therefore AR and MR of industry are downward sloping. As shown in figure 3, summation MC is the marginal cost curve for an industry, which is being derived by adding horizontally the marginal cost of curves of two firms MC1 and MC2. Total industries output is produced at a point where summation MC= MR. Therefore, total output is OM and the market price is OP. This is the price set by the centralized authority. Firm A sells OM₁ output and Firm B sells OM₂ output. OM₁+OM₂=OM. Market price is charged by both the firms.

therefore, price of firm A is OP_1 and price of firm B is OP_2 . Profit for firm A is $S_1K_1M_1P_1$ and profit for firm B is $S_2K_2M_2P_2$. This shows that firm A produces and sells greater quantity as compared to firm B and thus makes higher profits.

A type of cartel discussed above is very rare. In the real world we generally have loose type of cartel. Here we have two types of market sharing. They are-

- a. Market sharing by non- price competition and
- b. Market sharing by output quota

a. Market sharing by non- price competition- In case of oligopoly, due to interdependence of firms and uncertainty, price is rigid i.e. firms follow a particular price and there is no tendency either to increase or to reduce the price. At a uniform price firms are free to produce and sell that level of output which will maximize their profits. Here even though the firms are following same price they are free to change the style of their product, style of advertising the product, additional facilities or discounts may be given. If all member firms have identical cost, they will be agreeing to uniform monopoly price and this price will maximize their joint profits. But if their costs are different, cartel price will be decided by the bargaining between the firms. If low cost firms are interested in charging lower price cartel may break away.

b. Market sharing buy output quota- In this case an oligopoly firm enters in to an agreement regarding quota of output to be produced and sold by each of the firm at a particular agreed price.

If the cost of production is same for all the firms and firms are producing homogeneous product, a monopoly element will exist and all firms will share the market equally and charge the maximum possible price. On the other hand, if the cost of production is different for different firms, market share of the firms will differ. These differences are dependent on the bargaining power of the firms. The Quota of output shared by the firm depends on the past records and negotiation skills.

Another method for market sharing quota is to divide the markets region wise. In this case firms are free to decide the price and to bring changes in their product. When there are cost differences between the firms all types of cartels are unstable.

Price leadership:

Price leadership is one way of avoiding unnecessary competition. In case of price leadership one firm decides the price and the other follow it. Firms who decides the price will be the leader and the others are followers.

There are different types of price leadership. They are discussed below:

1) Price leadership by a low-cost firm- In this case a firm with lower cost of production becomes the leader. Here a firm with low cost sets a price and the other firms with higher cost of production accept the price. While deciding price, low cost firm has to ensure that this price brings some profits to the high cost firms.

2) Price leadership by a dominant firm - In this case one of the firms in the oligopoly market may be producing a large portion of the total output. Such a firm will become dominant, who can influence other firms in the market. As other firms are small they cannot have impact on the market. The dominant firm fixes a price which maximizes its own profit. Thus, the other firms will follow the price set by the dominant firm and accordingly adjust their output.

3) Barometric price leadership - In this type of price leadership an old experienced and most respected firm in the market becomes the leader. This firm study the changes in market conditions like demand for the product, cost conditions, level of competition etc. and decides such a price which protects the interest of all. A leader firm decides the price which is beneficial to all and other firms Follow the Leader.

4) Exploitative or aggressive price leadership - Here a large and dominant firm establishes its leadership through aggressive price policy and forces the other firms to follow the price set by him. If the firm's do not agree with the price, aggressive firms may threaten the other firms to keep them out of the market.

Price leadership by a dominant firm In case of price leadership by a dominant firm, one of the large and dominant firm in the industry sets the price and the other small firms follow the price set by the dominant firm. Following diagram explains the price leadership by a dominant firm.

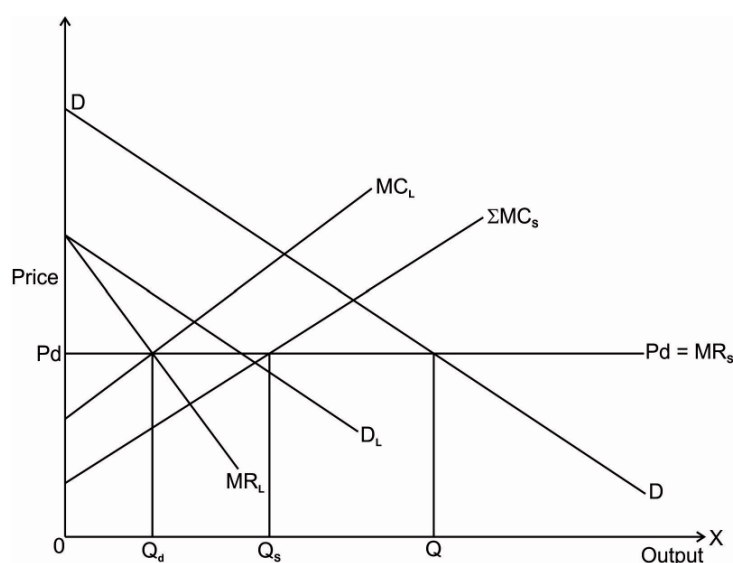


Diagram 12.5

In the above diagram DD is the demand curve of a market at and D_L is the demand curve of a dominant firm, MR_L is the marginal revenue curve and MC_L is the marginal cost of the dominant firm. The dominant firm will maximize their profit when $MR_L = MC_L$. Therefore, the price set by the dominant firm is P_d and the output of the dominant firm is Q_d . As the small firms in the market are price takers, they follow price P_d which is set by the dominant firm. For the small firms, price set by the dominant firm becomes their marginal revenue, $P_d = MR_s$. The small firms or followers will maximize their profit when $MR_s = \text{summation } MC_s$. Thus, the output of small firms is Q_s . Thus, in the market consumers pay price P_d and consume quantity Q . Out of this total quantity Q the share of dominant firm is Q_d and the share of small firms is Q_s . Whether the price leadership is successful or not depends on various factors. It is expected that the leader or dominant firm is fully aware of the reactions of the small firms. If the leader firm takes the decision with incomplete information, firms' leadership may not be successful. Some of the limitations of the price leadership are as follows-

1) Non price competition - There is a possibility that even though the small firms are following the price set by dominant firm, they may also follow various non-price competition methods, which are in the form of discounts, after sales services etc. In this case non price competition may lead to reduction in prices to protect their own market share.

2) Product differentiation - In case of oligopoly, if the firms are selling differentiated products, it is difficult to have the leadership. This is because each firm will incur selling cost in order to attract more customers. Selling cost is in the form of TV on newspaper

advertising, giving free samples, discount, etc. This situation forces the leader firm to enter into the competition and protect its market share.

3) Difference in the cost of production - Cost of production for each of the firm is different. In case of price leadership if the low cost firm becomes leader and sets the price, which other firms in the industry have to follow. In this case for a dominant firm it is difficult to follow the price set by low cost firm. If the firms with a lower cost enter into non price competition it may lead to open competition by all the firms. On the other hand, if high cost firm becomes the leader for setting the price it has to set high price for its product in order to cover the cost firms who are not ready to accept this high price may try to enter into non- price competition to enlarge their market.

PRICING METHODS

COST – PLUS PRICING / FULL COST PRICING / MARKUP PRICING

Cost-plus pricing is also called as full cost pricing or mark-up pricing. Two famous economist of Oxford University Hall and Hitch developed this concept of pricing. This is the most commonly adopted method of pricing. It is used by a company or firm to determine the selling price of their product. Cost-plus pricing is a very simple method for setting the prices of goods and services.

According to this method price of a commodity is determined by taking into consideration Average Fixed Cost (AFC), Average Variable Cost (AVC) and Normal Profit Margin (NPM) or markup percentage. This markup percentage is nothing but profit. In other words price is determined by adding a fixed mark-up to the cost of producing the product. This method is generally used by manufacturing firms. Thus, it is imperative to have an accurate information of average costs.

$$\square P = AFC + AVC + NPM$$

Example :

If variable cost of a product is ₹ 100, average fixed cost is ₹ 200 and desired markup is 50% on cost. The price will be calculated as follows:

$$\begin{aligned} P &= 100 + 200 + (0.5 \times 300) \\ &= 300 + 150 \end{aligned}$$

= ` 450

Advantages/Merits

- 1] This method is simple and easy for the firms to implement, no matter how many products the firm produces.
- 2] It promises fair returns to both producers and consumers.
- 3] It is less time consuming as it requires less data for calculation i.e. (AFC and AVC).
- 4] It is easy to apply.
- 5] This method guarantees stability in prices when cost of production remains stable.
- 6] This method provides a logical reasoning for increase in prices because prices increase as a result of increase in costs.
- 7] It lessens the cost of decision making as price can be calculated just by using one formula.

Disadvantages / Demerits

- 1] This method concentrates only on cost of production and profit margin, and completely overlooks demand and preferences by consumer.
- 2] It disregards the role of competition in the market.
- 3] It makes use of historical data rather than replacement value.
- 4] It is very difficult to estimate precisely the average variable cost and average total cost and distribute it between the various products produced by the firm.
- 5] Few economist are of the opinion that pricing should be based on marginal cost rather than average costs.

Despite of all the demerits, in reality many firms use this method because of following reasons.

- 1] If the price is more than the average cost, firms would make supernormal profits and this will interest the competitor's to enter in to the market.
- 2] It difficult to get correct information about MR and MC and therefore many firms use full cost pricing method.

Case Studies – Pricing Methods

- 1] Suppose the firm has capacity to produce 1000 units. It uses 70% of its capacity and is considered as the standard output. The total variable cost incurred is ` 1400 and the overhead cost is ` 700. The mark up decided by the firm is 25%.

Estimate the price per unit.

Standard output is = 700 units

i.e. 70% of its capacity

$$\begin{aligned}
 \text{Total Variable Cost} &= ₹ 1400 \\
 \square \text{Average Variable cost} &= ₹ 1400 / 700 = 2 \\
 \text{Overhead Cost} &= ₹ 700 \\
 \square \text{Average Fixed Cost} &= ₹ 700/700 = ₹ 1 \\
 \square \text{Average Cost} &= AVC + AFC \\
 &= 2+1 = ₹ 3
 \end{aligned}$$

$$\begin{aligned}
 \text{Now } P &= C (1+m) \\
 &= 3 (1+0.25) \\
 &= 3 (1.25) \\
 &= ₹ 3.75
 \end{aligned}$$

2] A firm produces 5000 units of commodity X at the total fixed cost of ₹ 2,00,000 & total variable cost of ₹ 3,00,000. Find the price which the firm would charge to its customers if it wants to make profit margin of 15% on cost. The firm uses cost plus pricing method.

$$\begin{aligned}
 \text{Output of the firm} &= 5000 \text{ units} \\
 \text{TFC} &= ₹ 200000 \\
 \text{TVC} &= ₹ 300000
 \end{aligned}$$

$$\begin{aligned}
 \square \text{Average Fixed Cost (AFC)} &= \frac{\text{TFC}}{Q} = \frac{200000}{5,000} \\
 &= ₹ 40
 \end{aligned}$$

$$\begin{aligned}
 \square \text{Average Variable Cost (AVC)} &= \frac{\text{TVC}}{Q} = \frac{300000}{5,000} \\
 &= ₹ 60
 \end{aligned}$$

$$\begin{aligned}
 \text{Average Total Cost} &= \text{AFC} + \text{AVC} \\
 &= ₹ 40 + ₹ 60 \\
 &= ₹ 100
 \end{aligned}$$

□ Net profit margin is 15% of total cost

$$\square \frac{15}{100} \times 100 = 15$$

$$\begin{aligned}
 \square \text{Price of Commodity} &= ₹ 100 + ₹ 15 \\
 &= ₹ 115
 \end{aligned}$$

3] If total cost of producing a commodity A is ₹ 5,00,000 and markup fixed by the firm is ₹ 1,00,000. Total Output to be sold is ₹ 6000 units. Calculate the price per unit.

$$\begin{aligned}
 \text{Price} &= \frac{\text{Total cost of production} + \text{markup}}{\text{Total quantity of output}} \\
 &= \frac{5,00,000 + 1,00,000}{6000} \\
 &= \frac{6,00,000}{6000} = ₹ 100
 \end{aligned}$$

4] If the cost of product is ` 500 per unit and the market expects 10% profit on costs.
Calculate selling price

Selling Price = AC + markup

$$= 500 + \frac{10}{100} \times 500$$

$$= 500 + 50$$

$$= \text{` } 550$$

5] ABC International expects to incur the following costs in its business in the upcoming year.

Total production cost = ` 250000

Total Sales and administration cost = ` 100000

Company wants to make profit of ` 200000

And ABC expects to sell 20000 units of its product.

On the basis of above information, calculate full cost price.

$$\text{Full Cost Price} = \frac{\text{Production cost} + \text{Sales and Administrative Cost} + \text{Markup}}{\text{Number of units expected to sell}}$$

$$= \frac{250000 + 100000 + 200000}{20000}$$

$$= \frac{550000}{20000}$$

Full Cost Price = ` 27.5 per unit

MARGINAL COST PRICING

According to marginal cost pricing method price is determined on the basis of the marginal cost of production. Marginal cost means cost of producing an extra unit of output. Here the price is charged on the basis of cost of additional unit of output which the firm produces. The price is determined in such a way that it must cover the marginal cost.

In the long run both average/ full cost pricing method and marginal cost pricing method will give same price under perfect competition. This is because under perfect competition in the long run $P = AR = MR = L$. This is shown in the following diagram.

$$AC = LMC$$

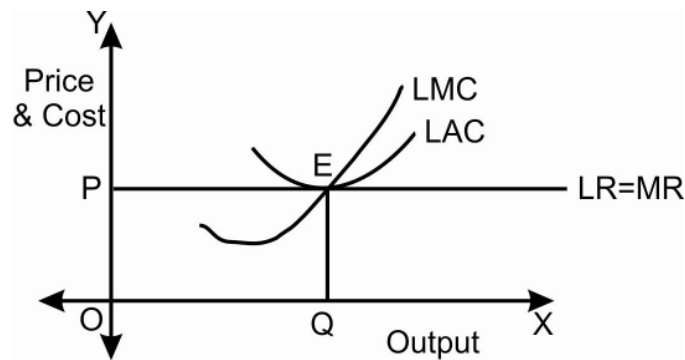


FIG 13.1

Above diagram shows that at profit maximizing condition i.e. $MR=MC$, Average/ Full Cost Price method and Marginal Cost Price Method gives same price i.e. OP .

But in case of monopoly, pricing with each of the method will give different result. This can be discussed with the help of following diagram.

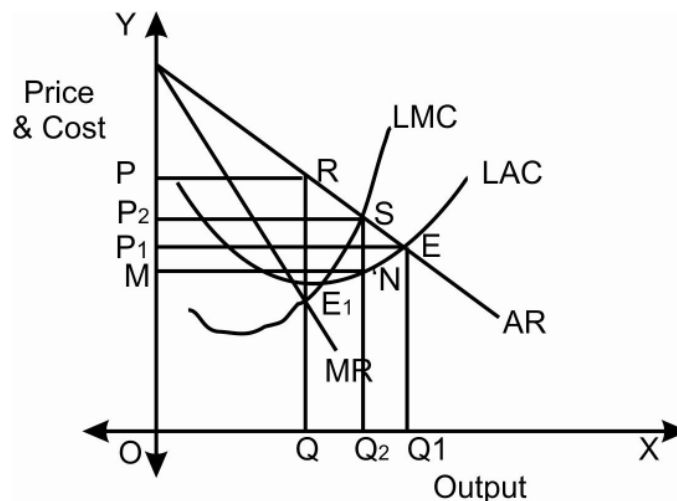


Fig 13.2

In the above diagram on the basis of profit maximizing condition i.e. $MR=MC$, equilibrium price is OP & equilibrium quantity is OQ .

On the basis of Average / Full Cost Pricing Method equilibrium price is OP_1 and quantity is OQ_1 . This price is considered to be fair for both consumers & producers.

On the basis of Marginal Cost Pricing Method ($P = MC$) price is OP_2 and quantity is OQ_2 .

Here $TR = OQ_2SP_2$ and $TC = OQ_2NM$

□ Profit = $MNSP_2$.

If price charged by using Marginal Cost Method (i.e. OP_2) is greater than the price charged by using full cost pricing rule (i.e. OP_1) firm will make profit (i.e. excess profit).

But if price charged by using Marginal Cost Pricing Method is less than price charged by using average cost pricing method, firm will make loss.

Advantages

- 1] This method helps in solving short run problems therefore it is more effective than full cost pricing method.
- 2] Firms will be able to increase sales as prices tend to be competitive.

Disadvantages

- 1] It is very difficult to calculate MR and MC accurately for every additional unit of output produced.
- 2] This method is not advantageous in the long run.
- 3] During recession, firms using marginal cost pricing encourage severe competition. The firm may lower prices to increase the sales. Due to this other firms also reduce their prices and hence no firm would be earning sufficient to cover the fixed cost.

MULTIPLE – PRODUCT PRICING

Most of the companies today produce more than one product and sell them in more than one markets. They produce variety of products instead of specializing in one product. They do this in order to make optimum utilization of their production capacities. The goods sold by them may be substitutes or complementary goods. An automobile firm like Maruti Suzuki produces wide range of cars. So each product will have an independent demand curve and hence a separate price.

Few more Examples:

- Samsung producing variety of products viz mobile phones, tablets, laptops etc.
- Cadbury producing variety of chocolates viz dairy milk, 5 star etc.

Pricing of variety of goods produced by a single firm is called multiple product pricing. It is also known as multi-product pricing or product line. In this type of pricing firms need to be very vigilant about the repercussions of change in prices of one product on another.

Marginal revenue functions help to explain the relationships between two products. These functions are:-

Suppose A & B are two products

$$MR_A = \frac{\Delta TR_A}{\Delta Q_A} + \frac{\Delta TR_B}{\Delta Q_A}$$

$$MR_B = \frac{\Delta TR_B}{\Delta Q_B} + \frac{\Delta TR_A}{\Delta Q_B}$$

Marginal revenue of a product A has two components i.e. change

intotal revenue of A product due to change in sale of A product and change in total revenue of B product due to change in sale of A product. Similarly we have equation for marginal product of B. Here also there are two components i.e. change in total revenue of B product due to change in sale of B product and change in total revenue of A product due to change in sale of B product.

If the second term on the right hand side is positive, commodities' are complementary and if second term is negative, goods are substitutes.

Multiple product pricing can be explained with the help of following diagram.

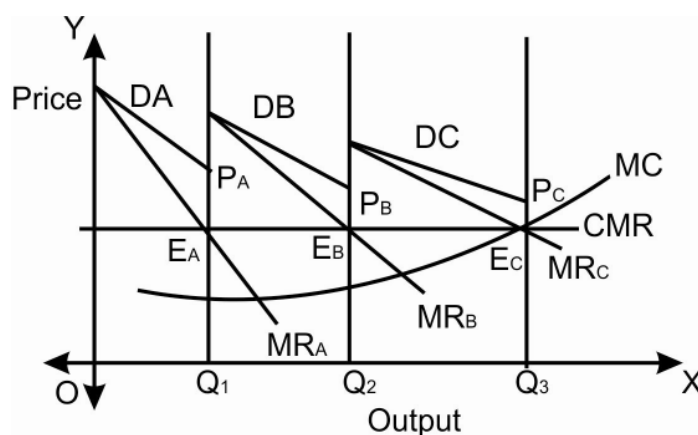


Fig 13.3

In the above diagram D_A , D_B & D_C are the demand curves of products A, B and C sold by the firm and MR_A , MR_B and MR_C are the corresponding marginal revenue curves. The firm maximizes its profit when $MR_A = MR_B = MR_C = MC$, i.e. [Marginal Revenue of each product should be equal to each other and that should be equal to Marginal Cost]

This is shown by points E_A , E_B , & E_C where the equal marginal revenue or combined marginal revenue (CMR) curve is equal to marginal cost.

Therefore output of product A is OQ_1 and price is P_AQ_1 , for product B output is Q_1Q_2 & price is P_BQ_2 , for product C output is Q_2Q_3 and price is P_CQ_3 . This shows that as demand curve becomes more flatter (relatively elastic), price goes on declining.

PRICE DISCRIMINATION

MEANING OF PRICE DISCRIMINATION

Price discrimination refers to the charging of different prices by the monopolist for the same product.

Few Definitions:

"Price discrimination exists when the same product is sold at different prices to different buyers." –Koutsoyiannis

"Price discrimination refers to the sale of technically similar products at prices which are not proportional to their marginal cost."

-Stigler

"Price discrimination is the act of selling the same article produced under single control at a different price to the different buyers." -

Mrs. Joan Robinson

"Price discrimination refers strictly to the practice by a seller of charging different prices from different buyers for the same good." -

Price discrimination refers to the act of selling the same article, produced under single control at different prices to different buyers.

Price discrimination generally takes place in case of monopoly. Following are the types of price discrimination.

1] Personal price discrimination- In this type different prices are charged to different consumers for the same product or service. Example: Doctors, Lawyers, Tuition Teachers etc. Charges different prices for different individuals. It is similar to first degree price discrimination.

2] Group Price Discrimination – Here entire population or area is divided into different groups and different prices are charged for different groups of people.

Example: Railways charges lower ticket to children and senior citizens and more for others. Industrial areas are charged more electricity charges as compared to residential areas. This is same as second degree price discrimination.

3] Market Price Discrimination – This means charging different prices for the same product in different markets.

CONDITION FOR PRICE DISCRIMINATION

1] Non-Transferability of goods – A monopolist can charge different prices for the same good provided that the consumers are not in a position to transfer the goods from one to other. This could happen only if consumers either do not meet each other or in case they meet, will not be able to exchange the goods.

2] Geographical Distance – If markets are situated at sufficiently long distances then the transfer of goods may not be economical. Example: IF we consider Mumbai and Kolhapur market and price difference is of ₹ 50 per unit, the transfer of goods from one buyer to other between the markets is not at all economical.

3] Political Hurdles – If political boundaries prevent the movement of people from one market to other market, a monopolist who operates in both markets can charge different prices for the same commodity.

4] Lack of awareness – When the consumers are ignorant of the price difference, they will not mind paying higher prices than what the others are paying.

5] Insignificant price difference – When the price difference is very small, the consumers would not bother about negligible price difference. Therefore it is possible for the monopolist to have price discrimination.

6] Link between Price and Quality– When consumers, due to irrationality or any other reason consider higher price as an indicator of better quality, then it is possible for the monopolist to charge higher price for such consumers.

7] Location – Goods sold in sophisticated or rich localities or sold in departmental stores may be charged higher prices than the same goods sold in poor localities.

8] Tariff Barriers – If home market is protected through tariffs, a monopolist may charge a higher price in the protected home market and lower price in competitive world market.

9] Government Sanctions – Government due to welfare social or political reasons may charge different prices for the same goods & services.

10] If monopolist can bring about some product differentiation like changing packaging sale, promoting after sales services etc. then price discrimination is possible.

11] Differences in Elasticity – If elasticity of demand is different in different markets, it is possible for the monopolist to have price discrimination.

EQUILIBRIUM OF PRICE DISCRIMINATING MONOPOLIST

For explaining equilibrium of price discriminating monopolist we make following assumptions:-

- 1] Monopolist operates in two different markets, i.e. market A & market B
- 2] Two markets differ in elasticities.
- 3] Production is undertaken at one place and it is at equal distance between the two markets so that there is no scope for price differences on the basis of transport cost.

Equilibrium of a price discriminating monopolist can be discussed with the help of following diagram.

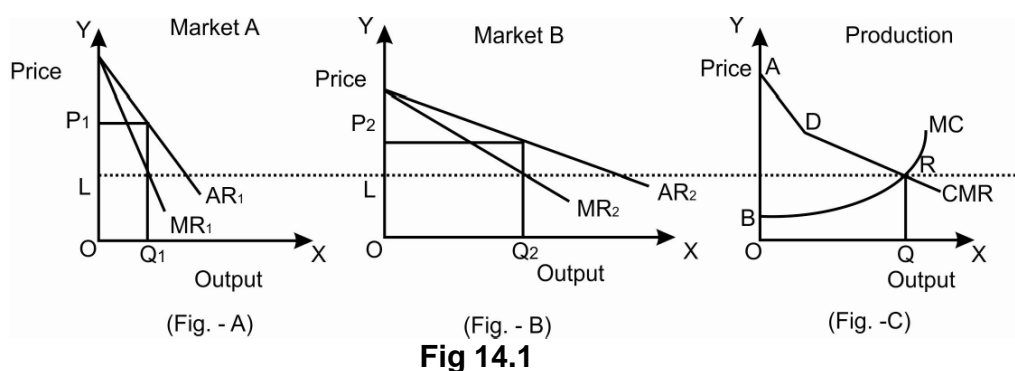


Fig 14.1

Above diagram shows that in (Figure-A) & (Figure-B), there are two markets- Market A & Market B. Market A is relatively inelastic and Market B is relatively elastic. As Market A is relatively inelastic, AR & MR, of Market A are steeper and as Market B is relatively elastic, AR₂ & MR₂ of market B are flatter. [AR & MR are the Average & Marginal revenue Curves of the two markets.] (Figure-C) explains the production.

CMR is the Combined Marginal Revenue Curve in (Figure-C) which is derived from horizontal summation of MR₁ and MR₂.

In figure-C Marginal Cost Curve (MC) intersects the combined marginal revenue curve at point R. Therefore total output is OQ. This output is distributed between market A & B in such a way that MR₁ = MR₂ = MC. In order to show this equality we have drawn horizontal line RL from point R in (Figure-C) to Y axis of (Figure-A).

Accordingly OQ₁ output is sold in market A at price OP₁ and OQ₂ output is sold in market B at price OP₂.

[Price in relatively inelastic market is greater than price in relatively elastic market.]

□ Profit of the monopolist = TR – TC

$$\begin{aligned} & \text{OQRDA} - \text{OQRB} \\ &= \text{BRDA} \end{aligned}$$

Therefore Price Discrimination monopolist will be in equilibrium when:-

- 1] Different markets differ in price elasticities enabling him to charge different price.
- 2] Total output is distributed in all the markets in such a way that marginal revenue in all the markets is equal.
- 3] Marginal Revenue in all markets which are equal must also be equal to marginal cost at equilibrium output.

DUMPING

The practice of discriminatory monopoly pricing in the area of foreign trade is described as dumping. It implies different prices in the domestic and foreign markets.

Dumping refers to the situation in which producer enjoys a monopoly power in the domestic market, charges a high price to the domestic buyers and sell the same commodity at low competitive price in the world market or foreign markets. This type of dumping which results in international price discrimination is called persistent Dumping.

The rationale behind dumping is that it enables the exporter's to compete in the it enables exporters to compete in the foreign market and capture the market by selling at a low price, even sometimes below cost and make up the deficiency in sales revenue by charging high prices to the domestic buyers.

The success of international price discrimination depends on following conditions.

- 1] The producer must possess a degree of monopoly power at least in the home market.
- 2] The markets should be widely separated.
- 3] It should not be possible for the buyers to re-sell the goods from a cheaper market to the costly market.
- 4] Elasticity of demand should be different in different markets.

A situation of dumping can be discussed with the help of following diagram.

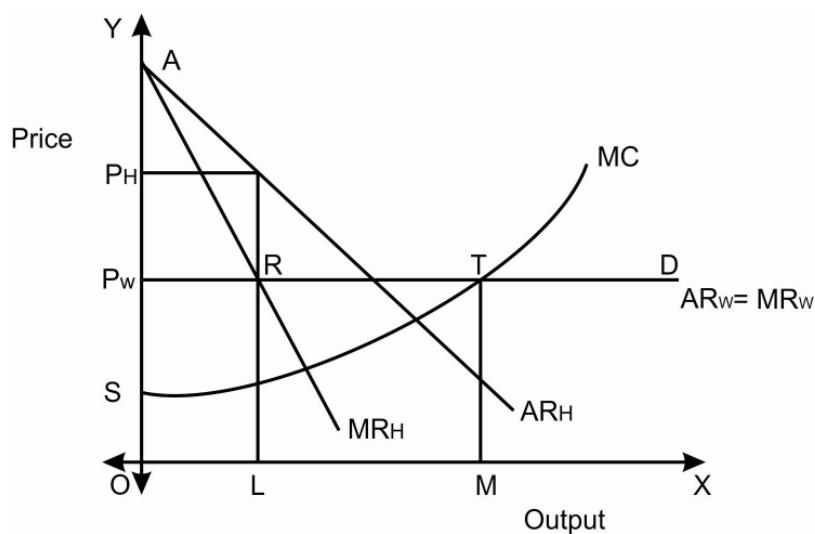


Fig 14.2

In the above diagram AR_H and MR_H are the average and marginal revenue curves of the home market. As the seller is monopolist in the home market, they are downward sloping.

$AR_W = MR_W$ is the average and marginal revenue curve of the world market. It is perfectly elastic i.e. parallel to X-axis.

ARTD is the combined marginal revenue curve of the home market and of the world market. Equilibrium output is determined at the point where combined marginal revenue curve equals the marginal cost curve. In the above diagram equilibrium point is T and equilibrium output is OM.

This total output is distributed between two markets in such a way that marginal revenue of two markets are equal and that will be equal to marginal cost i.e. ($MR_H = MR_W = MC$)

Accordingly OL output is sold in the home market at price OP_H and LM output is sold in the world market at price OP_W .

□ Total output $OM = OL + LM$.

Price charged in the domestic market (OP_H) is greater than price charged in the world market i.e. (OP_W).

□ Total profit of price discriminating monopolist is given by **TR – TC**

□ $TR = OMTRA$ & $TC = OMTS$

□ Profit = Area STRA

This is the maximum profit earned by two markets.

TRANSFER PRICING

Transfer prices are internal prices at which intermediate goods from upstream divisions are sold to downstream divisions. [Upstream divisions are those which are producing intermediate product & downstream divisions are those that are producing finished product.]

In the present day industrial system, vertical integration is common. [A firm is considered to be vertically integrated when it contains several divisions, with some divisions producing parts and components which other divisions use to produce the finished product.]

In such a company it is not easy for top management to be familiar with all stages of production process. This leaves scope for the emergence of bureaucratic style of functioning.

In a vertically integrated firm it is not easy to determine the amount of profit that should be credited to a division producing intermediate good in such a way that firm's total profit is maximized. For this management has to determine appropriate transfer price of intermediate goal.

In our case of determining transfer price we assume that there are only two stages of production.

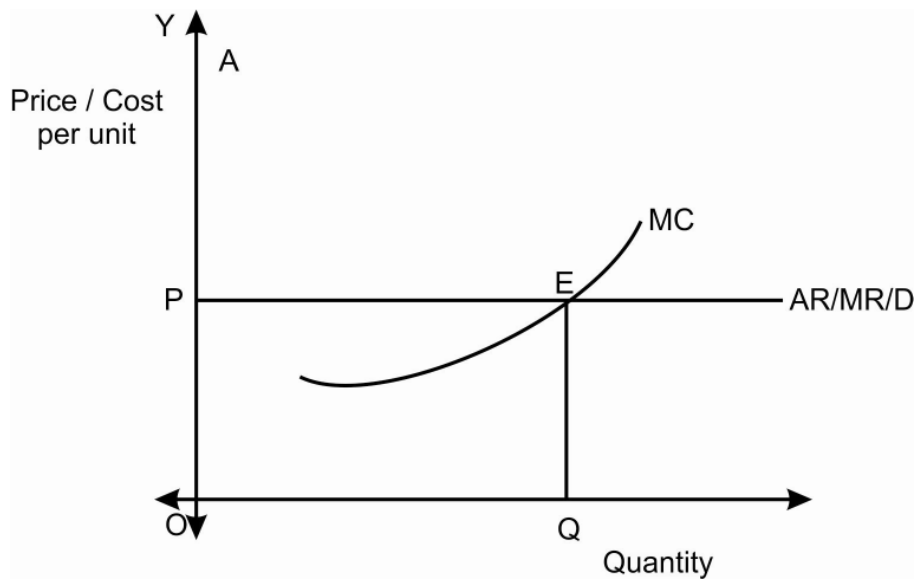
- 1] In the first stage cloth is produced as an intermediate product and
- 2] In the second stage cloth is used for manufacturing shirts.

We discuss transfer pricing under 2 conditions

1] An External Market Exists for Cloth.

This means that cloth producing divisions can sell cloth to outside firm and divisions requiring cloth to make shirts can borrow from external sources.

As external market is perfectly competitive, there will be a market determined price at which cloth manufacturing division will sell its product to cloth using division. This can be explained with the help of following diagram

**Fig 14.3**

Here cloth manufacturing division faces horizontal demand curve. For maximizing profit cloth manufacturing division will expand their output up to the point where $(MR=MC)$ or $(P=MC)$.

Accordingly OP is the market determined price of cloth.

If cloth manufacturing unit tries to set a price in excess of market price, shift making division purchase cloth from outside suppliers. Similarly if shift making unit refuses to pay a market determined price, the cloth producing division will sell their cloth to other buyers in open market.

Where an external market exists, the output of intermediate good producing division may not necessarily be equal to input demand of final good producing unit. If there is excess supply of cloth, it can be sold to other users. And if supply of cloth is insufficient, shift making division can buy cloth from other markets.

2] No External Market

When external market do not exist, cloth can be bought and sold only between two divisions of the firm. Here conflict may develop regarding the price to be charged for the cloth by its cloth manufacturing division. Here cloth manufacturing unit wants to set a high price but shirt making unit will benefit from lower price. Therefore management has to determine such a price for cloth that maximizes the overall profit of the firm. Following diagram explains the determination of price for intermediate and finance product.

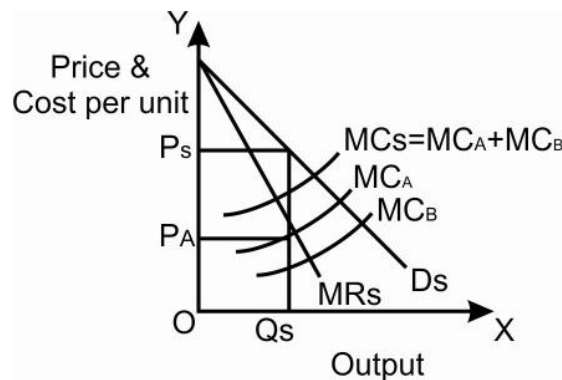


Fig 14.4

In the diagram D_s and MR_s are the demand (average) & marginal revenue curves for shirt.

The marginal cost of producing cloth to make shirt is MC_A and the marginal cost of transforming cloth into shirt is MC_B .

□ Marginal cost of each additional shirt is $MC_A + MC_B = MC_s$.

For a firm combining cloth manufacturing and shirt making division, profit maximizing output is at a point where $MR_s = MC_s$. Thus output per period is Q_s . The transfer price determined for cloth must be such that it compels the managers of shirt making unit to produce OQ_s quantity of shirts.

Top management of the integrated firm would solve this problem by advising the cloth division to change a price that is equal to the marginal cost of producing cloth.

For shirt making division profit maximizing quantity is OQ_s & price is OP_s and for cloth unit price is OP_A at which cloth unit will supply the exact amount of cloth that is necessary for producing OQ_s amount of shirts.

CAPITAL BUDGETING

INTRODUCTION / MEANING OF CAPITAL BUDGETING

Capital budgeting or investment appraisal is an official procedure used by firms for assessing and evaluating possible expenses or investments. It is a process of planning of expenditure which involves current expenditure on fixed/durable assets in return for estimated flow of benefits in the long run.

Investment appraisal is the procedure which involves planning for determining whether firm's long term investments such as heavy machinery, new plant, research and development projects are worth the funding or not.

Charles T. Horn green defines Capital budgeting as a long term planning for making and financing proposed capital outlays.

Peterson defines capital budgeting as the process of planning capital

projects, raising funds and efficiently allocating resources to capital projects.

Thus capital budgeting is the decision of the firms which leads to most efficient long term investment in the production process with the positive expectations regarding future flow of returns. A sound capital budget is the one which is not only done at the right time but is also of right quality and quantity. Success or failure of firms is based on soundness of capital budgeting.

OBJECTIVES OF CAPITAL BUDGETING

- 1) To identify whether the replacement of any of the existing fixed assets gives more profit than earlier.
- 2) To identify the cost-effective and profit oriented capital expenditure.
- 3) To decide and execute correct method of investment appraisal.
- 4) To evaluate the merits and demerits of each prospective projects to decide the best one.
- 5) To elect most suitable project for the firm.
- 6) To identify and make provisions for the volume of finance required for the capital expenditure.

FEATURES OF CAPITAL BUDGETING

- 1) Capital budgeting decisions influences rate and direction of growth.
- 2) Capital budgeting comprises of the investment in present for getting benefits in the future.
- 3) Usually, the forthcoming benefits arising out of investments are spread over several years.
- 4) The investments made by firm in present will determine its financial condition in future.
- 5) Here each investment includes huge volume of funds.
- 6) Investment decisions taken here are irreversible.
- 7) It helps to avoid and reduce unnecessary expenditures.
- 8) It helps to replace current old equipment by modern and more efficient equipment.
- 9) There is a high degree of risk involved in capital budgeting.

IMPORTANCE OF CAPITAL BUDGETING

1) Helps to determine the future of the firm:

It helps firms to take long term investment decisions. Benefits arising out of investments are spread over several years. As a result capital budgeting decision has its effect over a long time span and certainly it affects the firm's future growth and development. A wrong decision taken in present can prove terrible for the health of the firm in future. So the capital budgeting helps to determine the future of the firm.

2) Involvement of large amount of funds:

Capital budgeting decisions involve significant amount of investment. Therefore there is a need for judicious and accurate decisions, as an inappropriate decision would not only result in heavy losses but also affects the growth of the firm.

3) Decisions are Irreversible:

Capital budgeting decisions are irreversible because such decisions cannot be taken back without any substantial loss. These decisions involve bulky investments such as heavy machinery, new plant, buying land, construction of building, research and development projects so on so forth. And it is difficult to find a market for such second hand or used assets. Therefore capital budgeting decisions are irreversible.

4. Covers Risk and uncertainty:

There is a high degree of risk and uncertainty involved in capital budgeting decision. Investment done in present will give returns in future. The future is indefinite and full of risks. Longer the period of project, more may be the risk and uncertainty involved in it. Apt and sound capital budgeting will help to cover these risks and uncertainties.

5. Helps to estimate and forecast future cash flows:

Capital budgeting helps firm to select a best project and estimate its future cash flows, which in turn helps to determine whether a project should be accepted or rejected.

6. Helps to monitor and Control of expenditures:

A good project can become bad one if expenditures aren't judiciously controlled or monitored. A sound capital budgeting helps to monitor and control of expenditures.

7. Helps to maximise shareholder's worth

Capital budgeting protects the interests of the shareholders because it avoids over-investment and under-investment in fixed

assets. By selecting the most rewarding projects, the management enables the maximization of shareholder's worth.

8. Long term Effect on Profitability:

Profitability of firm depends upon the extent of Capital expenditures. If the expenditures are incurred after making capital budget accurately, then profitability of the firm will be high.

9. National Significance:

The selection of any project through capital budgeting will ultimately results in the creation of more employment opportunities, increase in national income, economic growth and development.

STEPS INVOLVED IN CAPITAL BUDGETING

Capital budgeting is a procedure in which multiple steps are involved. Firms use Capital budgeting to determine worth of a project or investment. The capital budgeting process involves five steps.

Step 1. Identification of various Investment Proposals:

The first step in capital budgeting is to identify various investment proposals. Identifications of investment proposals will give firm an idea about options available and then it will be easy for a firm to select the best possible investment proposals. The proposal regarding potential investment opportunities may come from workers of any department, management or from any officer of the firm.

Step2. Screening, Evaluation and selection of the Proposals: After identification of prospective investment proposal it is very important to screen and evaluate these proposals on the basis of certain parameters such as practicality, feasibility, risk and uncertainty involved and most important profitability. There are many methods by which this screening and evaluation can be done such as payback period method, net present value method, internal rate of return method etc. After this entire exercise it becomes imperative for firm to select best suited investment proposal.

Step3. Preparation of Capital Expenditure Budget:

After selection of investment project, preparation of capital expenditure budget is must. The estimated amount of expenditure to be incurred on fixed assets during the given period is specified by capital expenditure budget.

Step4. Implementing and monitoring of the Proposal:

After selection of investment proposal and preparation of budget it is imperative to implement the project. While executing the project,

it is better to allocate roles and responsibilities to staff for completing the project within the given time and cost structure so as to avoid unnecessary delays and losses. Investor should monitor both quality and quantity associated with production process. Along with this close monitoring with regard to development of market for the product and repayment of dividends to stakeholders is also important.

Step5. Evaluation of the proposal:

Evaluation of the performance is the last stage in the process of capital budgeting. The evaluation can be done by comparison of projected and actual expenditures, and also by comparing the anticipated and actual return from the investment.

Advantages and Disadvantages of Capital Budgeting

Advantages of Capital Budgeting:

- 1) Capital budgeting helps firm to understand and manage risk and uncertainty associated with investment decisions.
- 2) It helps firm to select best possible and cost effective investment proposal for maximising profit.
- 3) It helps firm to make long-term investment decisions.
- 4) It helps to avoid and reduce unnecessary expenditures and offers adequate control over entire outlay.
- 5) It helps firm to take an informed decision about an investment project taking into consideration merits and demerits of each project.
- 6) It helps firm to curb over investing and under-investing.
- 7) All methods of capital budgeting aims at maximising shareholders worth.

Disadvantages of Capital Budgeting:

- 1) Capital budgeting decisions are of long-term in nature.
- 2) Almost all Capital budgeting decisions are irreversible in nature.

- 3) Capital budgeting comprises of the investment in present for getting benefits in the future. Future is always uncertain. Therefore there is a possibility that calculations of the firm may go wrong.
- 4) Risk and the discounting factor remains subjective therefore there is a possibility that they may affect actual profit.

TECHNIQUES OF INVESTMENT APPRAISAL

PAYBACK PERIOD METHOD

It is one of the simplest method of investment appraisal. It helps to calculate period within which initial investment or entire cost of project would be completely recovered. It is also known as pay-off or pay out method. It gives total number of years in which the total investment in particular capital project pays back itself. As per this method there will be no profit till the payback period is over. **Selection criteria:** According to payback period criteria, project with lowest payback period should be selected.

Following methods are used to calculate Payback period.

Type I

If the firm is generating constant cash flows every year, then following formula will be used.

$$\text{Payback Period} = \frac{\text{Initial Investment}}{\text{Net annual Cash inflows}}$$

Example 1

Calculate Payback period for the following data and find most suitable project.

Projects	Initial Investment (In Rupees)	Net annual Cash Inflows
A	30000	5000
B	30000	6000
C	30000	2000
D	30000	3000

Solution:

Projects	Initial Investment	Net annual Cash Inflows	Payback Period $\frac{\text{Initial Investment}}{\text{Net annual Cash inflows}}$	Ranks
A	30000	5000	$\frac{30000}{5000} = 6 \text{ years}$	2
B	30000	6000	$\frac{30000}{6000} = 5 \text{ years}$	1
C	30000	2000	$\frac{30000}{2000} = 15 \text{ years}$	4
D	30000	3000	$\frac{30000}{3000} = 10 \text{ years}$	3

On the basis of payback period project B should be selected.

Type II

If firm is generating uneven or different cash flows in different years, then we have to calculate cumulative cash flows. The year in which cumulative cash flow is equal to initial investment, that year will be considered as payback period.

Example 1

Suppose an initial investment in a project is **Rs. 50000** and following are the annual cash flows. Calculate payback period.

Year	Annual Cash flows
First	10000
Second	15000
Third	25000
Forth	40000
Fifth	60000

Solution:

Year	Annual Cash flows	Cumulative cash flows
First	10000	10000
Second	15000	25000
Third	25000	50000
Forth	40000	90000
Fifth	60000	150000

As initial investment is recovered in third year, payback period is 3 years.

Example 2

Suppose there are two projects A and B, with an initial investment of **Rs. 100000** each. Cash flows of both the projects are given below. Calculate payback period and find most suitable project.

Year	Annual Cash flows For Project A	Annual Cash flows For Project B
First	20000	40000
Second	30000	60000
Third	50000	70000
Forth	70000	90000
Fifth	90000	95000

Solution:**For project A**

Year	Annual Cash flows	Cumulative cash flows
First	20000	20000
Second	30000	50000
Third	50000	100000
Forth	70000	170000
Fifth	90000	260000

For project B

Year	Annual Cash flows	Cumulative cash flows
First	40000	40000
Second	60000	100000
Third	70000	170000
Forth	90000	260000
Fifth	95000	355000

For project A, initial investment is recovered in third year. Therefore payback period is 3 years. For project B, initial investment is recovered in second year. Therefore payback period is 2 years. On the basis of payback period criteria, project B should be selected.

Type III

After calculating cumulative cash flows, if we are not getting cumulative cash flows exactly equal to initial investment, then we use following formula to calculate payback period.

$$\text{Payback period} = E + \frac{B}{C}$$

Where,

E = Preceding year of final recovery

B = Balance amount to be recovered

C = Cash flow during the year of final recovery

Example 1

Suppose an initial investment in a project is **Rs. 20000** and annual cash flows are as follows. Calculate payback period.

Year	Annual Cash flows
First	4000
Second	6000
Third	9000
Forth	10000
Fifth	14000

Solution:

Step 1:

Year	Annual Cash flows	Cumulative cash flows
First	4000	4000
Second	6000	10000
Third	9000	19000
Forth	10000	29000
Fifth	14000	43000

Step 2:

It can be seen from the above table that out of initial investment of Rs. 20000, Rs. 19000 are recovered in third year and Rs. 29000 are recovered in the fourth year. Therefore payback period lies between third and fourth year. The balance amount still to be recovered is Rs. 1000. (i.e. 20000 – 19000 = 1000)

Step 3:

Payback period = E + $\frac{B}{C}$ Where,

E = Preceding year of final recovery = 3 years.

B = Balance amount to be recovered = Rs. 1000

C = Cash flow during the year of final recovery = 10000

Therefore, Payback period = $3 + \frac{1000}{10000} = 3 + 0.1 = 3.1 \text{ years.}$

Merits of Payback period Method

- 1) This method is simple to calculate and easy to understand.
- 2) This method is more realistic because psychology of any investor is that he/she would like to get back initial investment as soon as possible.
- 3) This method is relatively safe because it avoids risk in long run.
- 4) This method help us to rank various projects and select best out of them.
- 5) This method gives importance to the speedy recovery of initial investment.

Demerits of Payback Period Method

- 1) It stresses only on the recovery of initial investment and completely ignores the annual cash inflow after the payback period
- 2) This method oversee the interest i.e. costs of capital which is an important part of making sound investment decisions.
- 3) This method ignores time value of money.

NET PRESENT VALUE (NPV) METHOD

Investment in project generates series of income (cash inflows) over a number of years. It is also known as discounted cash flow technique. NPV method considers the time value of money. To find out whether investment is worthwhile or not, the present value of this series of income (cash inflows) is calculated at a given rate of discount. This gives us Gross Present Value (GPV). If we deduct initial cost (investment) of project from GPV we get Net Present Value i.e. NPV.

Investment should be made if present value of the expected future cash inflows from project is larger than the cost of the investment. In simple terms if $NPV > 0$ then accept the project and if $NPV < 0$, then reject the project. In case of more than one project, project with higher NPV should be preferred by the firm.

$$NPV = GPV - \text{Initial Cost.}$$

If $R_1, R_2, R_3, \dots, R_n$ are yields of assets after first, second, third, n^{th} year and r is the rate of discount then,

$$NPV = \frac{R_1}{(1+r)} + \frac{R_2}{(1+r)^2} + \frac{R_3}{(1+r)^3} + \dots + \frac{R_n}{(1+r)^n} - \text{Initial Cost}$$

Example1

If an initial investment is Rs. 20000 in a project. The project generates annual cash inflows of Rs. 6000, Rs. 10000 and Rs. 15000 for 3 years respectively. If rate of discount is 12 % p.a. then calculate NPV and find out whether project should be accepted or rejected.

Solution:

$$NPV = \frac{R_1}{(1+r)} + \frac{R_2}{(1+r)^2} + \frac{R_3}{(1+r)^3} + \dots + \frac{R_n}{(1+r)^n} - \text{Initial Cost}$$

$$NPV = \frac{6000}{(1+0.12)} + \frac{10000}{(1+0.12)^2} + \frac{15000}{(1+0.12)^3} - 20000$$

$$NPV = \frac{6000}{(1.12)} + \frac{10000}{(1.12)^2} + \frac{15000}{(1.12)^3} - 20000$$

$$NPV = \frac{6000}{1.12} + \frac{10000}{1.2544} + \frac{15000}{1.4049} - 20000$$

$$NPV = 5357.14 + 7971.94 + 10676.92 - 20000$$

$$NPV = 24006 - 20000$$

$$NPV = 4006$$

As NPV is positive, project should be selected.

Example2

If an initial investment is Rs. 30000 in a project. The project generates annual cash inflows of Rs. 10000, Rs. 12000 and Rs.

15000 for 3 years respectively. If rate of discount is 12 % p.a. then calculate NPV and find out whether project should be accepted or rejected.

Solution:

$$\begin{aligned}
 \text{NPV} &= \frac{R_1}{(1+r)} + \frac{R_2}{(1+r)^2} + \frac{R_3}{(1+r)^3} + \dots + \frac{R_n}{(1+r)^n} - \text{Initial Cost} \\
 \text{NPV} &= \frac{10000}{(1+0.12)} + \frac{12000}{(1+0.12)^2} + \frac{15000}{(1+0.12)^3} - 30000 \\
 \text{NPV} &= \frac{10000}{(1.12)} + \frac{12000}{(1.12)^2} + \frac{15000}{(1.12)^3} - 30000 \\
 \text{NPV} &= \frac{10000}{1.12} + \frac{12000}{1.2544} + \frac{15000}{1.4049} - 30000 \\
 \text{NPV} &= 8928.57 + 9566.33 + 10676.92 - 30000 \\
 \text{NPV} &= 29171.82 - 30000 \\
 \text{NPV} &= -828.18
 \end{aligned}$$

As NPV is negative, project should be rejected.

Merits of NPV Method

- 1) This method takes into account the time value of money.
- 2) This method takes into account entire series of cash inflows that are generated.
- 3) This method is simple to understand, here we simply accept or reject the project on the basis of NPV.
- 4) This method help us to take correct decision if we are looking for maximum profits.

Demerits of NPV method

- 1) This method involves good amount of calculations and it is little complicated method.
- 2) If we want to use this method, knowledge of discount rate is must. If we are not aware of discounting rate then we cannot use this method.
- 3) The use of this method needs forecasting of future cash inflows and the discount rate. Thus correctness of Net Present Value depends on accurate estimation future cash inflows and the discount rate. This may not be possible in reality.

INTERNAL RATE OF RETURN (IRR) METHOD

Internal rate of return method like NPV also considers time value of money by discounting annual cash inflows. This method is also known as time adjusted rate of return method. In this method we find out that rate of return which will equate the present value of future cash inflows to the present cost of the project. It is generally the rate of return that project earns. It is the discount rate (r) which equates aggregate present value of the net cash inflows with aggregate present value of cash outflows of a project. In simple terms it is the rate which makes NPV of a project equals to zero. In case of multiple projects, project with higher IRR should be selected.

Following formula is used for calculating IRR.

$$I = \frac{R}{1+r}$$

Where,

I = Initial Investment

R = Cash flows

r = Rate of return

Example 1

If a sum of Rs. 800 is invested in a project, it will earn Rs. 1000 at the end of one year. Calculate IRR.

$$\frac{R}{1+r} I =$$

Where,

I = Initial Investment = Rs. 800

R = Cash inflows = Rs 1000

r = Rate of return = ?

$$800 = \frac{1000}{1+r}$$

$$800 (1+r) = 1000$$

$$800 + 800 r = 1000$$

$$800 r = 1000 - 800$$

$$800 r = 200$$

$$r = \frac{200}{800}$$

$$r = 0.25$$

or

$$r = 25 \%$$

Example 2

If a sum of Rs. 20000 is invested in a project, it will earn Rs. 120000 at the end of one year. Calculate IRR.

$$\frac{R}{1+r} I =$$

Where,

I = Initial Investment = Rs. 20000

R = Cash inflows = Rs 120000

r = Rate of return = ?

$$20000 = \frac{120000}{1+r}$$

$$20000 (1+r) = 120000$$

$$20000 + 20000 r = 120000$$

$$20000 r = 120000 - 20000$$

$$20000 r = 100000$$

$$r = \frac{100000}{20000}$$

$$r = 5$$

or

$$r = 5 \%$$

Merits of IRR Method

- 1) Like NPV, this method also takes into account the time value of money.
- 2) This method provides meaningful consideration to the entrepreneurs in their decision making process.
- 3) This method is more realistic as it deals with the entire range of annual cash inflows earned during lifetime of the project.

Demerits of IRR method

- 1) This method is difficult to understand and tedious to calculate.
- 2) It does not consider the size of the project while comparing projects. Here cash inflows are compared with the volume of capital expenditure. So it is unsuitable method for ranking the projects.