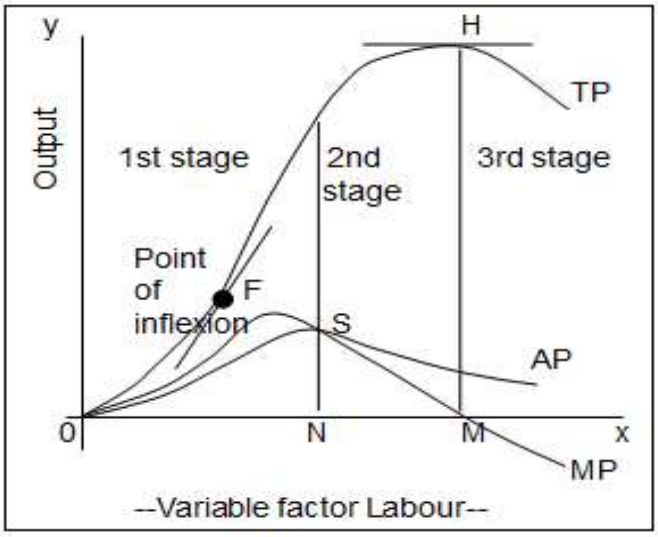
Again, it can be seen from the above table 6.1 that total product is the highest when marginal productivity of labour is zero. After this point both total and average product fall and marginal product of labour becomes negative. We can study the rise and fall of production with diagrams in three stages.

Three Stages of the Law of Variable Proportions: From the above table 6.1 we see the behaviour of output with varying quantity of labour and fixed quantity of capital. The rise and fall of output can be divided into three stages as has been shown in the following figure 6.1.

Figure 6.1 : The Three Stages of Law of Variable Proportions



Stage One: in the first stage the total output to a point increases at an increasing rate. In the above figure 6.1 it can be seen that the total output increases rapidly up to point F. This point is called **'the point of inflexion'**. From this point onwards in stage one, total output increases but at a slower rate. Therefore, the slope of the curve starts to fall slightly. Stage one ends at the point where average product is the maximum. In this stage, the quantity of the fixed factor (capital) is too much relative to the quantity of the variable factor (labour) so that if some of the fixed factor is withdrawn, the total product will increase. Stage one is known as the stage of *increasing returns*.

Stage Two: in stage two, the total product continues to increase at a diminishing rate until it reaches its maximum point H (figure 6.1) where

the second stage ends. At the end of second stage marginal product becomes zero. This stage is known as the stage of *decreasing returns* as both the average and marginal products of the variable factor continuously fall during this stage.

Stage Three: in stage three the marginal product becomes negative. Therefore, both total product and average product decline. In this stage, total product curve and average product curve slope downward and marginal product curve goes below the X-axis. This is the opposite of first stage. In stage three, variable factor (labour) is too much in relation to fixed factor (capital). This stage is called the stage of *negative returns.*

A rational producer will always like to produce in stage two. The producer will not choose stage one where marginal product of fixed factor is negative. If he chooses this stage, he will not be utilizing completely the opportunity of production by increasing variable factor. A rational producer will never choose stage three also. Because, in this stage, he can always increase output by reducing the quantity of variable factor whose quantity is excess in proportion of fixed factor. Even when the variable factor is free, the rational producer will stop at the end of second stage.



Convex Curve: A curve is said to be convex as the slope or gradient of the curve increases as we go down along the curve. But it can not touch any of the axis. (Refer to Appendix A for more detail at the end of block III).

Significance of the Law of Variable Proportions: The law of variable proportions is very important in the field of economics. Till Marshall it was believed that the law was applicable in the field of agriculture only. But the modern economists propound that the law is equally applicable to industries and other productive activities. If the law actually does not occur, we can produce any amount of food grain in a small size of holding by using more and more amount of labour and capital. But in spite of the presence of the law of variable proportions a country like India need not be pessimistic where there is tremendous pressure of population and agricultural production is not sufficient. Productivity in the field of agriculture can be increased by making advancement in technology to avoid food crisis.



CHECK YOUR PROGRESS

Q.1. Mention the assumptions of law of variable proportions. (Answer within 40 words)

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Q.2. What is 'point of inflexion'? (Answer within 40 words)

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Q.3. Which stage is known as the stage of diminishing returns and why? (Answer within 40 words)

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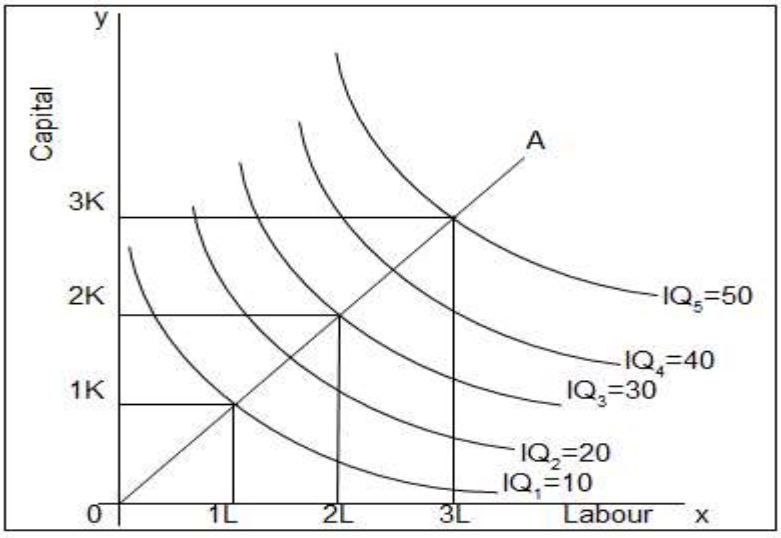
6.5 RETURNS TO SCALE

Under the law of variable proportions we have known that the changes in total output as a result of change in variable factor keeping quantity of other factors of production constant. But when all inputs are changed in a fixed proportion, there is change in the scale of production. The study of changes in output as a consequence of changes in the scale is the subject matter of "returns to scale". Let us make the distinction between 'the law of variable proportions' and 'returns to scale' clearer with the help of the producer who uses both labour and capital in the process of production. When the producer changes the quantity of labour and keeps capital constant, the law of variable proportions or the law of diminishing returns occurs. But if the producer changes both labour and capital in the same proportion and the changes in total production are studied, it refers to returns to scale. It is called so because there is change in the scale of production. In other words, returns to scale is the rate at which output increases as inputs are increased proportionately.

The concept of returns to scale can be explained with the help of iso-quant. Returns to scale may be increasing, decreasing or constant. These concepts have been discussed below.

Increasing Returns to Scale: If output more than doubles when inputs is doubled, there is increasing returns to scale. For example, if inputs are increased by 2 percent and consequent increase in output is 3 percent, then it is a case of increasing returns to scale. This has been shown with the help of the following figure 6.2.

Figure 6.2 : Increasing Returns to Scale



In the above figure 6.2, the firm's production function exhibits increasing returns to scale. The line 0A originating from the origin describes a production process in which labour and capital are used as inputs to produce various levels of output. As the iso-quants move upward along the line 0A, they become closer. As a result, less than twice the amount of both inputs is needed to increase production from 10 to 20 units. When inputs are doubled, output increases to 30 units as shown by IQ_3.

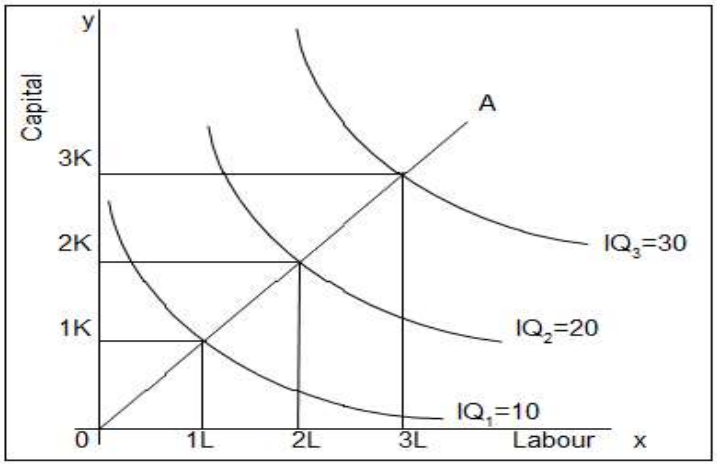
Marginal Physical Productivity of Labour and Capital: it is the additional output obtained from an additional unit of labour or capital i.e. the additional output per unit of labour or capital.

The increasing returns to scale may be due to technical or managerial expertise. Large scale production process cannot be halved and when used for production they are more efficient. Such large scale operation allows managers and workers to specialize in their tasks and uses more sophisticated large scale factories and equipments.

Constant Returns to Scale: If output increases in the same

proportion as the increase in inputs, returns to scale is said to be constant. With constant returns to scale, the size of the firm's operation does not affect the productivity of its factors : one firm using a particular production process can easily be duplicated so that two plants produce twice as much output. For example, a large travel agency might provide the same service per client and use the same ratio of capital and labour as a small agency that services fewer clients.

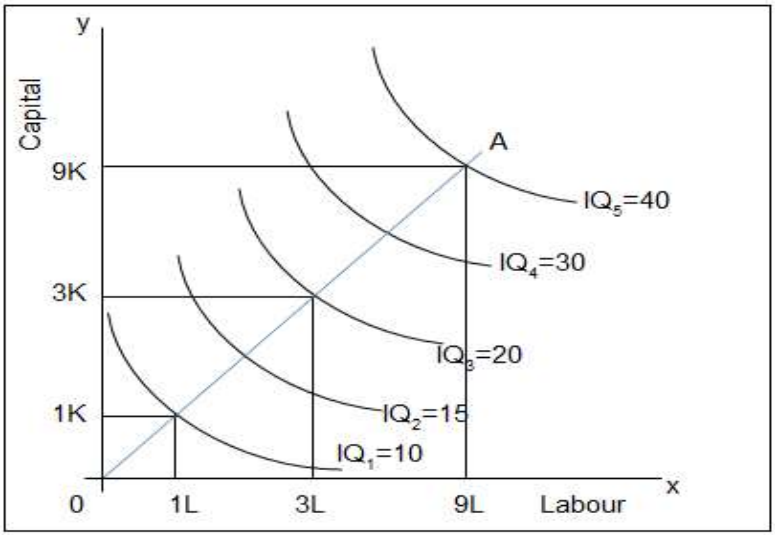
Figure 6.3 : Constant Returns to Scale



In the above figure 6.3, the firm's production function represents constant returns to scale. When 1 unit of labour hour and one hour of machine time are used, an output of 10 units is produced. When both inputs are doubled, output doubles from 10 to 20 units; when both inputs triple, output triples from 10 to 30 units.

Decreasing Returns to Scale: When the rate of increase in output is smaller than the proportion of increase in inputs, decreasing returns to scale is said to exist in the production process. It means that output may be less than double when all inputs are doubled.

Figure 6.4 : Decreasing Returns to Scale



Classical Economics: The economic thought which evolved in UK during the period mid eighteenth century to mid-nineteenth century. Its principal contributors were : Smith, Malthus, Say, Senior and J. S. Mill.

In the above figure 6.4, it can be seen that to increase output from 10 to 20 units inputs need to be increased more than twice. Similarly, to raise the level output by four times from 10 to 40 units, the firm needs to employ nine times of its initial inputs, i.e., 9 units of capital and labour each.The common cause of diminishing returns to scale is diminishing returns to management. As the output grows managers are overburdened and become less efficient in rendering duties. Communication between workers and managers can become difficult to monitor as the work place becomes more and more impersonal. Decreasing returns to scale may also arise due to exhaustible nature of natural resources.



CHECK YOUR PROGRESS

Q.4. What do you mean by returns to scale? (Answer in about 40 words)

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Q.5. Distinguish between returns to scale and law of variable proportions. (Answer in about 40 words)

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6.6 CONCEPTS IN PRODUCTION

We have already mentioned that a firm has to take several decisions while producing a commodity. A commodity may be produced by various methods of production. Among the set of technically efficient processes, the choice of a particular technique is a purely economic decision. The decision is based on price of factors. Another decision to be taken is to determine the range of output where marginal products of factors are positive but declining.

6.6.1 Production Function

A production function is a relation between inputs to the production process and the resulting output. A production function shows the highest output that a firm can produce for every specified combination of inputs. Let us assume that there are two inputs (factors of production) labour and capital. Now the production function can be written as:

$$Q = f (L, K)$$

where, Q is a dependent variable which represents output; and both labour (L) and capital (K) are independent variables.

This relation simply states that output depends on inputs. To get output Q, inputs can be combined in various proportions. But as technology improves the same inputs can give more and more output and the same output can be obtained by less and less input. In our production function, there are only two variables. But there may be other variables in the production function.

6.6.2 Iso-quant

An iso-quant or equal product line is a curve showing all possible combinations of inputs that yield the same level of output. This concept is analogous to consumer's indifference curve. Therefore, it is also known as producer's indifference curve. Let us explain the concept with the help of a production function which uses both labour and capital and produces 50 units.

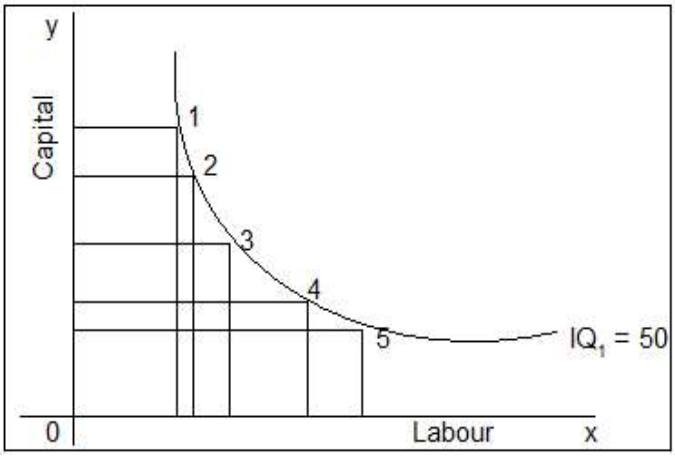
Table 6.2 : Combination of Labour and Capital to Produce Output

Combination of Labour and Capital	Units of Labour	Units of Capital	Output
1	1	13	50
2	2	9	50
3	3	6	50
4	4	4	50
5	5	3	50

In this example, the producer can produce 50 units of output with 1 unit of labour + 13 units of capital, 2 units of labour + 9 units of capital, 3 units of labour+ 6 units of capital, 4 units of labour + 4 units of capital or 5 units of labour + 3 units of capital. When these points are plotted on graph paper and joined, they form an iso-quant. In other words, an iso-quant is a locus of points showing alternative combinations of labour and capital which produce same level of output.

The above table has been shown graphically in the following figure 6.5. In the figure IQ_1 represents the Iso-quant curve. Capital has been depicted in the y-axis while the labour has been shown in the x-axis. Point 1 on the IQ_1 curve represents the capital-labour combination 1, which represents 13 units of capital and 1 unit of labour. Other combinations 2,3,4 and 5 thus represent different units of capital labour of the iso-quant.

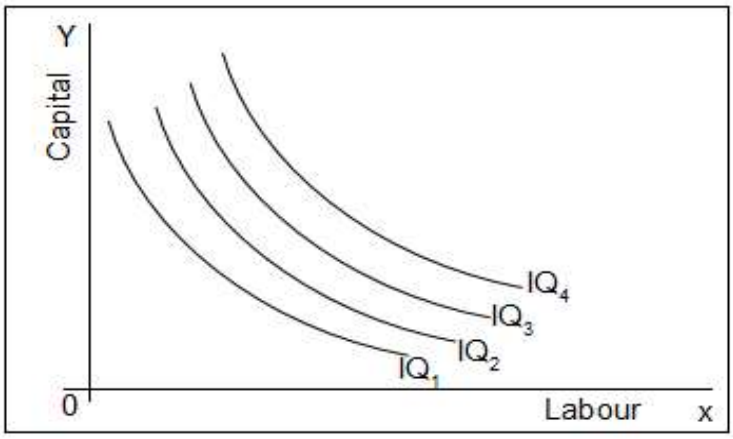
Figure 6.5 : Iso-quant



6.6.3 Iso-Product Map or Isoquant Map

The Iso-Product Map, like the Indifference Curve Map shows a set of iso-product curves. A higher iso product curve shows a higher level of output and a lower iso-product curve represents a lower level of output. Figure 6.6 is an isoquant map. The points on the same IQ shows an equal level of output whereas an IQ to the right represents a larger amount of output.

Figure 6.6: Isoquant Map



6.6.4 Marginal Rate of Technical Substitution

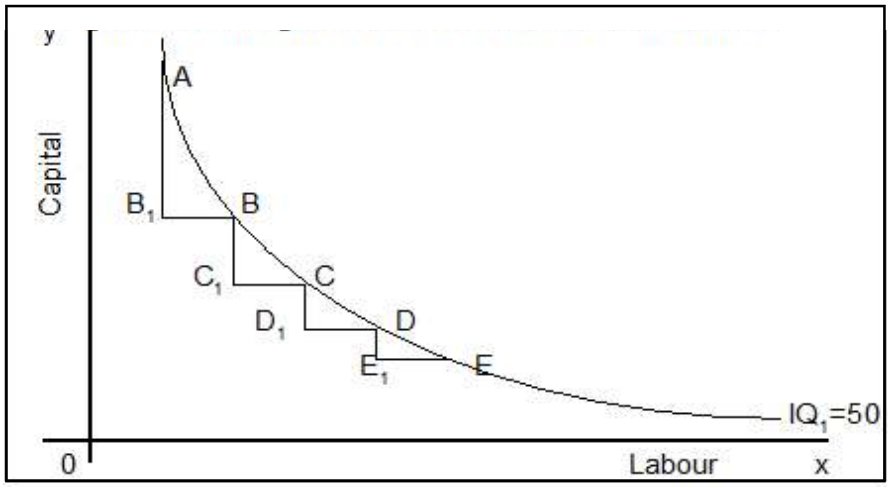
The concept of Marginal Rate of Technical Substitution ($MRTS_{LK}$) between labour and capital can be explained with the help of the following Table 6.3.

Table 6.3

Combinations of labour and capital	Units of labour(L)	Units of capital(K)	Output	$MRTS_{lk}$
A	1	15	50	-
B	2	11	50	4
C	3	8	50	3
D	4	6	50	2
E	5	5	50	1

As can be seen from the table (Table 6.3), 50 units of output can be produced by using 1 unit of labour and 15 units of capital. The same output can be produced by combination of B which uses 2 units of labour and 11 units of capital. Same amount of output can be produced by combination of C, D and E which uses more and more units of labour but lesser and lesser units of capital. That is, in the different combinations of inputs labour can be substituted for capital and yet we have the same amount of output. The rate at which one factor of production can be subsituted for the other to obtain the same amount of output is known as the 'marginal rate of technical substitution' (MRTS). In other words, MRTS of labour for capital is the number of units of capital which can be replaced by one unit of labour, the quantity of output remaining the same. MRTS is the slope of the isoquant or the amount of one input (K) that a firm is able to give up in return for a unit of another input (L) with no change in total output. Another characteristics of $MRTS_{LK}$ is that MRTS has a diminishing tendency. In other words, as the amount of labour units is increasing in the succeeding combinations, less and less units of capital are sacrificed to obtain the same output.

Figure 6.7 : Marginal Rate of Technical Substitution



The above figure 6.7 shows that iso-quant IQ_1 represents output level 50. As we move downward from A to B, AB_1 units of capital is substituted by BB_1 units of labour. Similarly, B to C, BC_1 units of capital is substituted by CC_1. Again if we come down from point C to D, CD_1 units of capital is foregone to obtain EE_1 units of capital. It is clear that for the same quantity of labour (represented by $BB_1 = CC_1 = DD_1 = EE_1$), we are sacrificing less and less of capital (represented by $AB_1 > BC_1 > CD_1 > DE_1$). When more units of labour are used to compensate for the loss of the units of capital to maintain constant output, the ***marginal physical productivity*** of labour diminishes and the marginal physical productivity of capital increases. Therefore, MRTS diminishes as labour is substituted for capital. It makes the iso-quant convex to the origin.

Elasticity of Substitution: The degree of substitutability between two inputs is measured by elasticity of substitution. It is the proportionate change in the ratio of the factors divided by proportionate change in the MRTS.

Therefore :

$$Es = \frac{\text{proportionate change in the ratio of the factors}}{\text{proportionate change in the MRTS}}$$

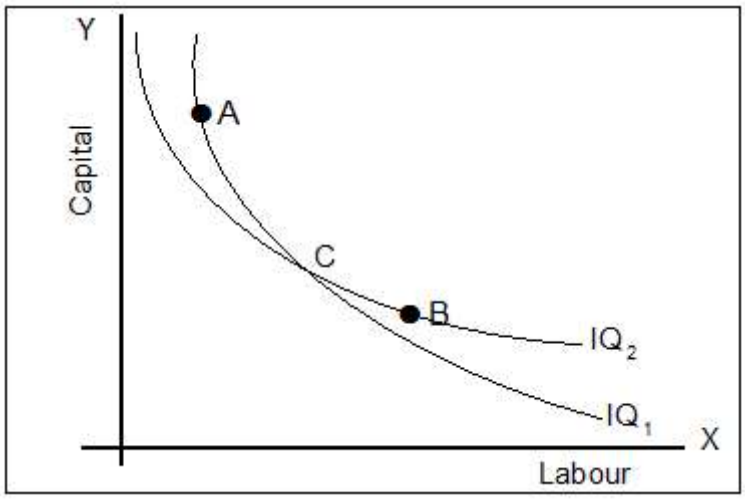
Es (Elasticity of substitution) varies between zero and infinity. When two

factors can not be substituted at all, Es is zero and elasticity of substitution is infinite when the factors are perfect substitutes i. e E_s is 1.

6.6.5 Properties of Iso-quant : An iso-quant has the following properties:

- An iso-quant slopes downward from left to the right. It happens because when quantity of labour is increased, the quantity of capital must be reduced so that there is no change in quantity of output produced.
- Two iso-quants can not intersect each other. If they intersect each other, there will be common factor combination for two different levels of output. This has been explained with the help of the following figure 6.8.

Figure 6.8 : Iso-quants do not intersect each other



In the above figure 6.8, IQ_1 and IQ_2 intersect at point C. Thus, the point C lies on IQ_1. Again, point A also lies on IQ_1. Therefore, it means that at both the points (A and C) the level of output is the same. On the other hand, point C lies on IQ_2 meaning same level of output at point C and point B on the iso-quant.

Thus, we found that:

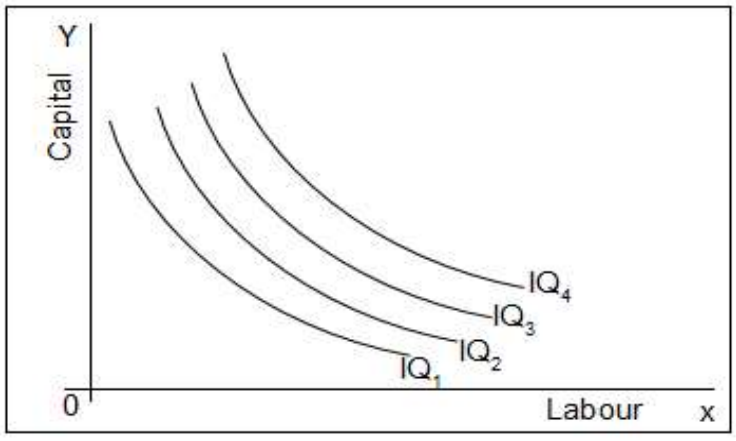
Output level at point A= Output level at point C.

Output level at point B = Output level at point C.

Thus, Output level at point A= Output level at point B. This is completely ridiculous. So, it can be said that two iso-quants can not intersect.

- Every iso-quant is ***convex*** to the origin. The convexity property of an iso-quant means that as we move down on the curve less and less of capital is required to be substituted by a given increament of labour so as to keep the level of output constant. In other words, the convexity is due to the diminishing marginal rate of technical substitution (MRTS). The degree of convexity of the iso-quant depends on the rate at which the MRTS diminishes. If the iso-quants are concave to the origin, it would mean that the marginal rate of technical substitution is increasing and more capital is replaced to get one additional unit of labour.
- As an iso-quant moves upward to the right, it represents higher levels of output. In the following figure 6.9, IQ_2 is higher than IQ_1 and it represents higher level of output. Similarly, IQ_3 is higher than IQ_2 representing higher level of output.

Figure 6.9: Movement of Iso-quants



- There may be a number of iso-quants in between two iso-quants. They show various levels of output that combination of two inputs can produce between any two iso-quants.

Tangent : a tangent is a straight line which touches a curve at a single point. The point where the straight line touches the curve is called the point of tangency.



CHECK YOUR PROGRESS

Q.6. What is an iso-quant? (Answer in about 30 words)

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Q.7. What is elasticity of substitution? (Answer in about 30 words)

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Q.8. What is meant by convexity of an iso-quant? (Answer in about 30 words)

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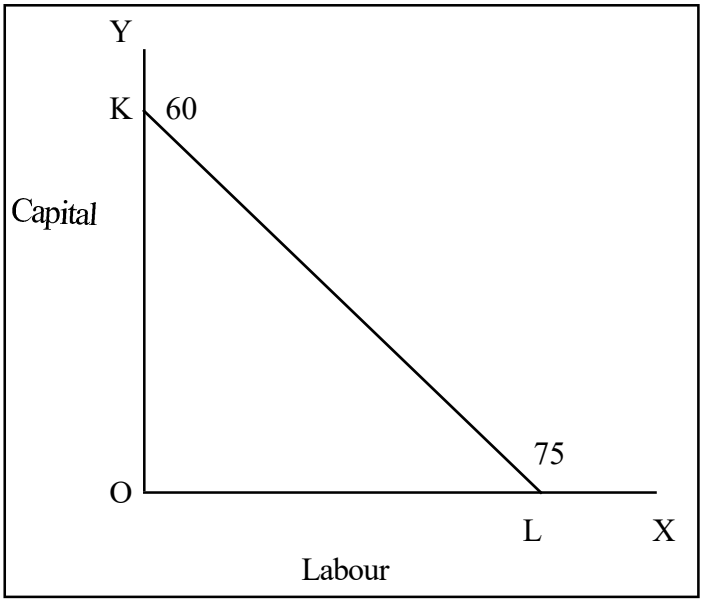
6.7 EQUILIBRIUM OF A FIRM

The concept of equilibrium of a firm can be explained with the help of iso-quants and iso-cost lines. An iso-quant maps represent the various factor combinations which can yield various levels of output.

Let us now introduce the concept of the iso cost line. The prices of factors are represented by the iso-cost line. The iso-cost line determines what combination of factors the firm will choose for production. An iso-cost line shows various combinations of two factors that the firm can buy with a given outlay. Figure 6.10 shows an iso-cost line where units of labour are measured on the X-axis and units of capital are measured on the Y-axis. We assume that the prices of factors are given and constant for the firm. If the firm can spend Rs. 300/- with labour cost at Rs. 4 per labour hour and capital cost at Rs. 5 per machine hour, then the producer can buy 75 units

of labour or 60 units of capital if the entire amount of Rs. 300/- is spent on labour or capital respectively. Let OL represents 75 units of labour and OK represents 60 units of capital. Joining points K and L, we get the iso cost line which passes through all combinations of labour and capital which the firm can buy with Rs. 300/-. Thus, an iso-cost line can be defined as the locus of various combinations of factors which a firm can buy with a constant outlay. The iso- cost line is also called the price line or outlay line.

Figure 6.10 Iso-cost Line

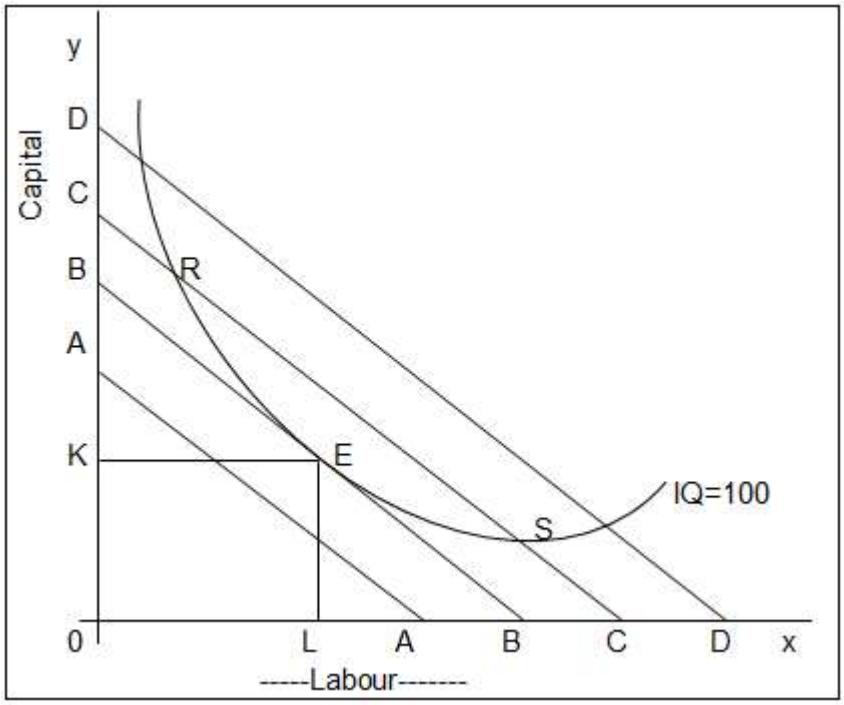


The iso cost line shifts when the total outlay which the firm wants to spend on the factors changes. A greater outlay will cause the iso cost line to shift to the right.

The equilibrium condition of the firm depends on its objectives. As mentioned earlier, an isoquant map given the various factor combinations which can yield various levels of output, every isoquant showing those factor combinations which can produce a specified level of output. A family of iso-cost line represents the various levels of total cost or outlay, given the prices of two factors.

We have already said that the point of least cost combination of factors for any level of output is where the iso-quant is ***tangent*** to an iso-quant. The point of tangency is the point where a straight line touches a curve. This has been explained with the help of the following figure 6.9.

Figure 6.11 : Equilibrium of a Firm



In the above figure 6.11 AA, BB, CC and DD are different iso-cost lines. They show different levels of cost at which production can take place. An important point to note here is that iso-cost lines are always parallel to each other. The producer wants to produce 100 units of output and he has to decide which level of cost will maximize his profit.

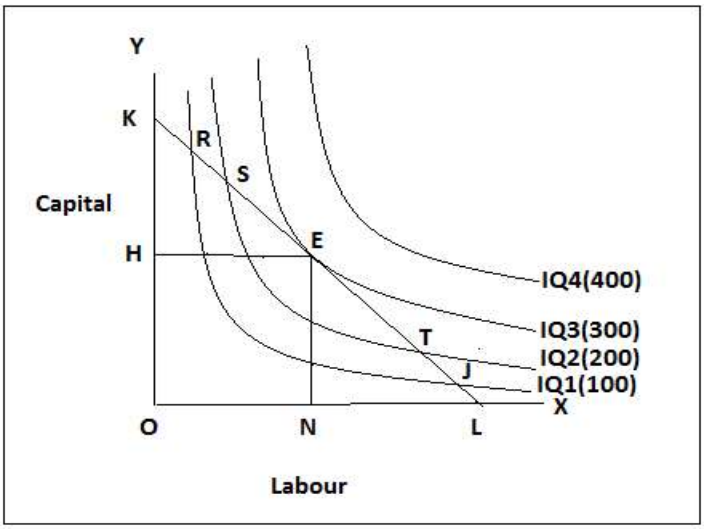
Profit will be maximum at point E where the iso-quant IQ touches the iso-cost line BB. At this point the producer uses 0L amount of labour and 0K amount of capital. Points other than E can not be point of equilibrium as other points cannot fulfil the condition of tangency. If we consider the point R, cost is beyond the reach of the producer. Therefore, the producer will not choose a combination other than E which is the least cost factor combination for producing 100 units of output.

It should be remembered that the point of tangency between the iso-cost and the iso-quant is not a necessary condition for producer's equilibrium. At the point of tangency, the iso-quant must be convex to the

origin. In other words, marginal rate of technical substitution of labour for capital must be diminishing.

The second situation of output maximisation for a given level of cost can be explained with the help of the following diagram.

Figure 6.12 Output Maximisation for a Given Cost



With the given outlay, there will be a single iso-cost line. The firm will have to choose a factor combination lying on the given iso-cost line. The producer will now be in equilibrium at point E where IQ_3 is tangent to KL using ON units of labour and OH units of capital. The firm has the option of producing at R, S, T and J but point E enables the firm to reach the highest possible isoquant IQ_3 producing 300 units of output.



CHECK YOUR PROGRESS

Q.9. State two options of a firm to attain equlibrium.

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Q.10. State the conditions to be fulfilled for the equilibrium of a firm.

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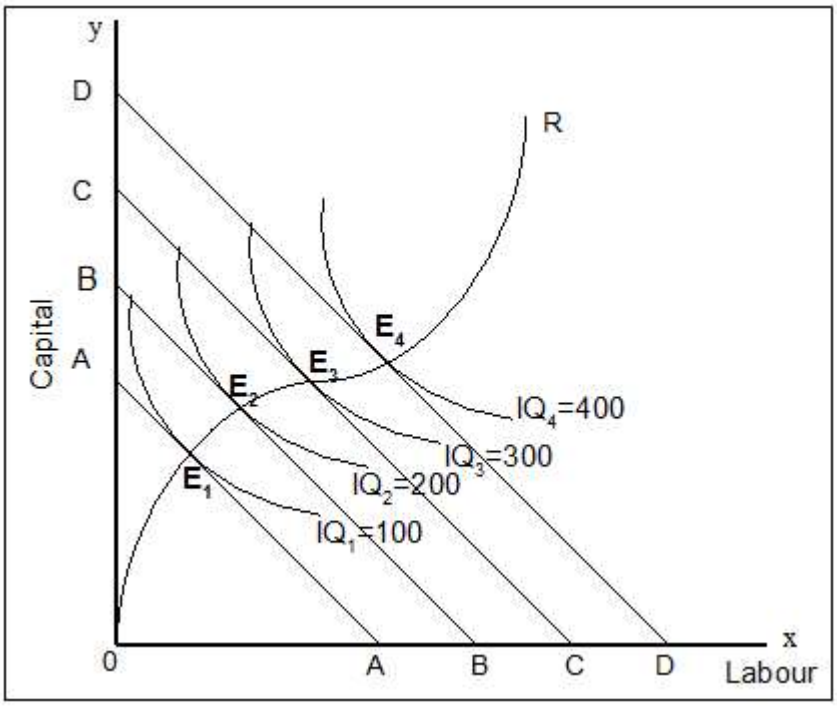
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6.8 EXPANSION PATH

After discussing how a producer reaches equilibrium, we are now in a position to study how a producer will change his factor combination as he expands output with given factor prices. We can study how he will proceed with the help of iso-cost and iso-quant. Suppose, the producer uses labour and capital and their prices are represented by the iso-cost line AA which is shown in the next page.

In figure 6.13, parallel to the iso-cost line AA, there are other three iso-quants BB, CC and DD which show different levels of total cost or outlay. Suppose the producer wants to produce 100 units of output. Then he will produce at point E_1. Suppose he wants to produce 200 units of output, he will choose to produce at E_2 which is a point of tangency between iso-cost curve BB and iso-quant IQ_2. Likewise, for higher level of output 300 and 400, the firm will respectively produce at E_3 and E_4. If we join all the least cost equilibrium points E_1, E_2, E_3 and E_4,

Figure 6.13 : Expansion Path



we get the expansion path. Thus, expansion path may be defined as the locus of the points of tangency between the equal product curves and iso-cost lines as the firm expands output.

The expansion path may have different paths and shape depending upon the relative prices of the productive factors used and the shape of the iso-quant. Since expansion path represents minimum cost combinations for various levels of output, it shows the cheapest way of producing each output given the relative prices of the factors.

6.9 ECONOMIES AND DISECONOMIES OF SCALE

Economies of scale :

Economies of scale refers to the advantages or benefits enjoyed by a firm or an industry following an expansion of its scale of production. It is also regarded as the benefits of large scale of production. There are two types of economies of scale-

Scale – (a) internal economies and

(b) external economies

Internal Economies of Scale :

When a particular firm of an industry enjoys certain advantages following an expansion in its scale of production, the advantages will be known as internal economies of scale. Different internal economies are explained below–

(i) **Financial economies :** A big firm with a higher scale of production enjoys financial economies in the sence that the firm can easily secure bank loans as compared to a small firm.

(ii) **Technical economies :** Technical economies arises when a firm uses large machinaries. Large machineries have more productive capacity. Given the productive capacity of the machine and given the fixed cost, the smaller is the output produced, the higher is the cost per-unit and larger is the amount of output prodreced, the lower is the unit cost. A large firm will therefore, have lower production cost per-unit of output produced.

(iii) **Market economies :** A big firm will generate a higher demand for raw

materials compared to a small firm. The supplier of raw-materials may offer rebates to the big firm as it makes a bulk purchase such rebates may not be given to a small firm which makes a small purchase. A big firm may also undertake extensive surveys of market demand for its product.

(iv) **Managerial economies :** A big firm may employ efficient personal to oversee the production plans and programmes. At a large scale production, managerial works are done in a very efficient way which helps to reduce the cost. In a large scale production, the whole unit is grouped into certain divisions, such as production, marketing, export etc. Eact division is leaded by an expert manager. Above all, a general manager is also appointed. Thus managerial economies arises as a result of expert work of the skill managers.

(v) **Labour related economies :** The big firm has a large market for its product. It can go in a big way for division of labour and specialisation. Such a firm can offer various incentives like rapid promotion, provision of pension etc.

(vi) **Risk bearing economies :** Large scale firm can easily bear the risks. A big firm can produce a number of commodities. If the demand for a particular product goes down in the market, the big firm can still fall back upon the other products. They can easily cover the losses incurred by one or more units.

External Economies of Scale

External economies refers to the economies or benefits enjoyed by all the firm which are generated by the industry as a whole. External economies are associated with the benefits of localisation of industries. Sualkuchi is the center of the silk industry of Assam. As and when the number of loom increases, it may be possible to establish a sophisticated colouring and calendening plant at sualkuchi. This will benefit all the weavers. This is an example of external economies of scale. External economies can be analysed in the following way–

(i) **Economies of concentration :** When firms concentrate in a specific area, they can reap the benefits of several aspects. These aspects

may be skilled workers, better transport facilities, credit facilities etc.

(ii) Economies of information : When a large scale industry publishes reports, statistics and other informations regarding the products, markets, future prospects and other related matters by its own survey and research, the other firms concentrated nearby can avail these necessary informations.

(iii) Economies of welfare : Welfare policy of one firm compels the others to adopt sufficient measures for the welfare of the workers. Besides, all firms can work together to bring welfare of the whole community.

Diseconomies of scale :

Diseconomies of scale refers to disadvantages that a firm or an industry faces following an expansion of its scale of production. There may be internal or external diseconomies of scale.

Internal Diseconomies of scale :

(i) As the firm expands beyond a certain stage the organiser finds it difficult to co-ordinate the activities, efficiency suffers and there arises the problem of mismanagement of large-scale production.

(ii) Every machinery has a maximum productive capacity and when the firm overexpands it becomes difficult to raise output without raising the cost of production.

External Diseconomies of scale :

There are certain external diseconomies of scale. These are–

(i) The disadvantages of localisation of industry will become more prominent as the industry expands. Unplanned urbanisation, environmental pollution and other problem will begin to surface.

(ii) Large scale industry demands more raw materials and as a result, the price of raw materals will begin to rise leading to inflation in the economy.



Division of labour : Division of labour means the breaking up of a job into smaller parts and assigning each part into a particular worker.

Specialisation : Specialisation is a wider sence of division of labour. Division of labour is specialisation only with regard to one factor of production ie. labour. But specialisation implies specialisation of all other factors of production land, capital and organisation.

Localisation of industry : Localisation of industry implies the concentration of the different firm of the industry at a certain place or region.

6.10 THE IMPORTANCE OF PRODUCTION FUNCTIONS IN MANAGERIAL DECISION MAKING

For managers, understanding of the basic concept of production provides a conceptual framework for decisions involving the allocation of a

firm's resources both in the short run and in the long run. We discuss below one such key management principle.

Careful Planning can help a firm to use its Resources in a Rational Manner :

As discussed earlier, a firm has three stages of production and stage II is the only stage for a rational firm to operate. But, the firm may find itself in stage I or stage III depending on how much the consumer wants to buy. This means that, for a firm to operate in stage II only, careful planning is necessary regarding the amount of fixed inputs regarding the amount of fixed inputs that will be used along with the variable ones. If the firm anticipates demand to be in stage II, then the capacity is perfect for its needs. However, if the firm anticipated demand to be in stage III, then it would have to increase its capacity so that stage II includes higher level of output. Similarly, if the firm forecasts demand to be in stage I, it would have to consider decreasing its capacity. Thus, managerial decision making requires two basic elements – (i) accurate forecast of demand, and (ii) effective communication between the production and marketing function.



CHECK YOUR PROGRESS

Q.11. What does the expansion path exhibit?

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6.11 LET US SUM UP

- A production function is a relation between inputs to the production process and the resulting output.
- An iso-quant or equal product line is a curve that shows all possible combinations of inputs that yield the same output. It is also known as producer's indifference curve.

- Amount by which the quantity of one input can be reduced when one extra unit of another input is added without any change in output is called marginal rate of technical substitution (MRTS).
- The degree of substitutability between two inputs is measured by elasticity of substitution. It is the proportionate change in the ratio of the factors divided by proportionate change in the MRTS.
- The law of variable proportions shows the changes in the quantity of one input while other inputs are kept constant.
- There are three stages in the law of variable proportions. A rational producer will always like to produce in stage two.
- It was first believed that the law was applicable in the field of agriculture only. But the modern economists propound that the law is equally applicable to industries and other productive activities.
- The study of changes in output as a consequence of changes in the scale is the subject matter of returns to scale.
- Returns to scale may be constant, increasing or decreasing. Returns to scale vary among different production functions. Normally returns to scale is greater in the production function associated with larger firms.
- The law of variable proportions shows how output changes with changes in the quantity of one input while other inputs are kept constant. But in case of returns to scale, all inputs are changed in a fixed proportion.
- The condition of equilibrium is determined at the point of tangency between iso-cost and iso-quant. Iso-cost is a straight line which shows various combinations of two factors that the firm can buy with a given outlay.
- It should be remembered that the point of tangency between the iso-cost and the iso-quant is not a necessary condition for producer's equilibrium. At the point of tangency, the iso-quant must be convex to the origin. In other words, marginal rate of technical substitution of labour for capital must be diminishing.
- When a firm increases output, it moves from one equilibrium point

to another. Such change of equilibrium position form one to the other is captured by expansion path.

- Expansion path is the locus of the points of tangency between the equal product curves and iso-cost lines as the firm expands output. In other words, it is the locus of least cost combination points.



6.12 FURTHER READINGS

1) Ahuja, H. L. (2006). *Modern Economics.* New Delhi: S. Chand & Co. Ltd.
2) Dewett, K. K. (2005). *Modern Economic Theory.* New Delhi: S. Chand & Co. Ltd.
3) Koutsoyiannis, A (1979). *Modern Microeconomics.* New Delhi: Macmillan
4) Sundharam, K. P. M & Vaish, M. C. (1997). *Microeconomic Theory.* New Delhi: S.Chand & Co. Ltd.



6.13 ANSWERS TO CHECK YOUR PROGRESS

Ans. to Q. No. 1 : The law of variable proportions is based on the following assumptions–

- There should not be any change in the state of technology.
- Only one input will undergo change in quantity keeping all other inputs constant.
- All the units of the variable factor are homogenous.
- It is possible to change the proportion in which the various inputs are combined.

Ans. to Q. No. 2 : In the first stage of production, total output increases at an increasing rate upto a certain point. This point is called the point of inflexion.

Ans. to Q. No. 3 : The third stage is known as the stage of diminishing returns as both the average and marginal products of the variable

factor continuously fall during this stage.

Ans. to Q. No. 4 : When the producer changes both labour and capital in the same proportion and the changes in total production are studied, it refers to returns to scale. It is called so because there is change in the scale of production.

Ans. to Q. No. 5 : The law of variable proportions shows how output changes with changes in the quantity of one input while other inputs are kept constant. But in case of returns to scale, all inputs are changed in a fixed proportion.

Ans. to Q. No. 6 : An iso-quant or equal product line is a curve showing all possible combinations of inputs that yield the same level of output. This concept is analogous to consumer's indifference curve. Therefore, it is also known as producer's indifference curve.

Ans. to Q. No. 7 : The degree of substitutability between two inputs is measured by elasticity of substitution. It is the proportionate change in the ratio of the factors divided by proportionate change in the MRTS. Therefore:

$$Es = \frac{\text{proportionate change in the ratio of the factors}}{\text{proportionate change in the MRTS}}$$

where, Es = elasticity of substitution, MRTS = marginal rate of technical substitution.

Ans. to Q. No. 8 : The convexity property of an iso-quant means that as we move down on the curve less and less of capital is required to be substituted by a given increment of labour so as to keep the level of output constant. The degree of convexity of an iso-quant depends on the rate at which the MRTS diminishes.

Ans. to Q. No. 9 : The two options a firm will have to attain equilibrium are:

- maximizing output for a given cost, or
- minimizing cost subject to a given output.

Ans. to Q. No. 10 : The following two conditions must be fulfilled for the equilibrium of a firm:

- The iso-cost line should be tangent to the iso-quant.

- At the point of tangency, the iso-quant must be convex to the origin.

Ans. to Q. No. 11 : Since expansion path represents minimum cost combinations for various levels of output, it shows the cheapest way of producing each output given the relative prices of the factors.



6.14 MODEL QUESTIONS

Q.1. Describe the significance of the law of variable proportions.

Q.2. Write a short note on the concept of expansion path.

Q.3. Write a short notes on:

a) Constant returns to scale

b) Decreasing returns to scale

c) Increasing returns to scale

Q.4. Explain the law of variable proportions with the help of suitable diagram.

Q.5. What do you mean by returns to scale? Discuss its various types with the help of suitable diagrams.

Q.6. Discuss the equilibrium of a firm using iso-quant and iso-cost lines.

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UNIT 7: COST ANALYSIS

UNIT STRUCTURE

7.1 Learning Objectives

7.2 Introduction

7.3 Cost Function

7.4 Cost Concepts

- 7.4.1 Opportunity Cost or Alternative Cost
- 7.4.2 Explicit Cost and Implicit Cost
- 7.4.3 Money Costs and Real Cost
- 7.4.4 Accounting Cost and Economic Cost
- 7.4.5 Sunk Costs, Marginal Cost and Incremental Cost

7.5 Nature of Cost Curves in the Short-run

- 7.5.1 Total Variable Cost and Total Fixed Cost
- 7.5.2 Average Cost Curves
- 7.5.3 Marginal Cost Curve

7.6 Long Run Cost Curve of Firm

- 7.6.1 Long Run Average Cost Curve
- 7.6.2 Long Run Marginal Cost Curve

7.7 Managerial Uses of Cost Function

7.8 Let Us Sum Up

7.9 Further Reading

7.10 Answer to Check Your Progress

7.11 Model Questions

7.1 LEARNING OBJECTIVES

After going through this unit you will be able to

- explain the concepts of costs
- define cost function
- compare between various types of short run cost curves
- describe how long run average cost curves and marginal cost curves are derived

- explain the significance of cost function in managerial decision making

7.2 INTRODUCTION



Acquisition-
It is the act of contracting or assuming or acquiring possession of something.

Cost plays an important role in decision making process of a firm. Profit maximization is an important objective of a firm. Besides profit maximization, costs determined whether a new product is to be introduced or not, whether there should be new *acquisition* and so on. In the language of a layman, the sum of all expenditure incurred in the process of production is called cost. The term cost of production may be used in several senses. We will discuss all of them.

The costs incurred on the production process may be studied in both short run and long run. In the short run, fixed factors can not be changed. Output can be increased only by varying the quantities of variable factors. But in the long run there is no fixed factor. A period is called long run if all inputs can be changed within that period. In this unit we will discuss how long run average and long run marginal costs are derived. The concept of cost discussed in this unit falls within the purview of traditional theory of costs.

7.3 COST FUNCTION

The theory of costs plays a major role in managerial economics while allocating scarce resources. A cost function is a derived function. It is derived from the production function. The relationship between cost and output is known as cost function, i.e. it relates the cost of production to the firm's level of output. Economic theory distinguishes between short-run and long- run cost. Short run costs are the costs over a period of time during which some factors of production are fixed. The long-run costs are costs increased over a period of time during which it is possible to change all the factors of production. But both in the short run and in the long run, total cost is a multivariate function. Symbolically, we may write the short run cost function as

$$C=f(X, T, P_f, K)$$

where C= total cost

X= output

T= Technology

P_f= prices of factors

K= fixed factors

The long-run function is different from short run cost function. It does not contain the variable 'K' which represents the fixed factor. Every factor is a variable in the long run. Symbolically, the long-run cost function may be represented as

$$C=f(X, T, P_f)$$

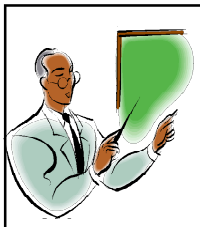
If we compare the long-run production function with the short run production function, we see that the variable K representing technology is absent in the long run production function. This happens because technology undergoes changes in the long-run.

7.4 COST CONCEPTS

The term cost is frequently used without explaining what it actually means. Since the term cost has different meanings, it is essential that the term be defined precisely. Let us discuss them below.

7.4.1 Opportunity cost or Alternative cost

The concept of opportunity cost plays a major role in managerial decision making. While deciding the cost of a product, it is always important to consider what the customer is willing to sacrifice to obtain the particular product. The opportunity cost of any good is the next best alternative good that is sacrificed. Since resources are scarce, they can not be put in all uses simultaneously. If they are used to produce one thing they have to be withdrawn from other uses. For example, a plot of land can be used to produce either rice or wheat. When it is employed to produce rice, it means that we have sacrificed the quantity of wheat for rice. The opportunity cost of producing rice is the amount of wheat sacrificed.



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Opportunity cost: It refers to the amount of subjective value foregone in choosing one activity over the next best alternative. The opportunity cost or transfer cost of any good is the next best alternative good that is given up. It is the opportunity missed or alternative foregone in having one thing rather than the other or in putting a factor service to one use instead of the other. While taking any production decision, opportunity cost associated with the use of firm's resources should be taken into account.

7.4.2 Explicit cost and Implicit cost

Explicit costs are those costs that involve an actual payment to other parties, while implicit costs represent the value of foregone opportunities but do not involve an actual cash payment. Implicit costs are as important as explicit costs. Ignoring implicit cost means that a part of the total opportunity cost has been ignored. Let us take the case of a person who does not hire a manager and runs his own business. While working for someone else, he could have earned a good salary. That salary foregone is often neglected in accounting statement but any rational decision making policy should include both explicit and implicit cost.

7.4.3 Money cost and Real cost

Money costs are total money expenses incurred by a firm for purchasing the inputs, together with certain other items. These will include wages and salaries of workers, cost of raw materials, expenditures on capital equipment, depreciation cost, rent on buildings, interest on capital invested and borrowed, advertisement and transportation cost, insurance charge, taxes and so on. It is also called nominal cost or expenses of production.

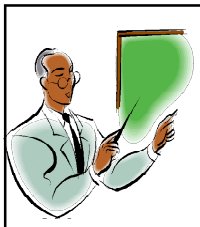
Some elements always lie behind the money cost which can not be explicitly measured. The efforts and sacrifices made by the capitalists to save and invest, the foregone leisure by the workers are some example of real cost. Marshall defined such expenditure as real cost. An unpleasant work does not always carry high wage and a pleasant work does not carry low wage. Thus, it can be said that money cost and real cost do not correspond to each other.

7.4.4 Accounting cost and Economic cost

The concept of cost as conceived by an accountant is different from the idea conceived by an economist. Accountants are concerned with reporting the past performance of the firm for external use, as in annual reports. Financial accountants tend to take a retrospective view of the firms finances and operations because they must keep track of assets and liabilities and evaluate past performances. It is called so because accountants use this cost concept. But an economists approaches cost somewhat differently. They take a forward looking view of the firm. They are concerned with the allocation of scarce resources. Therefore, they care about what cost is likely to be in future and about the ways in which resources could be rearranged to reduce cost and improve profitability. It refers to foregone opportunities. The word 'economic' tell us to distinguish between costs that the firm can control and those it can not.

7.4.5 Sunk cost, Marginal cost and Incremental cost

Sunk cost is an expenditure that has been made and can not be recovered. For example, let us take the case of a producer who buys specialized equipment designed for a particular purpose. That equipment can be used to do only what it was originally designed for and can not be converted for some other use. It has no alternative use and therefore, its opportunity cost is zero. The expenditure on this equipment is called sunk cost. In general, sunk costs are irrelevant in decision making.



LET US KNOW

Sunk costs: Sunk cost is incurred in the past and it is not affected by current decision. The money used as sunk cost can not be recovered. It has no opportunity cost. Sunk cost is an expenditure that has been made and can not be recovered.

Marginal cost refers to the change in total cost corresponding to an increase in output by an additional unit. On the other hand **incremental cost** refers to the total additional cost of implementing a managerial decision. It may be the increase in expenditure owing to introduction of a new product line or acquisition of a new unit of production and so on.



CHECK YOUR PROGRESS

Q1. Distinguish between marginal cost and incremental cost.

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.....

Q2. What is sunk cost? Is sunk cost relevant in managerial decision making?

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7.5 NATURE OF COST CURVES IN THE SHORT- RUN

The short-run is a period in which the firm can not change its plant, equipment and the scale of organization. To increase output, it can only employ more variable factors with the same quantity of fixed factors.

7.5.1 Total Variable Cost and Total Fixed Cost

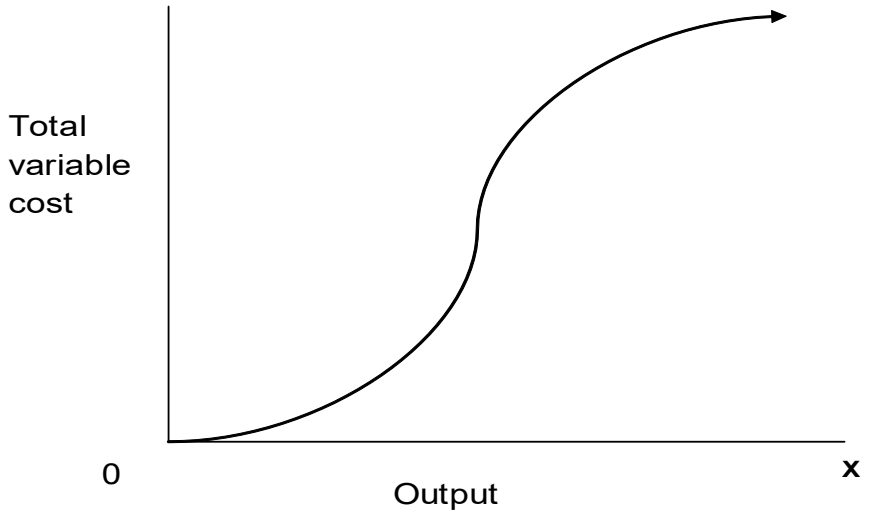
Total cost is an all inclusive concept encompassing expenses of all kinds required to do business. It is the cost of producing any fixed

level of output. The total cost may further be subdivided into **total variable** and **total fixed** cost. Let us discuss them below.

Total variable cost:

The total variable costs are those expenses of production which change with the changes in total output of the firm. It means that they can be adjusted with the change in output level. For example a bread producer wants to increase the production of bread from 200 to 350 units. Now he will require more wheat and more labourers. Therefore, expenditure on these two items is called variable cost. Variable costs are also called primary cost or direct cost. Variable cost includes expenditure on labour, raw materials, power, fuel, etc.

Figure 7.1 : Total Variable Cost Curve



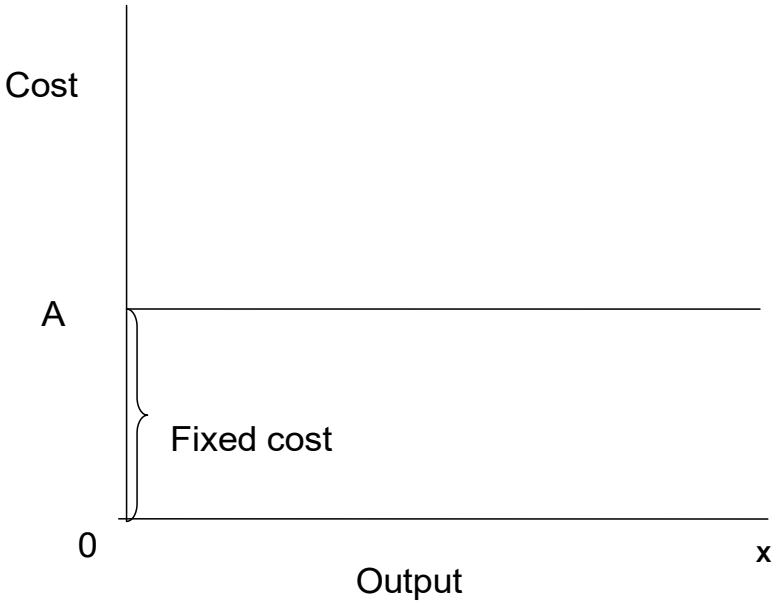
The total variable cost curve starts from the origin as shown in the Fig: 7.1. It is so because when nothing is produced total variable cost is zero.

Total Fixed cost:

On the other hand, some components of production can not be varied in the short run. For example, our bread producer can not increase its plant size quickly in the short run. He has to collect capital and order the equipment for purchasing. Such expenditure on capital equipment, building, administrative staff salaries, land

maintenance etc are called fixed costs. It is called so because it can not be adjusted in the short run. Fixed cost is the cost which does not vary with the level of output. Fixed costs are known as 'overhead' cost. The total fixed cost curve is horizontal line as shown in Fig: 2 which is parallel to the X axis. In the Fig: 7.2, 0A is the quantity of fixed cost incurred in the short run.

Figure 7.2 : Total Fixed Cost Curve



Both total fixed costs (TFC) and total variable cost (TVC) together constitute total cost (TC). Thus,

$$TC = TVC + TFC$$

The shape of the total cost curve resembles the shape of the total variable cost curve as shown by fig 7.3. The distance between the total cost curve and the total variable cost curve represents total fixed cost.

Total fixed cost

Total variable cost

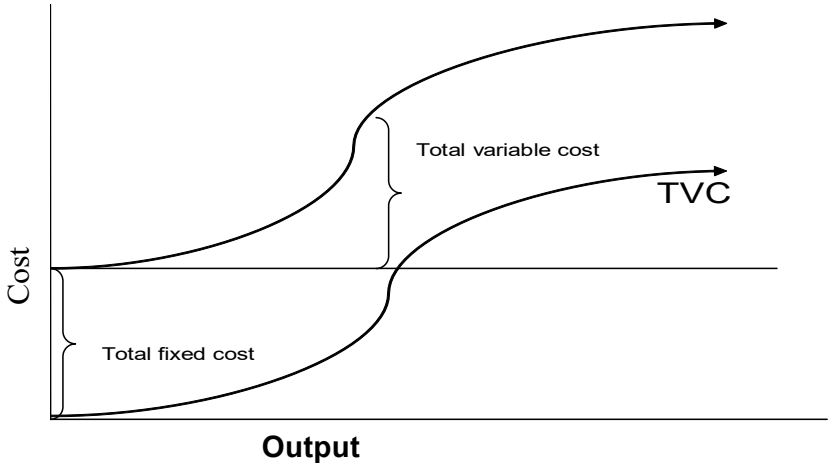


Fig 7.3

The slope of the total cost curve is related to returns to scale concept. We know that returns to scale refers to resultant increase in output for increase in all inputs in a particular proportion. A production function does not always exhibit the same degree of returns to scale over the entire range of output. It has been found in most of the cases that returns to scale is increasing at the initial stage, followed by constant returns to scale over the intermediate levels of output and finally decreasing returns to scale operates at high levels of output.

7.5.2 Average cost Curve

Average cost (AC) is defined as total cost of production divided by the total number of output produced. Cost per unit is more relevant in decision making than the total cost function. This is because the manager must compare cost per unit of output to the market price of that output.

$$AC = \frac{TC}{Q}$$

Here, TC represents total cost incurred in the process of production and Q represents the number of output produced. We have already studied that total cost (TC) is nothing but the sum of total fixed cost and total variable cost.

TC

$$ATC = \frac{}{Q}$$

$$\text{Or, } ATC = \frac{TVC+TFC}{Q}$$

$$= \frac{TVC}{Q} + \frac{TFC}{Q}$$

$$= AVC + AFC$$

It means that average cost is the sum total of average variable cost and average fixed cost. Now we will discuss the shape of average fixed cost and average variable cost curves.

Average fixed cost:

If the total fixed cost is divided by the total number of units of output produced, we arrive at average fixed cost. Average fixed cost is the amount of fixed cost required to produce a single unit of production. It is calculated by

$$AFC = \frac{TFC}{Q}$$

Where, Q is the number of total output produced. The shape of the average fixed cost curve is shown in Fig:7.4.

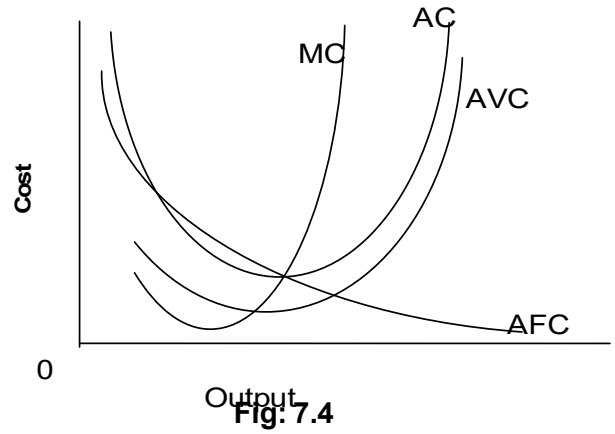


Fig. 7.4

Note: MC must cut both the AVC and AC at their respective minimum points

Average variable cost (AVC):

Average variable cost is the total variable cost divided by the number of units of output produced. It can be calculated in the following way-

$$AVC = \frac{TVC}{Q}$$

Where, Q stands for the total output produced. The average variable cost will generally fall as output increases from zero to the normal capacity output. But beyond the normal capacity of output it will rise steeply, because of the operation of the law of diminishing return. Average variable cost curve is shown in Fig 7.4.

7.5.3 Marginal cost Curve

To understand the concept of marginal cost, let us go back to the concept of marginal product. Marginal product is an additional output produced. For example, one producer produces 100 units. When he produces 101 units, the extra unit is called marginal output. Therefore, marginal cost is an addition to the total cost incurred on the production of an additional unit. Since total fixed cost does not undergo any change in the short run, marginal cost may also be

called an addition to the total variable cost in the short run. With the help of mathematics MC can be expressed as

MC= (TC) / Q

where TC is total cost and Q is output, " stands for a small change.

There is a direct relationship between AC and MC. When AC falls MC also falls but it is below AC. When AC rises MC is above it and AC equals MC at the lowest point of AC.

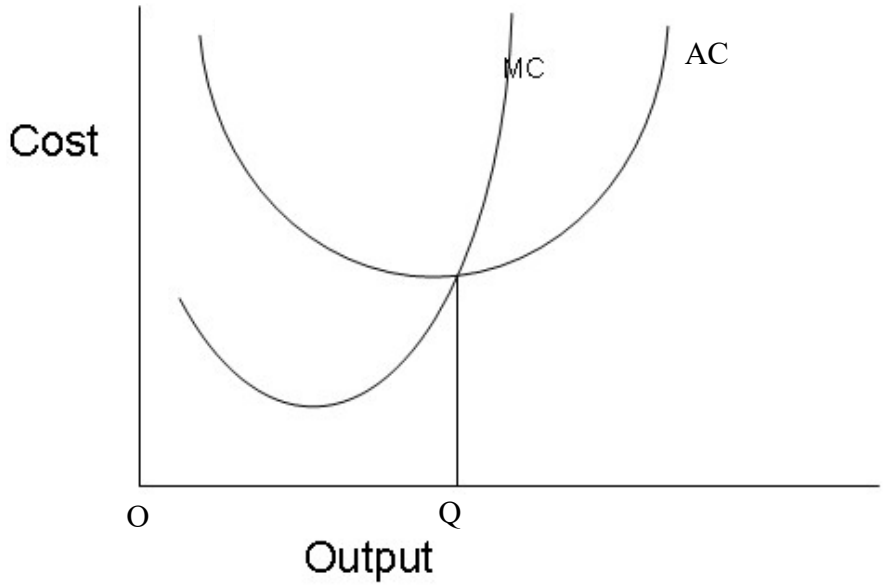


Fig: 7.5

Note: MC must cut AC from below at its minimum point

From the Fig: 4.5 it is clear that to the right of output Q, MC is higher than AC and to the left of Q, MC is lower than AC. But at output level Q, MC=AC. Thus, we find that

1. If MC< AC, then AC will be falling as output increases.
2. If MC>AC, then AC will be rising as output increases.
3. At point Q where AC is minimum, we have AC=MC.

7.6 LONG-RUN COST CURVE

Long run is a period when a firm can change its plant size and scale of operation. In the long run all factors are variable. Now the question is how short is the short run and how long is the long run? This depends on the industry and the production techniques used. Production length will vary from firm to firm. If there are no transactions and no specialized inputs, then all inputs can be quickly adjusted, and the long run is not very long.

7.6.1 Long-Run Average Cost Curve

Let us first discuss how long-run average cost curve is derived in the long run. We all know that a particular plant can produce a particular range of output. It is the lowest point of average cost curve beyond which production is not economic because of the operation of law of decreasing returns to scale which may occur for various reasons. Suppose the demand for a firm's product increases. Now the producer will install a new plant. The firm will be making use of the newly installed plant till it reaches the lowest point on the average cost curve. This way more new plants will be installed with the increase in demand for the firm's product.

We can derive the long-run average cost (LAC) curve from the short run average cost curves by fitting a line which is tangent to all SAC curves.

In Fig: 7.6, LAC is the long run average cost curve. Each point on the LAC is a point of tangency with the corresponding short run average cost curve. Therefore, it is also called Envelope Curve. The firm will produce OM amount of output at the minimum point E. If the firm produces less than OM, it is not reaping fully the economies of scale and if it produces beyond OM, there will diseconomies of scale. In both the cases, the average cost of production will be higher.

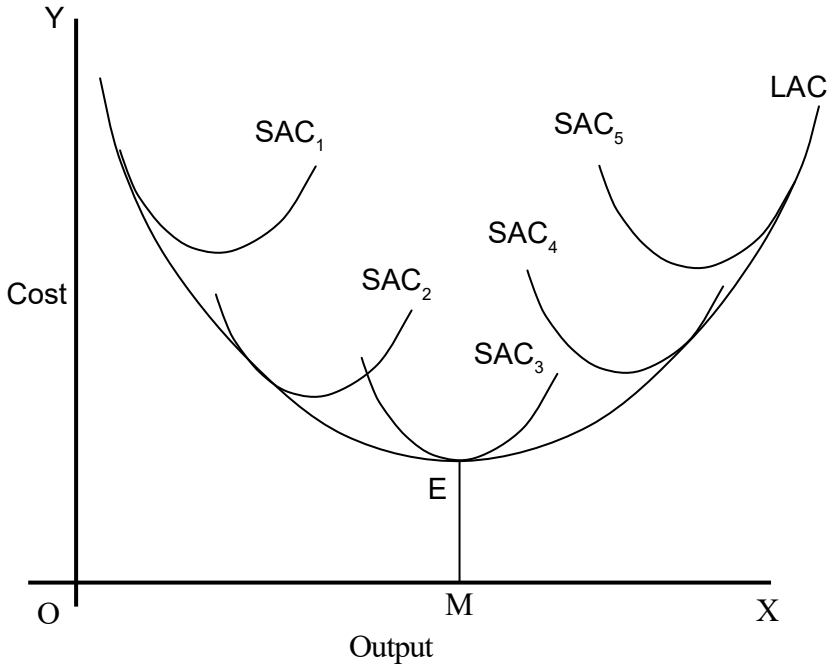


Fig: 7.6

The shape of the long-run average cost curve is like U. This shape reflects the laws of returns to scale. According to this law, the unit cost of production decreases as plant size increases, due to the economies of scale which large plant sizes make possible. It has been assumed that this plant is completely inflexible. There is no reserve capacity, not even to meet temporary rise in demand. If this plant size increases further than this optimum size there are diseconomies of scale. The turning up of the LAC is due to managerial diseconomies of scale when output is increased beyond the optimum size.

7.6.2 Long Run Marginal Cost Curve

The long-run marginal cost can be derived from the short run marginal cost curves (SRMC) but it does not envelope them like the LAC. The LRMC curve is formed from the point of intersection of the SRMC curves with vertical lines to the X axis drawn from the points of tangency of the corresponding SAC curves and the LRA cost curves. At that level of output, the LMC must be equal to the SMC curve at which the corresponding SAC curve is tangent to the LAC curve.

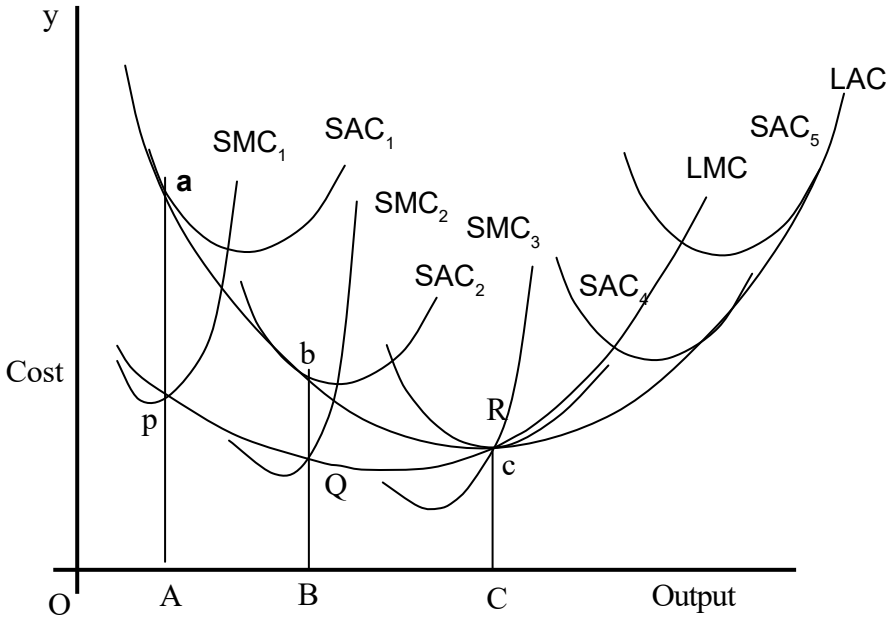


Fig: 7.7

In Fig: 7.7, let us start with the point 'a' which is a point of tangency between SAC and LAC. From this point a vertical line aA is drawn on the X axis and it cuts the SMC_1 at point P. Similarly 'b' and 'c' are the other two points of tangency between other two SAC curves and the LAC curve. Corresponding to these two points of tangency, the point of intersection between vertical lines bB and cC are Q and R. After joining P, Q and R we get the LMC curve. At this minimum point R, the LMC curve intersects the LAC curve. Long run marginal cost bears direct relationship with the long run average cost. When both LAC and LMC falls, LMC is lower than LAC. But as LAC and LMC both increase, LMC is higher than LAC. But the LMC cuts the LAC at the lowest point. The same relationship is true in the short run also.

7.7 MANAGERIAL USES OF COST FUNCTION

The theory of cost is a fundamental concern of managerial economics. It is difficult to make managerial decisions without taking help of cost. For a profit maximizing firm, the decision to add a new product is made by comparing additional revenues to the additional costs associated with that new product. Similarly, the decision on capital investment is made

by comparing the rate of return on the investment with the opportunity cost of the funds used to make the capital acquisitions. Cost is also important in the non profit sectors. For example, in obtaining new fund for a project on dam, the respective authority must show that the benefit of cost must be higher than all negative externalities arising from the cost.

Managerial decision making is facilitated by information that shows the cost of each level of output, i.e. average cost. A firm operates in short run but plans in the long run. At a particular point of time, the firm has one or more fixed factor of production. Therefore, production decision must be based on short run cost curves. But a firm can change the scale of operation in the long run. The long run cost functions are used for planning the optimal scale of plant size.



CHECK YOUR PROGRESS

Q3. Fill in the blanks with appropriate words:

(i) The total cost may further be subdivided into .....and .....cost.

(ii) Average cost = ...

(iii) .....refers to the change in total cost corresponding to an additional increase in production.

(iv) .....is an expenditure that has been made and can not be recovered.

(v) The shape of the long run average cost curve is like .....



7.8 LET US SUM UP

This unit is associated with the learning of the concepts of cost, short run costs and long run costs. Opportunity cost is the best measure of a resource cost which is nothing but the value of that resource in its highest valued alternative use. Money cost can be explicitly measured in terms of money. But real costs can not be directly measured. Money costs are total

money expenses incurred by a firm in producing a commodity where the efforts and sacrifices of the factor or the entrepreneur is called real cost of production. Accounting costs are concerned with a firm's financial statements but economic cost is concerned with the firm's past performance. Sunk cost is an expenditure that has been made and can not be recovered but it is not so relevant in managerial decision making. Marginal cost and incremental costs play crucial role in decision making.

The theory of cost has been approached here from both short term and long term perspectives. In the short run, total cost is the sum of total variable and total fixed cost. The total variable costs are those expenses of production which change with the changes in total output of the firm. But some components of production can not be varied in the short run, they are called fixed costs. Average fixed cost is the fixed cost per unit of output and average total cost is total cost per unit of output. Marginal cost is the increase in cost resulting from the production of one extra unit of output. There is a direct relationship between AC and MC. When AC falls MC is below AC. When AC rises MC is above it and AC equals MC at the lowest point of AC.

In the long run, average cost curve is an envelope curve of the short run average cost curve. The shape of the LAC curve is like the U. The U shape occurs due to the laws of returns to scale. The long run marginal cost curve can be derived from the short run marginal cost curves (SRMC), but it does not envelope the short run marginal cost like the LAC curve. The same direct relationship between average cost and marginal cost curve which is applicable in the short is also applicable in the long run. Break Even Analysis is concerned with finding out the break even point i.e. the point at which total cost equals sales revenue.



7.9 FURTHER READING

1) Ahuja, H.L. (1991): *Modern Economics,* S. Chand and Company LTD.

2) Keats and Young (2004): *Managerial Economics*, Pearson Education

3) Koutsoyiannis, A. (1994): *Modern Microeconomics*, Macmillan

4) Peterson et al. (2008): *Managerial Economics*, Pearson Education

5) Pindyck, R.S and D.L. Rubinfeld (2004): *Microeconomics*, Prentice-Hall India



7.10 ANSWERS TO CHECK YOUR ROGRESS

Ans to Q.No.1: Marginal cost refers to the change in total costv corresponding to an additional increase in production and incremental cost refers to the total additional cost of implementing a managerial decision

Ans to Q.No. 2: Sunk cost is an expenditure that has been made and can not be recovered. In general, sunk costs are irrelevant in decision making.

Ans to Q.No. 3: (i) Total variable cost and total fixed cost,

(ii) Total cost,

(iii) Marginal cost,

(iv) Sunk cost

(v) U shape of cost curve .



7.11 MODEL QUESTIONS

1. Describe the relationship between average cost and marginal cost with the help of a diagram.
2. Distinguish between fixed cost and variable cost.
3. Explain why there is no fixed cost in the long run.
4. What is the main reason behind the U shape of LAC curve?
5. Describe the Break even Analysis and its assumptions

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UNIT 8: OBJECTIVES OF FIRM

UNIT STRUCTURE

8.1 Learning Objectives

8.2 Introduction

8.3 Profit Maximising Model

8.4 Cyert and March's Behaviour Theory

- 8.4.1 Organisational Slack in Cyert and March's Behaviour Theory
- 8.4.2 Decision Making Process in Cyert and March's Behaviour Theory
- 8.4.3 Implications of the Cyert-March for Price Behaviour
- 8.4.4 Critisims of Cyert and March Model

8.5 Marris' Growth Maximation Model

8.6 Baumol's Sales Maximisation Model

- 8.6.1 Baumol Model without Advertising Expenditure
- 8.6.2 Baumol Model with Advertising Expenditure

8.7 Williamson's Managerial Discretionary Model

- 8.7.1 The Major Limitation of the Model

8.8 Let Sum Up

8.9 Further Readings

8.10 Check Your Progress

8.11 Model Questions

8.1 LEARNING OBJECTIVES

After going through this unit, we will be able to :

- know Profit Maximizing Model
- explain Cyert and March's Behaviour Theory
- know Marris' Growth Maximation Model
- explain Baumol's Sales Maximisation Model
- explain Williamson's Managerial Discretionary Model

8.2 INTRODUCTION

This unit is concerned with familiarizing the students with the concepts such as theory of the firm, Cyret and March's Behaviour Theory, Marris's Growth maximisation model, Baumol's sales maximisation model and Williamson's managerial discretionary model.

In general parlance, the theories of the firms are basically concerned about earning of profit. Profit is the difference between revenue earned and expenditure incurred. Earning of the profit is the major objectives of the firm. Profit-making is considered to be driving-force behind all business activities of firms. In the market, success or failure of a firm is basically measured by profit earned by that particular firm. In all the theories of the firm, profit is considered to be an important variable.

Cyert and March was considered as one of the pioneer of systematic behavioural theory of the firm. In a modern large multiproduct firm, ownership and management are considered to be two separate entities. In this model, the firm is not considered as a single entity with a single goal of profit maximisation by a single decision-maker, called the entrepreneur. Instead, Cyert and March regard the modem business firm as a group of individuals who are engaged in the decision-making process relating to its internal structure having multiple goals.

Robin Marris in his book The Economic Theory of 'Managerial' Capitalism which was published in the year 1964 has developed a dynamic balanced growth maximising model of the firm. The author concentrates on the proposition that modem big firms are managed by managers and the shareholders are the owners who decide about the management of the firms.

Baumol in his model emphasises on sales maximisation as a goal of the firm. According to Baumol, the separation of ownership from management gives discretion to the managers to pursue goals which maximise their own utility and deviate from profit maximisation, which is the desirable goal of owners.

Williamson has developed managerial utility maximisation objective as against profit maximisation. In large modern firms, shareholders and

managers are two separate groups. The former wants maximum return in their investment and hence their maximisation of profits. The managers on the other hand have consideration other than profit maximisation in their utility functions.

8.3 PROFIT MAXIMIZATION MODEL

As discussed in the introductory section, earning of profit is the sole objective of the firm. The theory of the firm is the microeconomic concept founded in neoclassical economics that states that firms (including businesses and corporations) exist and make decisions to maximize profits.The capacity of a firm to earn profit implies the performance and status of a firm in the market. It is considered to be a test of economic ability and performance of an individual firm. The firm has to earn a reasonable amount of profit in business to survive in the competitive world. Earning of profit is a widely accepted goal and there is nothing bad or immoral about it. Earlier profit maximization was the sole objective of a firm. This assumption has a long history in economic literature and the conventional price theory was based on this very assumption about profit making. In spite of several changes and development of several alternative objectives, profit maximization has remained as one of the single most important objectives of the firm even today. Both small and large firms consistently make an attempt to maximize their profit by adopting different techniques in business. Specific efforts have been made by small and big firms to maximize output and minimize production and other operating costs. Costs reduction, cost cutting and cost minimization has become strategies of a modern firm.

An important aspect of profit maximization model is that it helps to predict the price-output behavior of a firm both in short and long term. It is often argued that no other alternative model can explain and predict the behavior of business firms better than profit-maximization model**.** Profit-maximization implies earning highest possible amount of profits during a given period of time.A firm has to generate largest amount of profits by building optimum productive capacity both in the short run and long run

depending upon various internal and external factors and forces. There should be proper balance between short run and long run objectives. In the short run, a firm is able to make only slight or minor adjustments in the production process as well as in business conditions. The plant capacity in the short run is fixed and as such, it can increase its production and sales by intensive utilization of existing plants and machineries, having over time work for the existing staff etc. Thus, in the short run, a firm has its own technical and managerial constraints. But in the long run, as there is plenty of time at the disposal of a firm, it can expand and add to the existing capacities to build up new plants; employ additional workers etc to meet the rising demand in the market. Thus, in the long run, a firm will have adequate time and ample opportunity to make all kinds of adjustments and readjustments in production process and in its marketing strategies.

8.4 CYERT AND MARCH'S BEHAVIOR THEORY

In this section of the chapter, an analysis is made regarding Cyert and March's behaviour theory. Most of the behavioural theories of the firm have developed in the early fifties of the previous century. Some of the sagnificant works on behavioural theories may be traced in Simon's article 'A Behavioural Model of Rational Choice', published in the Quarterly Journal of Economics in 1955.The theory has sub-sequently been elaborated by Cyert and March.

According to Cyert and March, in a modern large multiproduct firm, ownership is separated from management. In their model, the firm is not considered as a single entity with a single goal of profit maximisation by a single decision-maker, called the entrepreneur. They regard the modern business firm as a group of individuals who are engaged in the decision-making process relating to its internal structure having multiple goals.They deal not only with the internal organisation of the firm but also with the problem of uncertainty. They reject the assumption of certainty in the neo-classical theory of the firm. They emphasise that the modern busi-ness firm is so complex that individuals within it have limited information and imperfect foresight with respect to both internal and external developments.

Cyert and March regard the modem business firm as a complex organisation in which the deci-sion-making process should be analysed in variables that affect organisational goals, expectations, and choices. They look at the firm as an organisational coalition of managers, workers, shareholders, suppliers, customers, and so on.

According to Cyert and March, a modern firm is supposed to have five different goals:

1. **Production Goal of a firm :**

   The production goal represents in large part the demand of those coalition members who are connected with production such as managers, workers and shareholders etc. It reflects pressures towards such things as stable employment, ease of scheduling, development of acceptable cost performance and growth. This goal is directly related to output decisions.

2. **Inventory Goal of a firm:**

   The inventory goal of a modern firm represents the demands of coalition members who are connected with inventory. This goal is related to decisions in output and sales areas. The inventory goal of the firm is mainly influenced by pressures on the inventory from salesmen and customers.

3. **Sales Goal of firm:**

   The sales goal aims at meeting the demand of coalition members connected with sales. The fulfillment of sales goals necessary for the stability of the organisation.

4. **Market-Share Goal:**

   An alternative to the sales goal is the market-share goal. It is related to the demands of sales management of the coalition who are primarily interested in the comparative success of the organisation and its growth. Like the sales goal, the market-share goal is related to sales decisions.

5. **Earning of Profit:**

   The profit goal of a firm is in terms of an aspiration level with respect to the money amount of profit. It may also be in the form of profit share or return on investment. Thus the profit goal is related to pricing of products

and allocation of resources.Cyert and March limit the number of goals to five because, according to them, to expand the list rapidly meets the point of diminishing returns. According to them, all goals must be satisfied because they are relevant to price, output and sales strategy decisions of the organisation. But there should be order of priority of goals of the firms. If one of the goals is not met and the individual responsible for that is not satisfied, a search will be made for a means to meet that goal. The search will be quite narrow and the organisation will use some rules-of-thumb to set the problem right. The rule of thumb of the firms are based on the past experience of the firm and the people within it.The aspiration levels of the individuals within the firm which determine these goals change over time as a result of organisational learning. Thus these goals are regarded as the product of a bargaining- learning process in the organisational coalition. But it is not essential that the different goals may be resolved amicably. Very often it happens that there may be conflicts among these goals. The organisational coalition is thus a coalition of conflicting interests.The conflicting interests can be reconciled by the distribution of payments to members of the coalition. These payments may be in cash or kind, the later being mostly in the form of 'policy side payments' i.e., the right to take part in the policy decisions of the organisation.

An important aspect of Cyert and March's behaviour theory is the satisficing behaviour of the coalition members.The conflicting goals of the organisation can be solved by subjecting them to a constant review. It is generally happen that aspiration levels of coalition members change with experience. In fact, the aspiration level of the coalition members changes with the process of sacrificing. Each person in the organisation has a satisficing level for each of his goals.If these levels are reached, they will not seek for more. But if they are not achieved, the aspiration levels are revised downwards. If they are exceeded, the aspiration levels are raised upwards. In both situations, the satisfactory levels of performance are changed accordingly.

8.4.1 Organisational Slack in Cyert and March's Behaviour Theory

An important aspect of Cyert and March's behaviour theory is organisation slack. It is necessary to define organisation slack before discussing importance of the variable on this model. A coalition is sound and workable if payments made to various members of the coalition are adequate. For this, enough resources are needed to meet demands of all coalition members. This is ordinarily not possible because disparity arises between the total resources available to the organisation and the total payments required to maintain the coalition.This difference between total available resources and total necessary payments is called organisational slack, by Cyert and March. Slack consists in payments to members of the coalition in excess of what is required to maintain the organisation.Many forms of slack exist when the organisation operates under market imperfections. The share-holders may be paid dividends in excess of what is required to keep them within the organisation. The customers may be charged lower prices so that they may stick to the products of the firm.The workers may be paid wages in excess of what is needed to keep them in the firm. The executives may be provided with services and personal luxuries more than what is required to keep them. All such excess payments are slack expenditures for the firm which every member of the coalition obtains from time to time.Thus "slack is typically not zero", is according to Cyert and March. Rather, it is positive. Some members of the coalition ordinarily obtain a greater share of the slack than do others. In general, those members of the coalition who are full-time tend to get slacker than the other members.Organisational slack plays a constructive role. It keeps the coalition in existence. It enables the firm in maintaining itself under 'crisis' type situation and to adjust itself to changes in external environ-ment. The organisational slack serves as a cushion to absorb

the shocks. Slack payments are increased during periods of flourishing business and decreased during periods of bad business. Thus organisa-tional slack plays both a stabilising and an adaptive role.

8.4.2 Decision Making Process in Cyert and March's Behaviour Theory

In the above sub-section of the chapter, we have discussed about organisational slack. In this sub-section of the chapter, an attempt has been made to discuss the decision making process in Cyert and March' behaviour theory. Cyert and March are of the view that the decision-making process rests with the top management to the lower levels of administration. Based on their share of the total budget of the firm, the organisational goals are set by the top management given resources to the various departments. The share of the budget depends on the bargaining power and the skill of each manager. The bargaining power is determined by the past performance of each department. In this process of allocation, the top manage-ment retains some funds to be allocated at its discretion at any time to any department.The decision process at the lower level provides various degrees of freedom of action to the administration. Once the budget share is allocated to each department, each manager has considerable discretion in spending the funds at his disposal. Decisions taken by managers are implemented by the lower level staff based on their experiences and the "blue print" rules lay down earlier.The decision-making process also depends upon information and expectations formed within the organisation. Information is required to facilitate the decision-maker. Information is not a costless activity. Search activity starts whenever a problem arises because search helps to locate and collect information.Information determines the aspirations (i.e., demands) of each department which, in turn, helps the top management in setting goals. Organisational expectations are related to the hopes and wishes of the decision-maker.Given the

information and expectations, the top management examines and decides upon the projects presented by the managers. It evaluates the projects on the basis of two criteria. The first is the budgetary constraint which is the availability of funds for the project. The second is an improvement criterion: Is the project better than the existing one? In making decisions, the top management follows the rule that leads to a better state in the future than it was in the past. The Cyert-March model of behaviourism is thus an adaptive rational system.

8.4.3 Implications of the Cyert-March Model for Price Behaviour

We have already analysed the Cyert-March model. It is necessary to study the implication of the Cyert-March model for price behaviour. They have developed a simplified model to illustrate the key processes at work in an oligopolistic firm when it makes its decisions on price, output, costs, profits, etc. In this model, each firm is assumed to have three sets of goals: for profits, production and sales, and three basic decisions to make on price, output and sales effort in each time period.It takes into consideration the firm's environment at the beginning of each period which reflects its past experience. Its aspiration levels are modified in the light of this experience, and organisational slack is permitted. Each firm was assumed to estimate its demand and production costs and choose its output level.If this output level does not yield the aspired level of profits, it searches for ways to reduce costs, re-estimate demand and, if required, to lower its profit goal. If the firm is prepared to lower its profit goal, it will readily reduce its price. Thus price was found to be sensitive to factors affecting costs due to the close relationship between prices, costs and profits.

8.4.4 Criticisms of Cyert and March Model

Several managerial economists have criticised the Cyert and March model on the following grounds:

1. The economists are of the view that Cyert and March theory deals with particular cases, whereas a theory is expected to be a general approximation of the behaviour of firms. Its empirical base is too limited to provide the details of theorising. Hence it fails as a theory of the firm.
2. Hawkins in his observation points out that "criticism of the behavioural approach is along the lines that it uses a sledgehammer to crack a walnut. Hawkin questioned whatever we really need to construct mirror images of companies, virtually assembling the decision-making process brick by brick, in order to predict their behaviour? He was in favour of simple models to suffice for the limited purpose.
3. The behavioural theory relates to a duopoly firm and fails as the theory of market structures. It does not explain the interdependence and interaction of firms, nor the way in which the interrelationship of firms leads to equilibrium of output and price at the industry level. Thus the conditions for the attainment of a stable equilibrium in the industry are not determined.
4. Another criticism of the theory is that the theory does not consider either the conditions of entry or the effects on the behaviour of existing firms of a threat of potential entry by firms.
5. The behavioural theory explains the short-run behaviour of firms and ignores their long-run behaviour. Thus "it cannot explain the dynamic aspects of inventions and innovations which are related to the long-run."
6. According to Koutsoyiannis, "No exact predictions can be derived from the postulates of the behavioural theory. The acceptance of satisficing behaviour renders practically the theory into a tauto-logical structure: Whatever the firms are observed to do can be rationalised on the lines of satisficing".
8. The behavioural theory is based on the simulation approach which is a predictive technique. It simply predicts the behaviour of the firm but does not explain it.

Despite these criticisms, the behavioural theory of Cyert and March is an important contribution to the theory of the firm which brings into focus 'multiple, changing and acceptable goals' in managerial decision-making.In this regard, Hawkins opines, "Few would doubt that behavioural theories are among the most dramatic of the new approaches to the theory of the firm. What is dramatic is that they dispense with the assumption that firms aim to maximise anything, even utility."



ACTIVITY 1

What are the criticisms of Cyert and March theory of the firm? Give reasons.

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_____

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CHECK YOUR PROGRESS

Q.1 : a) Cyert and March regard the modem business firm as a group of individuals who are engaged in the decision-making process relating to its internal structure having multiple goals (True/False)

b) Organisational slack is the difference between total available resources and total necessary payments. (True/False)

c) The rule of thumb of the firms is based on the past experience of the firm and the people within it. (Yes/No)

8.5 MARRIS GROWTH MAXIMISATION MODEL

As discussed in the introductory section of the chapter, Robin Marris in his book The Economic Theory of 'Managerial' Capitalism (1964) has

developed a dynamic balanced growth maximising model of the firm. He concentrates on the proposition that modem big firms are managed by managers and the shareholders are the owners who decide about the management of the firms.

The Growth Maximisation model as developed by Marris is based on certain assumptions:

1. Marris assumed that a given price structure prevailes in the market.
2. Production costs are given.
3. There is no oligopolistic interdependence.
4. Factor prices are constant.
5. Firms are assumed to grow through diversification.
6. All major variables such as profits, sales and costs are assumed to increase at the same rate.

Given these assumptions, Robin Marris is of the view that the objective of the firm is to maximise its balanced growth rate(G). The Growth of the firm itself depends on two factors: First, the rate of growth of demand for the firm's product and second, the rate of growth of capital supply.

Despite the fact that in modern big firms' ownership of the firm is separated from management, owners and managers have a common goal of balanced growth of the firm. According to Marris, there are two different utility functions for the manager and the owner of the firm. The utility function of the manager consists of his emoluments, status, power, job security, etc. On the other hand, the utility function of the owner includes profits, capital, output, market share, etc.Thus the manager of a firm aims at maximising his utility, and his utility depends upon the rate of growth of the firm. Though promoting the growth of the firm is the main aim of the manager, yet he is also motivated by his job security. The manager's job security depends upon the satisfaction of share-holders who are concerned to keep the firm's share prices and dividends as high as possible.Thus the manager aims at maximising the rate of growth of the firm and the shareholders (owners) aim at maximising their profits in the form of dividends and share prices. Marris analyses the means by which the firm tries to achieve its growth-maximisation goal.The firm may grow in size through the creation

of new products which create new demands. Marris calls it differentiated diversification. The introduction of new products depends upon the rate of diversification, advertising expenses, Rearch and Development expendi-tures, etc.Marris establishes the relationship between growth and profits on the demand side through diver-sification into new products. The links between growth and profits are different at different levels of growth. In this growth-profits relationship, growth determines profits. When the rate of growth of the firm is low, the relationship is a positive one.As new products are introduced, the firm expands (grows) and profits increase. With the further increase in the growth rate due to greater diversification into new products, the growth-profit relationship becomes negative. This is because there is the managerial constraint which sets a limit on the rate of managerial growth that restricts the growth of the firm.The firms' managerial ability to cope with a great number of changes at once is limited. It is not possible to develop a larger management team for the development and marketing of new products. The higher rate of diversification requires higher expenditures on advertising and research anddevelopment. As a result, beyond a certain growth rate, the higher growth rate leads to a lower rate of profit.

The other aspect of the growth-profits relation-ship is the rate of growth of capital supply. The aim of the shareholders is to maximise the growth rate of capital stock. The main source of finance for its growth is profits. Thus profits determine growth on the sup-ply side.A higher level of profits provides more funds directly for reinvestment. It also allows more funds to be raised on the capital markets. It, therefore, allows a higher rate of growth to be funded. This gives a direct and positive relationship between profits and growth.

For the equilibrium of the firm, the growth-de-mand and growth-supply relationship must be satis-fied. This is achieved when the demand for the firm's product and the rate of growth of capital supply intersect at a point where the growth-profits combination gives the optimum solution. This point does not provide an optimum solution because the managers desire more growth than is consistent with long-run profit maximisation. The extent to which they can increase the growth rate depends upon their desire for

job security. Their job security is threatened if the shareholders feel that the share prices and dividends are falling and there is the threat of take-over by other firms. This will affect the growth rate of capital supply (GS). Thus it is the financial constraint which sets a limit to the growth of the firm on the supply side. According to Marris, it is the retention ratio which determines the growth rate of capital supply. The retention ratio is the ratio of retained profits to total profits. If the retention ratio is very low, it means that almost all profits have been distributed to the shareholders. As a result, there are limited funds available with the managers for the growth of the firm and the growth rate will be very low.

Althrough Marris Growth Maximisation model is considered to be important contributions towards explaining the relationship between growth and profit, it has been criticised by economist on several grounds:

1. Marris assumes a given price structure for the firms. He, therefore, does not explain how prices of products are determined in the market. This is a serious weakness of his model.
2. Another defect of this model is that it ignores the problem of oligopolistic interdependence of firms in non-collusive market.
3. This model also does not analyse interdependence created by non-price competition.
4. The model assumes that firms can grow continuously by creating new products. This is unre-alistic because no firm can sell anything to the consumers. After all, consumers have their preferences for certain brands which also change when new products enter the market.
5. According to Koutsoyiannis, “Marris’s model is applicable basically to those firms which pro-duce consumers’ goods. The model is not appropriate for analysing the behaviour of manufacturing businesses or traders.”
6. Marris lumps together advertising and Research and Development expenses in his model. This is a serious shortcom-ing of the model because the effectiveness of these two variables is not the same in any given period.

8. Marris assumes that firms have their own research and development department on which they spend much for creating new products. But, in reality, most firms do not have such departments. For product diversifi-cation, they imitate the inventions of other firms and in case of patented inventions they pay royalties for using them.
8. The thoery is highly unrealistic as it assumes that all major variables such as profits, sales and costs increase at the same rate.
9. It is also doubtful that a firm would continue to grow at a constant rate, as assumed by Marris. The firm might grow faster now and slowly later on.
10. It is difficult to arrive at the growth rate which maximises the market value of the firm's shares and the rate at which the take-over is likely to take place.

Despite these criticisms, Marris's theory is an important contribution to the theory of the firm in explaining how a firm maximises its growth rate.

8.6 BAUMOL'S SALES MAXIMISATION MODEL

In this section of the chaper, Prof Baumol's sales maximisation model has been discussed. Professor Baumol emphasises that the main objectives of a firm is to maximise sales rather than profit maximisation. The separation of ownership from management gives power to the managers to pursue goals which maximise their own utility and deviate from profit maximisation, which is the desirable goal of owners. Given the discretion of the manager, Baumol argues that sales maximisation seems the most plausible goal of managers. From his experience as a consultant to large firms,Baumol found that managers are preoccupied with maximisation of the sales rather than profits. Baumol has provided various reasons that explain this attitude of the top management.

Firstly, there is evidence that salaries and other earnings of top managers are correlated more closely with sales than with profits.

Secondly, the banks and other financial institutions keep a close eye on the sales of firms and are more willing to finance firms with large and growing sales.

Thirdly, personnel problems are handled more satisfactorily when sales are growing. The employees at all levels can be given higher earnings and better terms of work in general. Declining sales, on the other hand, will make necessary the reduction of salaries and other payments and perhaps the lay-off of some employees. Such measures create dissatisfaction and uncertainty among personnel at all levels.

Fourthly, large sales, growing over time, give prestige to the managers, while large profits go into the pockets of shareholders.

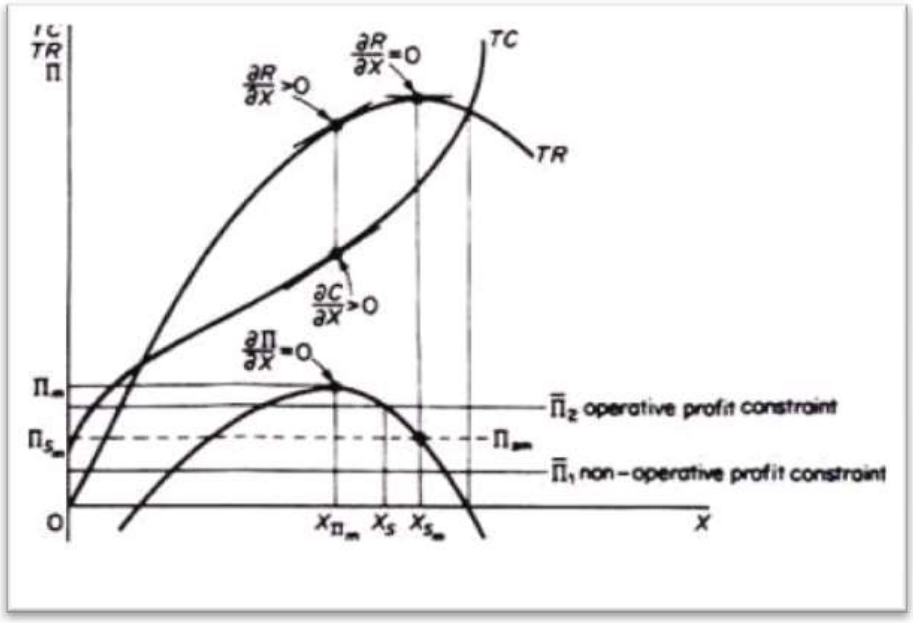
Fifthly, managers prefer a steady performance with 'satisfactory' profits to spectacular profit maximisation projects. If they realize maximum high profits in one period, they might find themselves in trouble in other periods when profits are less than maximum.

Baumol has developed two models of sales maximisation, one with advertisement expenditure and another without advertisment expenditure. Both these models have special sagnificance in expalining the attitude of the manager in modern business enterprises.

8.6.1 Baumol Model without Advertising Expenditure

Professor Baumol's has explained that maximisation of the sales is the sole objective of the manager. But in doing so, the manager has to ensure that while maximisating sales recvenue, a minimum amount of profit must be attianed by the firm. In this model, the firm is assumed to be able to pursue an independent price policy to set its price so as to achieve its goal of sales maximisation (given the profit constraint) without being con-cerned about the reactions of competitors.This can be explained in figure 8.1 where X axis represent sales revenue and Y axis represent profit of the firm.

Figure 8.1: Baumol Model without advertisement expenditure



Source: Accessed from internet (http://www. yourarticle library.com)

As shown in figure 8.1, the TR is the total revenue curve and TC is the total cost curve. As shown in the diagram, the level of the minimum acceptabl profit act as a constraint of the firm while going for maximising sales revenue. If the firm wants to maximise profit, it will produce the level of output X_{nm}. Although, in Baumol's model, the firm is a sales maximiser, it must earn a minimum level of profit acceptable to shareholders.If the minimum acceptable level of profit is $Ð_1$, the firm will produce the level of output X_{Sm} which maximises its sales revenue. With this level of output (X_{Sm}) the firm earns profits $Ð_{Sm}$, which are greater than the minimum required to keep the stockholders (and other interested parties) satisfied. Under these circumstances we say that the minimum profit constraint is not operative.If the minimum acceptable profit is $Ð_2$, the firm will not be able to attain the maximum sales revenue because the profit constraint is operative, and the firm will produce $X_s$units of output, which are less than at the level X_{Sm}.To Summarize, two types of equilibrium appear to be possible one in which the profit constraint

provides no effective barrier to sales maximisation (X_{Sm}) units of out-put with a minimum acceptable profit of $Đ_1$, and one in which it does (X_S) units of output with a minimum acceptable profit of $Đ_2$).

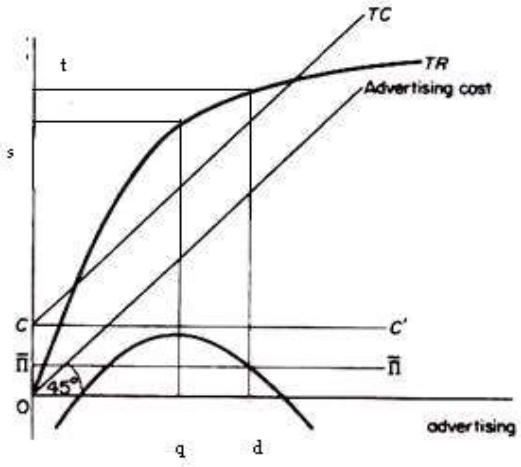
8.6.2 Baumol Model with Advertising Expenditure

The managerial economist Baumol offers another sales maximisation model with advertising expenditure. In this model, the goal of the firm is sales revenue maximisation subject to a minimum profit constraint which is exogenously determined. The new variable in this model is the introduction of advertising as a major policy variable of the firm. In this model, Baumol argues that in the real world non-price competition is the typical form of competition in oligopolistic markets. It is assumed in the model that sales revenue increases with advertising expenditure. This signifies that expenditure on advertisement will always shift the demand curve of the firm to the right and the firm will sell a larger quantity and earn larger revenue. The price is assumed to remain constant. This, however, is a simplifying assumption which may be relaxed in a more general analysis.

Another simplifying assumption of Baumol's model is that production costs are independent of advertising. Baumol recognizes that this is an unrealistic assumption, since with advertising, the physical volume of output increases and the firm might move to a cost structure where production cost is different (increasing or decreasing). But he claims that this assumption is simplifying and can be relaxed without substantially altering the analysis. A firm in an oligopolistic market will prefer to increase its sales by advertising rather than by a cut in price. While an increase in physical volume induced by a price cut may or may not increase the sales revenue, depending on whether demand is elastic or inelastic, an increase in volume brought about by an increase in advertising will always increase sales revenue, since by assumption the marginal revenue of advertising is positive. With advertising introduced into the model,

it is no longer possible to have equi-librium where the profit constraint is not operative. While with price competition alone, it is possible to reach equilibrium where profit is not operative; with non-price competition such an unconstrained equilibrium is impossible. Unlike a price reduction, increased advertising always increases sales revenue.Consequently it will always pay the sales maximiser to increase his advertising expenditure until he is stopped by the profit constraint. Consequently the minimum profit constraint is always operative when advertising (or any other form of non-price competition) is introduced in the model.The sales maximiser will normally have higher advertising expenditures than a profit maximiser. In any case advertising cannot be less in a sales-maximising model. Baumol's single-product model with advertising is shown in figure 8.2.

Figure 8.2: Baumol Model with advertising expenditure



Source: Accessed from internet (http://www.yourarticlelibrary.com)

In figure 8.2, outlay on advertisng is measured on the horizontal axis and the advertising function is a 45 line. Costs, total revenue and profits are measured on the vertical axis. Production costs are shown as being independent of the level of advertising (curve CC/). If these costs are added to the advertising cost line, the total-cost curve (TC) is obtained as a function of advertising outlay. Subtracting the total cost from the total revenue at each level

of output we obtain the total-profit curve Ð. The firm who wants to maximise profit will spend oq on advertising and earns a revenue amouning to os as shown in figure 8.2. However, the sales-maximising firm will spend more on advertising than the profit maximising firm. He will spend od and earns a higher revenue ot.

Baumol Model of Sales reveuemaximistaion has been cricised on the following grounds:

1. The managerial economist criticised Baumal on the ground that Baumol ignores the action-reaction pattern resulting from the advertising. Baumol also does not take interdependence among the firms into consideration.
2. Baumol always assumed that advertising increase sales revenue. But, he does not establish the implied positive relationship between the total revenue and advertising.
3. Baumol assumed that production cost remained unchanged as advertising increases. It means that total quantity produced remains constant. Thus, sales revenue can be increase only if the price of the commodity increases. This is inconsistent with the statement of Baumol that rise in advertisement expenditure will not change the price of the commodity.
4. With the increase in advertisement expenditure, total revenue curve shifts outward and in the new equilibrium revenue will be higher. However, in new equilibrium output may be lower and prices higher depending upon the shift of total revenue curve and elasticity of the demand curve. Baumol does not take these price changes into consideration

8.7 WILLIAMSON'S MANAGERIAL DISCRETIONARY THEORY

In this section of the chapter, a discussion has been made regarding the Williamson's Managerial Discretionary Theory. Williamson theory is considered to be a deviation from the earliar theories as discussed above. He has developed managerial utility maximisation objective as against profit

maximisation. In large modern firms, shareholders and managers are two separate groups. The former wants maximum return in their investment and hence their maximisation of profits. The managers, on the other hand, have consideration other than profit maximisation in their utility functions. Thus the managers are interested not only in their own emoluments but also in the size of their staff and expenditure on them. Thus Williamson's theory is related to the maximisation of the manager's utility which is a function of the expenditure on staff and emoluments and discretionary funds. The manager in a firm has the discretion to pursue goals other than profits to the extent that pressure from the capital market and competition in the product market is imperfect. Williamson's theory, like other managerial theories of the firm, assumes that utility maximisation is the manager's sole objective in a firm. However it is only in a corporate form of business organisation that a self-interest seeking manager can maximise his or her own utility, since there exists a separation of ownership and control. In those circumstances, the managers can use their 'discretion' to frame and execute policies which would maximise their own utilities rather than maximising the shareholders' utilities. This tendency of the manager is popularly known as principal–agent problem. However, this kind of practices could threaten their job security, if a minimum level of profit is not attained by the firm to distribute among the shareholders.

The discretionary theory as developed by Williamson's is based on certain basic assumptions:

1. Williamson assumes that imperfect competition exist in the markets.
2. Williamson also further assumes that there is a separation of ownership and management.
3. A minimum profit constraint exists for the firms to be able to pay dividends to their share holders.

Considering the above mentioned assumptions, to pursue the goal of utility maximisation, the manager directs the firm's resources in three ways:

1. According to Williamson, the manager desires to expand his staff and to increase their salaries. More staff (S) is valued by the

manager because they lead to the manager getting more salary, more prestige and more security.

2. To maximise his own utility, the manager indulges in “featherbedding” such as pretty secretaries, company cars, too many company phones, ‘perks’ for employees, etc. Such expenditures are charac-terised as ‘management slack’(S).
3. The manager also likes to set up “discretionary funds (D)” for making investments to advance or pro-mote company projects that are close to his heart. Discretionary profits or investments are what remain with the manager after paying taxes and dividends to shareholders in order to retain an effective control of the firm.

Thus, considering the above aspect, the manager’s utility function can be expressed as,

U = f (S, M, D)

Where, U is the utility function, S is the staff expenditure, M is the management slack and D the discre-tionary investments. These decision variables (S, M, D) yield positive utility and the firm will always choose their values subject to the constraint, S e”0e”M0, De”0. Williamson assumes that the law of diminishing marginal utility applies so that when additions are made to each of S, M and D, they yield smaller increments of utility to the manager.Further in his managerial theory, Williamson regards price (P) as a function of output (X), expenditure on staff (S), and the state of environment which he calls ‘a demand shift parameter (E), so that

P = f (X, S, E)

Howevre, the above relationship is subject to the some constraints:

(a) The demand function is assumed to be negatively sloping

$$\frac{\delta P}{\delta X} < 0$$

The above partial derivative implies that price and output are negatively relate

(b) Staff expenditures help increase the demand for the firms product:

$$\frac{\delta P}{\delta S} > 0$$

The result of the partial derivative clearly indicates that staff expenditure has a positive impact on price.

(c) Increases in the demand shift param-eter E, tend to raise demand. In other words,

$$\frac{\delta P}{\delta E} > 0$$

These relationships reveal that the demand for X is negatively related to P, but is positively related to S and E. When the demand increases, the output and expenditure on staff will also increase which will push the costs of the firm, and consequently the price will rise, and vice versa. To formalise his model, Williamson introduces four different types of profits: actual, reported, minimum required and discretionary profits.

Denoting

R = revenue

C = total production costs

T = taxes,

then actual profits π_A =R-C-T

If the amounts of managerial slack or emoluments (M) are deducted from the actual profits, we get reported profits ($ð_R$).

$\pi_R = \pi_A - M = R - C - T - M$

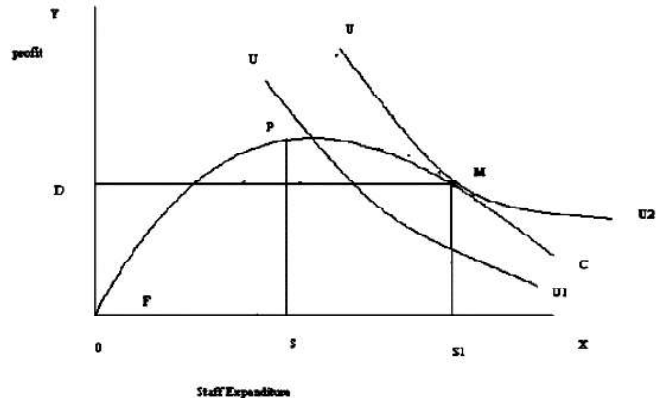
The minimum required profit (π_0) is the lowest level of profits after paying taxes which the shareholders must receive in order to hold shares of the firm.

Since discretionary profits (D) are what remains with the manager after paying taxes and divi-dends to shareholders, therefore,

$D = \pi_R - \pi_0 - T$

To explain Williamson's utility maximisation model diagrammatically, it is assumed for the sake of simplicity that U=f (S, D) so that discretionary profits (D) are measured along the vertical axis and staff expenditures (S) on the hori-zontal axis as shown in figure 8.3 produced below.

Figure 8.3: William Son's Utility Maximisation Model



FC is the feasibility curve show-ing the combinations of discretionary profit and staff expenditure available to the man-ager. It is also popularly known as the profit-staff curve. UU_1 and UU_2 are the indifference curves of the manager which show the combination of D and S. To begin, as we move along the profit-staff curve from point F upwards, both profits and staff expenditures increase till point P is reached. P is the profit maximisation point for the firm where SP is the maximum levels of profit when OS staff expenditures are incurred by the manager.But the equilibrium of the firm takes place when the manager chooses the tangency point M where his highest possible utility function $UU_2$and the feasibility curve FC touch each other. Here the manager's utility is maximised. The discretionary profits OD (=S_1M) are less than the profit maximisation profits SP.But the staff emoluments OS are maximised. However, Williamson points out that factors like taxes, changes in business conditions, etc. by affecting the feasibility curve can shift the optimum tangency point, like M in the Figure. Similarly, factors like changes in staff, emoluments, profits of stockholders, etc. by changing the shape of the utility function will shift the optimum position.

8.7.1 The Major Limitation of the Moddel

The Williamson model has been criticised by managerial economist on several grounds. Here, an attempt has been made to discuss conceptual weaknesses of this model:

1. The major criticism of the model is that the model does not clarify the basis of the derivation of his feasibility curve. In

particular, the author fails to indicate the constraint in the profit-staff relation, as shown by the shape of the feasibility curve.

2. Another criticsim of the model is that it lumps together staff and manager's emoluments in the utility curve. This mixing up of non- pecuniary and pecuniary benefits of the manager makes the utility function ambiguous. But these diffi-culties can be overcome by introducing a three-dimensional diagram. But it will make the analysis more complex.
3. Another limitation of the model is that the theory does not deal with oligopolistic interdependence and of oligopolistic rivalry.
4. Hawkins has criticised the theory on the ground that most economists are reluctant to pursue Williamson's utility-maximisation theory "due to the knowledge that so many factors (e.g., profit, sales, output, growth, number of staff and expenditure on plush offices and cars) are likely to give utility to people in industry that they shall end up with a model incapable of yielding any definite results."

But in spite of all the criticism, Williamson has supported his model by giving a number of empirical examples which are consistent with his model. Thus his theory is considered to be empirically sound as compared with other managerial theories. Williamson model is also considered to be superior to Baumol's sales maximisation model as it does not treat sales maximisation as a single criterion. But it considers sales maximisation as a means of the manager for increasing his staff and emoluments.



ACTIVITY 2

Explain the relationship between growth and profit with the help of Marris Growth Maximisation Model.

_____

_____



CHECK YOUR PROGRESS

Q.2: a) The book "The Economic Theory of Managerial' Capitalism" was written by Robin Marris (True/False)

b) The retention ratio is the ratio of retained profits to total profits. (Yes/No)



8.8 LET US SUM UP

- The success or failure of a firm is basically measured by profit earned by that particular firm. Earning of Profit is considered to be driving-force behind all business activities of firms.
- Cyert and March was considered as one of the pioneer of systematic behavioural theory of the firm. In a modern large multiproduct firm, ownership and management are considered to be two separate entities. They regard modern business firm as a group of individuals who are engaged in the decision-making process relating to its internal structure having multiple goals. Cyert and March consider firm as an organisational coalition of managers, workers, shareholders, suppliers and customers.
- According to Cyert and March, the organisa-tional slack plays both a stabilising and an adaptive role in a firm. The organisational slack serves as a cushion to absorb the shocks. Slack payments are increased during periods of flourishing business and decreased during periods of bad business.
- The dynamic balanced growth maximising model of the firm is provided by Robin Marris in his book The Economic Theory of 'Managerial' Capitalism. His theory is based on the proposition that modem big firms are managed by managers and the shareholders are the owners who decide about the management of the firms.
- Marris Growth Maximisation model is considered to be important contributions towards explaining the relationship between growth

and profit. Marris in his theory introduced a new concept which is known as differentiated diversification. Differentiated diversification means grow in size of the firm through the creation of new products.

- Marris establishes the relationship between growth and profits on the demand side through diver-sification into new products. The links between growth and profits are different at different levels of growth. In this growth-profits relationship, growth determines profits.
- Professor Baumol in his theory emphasises that the main objectives of a firm is to maximise sales rather than profit maximisation. But in doing so, the manager has to ensure that while maximisating sales recvenue, a minimum amount of profit must be attained by the firm
- According to Baumol, the separation of ownership from management gives discretion to the managers to pursue goals which maximise their own utility, which is the desirable goal of owners. Professor Baumol has developed two model of sales maximisation, one with advertisement expenditure and another without advertisement expenditure.
- Williamson's theory, like other managerial theories of the firm, assumes that utility maximisation is the manager's sole objective in a firm. Williamson in his theory assumed that shareholders and managers are two separate groups. The former wants maximum return in their investment and hence their maximisation of profits. The managers on the other hand have consideration other than profit maximisation in their utility functions.
- Williamson model is considered to be superior to Baumol's sales maximisation model as it does not treat sales maximisation as the single criterion.

8.9 ANSWERS TO CHECK YOUR PROGRESS

Ans to Q.No.1 :

a) True

b) True

c) Yes

Ans to Q.No.2 :

a) True

b) Yes



8.10 FURTHER READING

1. H.L.Ahuja (2010), "*Business Economics* ",S. Chand & Company Ltd., India.
2. D. D. Chaturvedi, S. L. Gupta (2012), "*Business Economics*", International Book House, India.



8.11 MODEL QUESTIONS

Q1. Explain in brief the Marris model of maximisation of Growth. Mention the main criticism of the model

Q2. Explain the factors a managers has to take into consideration for formulating its growth strategies.

Q3. Make a critical analysis of the Williamson's Managerial Discretionary Theory.

Q4. Provide an explanation of the Baumol's Managerial Theory of Sales Revenue Maximization.

*** ***** ***

UNIT 9 : REVENUE ANALYSIS

UNIT STRUCTURE

9.1 Learning Objectives

9.2 Introduction

9.3 Concepts of Total Revenue, Average Revenue and Marginal Revenue

9.4 Relationship between Total Revenue, Average Revenue and Marginal Revene Curves

9.5 Relationship between Total Revenue, Average Revenue, Marginal Revenue and Price Elasticity of Demand

9.6 Pricing Policies and its objectives

9.7 Pricing Methods

9.8 Let Us Sum Up

9.9 Further Readings

9.10 Answers to Check Your Progress

9.11 Model Questions

9.1 LEARNING OBJECTIVES

After going through this unit, you will be able to:

- discuss the concepts of total revenue, average revenue and marginal revenue
- derive the relationships between average revenue and marginal revenue curves
- explain the relationship between total revenue, average revenue, marginal revenue and price elasticity of demand.
- discuss Pricing Policies and its objectives and pricing methods

9.2 INTRODUCTION

In the previous course we have already discussed the nature of demand from the viewpoint of an individual consumer. In that context, we discussed that consumers demand goods and services as they provide

certain utility to the consumer. This means that a products available in the market for sale bought by a consumer has a demand. Let us now consider the matter from the viewpoint of a seller. A seller will be very much concerned with the nature of demand for his product. This is because the monetary value of demand of a consumer for the product constitutes his revenue. Thus, the more the demand, the greater will be the volume of revenue earned by the seller. The concept of revenue when viewed from the viewpoint of a seller is classified into three types: average revenue, marginal revenue and total revenue. In this unit, we shall discuss these three concepts and their inter-relationships. Apart from this, we shall also relate these concepts with the concept of price elasticity we have already discussed.

9.3 CONCEPTS OF TOTAL REVENUE, AVERAGE REVENUE AND MARGINAL REVENUE

We have already mentioned, the price paid by a consumer for a product constitutes revenue for the seller. It is, therefore, quite obvious that the more the seller sells, the greater will be the volume of his revenue. As such, the *total revenue* of a seller depends on two basic things; first, the price of a unit of the product, and the sales volume. The price per unit earned gives us *average revenue*. And the revenue earned by selling an additional unit is called the *marginal revenue*. Let us discuss these concepts in detail.

Total Revenue: The whole amount of money received by a seller from selling a given amount of the product is called total revenue. Let us suppose, if a seller sells 150 units of pens and each unit of pen is sold at a market prices at Rs. 12/-. The total revenue earned by the seller is Rs.1800/- (Rs.12 X 150 units). Thus, by definition,

Total Revenue = Market price X total quantity sold.

Symbolically, TR = P X Q.

where, TR stands for total revenue, P stands for market price and Q stands for total quantity sold.

Average Revenue: Average revenue is defined as the average value of total revenue with respect ot the number of units sold. Average revenue can be obtained by dividing total revenue by the number of units sold. Thus,

$$\text{Average Revenue} = \frac{\text{Total revenue}}{\text{Total quantity sold}}$$

$$\text{Symbolically, AR} = \frac{TR}{Q}$$

where, AR stands for average revenue, TR stands for total revenue and Q stands for quantity.

With reference to the previous example, the average revenue of Rs. 12/- is obtained by dividing total revenue (Rs.1800/-) by total quantity sold (150 units).

From the above discussion, it seems that average revenue and price are the same concepts. It may be, or it may not be. If the seller sales each unit of the product at the same price, average revenue and price will be the same. If on the other hand, the seller sales the different units of the product at different prices, average revenue will not be equal to price. Let us consider an example. Suppose our hypothetical seller sales two units of the product to two different consumers, viz., consumer A and consumer B. Let us further suppose that the seller sells one unit of the product to consumer A at Rs.12 while he sells the other unit of product to consumer B at Rs.10. Thus, the average revenue earned by the seller comes out to be Rs.(12+10)/ 2 = Rs.11/- while prices of the two units of the product were Rs.12/- and Rs.10/- respectively.

In practice, we find that the seller sells the individual unit of the product at the same price at a particular point of time. This is because, if an individual seller tends to charge higher prices for the product, consumers will move away from him and will purchase the product from other seller who sells at a lower price. As against this, he cannot lower the price of the product at his will. This is because, if the seller tries to sell the product at a lower price, the other sellers will follow him and he will face competition in the market. Ultimately, a single price will prevail in the market. As such, in

economics average revenue is taken as equivalent to the price of the product except when we discuss the case of price discrimination.

Another important point to be noted here is that as we have already mentioned, the money value of demand of the consumer constitutes revenue for the seller. As such, the demand curve of the consumer is same as the total revenue curve of the seller.

Marginal Revenue: Marginal revenue is the net revenue earned by selling an additional unit of the product. Thus, marginal revenue is obtained when we calculate the changes in total revenue caused by the sale of an additional unit of the product.

Thus, marginal revenue is represented as:

$$\text{Marginal Revenue} = \frac{\text{Change in total revenue}}{\text{Change in total units sold.}}$$

Symbolically, it is represented as:

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

where, MR stands for marginal revenue, TR stands for total revenue, Q stands for total units sold, and $\triangle$ stands for change in.

Let us consider the case of marginal revenue in the context of our hypothetical seller who sells all units of pens at Rs.12/-. Suppose the seller increase his sales from 150 units to 151 units. In this case, the total revenue earning of the sellers will be Rs.1812/-. Thus, marginal revenue will be (Rs.1812-1800)= Rs.12/-; this is same as average revenue.

However, if price charged in the extra unit of the product is different from the price charged in the earlier units, marginal revenue will be different from average revenue. For example, let us suppose that our hypothetical seller sales the 151st unit at Rs.11.50/- while he sold all the previous units at Rs.12/-. Thus, the total revenue earned by the seller is Rs.1811.50/- and marginal revenue is (Rs.1811.50-1800) = Rs.11.50/-.

9.4 RELATIONSHIP BETWEEN TOTAL REVENUE, AVERAGE REVENUE AND MARGINAL REVNUE CURVES

From the above discussion, we are already familiar with the concepts of average revenue, marginal revenue and total revenue. In this section, we shall discuss the inter-relationships between these revenue concepts in more detail. In doing this, we shall first have to deduce the graphical shapes of the average revenue, marginal revenue and total revenue curves.

Before going to discuss the relationship between these revenue concepts, let us make a point clear here. These revenue concepts have a direct relation with the market structure under which the firm is operating in. Thus, the structure of the market affects the shapes of the revenue curves. We shall discuss the different forms of market structures in the next course in your third semester. For the time being, let us consider that there are two broad classifications of markets, viz., *perfect competition* and *imperfect competition*. Perfect competition is described as the market where there are large number of buyers and sellers and no individual participant is large enough to have the market power to set the price of a homogeneous product. As such, the seller can supply any amount of the product at the existing market price and the buyer also can buy any amount of the product. However, no seller/buyer can individually influence the market price. Again, the products of the different sellers are homogeneous; no differences among the products exist. The absence of perfect competition implies that the market is imperfect. In an imperfectly competitive market, the seller may have control over the market price. Thus, a seller under imperfect competition may have absolute control over the market price or a limited control over it only. However, there exists many forms of imperfect competition, and the degree of control of the seller over the market price depends on the form of the market the seller operates in.

Let us now analyse the shapes of the Total Revenue, Average Revenue and the Marginal Revenue Curves under the two broad market forms of perfect competition and imperfect competition.

Total Revenue, Average Revenue and Marginal Revenue Curves of a Firm under Perfect Competition: As we have already mentioned, a firm under perfect competition has to accept the prevailing market price and can sell any amount of output in the market at that price . Thus, a firm under perfect competition will earn AR, TR and MR similar to the following table 9.1.

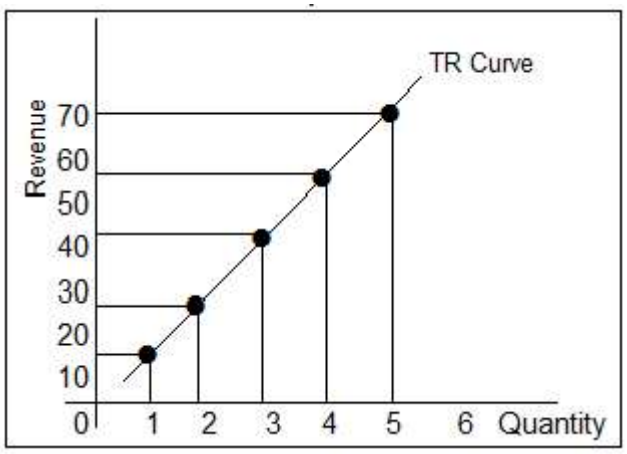
Table 9.1 : Total, Average and Marginal Revenue Schedules under perfect competition *(Revenue figures in* Rs.)

No. of units sold (Q)	Price (AR)	TR(AR X Q)	MR
1	14	14	14
2	14	28	14
3	14	42	14
4	14	56	14
5	14	70	14

Based on the above table 9.1, the shapes of TR, AR and MR curves of a perfect competitive firm have been shown in the following.

Total Revenue Curve: The following figure 9.1 portrays the shape of the Total Revenue Curve of a firm under perfect competition.

Figure 9.1: Total Revenue Curve of a Firm under Perfect Competition



From the figure it is obvious that the total revenue curve of the firm is an upward rising straight line. This curve, in fact represents the supply curve of a firm.

Average Revenue and Marginal Revenue Curves: We have already mentioned that under perfect competition, the market price for the product is fixed and the seller has no influence to alter the same. Again, the

seller can supply any amount of the commodity at the prevailing market price. Thus, the prevalent market price also becomes the average revenue and marginal revenue of the firm. This is clear from the above table 9.1. From the table it is clear that the prevalent market price, i.e., Rs.14 is also the average revenue and marginal revenue of the firm. Thus, the shape of average revenue curve and the marginal revenue curve will be the same. This has been shown with the help of the following figure 9.2.

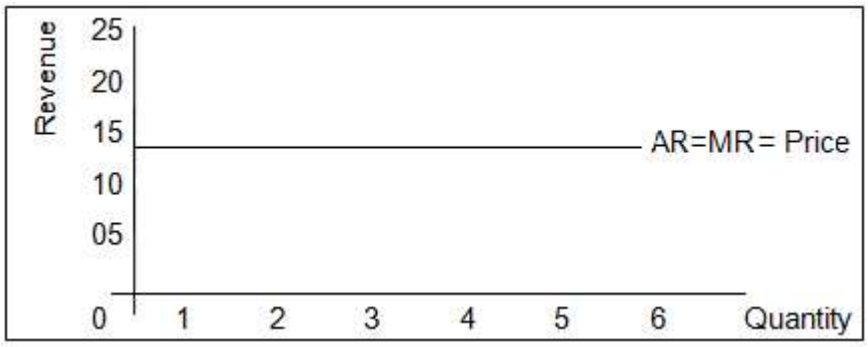


Figure 9.2: Average Revenue and Marginal Revenue Curve under Perfect Competetion

It can be seen from figure 9.2 that the firm's AR and MR curves are the same. The slope of the curve is horizontal.

AR and MR and TR Curves of a Firm under Imperfect Competition: Unlike perfect competition, a firm under imperfect competition does not have to sell its entire amount of the product at a fixed market price. This means that the firm can sell more units of the product as its price falls. We have shown a hypothetical schedule of AR, TR and MR in table 9.2.

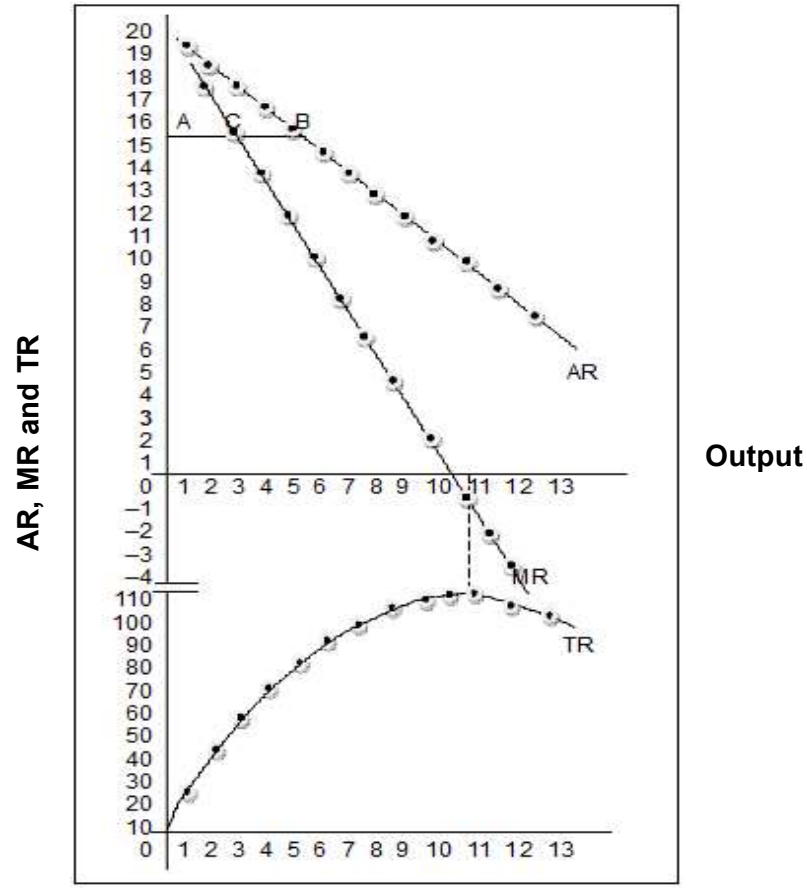
Table 9.2 : Total, Average and Marginal Revenue Schedules of a Firm under Imperfect Competition *(Revenue figures in* Rs.*)*

Number of units sold (Q)	Price or Average Revenue (AR)	Total Revenue (AR x Q)	Marginal Revenue
(1)	(2)	(3)	(4)
1	20	20	20
2	19	38	18
3	18	54	16
4	17	68	14
5	16	80	12

6	15	90	10
7	14	98	8
8	13	104	6
9	12	108	4
10	11	110	2
11	10	110	0
12	9	108	– 2
13	8	104	– 4

From the above table it can be seen that as AR declines by one rupee with the number of units sold being raised by one unit, MR declines by Rs. 2. Again, TR is the maximum when MR equals 0. After that MR becomes negative, and TR tends to decline. This has been shown in figure 9.3.

Figure 9.3 : AR, MR and TR curves of a Firm under imperfect competition



From figure 9.3 it can be seen that unlike perfect competition, firm's AR and MR curves under imperfect competition are not the same. However, both the curves are downward sloping. Again, the slope of the marginal revenue curve is twice as much steeper as that of the average revenue curve. This is because it can be seen from the above table 9.2 that as sale increases by one unit, average revenue falls by one rupee while marginal revenue falls by two rupees. Thus if we draw a ***perpendicular*** line on the y-axis from any point of the AR curve, say AB as shown in the figure, the MR curve will cut it in the middle. Thus, AC = half of AB.

Again, it can be seen that total revenue (TR) continues to rise until MR equals zero. Thereafter, as MR tends to become negative, TR tends to decline. Thus, the shape of the TR curve under imperfect completion is different from that of perfect competition.



A line is said to be ***perpendicular*** to another line if the two lines intersect at a right angle, i.e., if the two lines create a 90^0 angle.

CHECK YOUR PROGRESS

Q.1. Why are the AR and MR curves same under perfect competition? (Answer in about 40 words)

.....

.....

.....

Q.2. Is the shape of the total revenue curve same in case of both perfect competition and imperfect competition? (Justify your view in about 40 words)

.....

.....

.....

.....

Q.3. How will you derive average revenue from total revenue?

.....

.....

.....

9.5 RELATIONSHIP BETWEEN TR, AR, MR AND PRICE ELASTICITY OF DEMAND

We had already discussed that price elasticity of demand in a horizontal demand curve (which is found in case of perfect competition) is infinite. Again, we also discussed that the price elasticity of demand varies at different point in a linear demand curve. The linear demand curve (which is found in case of imperfect competition) can be utilized in deriving a relationship between the shapes of the AR,MR and TR curves and price elasticity of demand.

The relationship between price elasticity of demand and the revenue concepts, viz., AR, MR is expressed as:

$$MR = AR \frac{e - 1}{e}$$

where, MR = marginal revenue, AR = average revenue and e = price elasticity of demand.

Thus, from this formula we can know what would be the marginal revenue if elasticity and AR are given to us.

Let us take the case when price elasticity of demand is 1.

Thus,

$$MR = AR \frac{1 - 1}{1}$$

Thus, MR = AR X 0 = 0.

Again, from this formula we can find:

If e > 1, MR is positive, and MR<AR

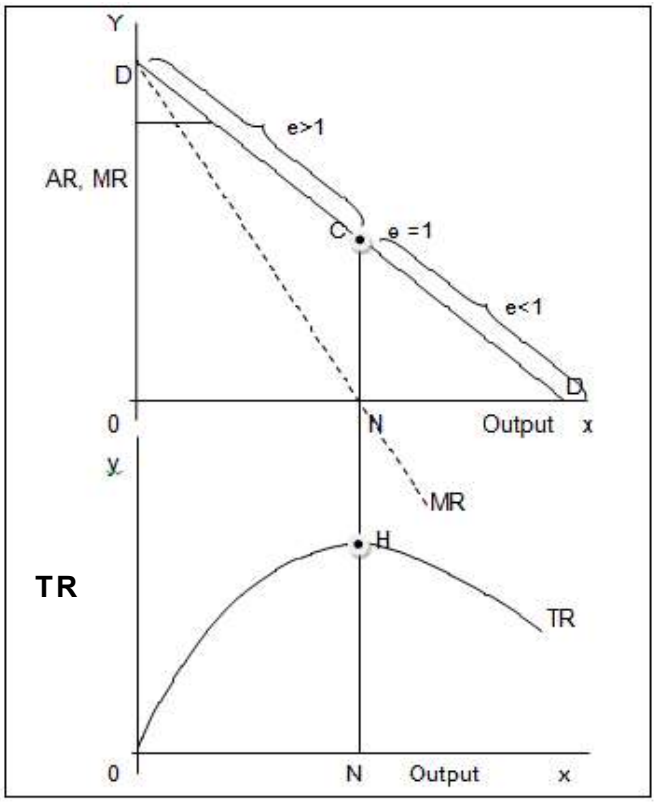
If e < 1, MR is negative, and MR>AR.

This relationship among AR, MR, TR and price elasticity of demand can also be shown graphically in figure 9.4.

From figure 9.4 it can be seen that C is the middle point of the average revenue curve DD. At this point C price elasticity of demand is equal to one . Corresponding to this point C of the DD curve, we can find that MR is equal to zero (this is because, corresponding to C of the DD curve, the MR curve cuts the x-axis at point N). Thus, at quantity 0N, price

elasticity of demand is 1, while MR is zero. At a quantity less than 0N, price elasticity of demand is greater than 1 (or positive) and at a quantity less than 0N, price elasticity of demand is less than 1 (or negative). It has also be seen that when the marginal revenue is positive, price elasticity of demand is also positive and when marginal revenue is negative, price elasticity of demand also becomes negative.

Figure 9.4 : Relationship between AR,MR, TR and price elasticity of Demand



Again, from the bottom panel of the figure it can be seen that total revenue is maximum when price elasticity of demand equals one. It can be further noticed that when the price elasticity of demand is greater than one (or positive), TR tends to increase and when the price elasticity of demand is more than one (or negative), TR tends to diminish.



CHECK YOUR PROGRESS

Q.4. What is the price elasticity of demand in case of a horizontal demand curve?

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Q.5. What happens to marginal revenue when price elasticity of demand equals one?

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Q.6. What happens to total revenue when price elasticity of demand is less than one?

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9.6 PRICING POLICIES AND ITS OBJECTIVES

Pricing is the process of determining what a company will receive in exchange for its product or service. A business can use a variety of pricing strategies when selling a product or service. The price can be set to maximize profitability for each unit sold or from the market overall. It can be used to defend an existing market from new entrants, to increase market share within a market or to enter a new market.Pricing policy refers to the way a company sets the prices of its services and products based on their value, demand, cost of production and the market competition. Pricing policy is essential for all companies as it provides a guideline for creating profits and identifying areas that bring in losses. Pricing policy goes hand in hand with pricing strategy

Objectives of Pricing Policies:

Let us discuss some objectives of pricing policies:

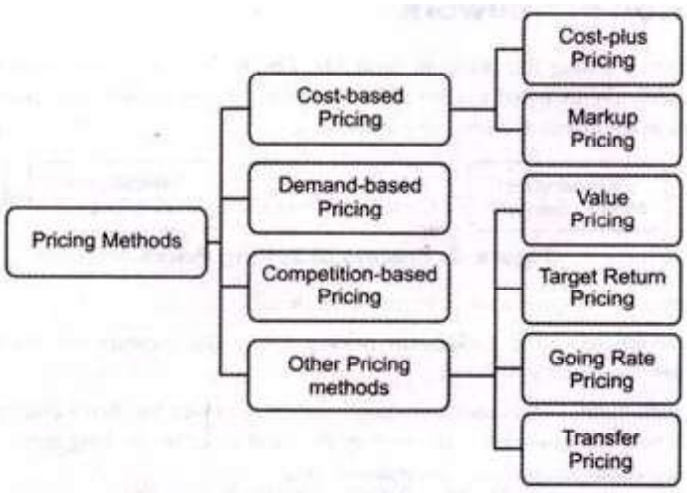
- **To Maximize Profits:** Every firm tries to maximize their profits. So they should have a price policy, which fetches them maximum revenue. Every firm should have a price policy keeping the long run prospects in mind.

- **Price Stability:** Always fluctuating price is not good for the company. A stable price always wins the confidence of customers.
- **Capture the Market:** Producer's aim is to capture the market and to do so, he fixes comparatively lower price for his product, while introducing a product to capture the major share of market. But once they gain stability and consistency they can change their price policy.
- **Facing Competitive Situation:**Every producer should fix the price, keeping the price of the competitor in mind; in some types of market structure; prices are fixed in such a way so as to restrict the entry of rival firms in the industry.
- **Ability to Pay:**The price should be fixed according to the ability of consumer to pay; high price for rich customers and low for poor customers. This can be applied in case of services given by doctors, lawyers etc.

9.7 PRICING METHODS

An organization has various options for selecting a pricing method. Prices are based on three dimensions that are cost, demand, and competition. The organization can use any of the dimensions or combination of dimensions to set the price of a product.

Figure 9.5: Pricing Methods



The different pricing methods as shown in the above figure are discussed below;

A. Cost-based Pricing: Cost-based pricing refers to a pricing method in which some percentage of desired profit margins is added to the cost of the product to obtain the final price. In other words, cost-based pricing can be defined as a pricing method in which a certain percentage of the total cost of production is added to the cost of the product to determine its selling price. Cost-based pricing can be of two types, namely, cost-plus pricing and markup pricing.

These two types of cost-based pricing are as follows:

i. *Cost-plus Pricing:* It refers to the simplest method of determining the price of a product. In cost-plus pricing method, a fixed percentage, also called mark-up percentage, of the total cost (as a profit) is added to the total cost to set the price. For example, XYZ organization bears the total cost of Rs. 100 per unit for producing a product. It adds Rs. 50 per unit to the price of product as profit. In such a case, the final price of a product of the organization would be Rs. 150. Cost-plus pricing is also known as average cost pricing. This is the most commonly used method in manufacturing organizations.

ii. *Markup Pricing:* It refers to a pricing method in which the fixed amount or the percentage of cost of the product is added to product's price to get the selling price of the product. Markup pricing is more common in retailing in which a retailer sells the product to earn profit. For example, if a retailer has taken a product from the wholesaler for Rs. 100, then he/she might add up a markup of Rs. 20 to gain profit.

B. Demand-based Pricing: Demand-based pricing refers to a pricing method in which the price of a product is finalized according to its demand. If the demand of a product is more, an organization prefers to set high prices for products to gain profit; whereas, if the demand of a product is less, low prices are charged to attract the customers.

The success of demand-based pricing depends on the ability of marketers to analyze the demand. This type of pricing can be seen in the hospitality and travel industries. For instance, airlines during the period of low demand,

charge less rates as compared to the period of high demand. Demand-based pricing helps the organization to earn more profit if the customers accept the product at a price more than its cost.

C. Competition-based Pricing: Competition-based pricing refers to a method in which an organization considers the prices of competitors' products to set the prices of its own products. The organization may charge higher, lower, or equal prices as compared to the prices of its competitors. The aviation industry is the best example of competition-based pricing where airlines charge the same or fewer prices for same routes as charged by their competitors. In addition, the introductory prices charged by publishing organizations for textbooks are determined according to the competitors' prices.

D. Other Pricing Methods: In addition to the pricing methods, there are other methods that are discussed as follows:

i. Value Pricing: Implies a method in which an organization tries to win loyal customers by charging low prices for their high- quality products. The organization aims to become a low cost producer without sacrificing the quality. It can deliver high- quality products at low prices by improving its research and development process. Value pricing is also called value-optimized pricing.

ii. Target Return Pricing: Helps in achieving the required rate of return on investment done for a product. In other words, the price of a product is fixed on the basis of expected profit.

iii. Going Rate Pricing: Implies a method in which an organization sets the price of a product according to the prevailing price trends in the market. Thus, the pricing strategy adopted by the organization can be same or similar to other organizations. However, in this type of pricing, the prices set by the market leaders are followed by all the organizations in the industry.

iv. Transfer Pricing: Involves selling of goods and services within the departments of the organization. It is done to manage the profit and loss ratios of different departments within the organization. One department of an organization can sell its products to other departments at low prices. Sometimes, transfer pricing is used to show higher profits in the organization by showing fake sales of products within departments.



9.8 LET US SUM UP

- The whole income received by a seller from selling a given amount of the product is called total revenue.
- Average revenue can be obtained by dividing total revenue by the number of units sold.
- Marginal revenue is the net revenue earned by selling an additional unit of the product.
- In case of perfect competition, the shape of average revenue curve and the marginal revenue curve are the same.
- Unlike perfect competition, firm's AR and MR curves under imperfect competition are not the same.
- Under imperfect competition, the slope of the marginal revenue curve is twice as much steeper as that of the average revenue curve.
- Price elasticity of demand in terms of the revenue concepts, viz., AR, MR is given as:

  $$MR = AR \frac{e - 1}{e}$$

  where, MR= marginal revenue, AR = average revenue and e= price elasticity of demand.
- If e = 1, MR is zero.
  If e > 1, MR is positive, and
  If e < 1, MR is negative.
- Total revenue is maximum when price elasticity of demand equals one.
- When the price elasticity of demand is greater than one (or positive), TR tends to increase and when the price elasticity of demand is less than one (or negative), TR tends to diminish.
- Pricing is the process of determining what a company will receive in exchange for its product or service.
- The different pricing methods are: Cost based pricing, Demand based pricing and Competetion based pricing method.



9.9 FURTHER READINGS

1) Ahuja, H. L. (2006). *Modern Economics.* New Delhi: S. Chand & Co. Ltd.
2) Dewett, K. K. (2005). *Modern Economic Theory.* New Delhi: S. Chand & Co. Ltd.
3) Koutsoyiannis, A (1979). *Modern Microeconomics.* New Delhi: Macmillan
4) Sundharam, K. P. M & Vaish, M. C. (1997). *Microeconomic Theory.* New Delhi: S. Chand & Co. Ltd.



9.10 ANSWERS TO CHECK YOUR PROGRESS

Ans. to Q.No. 1 : Under perfect competition, the market price for the product is fixed and the seller has no influence to alter the same. However, the seller can supply any amount of the commodity at the prevailing market price. As a result, the prevalent market price also represents the average revenue curve and marginal revenue of the firm. Hence, both the curves are same.

Ans. to Q.No. 2 : The shape of the total revenue curve is not same in perfect competition and imperfect competition. This is because price of a product remains fixed under perfect competition, while under imperfect competition, price of a product may change.

Ans. to Q.No. 3 : Average revenue can be derived from total revenue by dividing it by the number of units sold. Thus, average revenue = total revenue / no. of units sold.

Ans. to Q.No. 4 : Price elasticity of demand in case of a horizontal demand curve is infinite.

Ans. to Q.No. 5 : Marginal revenue becomes zero when price elasticity demand equals one.

Ans. to Q.No. 6 : When price elasticity is less than one, total revenue tends to diminish from its maximum point.



9.11 MODEL QUESTIONS

Q.1. Define the following terms:

a) Marginal Revenue b) Average revenue c) Total revenue

Q.2. How would you derive marginal revenue from total revenue?

Q.3. Why under imperfect competition, the MR curve is twice as much steeper than the AR curve?

Q.4. Derive the total revenue curve of a firm in a perfectly competitive market.

Q.5. Show the relationship between average revenue and marginal revenue under imperfect competition.

Q.6. Show the relationship between average revenue, marginal revenue and total revenue in a perfectly competitive market. Based on the relationship, derive the AR, MR and TR curves.

Q.7. Derive the relationship between AR,MR, TR and the price elasticity of demand under imperfect competition.

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UNIT 10 : MARKET STRUCTURE: PERFECT COMPETITION

UNIT STRUCTURE

10.1 Learning Objectives

10.2 Introduction

10.3 Concept of Market and Revenue Curves

10.3.1 Classification of Market Structure

10.3.2 Concepts of Total Revenue, Average Revenue and Marginal Revenue

10.4 Perfect Competition

10.4.1 Equilibrium of Firm in the Short-run

10.4.2 Equilibrium of the Industry in the Short-run

10.5 Perfect Competition: Long-run Analysis

10.5.1 Equilibrium of Firm in the Long-run

10.5.2 Equilibrium of the Industry in the Long-run

10.6 Let Us Sum Up

10.7 Further Reading

10.8 Answers to Check Your Progress

10.9 Model Questions

10.1 LEARNING OBJECTIVES

After going through this unit, you will be able to-

- define market
- classify market into different forms
- discuss perfect competition and equilibrium of a firm and industry both in the short-run and in the long-run.

10.2 INTRODUCTION

We all buy and sell various kinds of ***products*** in a market. In general, whenever we talk of a market, we have a place in mind, where buyers interact with sellers and buy goods and services in exchange of money. In this unit, we shall try to get a deeper insight into this concept 'market'. We



Goods: Those, which are tangible; like – books, foods, torch light, batteries etc.
Services: Those, which are intangible; like- the services of a barber, cobbler, lawyer, nurse etc.

shall try to define the term market in business and economics sense, and shall discuss the evolution of this concept. We shall also try to explain the classification of markets on the basis of different parameters.Again, we shall make an attempt to explain the equilibrium of a firm / industry under one of the major market structures: viz, perfect competition. This unit will be helpful for us in relating the theoretical principles of market with the day-to-day maket envirionment.

10.3 CONCEPT OF MARKET AND REVENUE CURVES

As we have said, by the term market, we in general understand a particular place or locality where goods are sold and purchased. However, in economics, the term 'market' does not mean a particular geographical place or locality. Thus, to define market in economics, the concept of a particular place or locality is not much important. What is important is the contact between the buyers and the sellers so that transaction (i.e., sale and purchase of commodities) can take place at an agreed price.

Thus, the essentials of a market are: a) commodity which is to be dealt with; b) the existence of buyers and sellers; c) a place, be it a certain region, a country or the entire world; and d) a communication between buyers and sellers, which ensures only one price for a commodity at a time.



Barter System: The system where good s and services were exchanged directly without using a separate unit of account or medium of exchange
Plastic money or electronic money: Credits cards, Debit cards, etc. which facilitate cashless transaction.

EVOLUTION OF MARKET: When goods were exchanged for goods in the ***barter system***, markets were very simple. But with the evolution of time, increasing needs and with improvement in science and technology, markets have become complex. Medium of Exchange has evolved from goods to money (metallic and paper); and from money it is now taking the shape of '***plastic money***' or '***electronic money***'. Similarly the geographic coverage of a market has also widened from the local market to the global market. Today, advancement in telecommunication has brought the concept of electronic commerce, which facilitates business on a global scale.

10.3.1 Classification of Market Structure

Market structure refers to the type of market in which firms operate. Market structure may be classified:

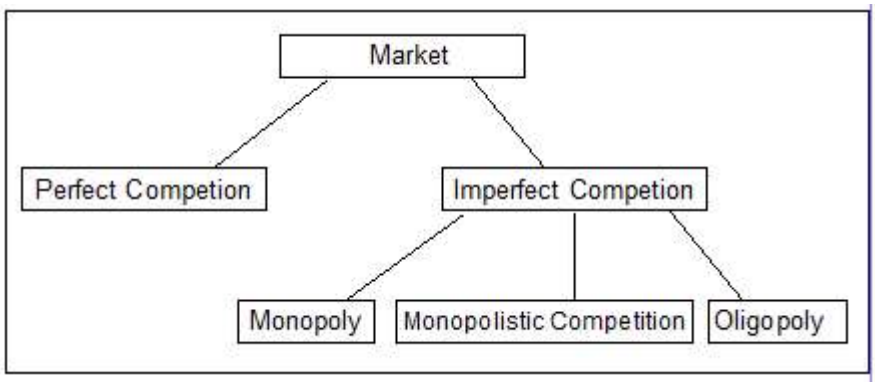
- On the basis of area as local, national and world markets;
- On the basis of time, as market price on any particular day or moment; short-period price, long-period price, or ***secular*** maket price covering a generation; and
- On the basis of nature of competition – perfect competition and imperfect competition.

Here, we shall basically discuss market structure on the basis of nature of competition. Nature of competition can be distinguished based on the following three criteria:

a) Number of Sellers in the industry,
b) Entry barriers into the industry, and
c) Nature of the product.

Thus, based on these above criteria, classification of market structure has been shown in the following tree diagram 10.1:

Figure 10.1: Classification of Market Structure



Thus, we have discussed that the market structure can broadly be classified into two major categories – perfect competition, imperfect competition. Market structure under imperfect competition can be further classified as monopoly, monopolistic competition and

oligopoly. In the following table 10.1, we shall try to look at the individual characteristics of these market structure with regard to the above three criteria.

Table 10.1: Individual Characteristcs of Different Types of Market

Market Type	*Number of Sellers*	*Entry Barrier*	*Nature of Product*
Perfect Competiton	Many, small, Independent	None	Homogenous
Monopoly	One	Very high	Homogenous
Monopolistic Competition	Many, small, virtually independent	None	Differentiated
Oligopoly	Few, interdependent	Substantial	Homogenous or Differentiated

10.3.2 Concepts of Average Revenue,Total Revenue and Marginal Revenue

Before discussing in detail about the different market structures, we shall try to look at the relationship among different concepts of average revenue (AR), marginal revenue (MR) and total revenue (TR). We shall also look at shapes of AR and MR under these major market structures: viz, perfect competition and imperfect competition in general.

Average Revenue: Consumers pay for the goods and services they buy. These constitute the earning of revenue/income of the sellers. Thus, the whole income received by a seller from the sales of a given amount of the product is called his total revenue. If we divide total revenue by the number of units sold, we can attain the average revenue. Converesely, by multiplying average revenue with the number of units sold, we can attain the total revenue. Thus:

$$\text{Average Revenue} = \frac{\text{Total Revenue}}{\text{Total units sold}}$$

$$\text{Symbolically, } AR = \frac{TR}{Q} \quad \text{or, } TR = AR \times Q$$

where, AR = Average revenue, TR = Total Revenue, Q= Total units sold.

Marginal Revenue: Marginal revenue on the other hand is the net revenue earned by selling an additional unit of the product.

Thus:

$$\text{Marginal Revenue} = \frac{\text{Change in Total Revenue}}{\text{Change in Total units sold}}$$

$$\text{Symbolically, } MR = \frac{\Delta TR}{\Delta Q}$$

where, MR = Marginal revenue, TR = Total Revenue, Q= Total units sold, Δ means change in.

Now we will discuss the shapes of the average and marginal revenue curves under perfect and imperfect competition.

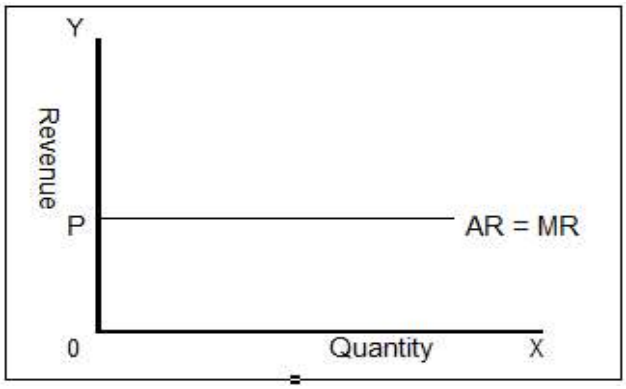
AR and MR Curves of a Firm under Perfect Competition: A firm under perfect competition has to accept the prevailing market price and can sell any amount of output in the market at that price. Thus, a firm under perfect competition will earn AR, TR and MR similar to the following table 10.2

Table 10.2: Total, Average and Marginal Revenue Schedules

Number of units sold (Q)	*Price or Average Revenue*	*Total Revenue (AR x Q)*	*Marginal Revenue*
(1)	(2)	(3)	(4)
1	14	14	14
2	14	28	14
3	14	42	14
4	14	56	14
5	14	70	14

Based on the above schedule, the shapes of AR and MR curves of a perfect competitive firm has been shown in the following figure 10.2:

Figure 10.2: AR and MR Curves of a Firm under Perfect Competition



It can be seen from figure 10.2 that the firm's AR and MR curves are the same. The slope of the curves is horizontal.

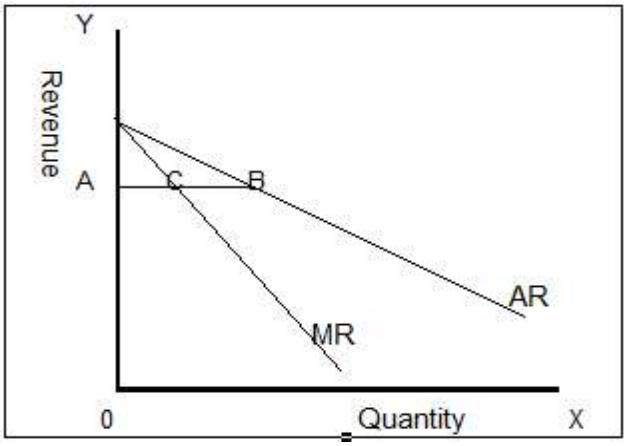
AR and MR Curves of a Firm under Imperfect Competition: Unlike perfect competition, a firm under imperfect competition does not have to sell all its amount at a fixed market price. This means that the firm can sell more units of the product as its price falls. We have shown a hypothetical schedule of AR, TR and MR in table 10.3 in the next page.

Table 10.3: Total, Average and Marginal Revenue Schedules

Number of units sold (Q)	*Price or Average Revenue*	*Total Revenue (AR x Q)*	*Marginal Revenue*
(1)	*(2)*	*(3)*	*(4)*
1	20	20	20
2	19	38	18
3	18	54	16
4	17	68	14
5	16	80	12

Based on the above schedule, the shapes of AR and MR curves of a firm under imperfect competition has been shown in the following figure:

Figure 10.3: AR and MR Curves of a Firm under Imperfect Competition



It can be seen from figure 10.3 that unlike perfect competition, the firm's AR and MR curves under imperfect competition are not the same. It is to be noted that both the curves are downward sloping. Again, the slope of the marginal revenue curve is twice as much steeper as that of the average revenue curve. This is because it can be seen from the above table 10.3 that as sale increases by one unit, average revenue falls by one unit of price (as its number of units sold increases by one unit), marginal revenue falls by two units of price. Thus if we draw a ***perpendicular*** line on the y-axis from any point of the AR curve, say AB as in figure 10.3, the MR curve will cut it in the middle. Thus, AC = half of AB.



Perpendicular: A straight line which make 90^0 angle on the axis on which it is drawn. Such a line will also be parallel to the other axis. Thus, a perpendicular line drawn on y-axis will be a parallel line to the x-axis.



LET US KNOW

In real market situation, perfect competition rarely exists. Many economists, therefore, question the usefulness of studying perfect competition. Though unreal, the study of perfect competition helps us to understand as to what may happen, if such a situation actually arises. And secondly, it also helps us to understand the real imperfect market structure – how much they deviate from perfect competition. In many advanced countries the markets of home and car insurance, internet service providers are highly competitive, though not perfectly competitive. Again, the

market of products like detergents, toothpastes etc. constitute the examples of monopolistic competition. In Indian context, the Indian Railways constitutes the example of monopoly in case of passenger carriage through railways. On the other hand, the market of passenger cars can be said to be good example of oligopoly.



ACTIVITY 10.1

Try to give some examples of the market structures like: Monopoly, monopolistic competition and oligopoly. Justify your choice of examples based on the criteria mentioned in table 10.1.

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CHECK YOUR PROGRESS

Q1: Define market. (Answer within 50 words)

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Q2: What are the different categories of a product? Give examples of each of the categories. (Answer within 50 words)

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10.4 PERFECT COMPETITION

Perfect competition is described as the market structure having no rivalry among the individual firms. Thus, the concept of perfect competition

is totally opposite to our general idea, where we mean by competition 'rivalry' among the individual firms. In the subsequent sections, we shall discuss equilibrium of firm and industry both in the short run and in the long run under this market structure.

Again, under perfect competition firms face two cost conditions: ***identical cost conditions*** and ***differential cost conditions***. We shall be confining our discussion only to identical cost conditions. Identical cost conditions will help us generalize our discussion from an individual firm to all other firms and thereby to industry as a whole. We shall now look at the assumptions on which this market structure rests.



Identical Cost Condition assumes that the firms in the industry face similar cost conditions. Thus, it becomes possible to generalise from a firm's analysis to the analysis of the whole industry.

The reverse is the case with ***differential cost condition***.

Assumptions of Perfect Competition: The assumptions of perfect competition are as follows:

- **Large number of sellers and buyers:** Presence of large number of buyers and sellers implies that it is not possible either for the individual firms or the individual buyers to affect the price or output in the market. That means, in perfect competition, individual firms have zero market power. Thus, an individual firm under perfect competition is a price taker.
- **Product homogeneity:** This assumption of perfect competition ensures that neither the buyers nor the sellers have any ground to differentiate among the products and, hence, ask for a different price. *(For the concept of product homogeneity, please refer to 'Let us know' in the next page)*.
- **Free entry and exit of firms:** This assumption is supplementary to the assumption of large number of sellers in the industry.
- **Profit maximisation:** The only goal of a firm in perfect competition is profit maximization.
- **No government intervention:** There is no government intervention in the market in any form like: tariffs, subsidies, rationing of production or demand, etc.

The fulfilment of these above five conditions forms a market structure known as '**pure competition**'. This market form is different from perfect competition, which requires the fulfilment of the following additional assumptions:

- **Perfect mobility of factors of production:** The factors of production including labour are fully mobile. Thus, labourers are fully mobile between different jobs and there is no labour union.
- **Perfect knowledge:** All sellers and buyers possess complete knowledge of the conditions of the market. Information is free and costless.

LET US KNOW



Product Homogenity: It is the quality of goods, services or factors which ensures that they cannot be differentiated in the minds of suppliers and consumers. A range of commodities is said to be homogeneous if all of them in that range are perfect substitutes for each other. The commodities may be physically distinct but economically homogeneous. The more the degree of homogeneity of products, the more will be the substitutability among them.

Short-run: It is that period of time which is too short for all economic agents (firm, industry or a buyer) to fully respond to a change. In our present analysis of market, short-run is the period in which a) no firm can enter into or exit from the industry, and b) the individual firms cannot make any adjustments to its *fixed factor of production*.

Long-run: It is that period of time which is sufficient for all economic agents to fully adjust to a change. The firms and industry can change both the variable and the fixed factors of production during this period.

CHECK YOUR PROGRESS



Q 3: State whether the following statements are True or False.(T/F)

(a) Absence of government intervention under perfect competition implies that fiscal instruments like subsidies, tax etc are not utilised by government to regulate the market.(T/F)

(b) Perfect mobility of factors of production is a feature of pure competition. (T/F)

Q 4: What is the basic difference between short-run and long-run in terms of the change in factory of production?

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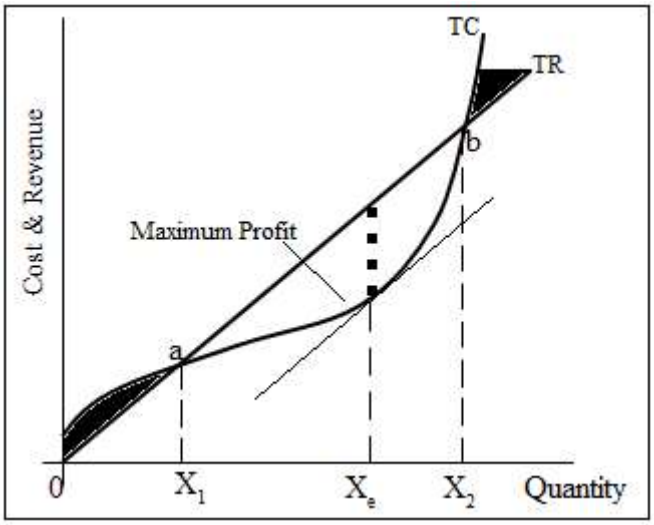
10.4.1 Equilibrium of a Firm in the Short-run

We shall now discuss the equilibrium of an individual firm and the industry both in the short run and in the long run. Here we shall utilize different cost concepts .

While discussing the assumptions of perfect competition, we have seen that the only goal of the firm is profit maximisation. Profit is calculated by: *TR* – *TC* (*TR* = Total Revenue and *TC* = Total Cost). Thus, the firm will produce that output which yields the maximum profit. Now, as the price is constant, hence marginal revenue and average revenue are constant and equal to price. The equilibrium of a firm may be shown graphically in two ways: either by using *TR* and *TC* curves, or by using *MR* and *MC* (MR = Marginal revenue and MC = Marginal Cost) curves.

Using TR and TC Curves: The following figure 10.4 describes the equilibrium of a firm using TR and TC curves. The *TR* curve is a straight line through origin O, which means that price is constant at any level of output and *TR* (*TR* = Price x Quantity) increases proportionate to sales. This means that as sales increase, total revenue will also increase by the same proportion.

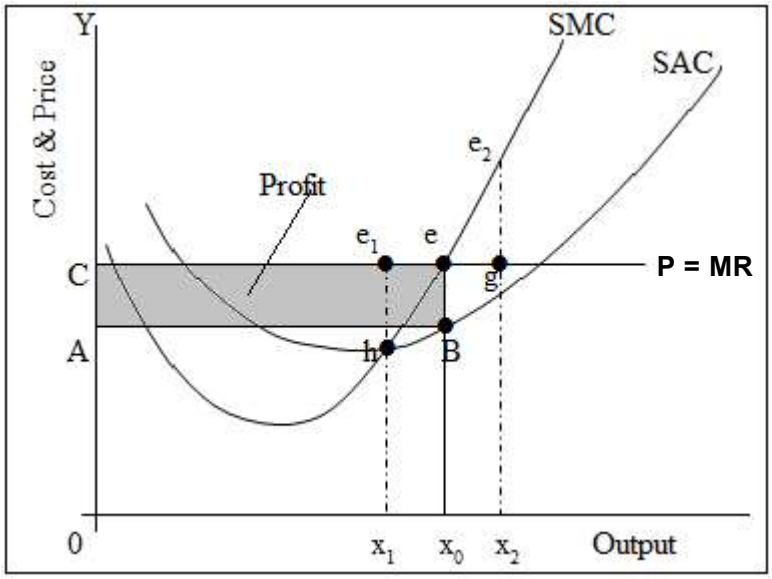
Figure 10.4: Firm's Equilibrium in the Short-run: TR & TC Approach



In the above figure, the shape of the *TC* curve reflects the U shape of *AC* (Average Cost) curve (we have already discussed the shapes of the different cost curves in the previous chapter). We also know that the prime motto of a business firm is to earn maximum profits. The profit maximising firm will attain equilibrium at the output level, where profit (gap between *TR* and *TC*) is maximum, i.e., at the level of output where tangents drawn to the TC and TR curves are parallel. In figure 10.4, X_e is that point and thus is the equilibrium point. At output levels smaller than X_1 and larger than X_2, the firm will incur losses. Because, in both the cases, total cost of the firm will be more than total revenue the firm earns. To the left of *a,* (the point where quantity is X_1), it can be seen that that the Total Cost (TC) curve lies above the Total Revenue (TR) curve, and hence the firm will suffer losses. Similarly, towards the right of *b*, the same thing is observed.

Using MR and MC Curves: This approach of explaining equilibrium of firm is more beneficial as it uses price as an explicit variable; and also helps in explaining the behavioural rule that leads to profit maximisation. Following figure 10.5 explains equilibrium of firm using this approach:

Figure 10.5: Firm's Equilibrium in the Short-run : MR & MC Approach

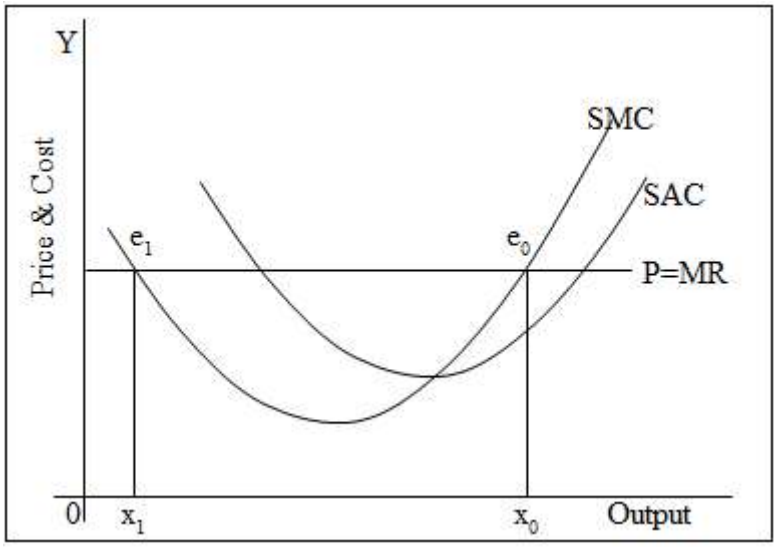


The firm attains equilibrium at that output level, where price=MC above the level of SAC (SAC means short-run average cost). In figure 10.5, *e* is that point and hence is the equilibrium point and x_0 is the equilibrium output. At any point left to x_0 output level, say at x_1, revenue is greater than marginal cost ($x_1e_1 > x_1h$), and this induces the firm to increase the output level to x_0. Similarly, any point right to x_0 output level, say x_2, the marginal cost of the firm is above revenue ($x_2e_2 > x_2g$), and this induces the firm to reduce output to the level x_0.

In figure 10.5, at point e, MR=MC, which means that the short run profit is maximised at the equilibrium output level, x_0. In fact, this is the first condition that must be fulfilled for firm's equilibrium. However, fulfilment of this condition does not always mean that the firm will necessarily be in equilibrium. It is possible, that in certain situations, MR=MC, but the firm is not in equilibrium. The next figure 10.6 explains this point. It is clear from the above figure 10.6 that the first condition of firm's equilibrium, i.e. MR=MC is fulfilled at two points: e_1 and e_0. The firm however, will not attain equilibrium at e_1,

since profit is not maximised. The firm attains equilibrium at e_0, since profit is maximized $x_0 > x_1$.

Figure 10.6:MR=MC Is Not the Sufficient Condition of Firm's Equilibrium



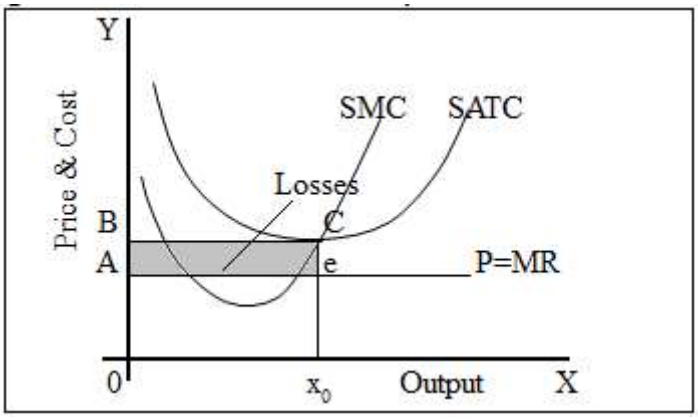
Thus, from the above figure it is clear that a second condition is required for firm's equilibrium. This condition can be stated as: MC cuts MR from below. Thus, we derive two conditions of firm's equilibrium:

a) MC = MR; and

b) MC cuts MR from below.

In case of figure 10.5, the firm earns excess profits of an amount of eB (price x_0e – SAC x_0B) per unit of output. And as the total output sold is $0x_0$ or AB, the excess profit earned by the firm amounts to the shaded area CABe. It is to be kept in mind that the firm, however, does not always earns excess profits while in short run equilibrium. To the contrary, the firm may have to suffer losses in the short-run while in equilibrium. This point has been explained with the help of the next figure 10.7.

Figure 10.7: Firm's Short-run Equilibrium with Losses



It can be seen in figure 10.7 that the firm suffers losses. This is because, at equilibrium point e (MR = MC; and MC cuts MR from below), cost per unit X_0C > revenue X_0e. This means that the firm suffers total losses eC per unit of output. Thus, the firm suffers a total loss of AeCB.



CHECK YOUR PROGRESS

Q 5: MR = MC. Is this condition alone sufficient for a firm's equilibrium? Explain in about 50 words.

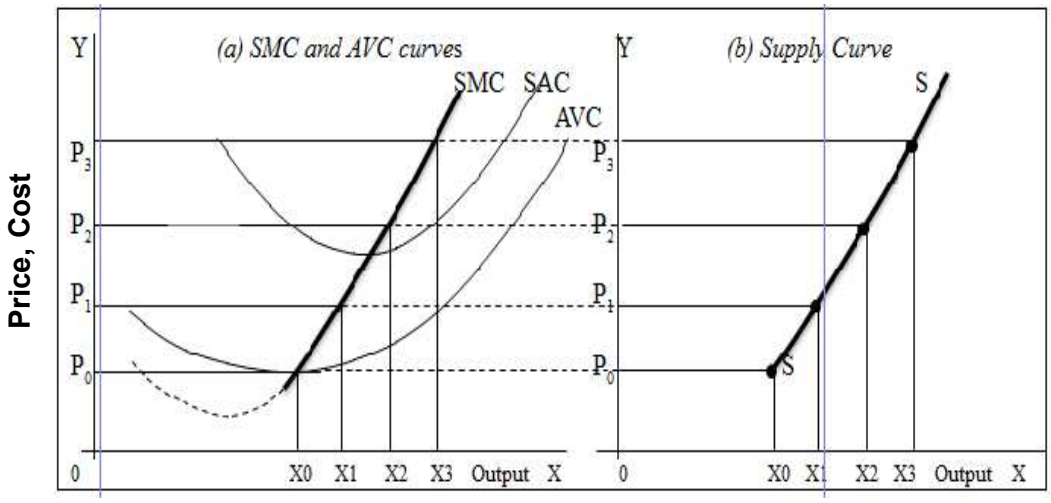
Q 6: When does a firm under perfect competition earn excess proifts? Can the firm earn such excess profits in the long-run as well? (Answer in about 40 words)

In the subsequent sections, we shall discuss industry equilibrium. It is to be noted here that all along we have utilized SMC curves for discussing firm's equilibrium. We have not derived firm's supply curve. This is because we have assumed that the price is given and there are large numbers of firms; hence, it is unlikely that an individual firm will influence either industry supply or demand. But in case of the industry as a whole, the industry can influence the market demand or supply by changing the price. Hence, to discuss industry's equilibrium, it becomes imperative to deduce the industry supply curve.

As we have discussed firm's equilibrium under identical cost conditions in the above, hence derivation of a firm's supply curve will help us derive the industry's supply curve as well.

Derivation of the Firm's Supply Curve: Figure 10.8 depicted in the following shows how much a firm produces under perfect competition at a given price. By varying the price, we get different levels of output, and this gives firm's short run supply curve as has been shown by panel (b) in figure 10.8.

Figure 10.8: Derivation of Short-run Supply Curve of a Firm

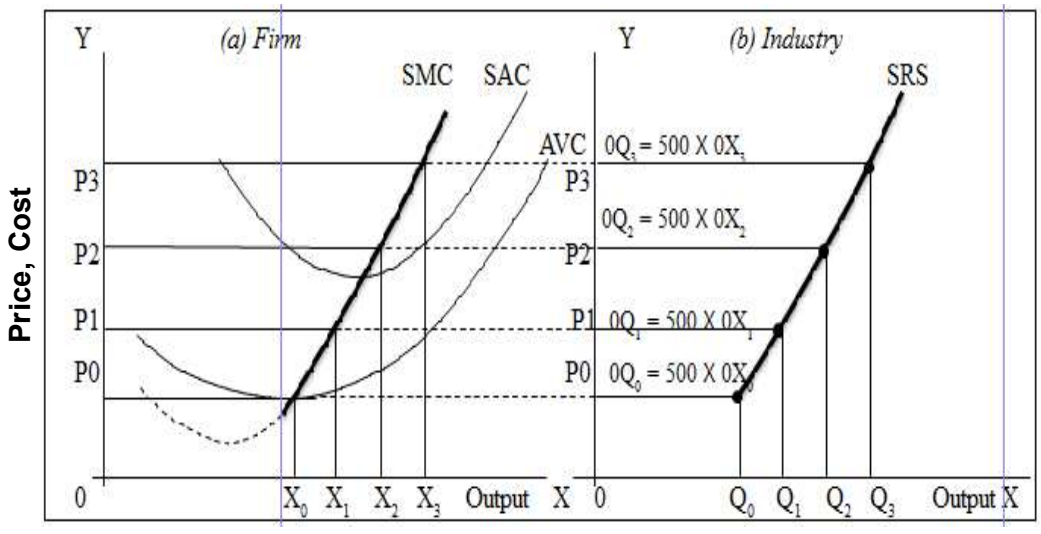


In the above figure, the minimum output the firm produces is $0X_0$, where price P_0 is equal to the minimum point on the *AVC* curve. For any price below P_0, the firm's revenue does not even cover the variable cost, and it does not pay the firm to produce any output. From panel (a), for different levels of the price, we get different quantities supplied by equating price to MC. In figure 10.8 (b) we plot these prices and quantities to get the supply curve.

In the above, while deriving the short run supply curve of the firm we have assumed that the minimum price P_0 is equal to the minimum AVC. That is, we have assumed that the revenues of the firm must cover variable costs. In the long run, unless the revenues of the firm cover the fixed costs as well, the firm cannot stay in production.

Derivation of the Industry Supply Curve: As we have assumed identical cost conditions, hence the market supply curve can be obtained by lateral summation (horizontal addition) of short run supply curves (i.e., short run marginal cost curves) of all individual firms in the industry. This has been explained with the help of figure 10.9 as has been shown in the next page.

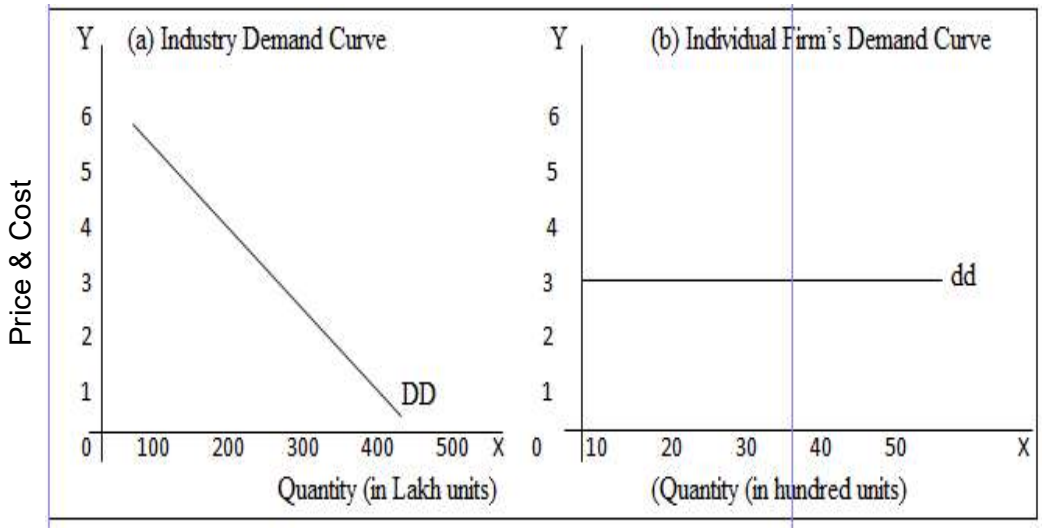
Figure 10.9: Derivation of Short-run Industry Supply Curve



In figure 10.9, we reproduce the panel (a) of figure 9.8, which describes the supply curve (MC curve) of a single firm. Now if we suppose that there are 500 such firms in the industry, the multiplication of each output level of the individual firms will give us the short-run industry supply curve. Thus, $OQ_3 = 500 \times OX_3$; OQ2 = $500 \times OX_2$ and so on. While putting these different quantities OQ_3, OQ_2, OQ_1 and OQ_0 against the respective prices P_3, P_2, P_1 and P_0, we get the industry supply curve SRS as has been shown in panel (b) of the figure 10.9.

Derivation of the Industry Demand Curve: We know that to explain equilibrium, we need to consider both the demand and the supply curve. We have derived the short-run industry supply curve. Now, let us see how is the shape of the industry supply curve? We have already seen that the demand curve of a competitive firm is horizontal straight line. But the shape of the industry's demand curve is negatively sloped. This has been shown in the following figure 10.10.

Figure 10.10: Short-run Demand curve under Perfect Competition



In panel (a) of the figure the industry demand curve has been depicted, and in panel (b), the firm's demand curve has been shown.

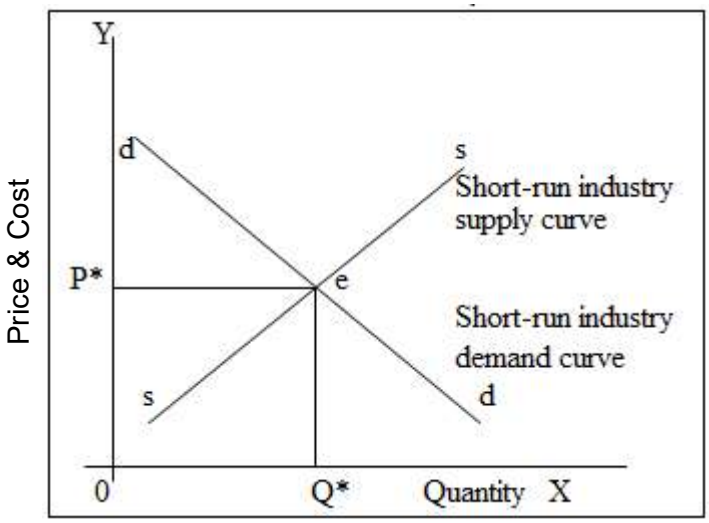
The demand curve for the industry as a whole is downward sloping, because the industry can, as a whole, change the market price, thus affecting consumers' demand. Therefore, the demand curve of industry (DD) represents the general law of demand.

10.4.2 Industry Equilibrium in the Short-run

The industry equilibrium in the short run is attained at the point where the short-run demand curve intersects with the short-run supply curve. This has been shown in Figure 10.11. In figure 10.11, e is the point where demand curve dd intersects the supply curve ss. Hence, *e* is the equilibrium point. Q* is the equilibrium quantity and P* is the equilibrium price.

It is to be noted here that though no individual firm can exert any influence on price, the collective action of suppliers and demanders determines the price.

Figure 10.11: Determination of Equilibrium Price under Perfect Competition





CHECK YOUR PROGRESS

Q 7: State whether the following statements true or false. (T/F)

(a) Under identical cost condition, it is possible to derive the industry supply curve through lateral summation of the individual firms' supply curves. (T/F)

(b) In the long-run, a firm willl continue its production even when its revenue does not cover fixed costs, but the variable costs are covered. (T/F)

Q 8: Unlike firm's horizontal demand curve, the industry's demand curve is negatively sloped. Why? (Answer in about 50 words)

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10.5 PERFECT COMPETITION: LONG-RUN ANALYSIS

So far we have discussed the short-run equilibrium analysis of a firm and industry under perfect competition. In the subsequent sections, we shall discuss the long-run equilibrium analysis of a firm and industry under this market structure.

10.5.1 Equilibrium of a Firm in the Long-run

In the long-run, entry and exit of firms may take place. Again, in the long-run, existing firms can adjust the quantities of their fixed inputs as well. Thus, in the long-run we expect two things: (1) existing firms will make adjustments in their output and costs. (2) if after these adjustments, a firm is still unable to cover its total costs, it will exit the industry. And if existing firms are earning super normal profits, then new firms will be lured into the industry.

Thus, for a competitive firm to be in equilibrium in the long-run, the following three conditions must be fulfilled:

- Price = Marginal Cost
- Price = Average Cost
- LMC curve cuts LAC curve from below.

Again, as both the marginal cost and the average cost is equal to price, hence both these conditions can be combined as:

Price = Marginal Cost = Average Cost.

In the earlier course, you have already known the shapes and concepts of different cost curves. Thus, conceptually we have learnt that the marginal cost can be equal to average cost only at the point where the average cost is neither falling nor rising, i.e., at the minimum point of the average cost curve.

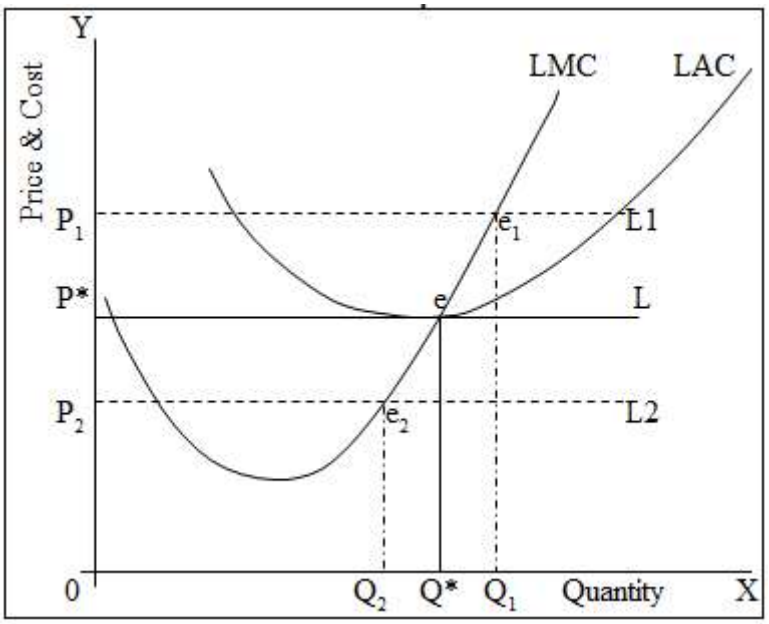
This gives us the condition of long-run equilibrium for a firm as:

Price = Marginal Cost = Minimum Average Cost.

LMC curve cuts LAC curve from below.

This has been explained in the following figure 10.12.

Figure 10.12: Long-run Equilibrium of a Firm under Perfect Competition



In the above figure 10.12, LAC is the long-run average cost curve and the LMC is the long-run marginal cost curve. The firm is in equilibrium at point e, where LMC curve cuts the LAC curve at its minimum. Corresponding to this equilibrium level, the equilibrium price is 0P*, and the equilibrium quantity is 0Q*. At this equilibrium level, the firm earns only normal profit.

The firm will not attain equilibrium at any other price or quantity level. Above the equilibrium price 0P*, let us consider price $0P_1$. At this price level, the firm's marginal cost will be higher than its average cost. Thus, the firm earns super-normal profits. This means that all the firms will earn super-normal profits; and this will attract entry of new firms to the industry. Thus, entry of new firms will ultimately lead the price to be settled at the level 0P*. Similarly, below price level 0P* as well, the firm does not attain equilibrium. Say, at price $0P_2$, the marginal cost of the firm will be below the average cost curve. This means that the firm will incur loss at price level $0P_2$. This means that all the firms will incur losses at this level. This will force some firms to exit from the industry. Thus, exit of firms will ultimately lead to increase in the price level to 0P*.

Thus, we can conclude from the above discussion, that a firm under perfect competition in the long run will be in equilibrium, when:

Price = MC = Minimum AC, and LMC curve cuts LAC curve from below.

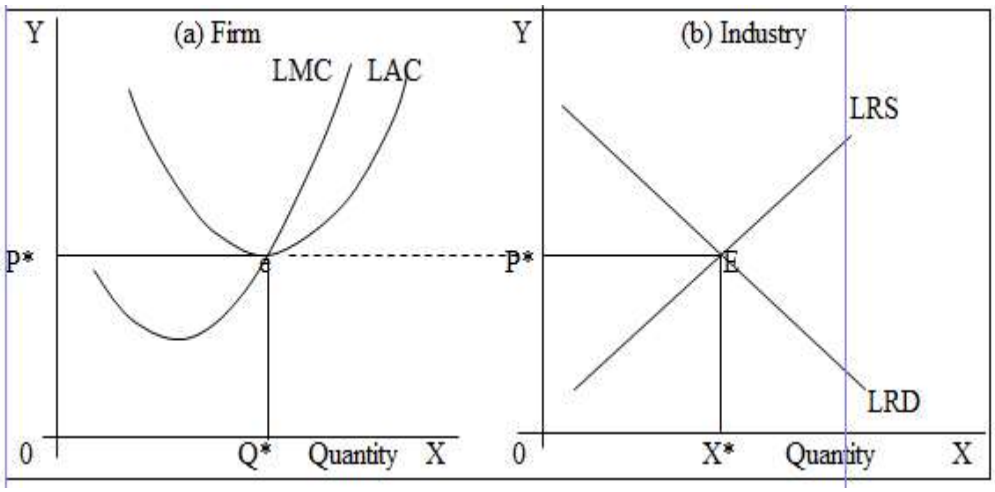
10.5.2 Industry Equilibrium in the Long-run

In the above, we have seen how a firm under perfect competition attains equilibrium in the long-run. An industry in the long-run attains equilibrium when the following three conditions are satisfied:

- the long-run supply and demand for the product of the industry are equal;

- all firms in the industry are in equilibrium; and
- there is neither the tendency for the new firms to enter the industry nor the existing firms to leave it.

Figure10.13: Industry Equilibrium in the Long-run



Panel (b) of the figure 10.13 depicts industry equilibrium in the long run. The long-run supply curve LRS intersects the long-run demand curve LRD at point E and hence long-run equilibrium is established at this point. Therefore, 0X* is the equilibrium quantity of the industry and 0P* is the equilibrium price. Corresponding to this point E, the firm's equilibrium has been shown in panel (a) of the figure. The firm attains equilibrium at point e, where the LAC curve intersects the LMC curve. Corresponding to this equilibrium level, the equilibrium quantity is 0Q*, and the equilibrium price 0P*. As the firm has attained equilibrium at the minimum point of the LAC curve, hence the firm is earning normal profit only. Again, as we have assumed identical cost conditions, hence all the firms will be in equilibrium at this level and will be earning only normal profits. The equilibrium of all firms with normal profit ensures that there is neither the tendency of the existing firms to exit from the industry nor new firms are attracted to enter the industry.

Thus, we have seen that under perfect competition when the industry attains equilibrium in the long-run, all the three conditions are satisfied; i.e.,

- the long-run supply and demand for the product of the industry are equal;
- all firms in the industry are in equilibrium; and
- there is neither the tendency for the new firms to enter the industry nor the existing firms to leave it.



CHECK YOUR PROGRESS

Q 9: State the conditions under which a firm under perfect competition attains equilibrium in the long-run. (Answer in about 30 words)

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10.6 LET US SUM UP

- The essentials of a market are:
  - a commodity which is to be dealt with;
  - the existence of buyers and sellers;
  - a place, be it a certain region, a country or the entire world; and
  - a communication between buyers and sellers, which ensures only one price for a commodity at a time.
- The market structure can broadly be classified into two categories – perfect competition and imperfect competition.
- Market structure under imperfect competition can be further classified into – monopoly, monopolistic competition and oligopoly.
- Market structure can be distinguished based on the three criteria:
  - number of sellers in the industry;

- entry barriers into the industry;
- nature of the product

- Two conditions must be fulfilled for a firm to be in equilibrium. These are:
  - MC = MR; and
  - MC cuts MR from below.
- And under perfect competition, a firm can earn excess profit or incur losses while attaining short-run equilibrium.
- The conditions of long-run equilibrium for a firm are:
  - Price = Marginal Cost = Minimum Average Cost.
  - LMC curve cuts LAC curve from below.
- Under perfect competition when the industry attains equilibrium in the long run, when three conditions are satisfied :
  - the long run supply and demand for the product of the industry are equal;
  - all firms in the industry are in equilibrium; and
  - there is neither the tendency for the new firms to enter the industry nor the existing firms to leave it.



10.7 FURTHER READINGS

1) Ahuja, H. L. (2006). *Modern Economics.* New Delhi: S. Chand & Co.
2) Chopra, P.N. (2008). *Micro Economics*. Ludhiana: Kalyani Publishers.
3) Dewett, K.K. (2005). *Modern Economic Theory*. New Delhi: S.Chand & Co.
4) Koutsoyiannis, A. (1979). *Modern Microeconomics*. New Delhi: Macmillan India.
5) Sundharam, K.P. M. & Vaish, M.C. (1997). *Microeconomic Theory.* New Delhi: S. Chand & Co.

10.8 ANSWERS TO CHECK YOUR PROGRESS

Ans to Q No 1: A market can be defined as a place or a common platform, where buyers and sellers interact to exchange goods and services at an agreed price.

Ans to Q No 2: Products include:

Goods : Those, which are tangible; like – books, foods, torch light, batteries etc.

Services : Those, which are intangible; like- the services of a barber, cobbler, lawyer, nurse etc.

Ans to Q No 3: (a) True (b) False

Ans to Q No 4: The basic difference between short-run and long-run is that during short-run an economic agent (a firm or an industry) can change only the variable factor of production. But in the long-run an economic agent can change both the variable and the fixed factors of production.

Ans to Q No 5: No. This is because, it is possible that a firm fulfills the condition of MR=MC, but yet its profit may not be maximised. This may occur when the short-run MC curve cuts the MR curve when it (MC curve) is still falling, and hence minimum cost has not been yet achieved.

Ans to Q No 6: A firm under perfect competition can earn excess profit only in the short-run. The earning of profit by an individual firm will attract new firms into the industry. As a result, in the long-run, a firm will be able to earn normal profit only.

Ans to Q No 7: (a) True (b) False

Ans to Q No 8: Unlike the horizontal demand curve of a pefect competitive firm, the demand curve for the industry as a whole is downward sloping. This is because, the industry can as a whole change the market price; thus affecting consumers' demand. Thus, the demand curve of industry represents the general law of demand.

Ans to Q No 9: A firm under perfect competition attains equilibrium in the long-run when two conditions are fulfilled: first, Price = MC = Minimum AC, and secondly, LMC curve cuts LAC curve from below.



10.9 MODEL QUESTIONS

Q 1: What are the basic the criteria of market classification?

Q 2: What is the difference between pure competition and perfect competition?

Q 3: What is product homegenity?

Q 4: Describe the price and output determination of a firm in the short-run under perfect competition.

Q 5: Discuss the price and output determination of an industry in the short-run under perfect competition.

Q 6: Explain the price and output determination of firm in the long-run under perfect competition.

Q 7: Analyse the price and output determination of an industry in the long-run under perfect competition.

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UNIT 11: MARKET STRUCTURE

UNIT STRUCTURE

11.1 Learning Objectives

11.2 Introduction

11.3 Monopoly: Basic Concepts

- 11.3.1 Demand and Marginal Revenue Curves
- 11.3.2 Short-run and equilibrium of the Monopoly Firm
- 11.3.3 Long run Equilibrium of the Monopoly Firm
- 11.3.4 Price Discrimination: Degree and Possibility

11.4 Monopolistic Competition: Definition and Assumptions

- 11.4.1 Equilibrium of a Firm: Short-run
- 11.4.2 Equilibrium of a Firm: Long-run
- 11.4.3 Group Equilibrium
- 11.4.4 Concept of Excess Capacity

11.5 Concepts of Oligopoly and Duopoly

11.6 Let us Sum Up

11.7 Further Readings

11.8 Answers to Check Your Progress

11.9 Model Questions

11.1 LEARNING OBJECTIVES

After going through this unit, you will be able to:

- define monopoly, and monopolistic competition
- discuss various issues relating to monopoly.
- explain price discrimination and its various degrees, possibility and profitability aspects.
- discuss monopolistic competition and briefly enumerate the meaning and basic features of oligopoly and duopoly.

11.2 INTRODUCTION

In the earlier unit, we have already come across the terms 'market and 'market equilibrium'. We have known that based on certain characteristics, market structures can be broadly classified into two categories: perfect competition and imperfect competition. Again, an imperfectly competitive market structure can be further divided as: monopoly, monopolistic competition and oligopoly. These markets structures can again be segmented into different types. In this unit, we will discuss basically two major imperfect market structures: monopoly and monopolistic competitions. We shall try to define these market structures, discuss relevant issues therein and explain graphically how firms / industry attain equilibrium under these.

11.3 MONOPOLY: BASIC CONCEPTS

In the earlier unit, we had discussed about perfect competition. We have seen that perfect competition is the market structure where there exists a large number of buyers and sellers and in which the influencing power of any seller is nil. The monopoly is just the opposite of perfect competition. The word 'monopoly' has come from the Greek words *monos polein,* which means 'alone to sell'. This single seller is called a *monopolist*. The term is also sometimes used for a single group of sellers that acts as a price setter, although often a group is called *a cartel.* Thus, in simple terms, monopoly can be described as the market structure where there is only one supplier of the product, which has no close substitute in the market.



Cartel: A group of firms acting together to control output and price

As there is only one seller of the product, therefore, the concept of firm and industry is the same in monopoly. In reality, the existence of a monopoly firm is as much rare as perfect competition. However, in some of our remote villages, where there is only one doctor, he may be seen as a monopoly supplier of medical services in the locality.

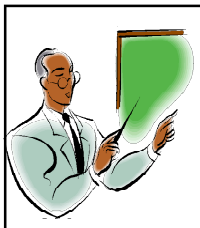


ACTIVITY 1

Do you notice in your locality that in some of the services/ products, there often only one service provider/supplier? Just think of these services : cooking gas (LPG cylinders), electricity, landline telephone services, fire services, water supply, postal services etc. You may find that until recently, in some of these services there was only one supplier. Some of these still have only one supplier even today. Make a list of such services/products in your locality. These could be interesting examples of monopoly in your area.



Brand name: Its a name or identity of a product that sets it apart from its competitiors.



LET US KNOW

There are some reasons behind the emergence of a monopoly.Certain factors may facilitate the monopoly industry by preventing new entrants into the industry. According to Prof. E.A.G. Robinson, there are four such sets of factors: a) legal prohibition (e.g., patents and licensing), b) control of a necessary factor of production, c) advantage of large scale of production and d) existence of goodwill (establishment of brand names in the market).

Patent: A patent is a set of exclusive rights granted by a state to an inventor or his assignee for a fixed period of time in exchange for a disclosure of an invention. The exclusive right granted to a patentee in most countries is the right to prevent or exclude others from making, using, selling, offering to sell or importing the invention.

There exists a category of monopolies known as social monopolies or public utilities. These monopolies are socially favoured to remain as monopolies, as large scale and single-handed operations of such monopolies benefit the socieity. Examples like: defence services (civil and military), public road construction, water supply services are important in this category.