CHAPTER SEVEN

COST AND REVENUES

1. DIFFERENT COST CONCEPTS

COST

'The amount of money which is spent on the production of a particular quantity of some commodity is called the Cost of Production'.

Factor Pricing is known as Cost of Production.

Cost = Rent +Wages + Interest + Profit

COST FUNCTION

Cost is a function of output. It means that cost (C) depends on output (Q).

$$C = f(Q)$$

$$Q \uparrow \rightarrow C \uparrow$$

$$Q \downarrow \rightarrow C \downarrow$$

Following are the different cost concepts:

1. ACTUAL COST AND OPPORTUNITY COST

Actual Costs are the expenditures which are actually incurred by the firm in payment for labour, material, plant, building, machinery, equipments, traveling and transport, fuel, etc. The total money expenses recorded in the books of accounts are, for all practical purposes, the actual costs. Actual cost concept comes under the accounting cost concept.

Opportunity cost is the loss of income due to opportunity foregone. Opportunity cost is also called *alternative or economic cost*. It arises because of scarcity and alternative uses of resources. We know that the resources that are available, at any point of time, to a firm or any business organization, are limited and resources have alternative uses. Therefore, profit maximizing firms have to choose the best from the alternatives available to them. When they opt for the best of the opportunities, they lose the returns expected from other alternatives. In fact, firms have to forego the gains expected from the second best alternative use of their resources. The foregone benefit is called opportunity cost of the gains from the chosen use of the resources. More precisely, **the opportunity cost equals the expected returns from the second best use of the resources foregone to avail the gains of their bet use.**

For example, suppose a man has Rs. 50,000 to invest. He has only two alternatives: he can invest this amount either in a printing machine or in a photocopier. He expects to earn an annual net income of Rs. 20,000 from the printing machine and Rs. 15,000 or in a photocopier. He expects to earn an annual net income of Rs. 20,000 from the printing machine and Rs. 15,000 from the photocopier. If the man is an income-maximizer, he would invest his money in the printing machine. If he does so, he

foregoes an annual income of Rs. 15000 expected from the photocopier. Thus, the opportunity cost of income from the printing machine is Rs. 15,000. Real life situation is full of such examples: if as student opts for a graduate degree in economics, he or she cannot be simultaneously a science graduate; if an MBBS opts for private practice, he/she foregoes the salary expected from employment in a government hospital; and so on.

Associated with the concept of opportunity cost is the concept of *economic rent* or *economic profit*. *Economic rent* is the difference between the actual earning and the opportunity cost. In our example, economic rent of printing machine is the excess of its earning over the income from the photocopier. That is, economic rent = Rs. 20,000 – Rs. 15,000 = Rs. 5,000. The business implication of this concept is that investing in printing machine is preferable so long as its economic rent is greater than zero. Also, if firms know the economic rent of the various alternative uses of their resources, the choice of the best investment avenue will not be a problem.

2. BUSINESS COST AND FULL COSTS

Business Costs include all the expenses which are incurred in carrying out the business. The concept of business cost is similar to the actual or real cost. Business cost "include all the payments and contractual obligations made by the firm together with the book cost of depreciation on plant and equipment." Both these concepts are used in calculating actual profits and losses in the business, in filing returns for income-tax, and for other legal purposes.

The concept of ***full costs*** includes two others costs: *opportunity cost* and *normal profit*. Opportunity cost includes the expected earning from the second best use of the resources, or the market rate of interest on the total money capital, and also the value of entrepreneur's own services which are not charged in the current business. **Normal profit is a necessary minimum earning, in addition to alternative cost, which a firm must get to remain in its present occupation.**

3. EXPLICIT AND IMPLICIT COST

Explicit Costs are those which fall under the actual or business costs entered in the books of accounts. The payments on account of wages, salaries, utility expenses, interest, rent, purchase of materials, license fee, insurance premium and depreciation charges are the examples of explicit costs. These costs involve cash payments and are clearly reflected by the usual accounting practices. The monetary payments – that is, cash outlays a firm makes to those 'outsiders' who supply labour services, materials, fuel, transport services, power and so on – are explicit costs. These are payments to non – owners of the firm for resource suppliers.

In contrast with these costs, there are other costs which do not take the form of cash outlays, nor do they appear in the accounting system. Such costs are known **as *implicit or imputed costs*.** Implicit costs are similar to opportunity cost. The costs of self-owned, self-employed resources are ***non-expenditure***, or **implicit costs.** To the firm,

these implicit costs are the money payments the self-employed resources could have earned in their next best alternative employments.

For example suppose an entrepreneur does not utilize his services in his own business and works as a manager in some other firm on a salary basis. If he starts his own business, he foregoes his salary as manager. This loss of salary is an implicit cost of his own business. It is implicit because the income foregone by the entrepreneur is not charged as the explicit cost of his own business. The implicit cost includes implicit wages, implicit rent, implicit interest etc. Although implicit costs are not taken into account while calculating the loss or gain of the business, these costs do figure in business decisions.

4. PRIVATE AND SOCIAL COSTS

We have, so far, discussed the cost concepts that are related to the functioning of a firm as a production unit, and those that are used in the cost-benefit analysis of the business decisions. There are, however, certain other costs which arise due to functioning of the firm but do not normally figure in the business decisions, nor are such costs explicitly paid by the firms. Instead, such costs are borne by the society. Thus, the total cost generated by the firm's decision may be divided into two categories: (i) those paid out or provided for by the firms; (ii) those not paid by firms including use of resources freely available and the disutility created in the process of production.

The costs of the category (i) are known as *private costs*, and of category (ii) are known as *external* or *social costs*. Let us look at the distinctive features of the private and social costs.

Private costs are those which are actually incurred or provided for by an individual or a firm on the purchase of goods and services from the market. For a firm all the actual costs, both explicit and implicit, are *private cost*. Private costs are internalized in the sense that "the firm must compensate the resource owner in order to acquire the right to use the resource." It is only the internalized cost which is included in the firm's total cost of production.

Social costs, on the other hand, means the cost which a society bears on account of production of a commodity. Social cost includes both private cost and the external cost. ***External cost*** includes (a) the cost of 'resources for which the firm is not compelled to pay a price,' e.g. atmosphere, rivers, lakes and also for the use of public utility service like roads, drainage system, etc.; and (b) the cost in the form of 'disutility' created through air, water and noise pollutions, etc. For instance, Attock Oil Refinery discharges its wastes into the Sindh river causing water-pollution causing danger to the beauty of city; mills and factories located in a city cause air-pollution by emitting smoke; cars, buses, trucks, etc., causes both air and noise pollution. Such pollutions cause great health hazards which impose a cost on the society as a whole. Such costs do not count in the cost structure of the firms and hence are termed *external costs* from the firm's point of view, and *social cost* from society's point of view. The

cost of category (b) is generally assumed to be equal to the total private and public expenditure incurred to safeguard the individual and public interest against the various kinds of health hazards created by the production system. But private and public expenditure serve only as an indicator, not as a measure, of public disutility.

5. NORMAL PROFITS AS A COST

The *minimum* payment required to keep producer's entrepreneurial talents engaged in this enterprise is called a **normal profit.** As is true of implicit rent or implicit wages, the normal return for the performing of entrepreneurial functions as in implicit cost. If this minimum or normal, return is not realized the entrepreneur will withdraw effort from this line of production and reallocate it to some alternative line of production. Or the individual may cease being an entrepreneur in favor or becoming a way or salary earner. **The economist includes as costs all payments – explicit and implicit, the latter including a normal profit – required to retain resources in a given line of production.**

6. SUNK COST

Assume you have just finished shopping at your local supermarket for groceries and are wheeling your grocery trolley up to a row of checkout counters. How do you decide which line to join? You pick the line you think will involve the least time. Assume that after waiting for ten minutes in a line that hardly moves, you notice that another line is fast disappearing. Do you switch to the available checkout, or do you think, 'Since I have already spent ten minutes in this line, I'm going to stay in this line'? The ten minutes you have already waited represents a **sunk cost**, which is a cost that you cannot recover *regardless of what you do*. You should ignore sunk costs in making economic choices. because your choice will have no impact on the sunk cost. Economic decision-makes should consider only those costs that are influenced by the choice. Sunk costs, by definition, are not influenced by the choice and are therefore irrelevant. Therefore, you should switch to the available checkout.

Another example, consider the purchase of specialized equipment for a plant. Suppose the equipment can be used to do only what it was originally designed for and cannot be converted for alternative use. The expenditure on this equipment is a sunk cost. *Because it has no alternative use; its opportunity cost is zero*. Thus it should not be included as part of the firm's economic costs. The decision to buy this equipment may have been good or bad. It doesn't matter. If's water under the bridge and shouldn't affect current decisions.

Now consider a ***prospective* sunk cost**. Suppose, for example, that the firm has not yet bought the specialized equipment but is merely considering whether to do so. A prospective sunk cost is an *investment*. Here the firm must decide whether the investment in specialized equipment is *economical*–i.e. whether it will lead to a flow of revenues large enough to justify its cost.

Economic decision-makers should consider only those costs that are influenced by the choice. Sunk costs, by definition, are not influenced by the choice and are therefore irrelevant.

6. SHORT-RUN AND LONG-RUN COSTS

Two other important cost concepts are short-run and long-run costs. *Short-run costs* may be defined as the costs which vary with the variation in output, the size of the firm remaining the same. *Long-run costs*, on the other hand, may be defined as the costs which are incurred on fixed assets, like plant, building, machinery, etc. such costs have long-run implications in the sense that these are not used up in the single batch of production, and are used over time in the process of production.

In the long-run, however, even the fixed costs become variable costs. Firms can hire more of all the inputs if they decide to increase the size of the firm or scale of production. Broadly speaking, 'the shot-run costs are those associated with variable costs in the utilization of fixed plant or other facilities, whereas long-run cost-behavior encompasses changes in the size and kind of plant.'

2. COST OF PRODUCTION

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Factor Pricing is known as Cost of Production.

Cost = Rent +Wages + Interest + Profit

COST FUNCTION

Cost is a function of output. It means that cost (C) depends on output (Q).

$$C = f(Q)$$

$$Q\uparrow \rightarrow C\uparrow$$

$$Q\downarrow \rightarrow C\downarrow$$

SHORT RUN COSTS

Short Run is the period during which at least on factor of production is constant. So total cost in the Short Run can be divided into two groups that are as follows:

a) Total Fixed Costs (TFC)
b) Total Variable Costs (TVC)

TC = TFC + TVC

TOTAL FIXED COST (TFC)

Total Fixed Costs (TFC) is the amount of money that is spent on the fixed inputs by the firm in order to produce a particular quantity of some commodity. Total Fixed Costs (TFC) is also referred as **Overhead cost, Indirect cost, Unavoidable cost, Supplementary cost.**

'The cost that does not vary with the change in output is called Total Fixed Cost.'

It means that if output increases decreases or even it becomes zero, fixed cost remains the same.

$Q\uparrow$ or $Q\downarrow$ or $Q = 0 \rightarrow$ TFC remains the same

Total Fixed Cost consists of:

a) Salaries of administrative staff or permanent staff
b) Depreciation of machinery
c) Expenses for building depreciation
d) Normal Profit etc.
e) Rent of the building
f) Premium or Interest

TOTAL VARIABLE COST (TVC)

Total Variable Costs (TVC) is the amount of money that is spent on the variable inputs by the firm in order to produce a particular quantity of some commodity. Total Variable Costs (TVC) is also referred as **Direct cost, avoidable cost, Prime cost. Floating cost.**

'The cost that varies with the change in output is called Total Variable cost.'

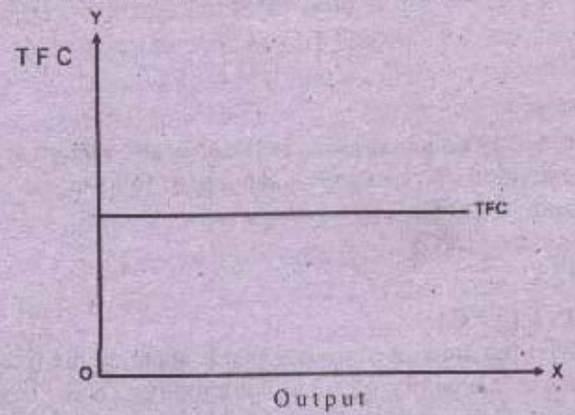
Total Variable cost rises when the firm increases output and falls when firm decreases output and there is no variable cost when there is no output.

$$Q \uparrow \rightarrow \text{TVC} \uparrow$$
$$Q \downarrow \rightarrow \text{TVC} \downarrow$$
$$Q = 0 \rightarrow \text{TVC } 0$$

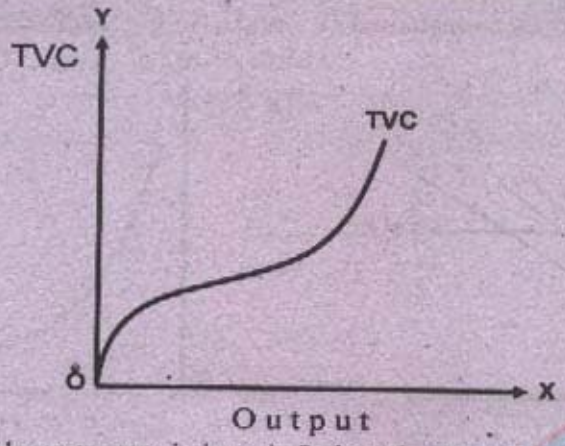
Total variable Cost consists of:

a) Raw material
b) Cost of direct labor
c) Running expenses of fixed capital such as fuel, ordinary repairs, routine maintenance etc.
d) Cost of the raw material.
e) Transportation cost
f) Advertisement cost
g) Taxes

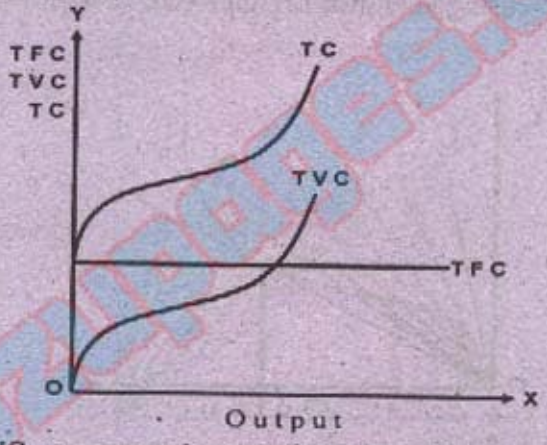
GRAPHICAL REPRESENTATION OF TC, TFC & TVC



Total Fixed Costs are denoted by straight line parallel to the output axis, because a firm has to bear these costs even if it is working or not.



Graphically total variable cost curve is inverse-S shaped. The shape of the TVC reflects the 'Law of Variable Proportions'. It starts from the origin because a firm will have to pay these costs when it starts producing output.



By adding TFC and TVC, we get total costs of the firm. TC curve does not start from the origin because it is the sum of TFC and TVC and total fixed costs are the costs which a firm has to bear in any case either it is producing or not.

DERIVATION OF AFC & AVC FROM TFC & TVC

From the total cost curves we can derive the average cost curves of the firm.

Mathematically we can obtain AFC by dividing TFC by number of units produced i.e.,

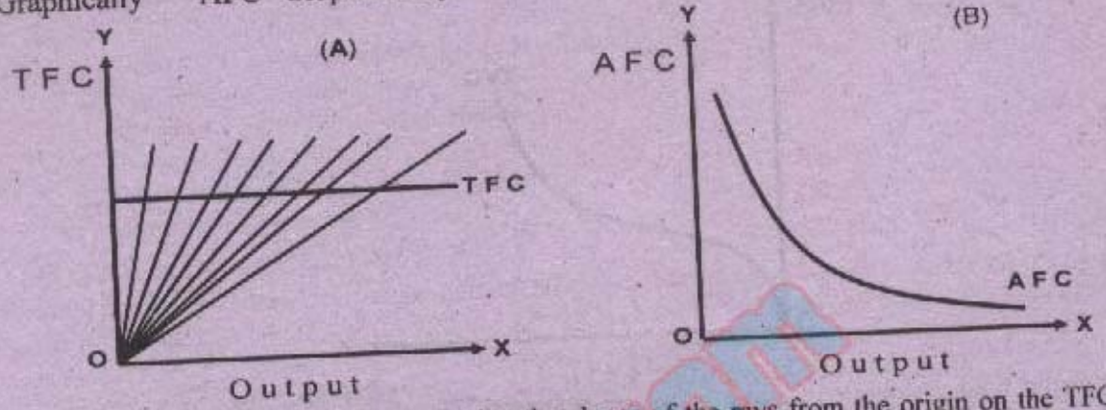
$$AFC = \frac{TFC}{Q}$$

As the number of units produced increase, AFC will decrease.

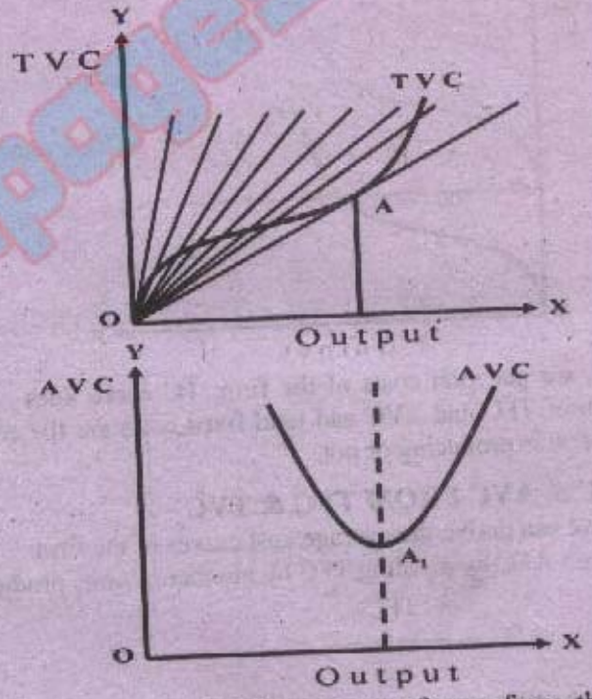
Similarly we can obtain AVC by dividing TVC by the level of output i.e.,

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

Graphically AFC= Slopes of rays on TFC and AVC=Slopes of rays on TVC



In the above diagram (A) we can see that the slopes of the rays from the origin on the TFC curve are continuously decreasing. It means that as number of units of production increase, AFC goes on decreasing as shown in figure (B).



In the diagram (A), we can see that the slopes of rays from the origin on the TVC curve decline continuously until the ray becomes tangent to the TVC curve at point 'A'. The slopes of rays start increasing after this point. It means that AVC falls first, reaches its minimum point 'A' i.e., the optimum point and rises after that point.

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DERIVATION OF AC & MC FROM TC

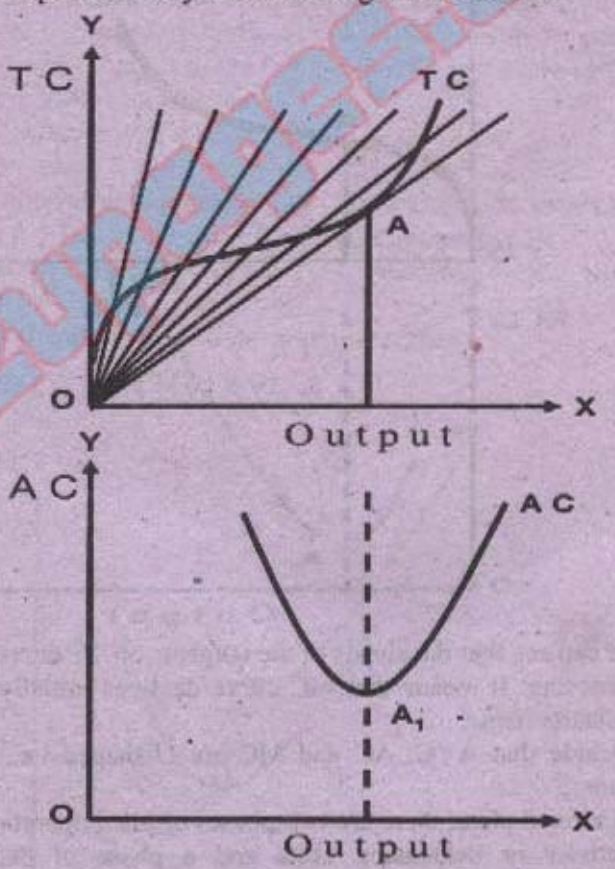
From the total cost curve we can derive the average cost curve.
Mathematically we can obtain AC by dividing TC by the level of output.

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

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

$$AC = AFC + AVC$$

Graphically AC = Slopes of the rays from the origin on TC curve.



In the diagram (A), we can see that the slopes of the rays from the origin show that AC first declines, reaches its minimum at point 'A' and after that point the slopes of rays

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start decreasing. It means that the shape of AC is similar to that of AVC.

MARGINAL COST

'The change in total cost that results from a unit change in output is called the Marginal Cost'.

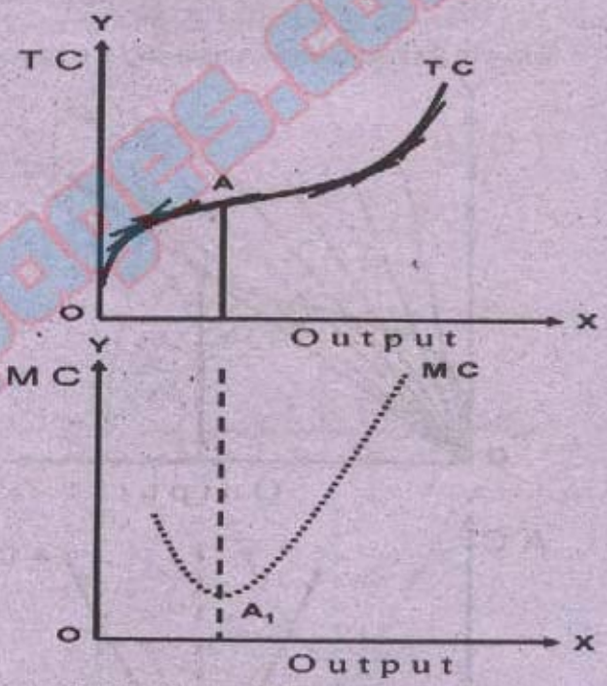
Mathematically the marginal cost is the first derivative of the total cost function i.e.,

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

Graphically MC = Slope of Total Cost curve.

OR

MC = Slope of Total Variable Cost curve.



In this diagram we can see that the slopes of the tangents on TC curve decrease up to point 'A' and then start increasing. It means that MC curve declines initially reaches its minimum at point 'A' and then starts rising.

Now we can conclude that AVC, AC and MC are U-shaped i.e., they reflect the Law of Variable Proportions.

In Short-Run with a fixed plant, there are two phases of plant operation i.e., there is a phase of increasing productivity or decreasing costs and a phase of decreasing productivity or increasing costs. There is a single point between these two phases at which unit costs are at a minimum. At this point the plant is utilized optimally.

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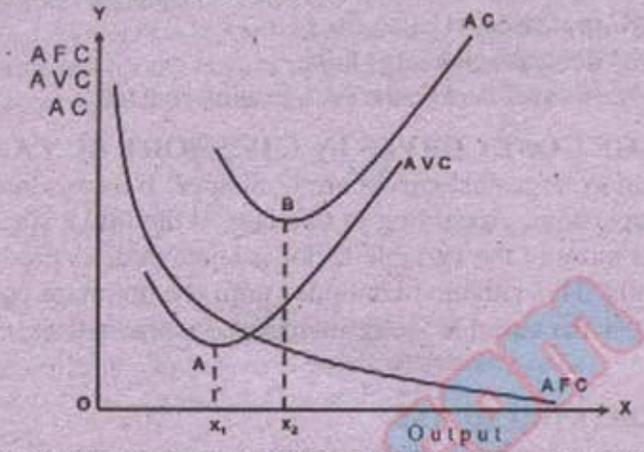
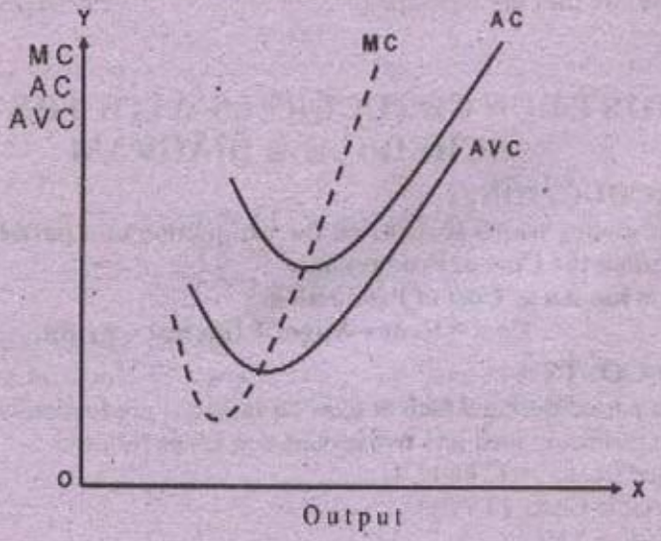
RELATIONSHIP BETWEEN AC & AVC



١. AC = AFC + AVC, it means that AFC and AVC are the part of AC.
٢. AVC and AC are U-Shaped and reflect the Law of Variable Proportions.
٣. Minimum point of AC occurs to the right of the minimum point of AVC. This is due to the following reasons:
   a) As AC is the sum of AFC & AVC.
   b) AFC decreases continuously with the increase in output.
   c) When after minimum point AVC starts rising, its increase, to some range, is offset by the decrease in AFC. So AC continues to fall.
   d) After some range the rise in AVC becomes greater than the fall in AFC, therefore AC starts rising.
   e) The AVC approaches AC as output increases.

RELATIONSHIP BETWEEN MC, AVC & AC



١. MC curve intersects the AVC and AC curves at their lowest points.
٢. When MC increases AC also rises.
٣. When MC decreases AC also falls.
٤. When MC is equal to AC, the AC remains constant.

WHY AVERAGE COST CURVES IN THE SHORT RUN ARE U-SHAPED?

In the Short Run average cost curves are U-Shaped. It means that they reflect the Law of Variable Proportions. According to this law, at the initial stages of production with a given plant as more of the variable factor is employed, its productivity increases and average cost falls. This situation continues until the optimum combination is reached. After this point as the variable factor increases, its productivity decreases and average cost rises.

WHY THE COSTS DECREASE?

There are two causes of decreasing average costs in the Short Run, which are as follows:

a) In the beginning, with the increase in output, AFC starts decreasing rapidly.
b) Before optimum combination of factors of production, AVC decreases due to Law of Variable Proportions.

WHY THE COSTS INCREASE?

There are two causes of increase in average costs in the Short Run, which are as follows:

a) Due to increase in output, AFC_S have decreased so much that they do not cause any more fall in average costs.
b) After optimum combination of factors of production, increase in variable factor causes the increase in costs.

Due to these reasons average costs of a firm decreases initially, reaches their minimum and start rising. Therefore they are U-Shaped.

3. SHORT RUN COST CURVES WITH THE HELP OF SCHEDULE & DIAGRAM

COST OF PRODUCTION

'The amount of money which is spent on the production of a particular quantity of some commodity is called the Cost of Production'.

Factor Pricing is known as Cost of Production.

Cost = Rent +Wages + Interest + Profit

SHORT RUN COSTS

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2) Total Variable Costs (TVC)

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It means that if output increases decreases or even it becomes zero, fixed cost remains the same.

$$TFC = AFC \times Q$$

$Q \uparrow$ or $Q \downarrow$ or $Q = 0 \rightarrow$ TFC remains the same

Total Fixed Cost consists of:

a) Salaries of administrative staff or permanent staff
b) Depreciation of machinery c) Expenses for building depreciation
d) Normal Profit etc. e) Rent of the building
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Total Variable cost rises when the firm increases output and falls when firm decreases output and there is no variable cost when there is no output.

$$TVC = AVC \times Q$$

$Q \uparrow \rightarrow$ TVC $\uparrow$
$Q \downarrow \rightarrow$ TVC $\downarrow$
$Q = 0 \rightarrow$ TVC 0

Total variable Cost consists of:

a) Raw material b) Cost of direct labor
c) Running expenses of fixed capital such as fuel, ordinary repairs, routine maintenance etc.
d) Cost of the raw material. e) Transportation cost
f) Advertisement cost g) Taxes

3. TOTAL COST (TC)

'Total cost is the sum total Fixed and Total Variable costs.'

$$TC = TFC + TVC$$
$$TC = AC \times Q$$

4. AVERAGE FIXED COST (AFC)

'The cost that can be obtained by dividing the total fixed cost by the units of output is called Average Fixed Cost.' $AFC = TFC/Q$ **where Q= Output**

$$AFC = AC - AVC$$

5. AVERAGE VARIABLE COST (AVC)

'The cost that can be obtained by dividing the total variable cost by the units of output is called Average Variable Cost.' i.e., **AVC = TVC/Q where Q= Output**

AVC = AC - AFC

6. AVERAGE COST (AC)

'Average Cost or the Average Total Cost can be obtained by dividing the total cost by the units of output.'

AC = TC/Q where Q= Output

'The sum total of AFC and AVC is also called the Average Cost or Average Total Cost.'

AC = AFC + AVC

7. MARGINAL COST (MC)

'Marginal Cost is the change in total cost due to the change in total output by on unit.'

MC = ΔTC/ΔQ where Q = Output

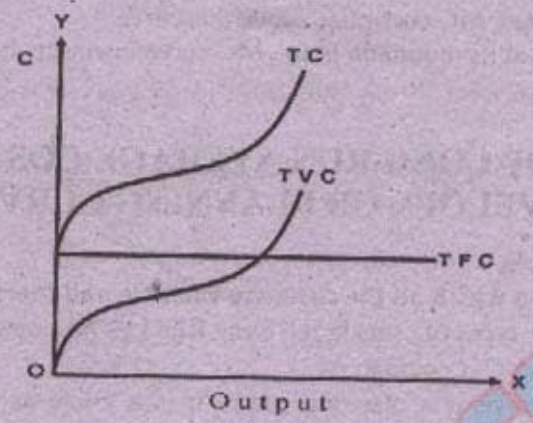
EXPLANATION WITH THE HELP OF SCHEDULE

1	2	3	4 (2+3)	5	6	7 (5+6)	8
Output	TFC	TVC	TC	AFC	AVC	AC	MC
(Units)	(Rs)	(Rs)	(Rs)	(Rs)	(Rs)	(Rs)	(Rs)
0	120	0	120	--------	--------	--------	--------
1	120	60	180	120	60	180	60
2	120	80	200	60	40	100	20
3	120	90	210	40	30	70	10
4	120	105	225	30	26.25	56.25	15
5	120	140	260	24	28	52	35
6	120	210	330	20	35	55	70

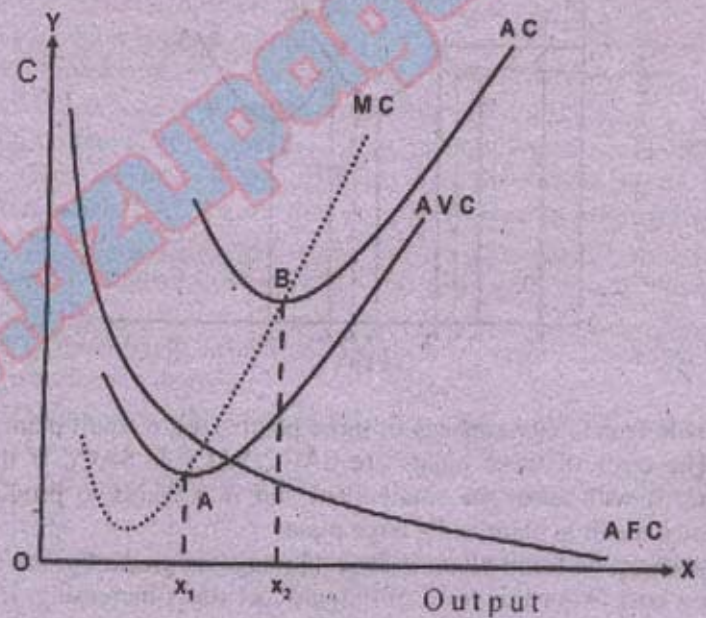
First four columns of this schedule show that Total Fixed Cost remains the same at each level of output while total variable cost and total cost increases gradually. Columns number 7 & 8 shows that Average Cost and Marginal Cost rise and fall simultaneously. If average cost rises, marginal cost also rises and vice versa. Rate of change of MC is greater than the rate of change of AC i.e., when AC increases, MC increases more than the AC and similarly when AC declines, MC decreases more than the AC. Columns number 6 & 8 show that AVC continues to fall so long as the marginal cost is below it i.e., up to the 4th unit of output. AVC starts rising at a point where MC crosses AVC i.e., from 4th unit of output.

EXPLANATION WITH THE HELP OF DIAGRAMS

We can explain the short-run cost curves with the help of two diagrams.



This diagram shows that TFC curve is parallel to x-axis i.e., fixed costs remain unchanged at each level of output. TVC curve represents the variable costs. This curve bends to the right first and then rises upward. This is due to the Law of Variable Proportions. TC curve is the resultant of the lateral summation of the TFC and TVC curves.



This diagram shows that AFC curve falls from left to right downward. It becomes closer and closer to the x-axis but it never touches the axis since AFC cannot become zero. AVC, AC & MC curves fall, reach their minimum points and starts rising. We can say that these curves are U-Shaped. This is due to the Laws of Variable Proportions.

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RELATIONSHIP BETWEEN AVERAGE AND MARGINAL COSTS

Following relationships exist among the various types of costs.

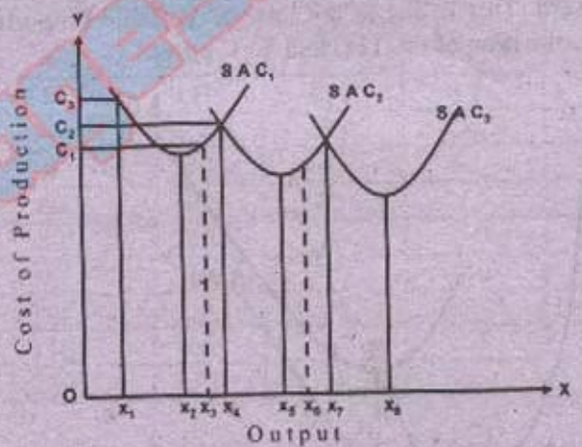
- When AC curve falls, MC curve remains below AC curve.
- When AC curve rises, MC curve lies above this curve.
- When AC curve is at its minimum point, MC curve intersects it i.e., at this point MC is equal to AC.

4. DERIVATION OF LONG RUN AVERAGE COST (LAC) CURVE (ENVELOPE OR PLANNING CURVE)

LONG RUN COST

'Long Run is the period in which all the costs are variable and there is no fixed cost'

- There are only two types of costs in the Long Run i.e., Average Cost & Marginal Cost.
- In the Long Run AVC is equal to AC.
- Long Run Cost curve is a planning curve. It is a guide to the entrepreneur in his decision to plan the future expansion of his output.
- Long Run average cost curve is derived from Short Run cost curves.



Suppose that available technology consists of three plant sizes, a small plant, a medium plant & a large plant. The costs of these plants are SAC_1, SAC_2 & SAC_3. If the firm wants to produce 'x_1' output, it will select the small plant and if it wants to produce 'x_4' and 'x_7' outputs, it will chose a medium plant and a large plant.

Suppose a firm is working on small plant. If demand increases gradually, the firm will produce 'x_2' output at lowest cost. After this level of output, cost starts increasing. If demand reaches 'x_3', the firm can either continue to produce with the small plant or it can install the medium size plant.

At this point decision depends upon firm's expectations about its future's demand. The same will be the matter when the level of output is 'x_6'.

Now if we say that available technology consists of many plant sizes, each suitable for a certain level output, the points of intersection of consecutive plants are numerous. As the

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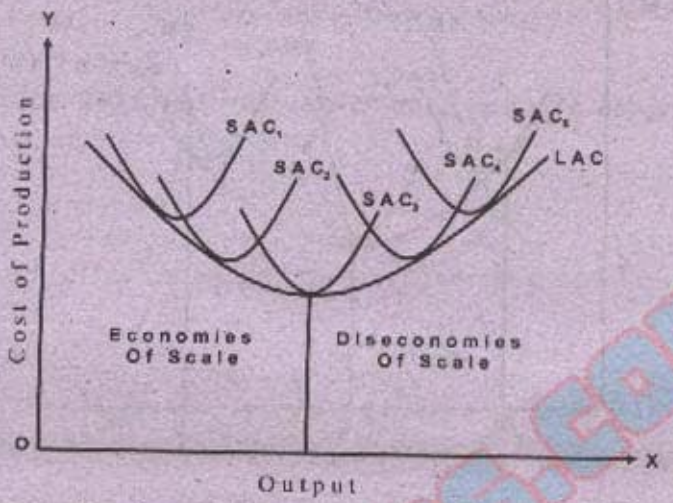
number of plants is very large, we obtain continuous curve, which is the planning curve (LAC) of the firm.



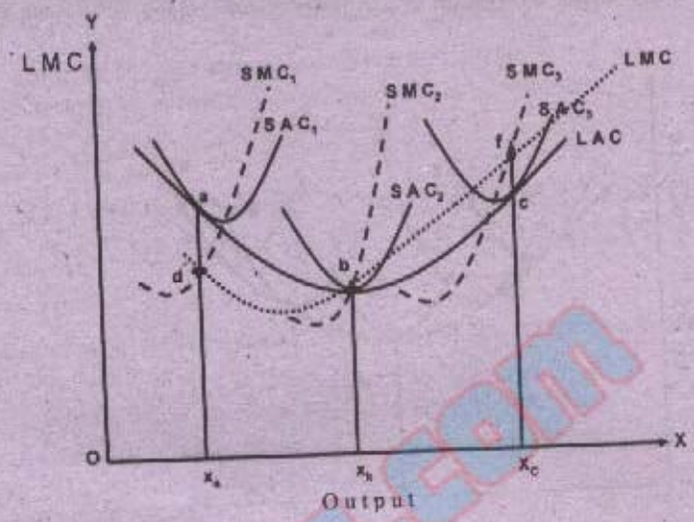
- LAC curve is the locus of points denoting the least cost of producing the corresponding output.
- It is planning curve because on the bases of this curve, the firm decides about the plant size for a particular level of output.
- It is called 'Envelope Curve' because it envelops the SRC curves.
- The shape of LAC curve depends on the economies of scale.

"In the traditional theory, it is assumed that economies of scale exist only up to the optimum plant size. Beyond this optimum size diseconomies of scale arise from managerial inefficiencies. LAC curve moves upward due to managerial diseconomies of scale."

- In traditional U-Shaped cost curves, each plant size can produce a single level of output optimally.
- The plant is completely inflexible. There is no reserve capacity, not even to meet seasonal variations in demand.
- When LAC decreases, the tangent between LAC and SAC would be at downward portion of the SAC curve.
- When LAC is minimum, it will be tangent on that plant size which shows also minimum level.
- When LAC increases, the point of tangency occurs at the rising part of SAC curves.

5. DERIVATION OF LONG RUN MARGINAL COST (LMC) CURVE

The Long Run Marginal Cost Curve is derived from the Short Run Marginal Cost Curves. LMC curve does not envelope SMC curves.



In this diagram, we can see that SAC_S are Short Run Average Cost Curves and SMC_S are Short Run Marginal Cost Curves. If we draw a perpendicular on horizontal axis from the point of tangency, this perpendicular cuts the SMC curve at some point. It is a point of LMC curve. If we repeat this procedure at all points of tangencies before the minimum point of LAC curve, we get the points of LMC curve below the LAC curve. At the minimum point of LAC, LMC curve intersects the LAC curve. To the right of the minimum point, we get these points above the LAC curve. By joining these points, we get LMC curve. At point 'K';

LMC=SMC=SAC=LAC

6. REVENUE ANALYSIS

The amount of money that is received by the firm after the sale of some quantity of certain commodity is called revenue i.e., revenue is the sale earnings of a firm.

KINDS OF REVENUE

Revenue of the firm can be classified into three categories which are as follows:

1. TOTAL REVENUE

The amount of money which a firm receives after selling a particular quantity of a commodity it produces is called Total Revenue.

A firm produces commodity 'X'. The price of this commodity in the market is Rs.10/- per unit. The firm sells one hundred units of the commodity 'X' at the prevailing price. The firm's total sales proceeds are Rs.1000/-. These sales proceeds are called Firm's Total Revenue.

Mathematically we can calculate Total Revenue as follows:

$$TR = P \times Q$$

Where TR = Total Revenue

P = Price
Q = Quantity i.e.,

Total Revenue = Price x Quantity

2. AVERAGE REVENUE

Per unit revenue which a firm receives after selling a particular quantity of a commodity it produces is called Average Revenue.

We can find out the Average Revenue by dividing the total sum of money received after the sale of a particular quantity of output by the quantity sold out.

For example, if a firm sells one hundred units of commodity 'X' for Rs.1000/- . In order to know the average revenue of the firm we have to divide this total revenue i.e., Rs.1000/- by units sold out.

Mathematically we can calculate Total Revenue as follows

AR = TR/Q

Average Revenue = Total Revenue / Quantity sold

AR = 1000/100 = Rs.10

3. MARGINAL REVENUE

The change in the total revenues of the firm due to the change in sale of the commodity by one unit is called Marginal Revenue.

For example, if the firm sells 100 units of commodity 'X' at the rate of Rs.10/-, its total revenue is Rs1000/-. Now the firm increases its sales by one unit i.e., it sells 101 units and receives Rs.1010/-. Rs.10/-, the firm received after the sale of an extra unit of the commodity over and above its previous revenue, is called marginal revenue.

MR = ΔTR / ΔQ

7. REVENUE ANALYSIS OF THE FIRMS UNDER PERFECT COMPETITION

We can discuss the relationship among Total, Average, and Marginal Revenues under the Perfect Competition

PERFECT COMPETITION

"Perfect Competition is a market structure characterized by a complete absence of rivalry among the individual firms".

There are some key assumptions about Perfect Competition.

KEY ASSUMPTIONS

Perfect Competition is based on the following assumptions.

1. LARGE NUMBER OF BUYERS AND SELLERS

It is assumed that there are large number of buyers and sellers in the market, so that no single buyer or seller can affect demand or supply of the market. It means that individual buyers and sellers cannot influence the market price.

2. PRODUCT HOMOGENEITY

The industry is defined as more than one firms producing homogeneous products. The buyers cannot differentiate among the products of different firms because there is no apparent difference in the commodities produced by different firms.

This assumption implies that in perfect competition, the individual firm is only price taker. Its demand curve is finitely inelastic.

3. FREE ENTRY & FREE EXIT OF FIRMS

It is assumed that there is no barrier for the firms to enter into the industry or to leave the industry.

4. PROFIT MAXIMIZATION

It is assumed that the objective of all the firms is profit maximization.

5. NO GOVERNMENT REGULATION

It is assumed that there is no government interference in the market. Subsidies, tariffs, rationing of production, all these interventions by the government are ruled out.

If the market situation fulfills these five conditions that would be called **'PURE COMPETITION'**. For Perfect Competition, it is necessary that the following two assumptions are fulfilled.

6. PERFECT MOBILITY OF FACTORS OF PRODUCTION

It is assumed that all the factors of production are free to move from one firm to an other. They are perfectly mobile. It means that there is a perfect competition in the market of factors of production.

7. PERFECT KNOWLEDGE ABOUT THE MARKET

It is also assumed that all the sellers and the buyers have complete knowledge of the conditions of the market.

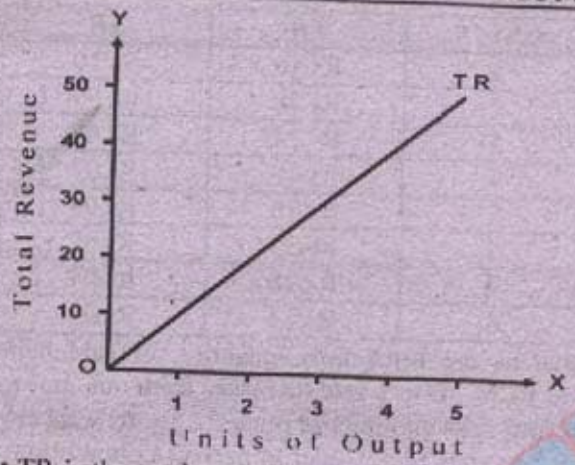
If these two additional conditions are fulfilled by the market situation, it is called Perfect Competition.

Price remains the same in perfect competition due to the above mentioned conditions. That is why Perfect Competition is also called **Law of One Price**.

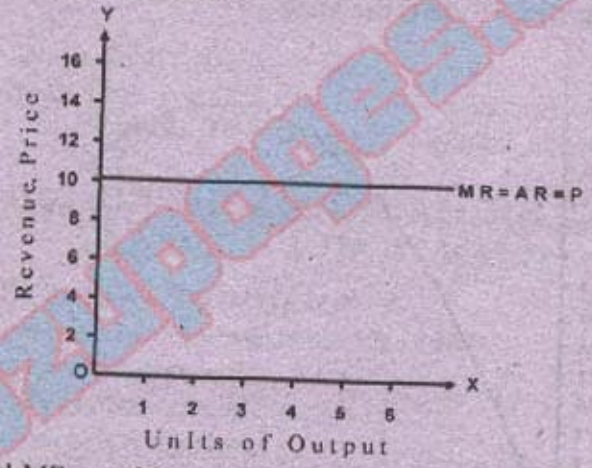
Under Perfect Competition, we can show the relationship among TR, AR, and MR with the help of following schedule and diagrams.

PRICE (Per Unit)	UNITS	TR	AR	MR
Rs.10	1	Rs.10	Rs.10	Rs.10
Rs.10	2	Rs.20	Rs.10	Rs.10
Rs.10	3	Rs.30	Rs.10	Rs.10
Rs.10	4	Rs.40	Rs.10	Rs.10
Rs.10	5	Rs.50	Rs.10	Rs.10

The table shows that per unit price is Rs.10/-, which cannot be changed under Perfect Competition. That is why the Total Revenue of the firm increases at a constant rate. So the AR and MR also remain equal to the per unit price i.e., Rs.10/-. We can say that under Perfect Competition, AR and MR are always equal.



This diagram shows that TR is the total revenue curve which starts from the origin and moves upward to the right. The trend of this curve shows that as the quantity sold out is increased, total revenue increases at a constant rate.



In this diagram AR and MR are shown by the same curve because under perfect competition the demand for a commodity is infinitely elastic. So MR and AR curves coincide and always remain parallel to X-axis.

8. REVENUE ANALYSIS OF THE FIRMS UNDER IMPERFECT COMPETITION

Imperfect Competition is the market situation where the firms produce close substitutes. Firms increase or decrease the prices of their products. When a firm decreases the price of its output, the demand for that output increases and vice versa. In imperfect competition, we assume that firms decrease their product price to increase their sales and profits. So under Imperfect Competition, there is a difference between MR and AR.

Under Imperfect Competition, we can show the relationship among TR, AR, and MR with the help of following schedule and diagrams.

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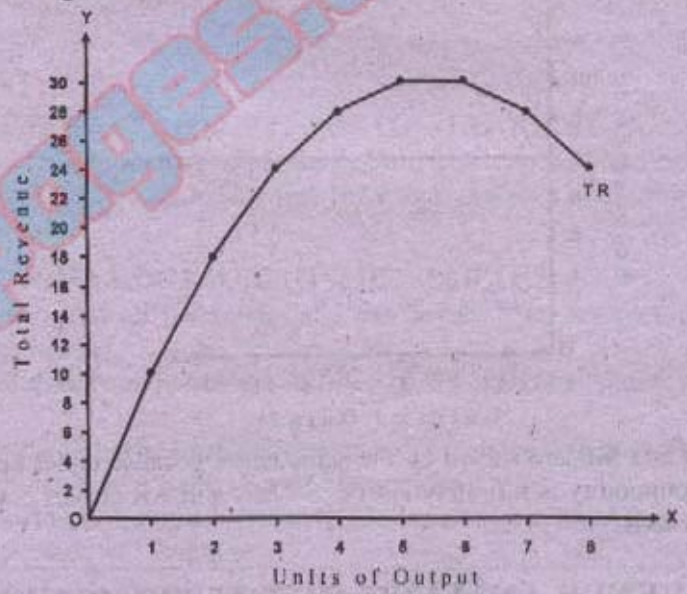
PRICE (Per Unit)	UNITS	TR	AR	MR
Rs.10	1	Rs.10	Rs.10	Rs.10
Rs.09	2	Rs.18	Rs.09	Rs.08
Rs.08	3	Rs.24	Rs.08	Rs.06
Rs.07	4	Rs.28	Rs.07	Rs.04
Rs.06	5	Rs.30	Rs.06	Rs.02
Rs.05	6	Rs.30	Rs.05	Rs.00
Rs.04	7	Rs.28	Rs.04	Rs.-2
Rs.03	8	Rs.24	Rs.03	Rs.-4

This schedule shows that as the price falls, quantity for sale increases. When the price decreases from Rs.10/- to Rs.6/-, firm's sale increases from one unit to five units and its total revenue is Rs.30. When firm sells six units at price Rs.5/-, its total revenue remains the same i.e., Rs.30 and firm's MR becomes zero. Under Imperfect Competition,

- When MR remains positive, TR increases
- When MR becomes zero, TR is maximum
- When MR is negative, TR starts declining



This diagram shows the TR curve. The trend of this curve shows that up to the 5th unit TR increases and it remains constant up to the 6th unit and after that it starts decreasing. The trend of this curve also shows that up to the 5th unit of output MR remains positive, due to which TR curve increases. It also shows that at the 6th unit, MR is zero, that is why TR curve remains parallel to the X - axis. It also shows that after 6th unit MR turns to negative, for which TR starts falling.

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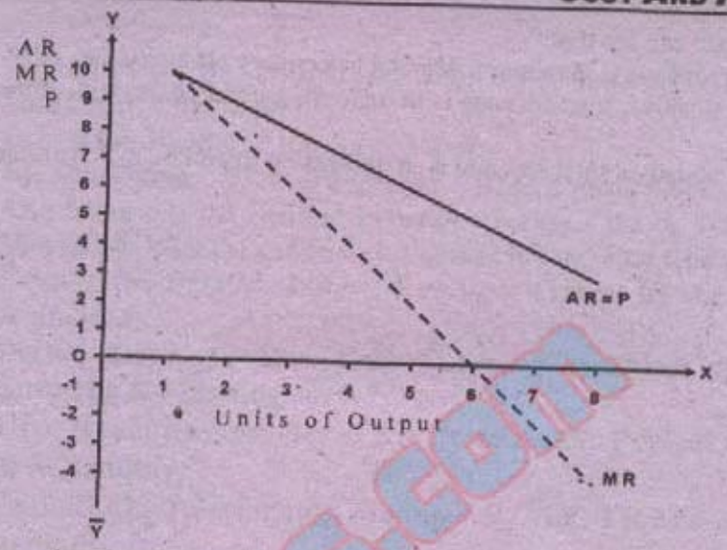


This diagram shows that the slope of the AR curve is negative i.e., if the firm wants to sell its output greater than before, it has to reduce its price. MR is the marginal revenue curve of the firm which lies below the AR curve. This shows that when AR falls, MR also falls but more than AR.

9. RELATIONSHIP AMONG AR, MR, TR AND ELASTICITY OF DEMAND

RELATIONSHIP BETWEEN TR AND MR

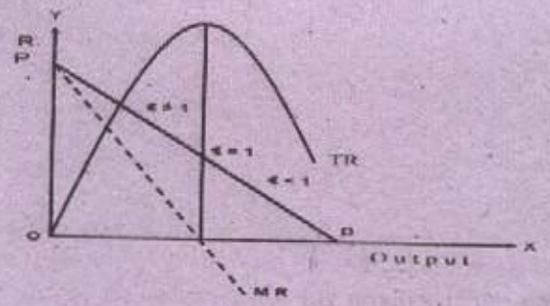
There can be following three relationships between TR and MR.

- When TR increases, MR decreases.
- When TR reaches its maximum, MR is zero.
- When TR declines, MR is negative.

RELATIONSHIP BETWEEN AR AND MR

When AR curve decreases, MR curve also decreases but MR lies below AR curve. We know that AR = D. If demand is linear, MR curve will exactly lie half the distance between the vertical axis and the demand curve.

MR AND ELASTICITY OF DEMAND



In this diagram we can see that;
If MR = 0, total revenue is maximum, demand has unitary elasticity, i.e., ed = 1
If MR > 0, i.e., positive, total revenue is in increasing trend i.e., $\varepsilon_d > 1$, it means that demand is more elastic.
If MR < 0, i.e., negative, total revenue is in decreasing trend i.e., $\varepsilon_d < 1$, it means that demand is less elastic.

QUESTIONS FOR REVIEW

Q No.1 **What is Cost of Production? Explain in detail the Family of the Short Run Cost Curves.OR**
Explain & illustrate the concepts of:
A) Total Cost B) Average Cost C) Marginal Cost
Also bring out the relation between Average Cost & Total Cost in the Short Run. Why the average cost curves in the Short Run are Ú-Shaped?

Q No.2 **Explain the Family of Short Run Cost Curves by the help of table & diagram.**

Q No.3 **Derive the Long Run Cost Curve. Why this Curve is called Envelope & Planning curve?**

Q No.4 **Give Revenue Analysis of the firms under Perfect Competition & Monopoly.**

Q No. 5 **Explain the relationship among AR, MR, TR and elasticity of demand.**

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