

# Micro Economics Notes PDF

# On

Production and Costs

(Class - 11)

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# PRODUCTION

It is primarily concerned with the transformation of resources into commodities.

# PRODUCTION FUNCTION

Physical inputs are used in the production function. A firm's production function describes the relationship between output and production factors used in the manufacturing process. It displays the number of inputs required to produce the highest level of the final output.

The production function is expressed using the following formula:

Q=f(x1, x2)

Here, Q is equal to final units of output, x1 and x2 are the amount of production factor 1 and amount of production factor 2 respectively.

The above equation shows that production factors 1 and 2 can be used to produce the final units of output.

# Types of Production Function:

There are two types of Production Function.

**1. Short-run Production Function:** In this production function one factor of production is variable and all others are fixed. So, the law of return to a factor is applied. It is also called a variable proportion type of production function.

It is a time period which is not enough to make change in all inputs. This level of production can be changed by changing the variable factors.

**2. Long-run Production Function:** All production factors are variable in this production function. As a result, the law of diminishing returns to scale is applied. It is also referred to as the constant proportion type of production function.

It is a time period long enough to change all inputs, and all inputs are variable in the long run.

Total product or Total physical product: It refers to the total quantity of goods and services produced by a firm in a given period of time.

 $TP = \sum MP$ 

# Average Production:

The average production is the variable factors per unit production.



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**Quantity of Labor** 

**Marginal product:** It refers to the change in total product resulting from the employment of an additional unit of variable factor. In other words, it is the contribution of each additional unit of variable factor to output.

$$MP = \frac{\Delta TP}{\Delta L} \text{ or } MP_n = TP_n - TP_{n-1}$$

#### **Relation between Total, Average and Marginal Product:**

- **1.** When TP rises at an increasing rate, MP rises as well.
- **2.** MP decreases as TP increases at a decreasing rate.
- **3.** When TP is at its maximum, MP equals zero.
- **4.** When TP starts to fall, MP becomes negative.

Labour	MP	ТР	AP
1	2	2	2
2	3	5	2.5
3	4	9	3
4	3	12	3
5	1	13	2.6
6	0	13	2.16
7	-2	11	1.6

- **1.** When MP > AP, AP rises.
- 2. When MP = AP, AP is maximum and constant.
- **3.** When MP < AP, AP falls.
- 4. MP may be zero or negative, but AP continues to be positive.
- 5. AP increases, even when MP falls but MP should lie above AP.

**Returns to a factor:** It describes the output behavior when only one variable factor of production is increased in the short run while fixed factors remain constant.

**Law of variable proportion:** The law of variable proportion states that when more and more units of variable factors are used to increase output, output initially increases at an increasing rate before falling.



**1. Stage I (Stage of Increasing Return to factor):** TP Increases at an ever-increasing rate: Initially, as more units of variable factors are combined with fixed factors, total physical production increases at an increasing rate, and MP rises.

# The following are the reasons for the increased return:

- (a) Under utilisation of fixed factor
- (b) Indivisibility of factor
- (c) Increased efficiency of variable factor

**2. Stage II (Stage of Diminishing Return to factor):** TP increases at decreasing rate :As more and more units of variable factors are employed with fixed factors then total product increases at diminishing rate, MP decreases but is positive. At the end of this phase TP maximum and MP becomes zero.

# Cause of diminishing return:

- (a) optimal use of fixed factor
- (b) imperfect factor substitutability

**3. Stage III (Stage of negative return to factor):** TP falls: As more units of variable factors are combined with fixed factors, total output begins to fall and marginal product becomes negative.

#### Cause of negative return:

- (a) Inadequate coordination between fixed and variable factors.
- (b) Excessive use of fixed factors

Economic Cost: It is the sum total of explicit and implicit cost.

**Explicit Cost:** Actual money expenditure incurred by a firm on the purchase and hiring the factor inputs for the production is called explicit cost. These are entered into books of accounts. For example-payment of wages, rent, interest, purchases of raw materials, etc.

**Implicit cost:** This is the cost of self-owned production resources used in the manufacturing process. Or the estimated value of inputs supplied by the owner. These are not recorded in the accounting books.

**Normal profit:** This is the bare minimum needed to keep the producers in business. In other words, it is the entrepreneur's minimum supply price. It is also known as an entrepreneur's wage.

**Total cost:** It refers to the total amount of money which is incurred by a firm on production of a given amount of a commodity.

Total cost is the sum of total fixed cost and total variable cost.

 $TC = TFC + TVC \text{ or } TC = AC \times Q$ 

Total fixed cost:- It is also called supplementary cost. It is the total expenditure incurred by the producer for employing fixed inputs. Ex- Rent of land and building, interest on capital, license fee etc. TFC = TC – TVC or TFC = AFC × Q

# Features of Total Fixed Cost:

(a) It remains constant at all output levels. Even at zero output level, it is not zero. As a result, the TFC curve is parallel to the X-axis.

(b) Total cost at zero output level equals total fixed cost.

#### Total variable cost

It is the cost that varies with the amount of output produced. It is zero at the output level of zero. The TVC curve is perpendicular to the TC curve. Excluding raw material costs, power expenses, and so on.  $T_{1}(0 = TC) = T_{1}(0 = A)(0 = C)$ 

 $TVC = TC - TFC \text{ or } TVC = AVC \times Q$ 

#### Features of Total variable cost: -

(a) When the output is zero, it is zero.

(b) It rises in proportion to the increase in output.

(c) Initially, TVC grows at a diminishing rate due to increasing returns, but later, it grows at an increasing rate due to diminishing returns.



Average cost: It is per unit cost of production of a commodity. It is the sum of average fixed cost and average variable cost.

$$AC = \frac{TC}{Q}$$
 or  $AC = AFC + AVC$ 

Average fixed cost: It is per unit fixed cost of production of a commodity.

 $AFC = \frac{TFC}{Q}$  or AFC = AC - AVC

#### Features of AFC:-

- (a) As output increases, AFC decreases.
- (b) A rectangular hyperbola is the shape of the AFC curve.
- (c) It cannot cross the X or Y axes.



Average variable cost: It is per unit variable cost of production of a commodity. AVC is U-shaped due to law of variables.



$$AVC = \frac{TVC}{Q}$$
 or  $AVC = AC - AFC$ 

**Marginal Cost:** It refers to a change in TCTC as a result of the production of an additional unit of a commodity. MC =  $\Delta$ TC/ $\Delta$ Q or MCn = TCn – TCn–1. But in the short run, it is calculated from TVC.



#### **RELATION BETWEEN SHORT-TERM COSTS**

The total cost curve and the total variable cost curve remain parallel. Total fixed cost is equal to the vertical distance between these two curves. The TFC curve remains parallel to the X-axis, while the TVC curve remains parallel to the TC curve.

As the level of output increases, so does the vertical distance between the AFC and AC curves. The vertical distance between the AC curve and the AVC curve, on the other hand, continues to decrease, but these two curves never intersect because the average fixed cost is never zero.

#### **Relation between MC and AVC:**

(i) When MC < AVC, AVC falls.

(ii) When MC = AVC, AVC is minimum and constant.

(iii) When MC > AVC, AVC rises. The MC curve cuts the AVC curve at its lowest point. Both curves are U-shaped and start from the same point.



#### Relation between MC and AC:

(i) when AC falls, MC < AC.

(ii) when AC rises, MC > AC.

(iii) when AC is constant and minimum, MC = AC



#### REVENUE

Revenue is the amount of money earned from the sale of a product.

Total revenue: It is the total amount of money received by a firm from the sale of given units of a commodity.

 $TR = AR \times Q$  Or  $TR = \sum MR$ 

TR = Price × Quantity Sold.

Price. = AR

**Average revenue:** It is the revenue received per unit from the sale of a commodity. The average revenue equals the price. The price of a commodity per unit is also referred to as AR.

$$AR = \frac{TR}{Q}$$
 or  $\frac{P \times Q}{Q} = P = Price$ .

Marginal revenue: It is net addition to total revenue when one additional unit of output is sold.

$$MR = \frac{\Delta TR}{\Delta Q} Or MR_n = TR_n - TR_{n-1}$$

#### Relation between TR, AR, and MR when more quantity sold at the same price: under perfect competition:

(a) At all levels of output, average revenue and marginal revenue remain constant, and the AR and MR curves are parallel to the x-axis. AR = MR

(b) Total revenue grows at a constant rate. The MR is constant, and the TR curve is a positively sloped straight line through the origin.

Relation between TR, AR and MR when more quantity by sold at the lower price or there is monopoly or monopolistic competition in the market:

(a) The slope of the average revenue and marginal revenue curves is negative. The MR curve is located beneath the AR curve. MR > AR

(b) Marginal revenue declines twice as fast as average revenue.

 $MR = \frac{1}{2}AR$ 

(c) So long as marginal revenue decreases and positive, total revenue increases at diminishing rate. When marginal revenue is zero, total revenue is maximum and when marginal revenue becomes negative, TR starts falling.



#### Relation between AR and MR (General relationship):

AR is maximum and constant when MR = AR. MR, can be negative but not AR. When MR < AR, AR falls. When TR rises at an increasing rate, MR and AR rise as well.

**Concept of Producer's Equilibrium:** If refers to the stage where producer is getting maximum profit with given cost and he has no incentive to increase or decrease the level of output.

A. MR and MC Approach: Conditions of producers equilibrium according to this approach are :

(a) MC = MR and also AR = MR, hence AR = MR = MC. MC should be rising.

(b) MC curve should cut the MR curve from below at the point of equilibrium.

Or

MC should be more than MR after the equilibrium point, with increase in output.

**Normal Profit:** - This is a no-profit, no-loss situation that occurs when P = AC. It is the minimum return on investment that a producer expects from his capital in the business.

**Break-even Point:** - It happens when AR = AC or when (TR = TC). At this point, the firm generates no economic profit or normal profit. OR we can say it is simply covering all of its expenses.

**Shut-down Point:** - This occurs when a company only covers its variable costs; in this case, the company suffers a loss of fixed costs. (TR < TVC OR AR < AVC)

**Supply:** - The amount of a commodity that a firm or seller is willing to sell at different prices during a given period of time is referred to as supply.

# Factors affecting supply of a commodity:

- Price of the commodity.
- Prices of other related goods.
- Level of Technology.
- Prices of inputs.
- No. of firms.
- Government policy regarding Taxation and subsidies.
- Goals of the firm.

# PRODUCTION

Production can be defined as the transformation of resources into commodities. The production function is the relationship between the output and the factors of production. Students can refer to the Class 12 Economics Chapter 3 Notes to revise the formula that defines the production function. Production functions can be classified into short term and long term based on the variables used. In the short term, one factor is fixed while the others are variable. In long term function, all the factors of production are variable.

Total product is the sum of the final units of output produced by a firm. With the help of Class 12 Microeconomics Chapter 3 Notes, students can understand how to derive the total product with the help of an equation. These notes will also explain to the students the concept of average product and marginal product. Students can learn how to clearly differentiate between the two with the help of graphs and equations. The notes summarise the effect of the total product on the marginal product and the effect of the changes in the marginal product over the average product.

# LAW OF DIMINISHING RETURNS

The laws of diminishing returns and its three stages have also been explained along with the factors that influence each of these stages. The first stage of increasing returns to the factor is caused by the underutilization of fixed

factors, the indivisibility of factors and increased efficiency of the variable factor. In the second stage of diminishing return to factor, the diminishing returns are caused by optimal use of fixed factor and imperfect factor substitutability. Poor coordination between the fixed and variable factors and overutilization of fixed factors cause negative returns in the third stage of negative returns to factors.

# Change in Q.Supplied Vs change in Supply:

(a) Change in Q.Supplied or Movement along supply curve

#### (i) Due to change in price of Commodity other factors remain constant

(b) Change in Supply or Shift in supply curve

#### (i) Due to change in factors other than price of the commodity

In simple words, Increase in supply–More supply at the same price or same supply at lower price. Decrease in supply– Less supply at same price or same supply at a higher price.

