UNIT - V

THEORIES OF PRODUCTION, COST ANALYSIS AND MARKET STRUCTURES

PRODUCTION FUNCTION

The term Production function refers to the relationship between the inputs and outputs produced by them in physical terms. The production function may be defined as the functional relationship between physical inputs (i.e. the factors of production) and physical outputs (i.e. the quantity of goods produced).

According to Watson - "Production function is the relation between physical inputs and outputs of a firm". A production function includes a wide range of inputs like Land, Labour, Capital, Organization, and Technology. Algebraically, it may be expressed in the form of an equation as:

$$Q = f(L, La, K, O, T)$$

where,

Q stands for the output of a good per unit of time;
f refers to the functional relationship;
L for land (or natural resources);
La for labour (or employees);
K for capital (or investment);
O for organization (or management); and
T for given technology.

The production function with many inputs cannot be depicted on a diagram. Moreover, given the specific values of the various inputs, it becomes difficult to solve such a production function mathematically. Economists, therefore, use a two-input production function. If we take two inputs, labour and capital, the production function assumes the form

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

It explains in what proportion, factor inputs should be combined to increase the production with lower costs.

LAW OF VARIABLE PROPORTIONS law of returns / law of diminishing returns

The law of production shows the relationship between additional input and additional output. In economics, the production function with one variable input is explained with the help of Law of Variable Proportions. The law of variable proportion is the modern approach to the 'Law of Diminishing Returns' (or The Laws of Returns). (short time applicable)

The law of variable proportion shows the production function with one input factor variable while keeping the other input factors constant. The law of variable proportion states that, if one factor is used more and more (variable), keeping the other factors constant, the total output will increase at an increasing rate in the beginning and then at a diminishing rate and eventually decreases absolutely.

This law states three types of productivity an input factor – Total productivity, Average productivity and Marginal Productivity.

1. **Total production (TP):** The maximum level of output that can be produced with a given amount of input.

2. **Average Production (AP):** The output produced per unit of input i.e., AP = Q/L
3. **Marginal Production (MP):** The change in total output produced by the last unit of an input.
   - Marginal production of labour = ΔQ / ΔL (i.e. change in the quantity produced to a given change in the labour).
   - Marginal production of capital = ΔQ / ΔK (i.e. change in the quantity produced to a given change in the capital).

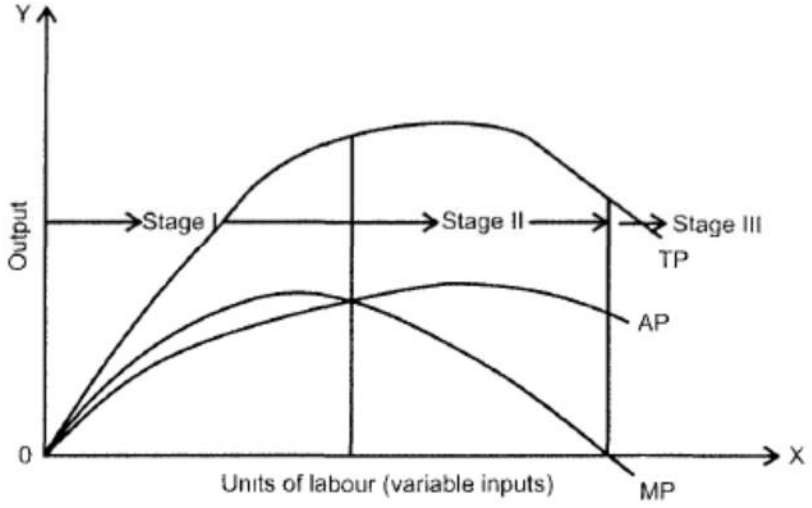
Three stages of law:

The behaviors of the output when the varying quantity of one factor is combines with a fixed quantity of the other can be divided in to three stages. The three stages can be better understood by following the table:

Fixed factor (Capital)	Variable factor (Labour)	Total Product	Average Product	Marginal Product	Stage
1	1	100	100	-	Stage I
1	2	220	110	120	
1	3	330	110	110	
1	4	400	100	70	Stage II
1	5	450	90	50	
1	6	480	80	30	
1	7	480	80	0	Stage III
1	8	450	68.5	-30	

The above table shows that both the average and marginal products increase at first and then decline. Average product is the product for one unit of labour. It is calculated by dividing the total product by the number of labour. Marginal product is the additional product resulting from additional labour. The total product increases at an increasing rate till the employment of the 4^{th} labour. Beyond 4^{th} labour, the marginal product is diminishing. The marginal product declines faster than the average product. When 7^{th} labour is employed, the total product is maximum. For 8^{th} labour the marginal product is zero and 9^{th} labour is negative. Thus when more and more units labour are combined with other fixed factors, the total product increases first at an increasing rate, then at a diminishing rate and finally it becomes negative.

The above idea can be more clearly illustrated with the help of a diagram:



When one input is variable and others are held constant, the relations between the input and the output are divided into three stages. The law of variable proportion may be explained under the following three stages as shown in the graph.

- **Stage-I:** The total product increases at an increasing rate, the marginal product increases at an increasing rate resulting in a greater increase in total product. The average product also increases. This stage continues up to the point where average product is equal to marginal product. It is known as Stage of Increasing Returns.
- **Stage-II:** The total product increases only at a diminishing rate. The average product also declines. The second stage comes to an end where total product becomes maximum and marginal product becomes zero. It is stage of Diminishing Returns.
- **Stage-III:** The marginal product becomes negative; the total product also declines. The average product continues to decline. This is stage of Negative Returns.

ISO – QUANTS

The term 'Iso' is derived from a Greek word which means 'Equal' and the term 'Quant' is derived from a Latin word which means 'Quantity'. Iso-Quant means equal quantity throughout the production process. It is defined as a curve which shows different combinations of two inputs producing same level of output. It is also called 'Iso-Product Curve'.

The producer is indifferent as to which combination he uses for producing the same level of output, so it is also known as 'Product Indifference Curve' or 'Equal Product Curve' or 'Production function with two variables'.

Iso-Quant Schedule

Combinations	Labour	Capital	Output (units)
A	20	1	1000
B	15	2	1000
C	11	3	1000
D	8	4	1000
E	4	5	1000

In the above schedule, there are five possible combinations. All the five combinations yield the same level of output i.e. 1000 units. 20 units of labour and 1 unit of capital produce 1000 units. 15 units of labour and 2 units of capital also produce 1000 units and so on. All combination are equally likely because all of them produce the same level of output i.e. 1000 units. Now if plot these combinations of labor and capital, we shall get a curve. This curve is known as an Iso-quant.

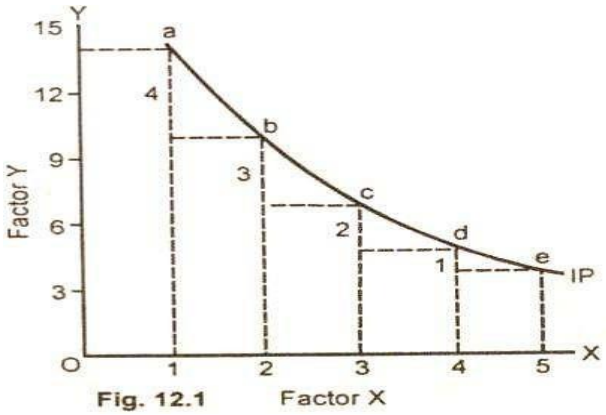


Fig. 12.1

The table shows different combinations of input factors to yield an output of 1000 units of output. The degree of convexity of isoquants depends upon the rate at which marginal rate of technical substitution changes. The greater the rate at which MRTS falls, the greater the convexity of the isoquants and vice-versa. The graphical representation of an Iso-Product schedule is Iso-Quant Curve.

Iso-Quant Map:

A group or a set of Iso-Product curves representing different levels of output shown on a graph is called Iso-Quant Map. A higher Isoquant shows a higher level of output and a lower Isoquant represents a lower level of output.

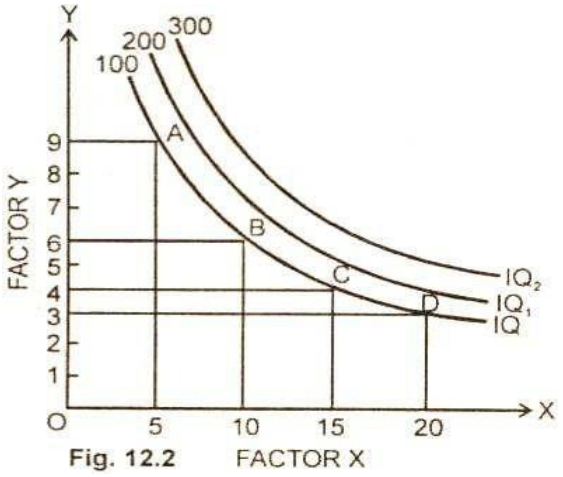


Fig. 12.2

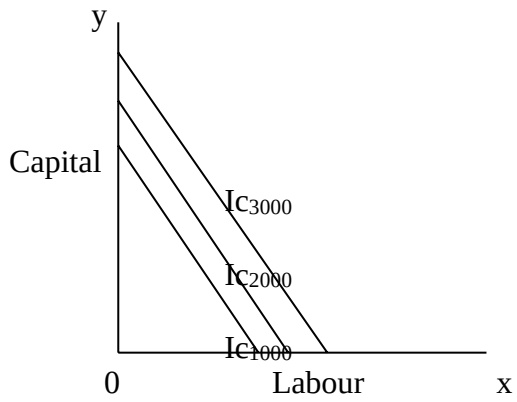
Features of Iso-Quant:

1. **Slopes downwards from left to right:** Isoquants have negative slope. This is so because, when the quantity of one factor (say, 'X') is increased, the quantity of other factor (say, 'Y') must be reduced, so that total product remains constant. If, however, the marginal productivity of the factor becomes negative, the isoquant bends back and acquires positive slope.
2. **Do not intersect each other:** Intersection of isoquants showing different levels of output is a logical contradiction. It would mean that isoquants representing different levels of output are showing the same amount of output at the point of intersection, which is wrong. Thus, we rule out the following cases in case of isoquants.
3. **Do not touch the axes:** Isoquants do not touch both x-axis and y-axis as one input factor (labour) is increasing the other input factor (capital) is decreased in a proportionate rate.
4. **Convex to point of origin:** This property of isoquants is based upon the 'Principle of Diminishing Marginal Rate of Technical Substitution'. Employment of each successive unit of one factor (say, labour) will be required to compensate for smaller and smaller sacrifice of the other factor (say, capital) so as to maintain the same level of output. Concave shape of the isoquants would be against the above principle of 'Diminishing Marginal Rate of Technical Substitution'.

ISO - COSTS

Iso-Cost line represents different combinations of two factors which the producer can get for a certain amount of given money at given prices of the factors. If the production changes the total cost also changes. Ex: Suppose a producer is having Rs.500. If the price of units of labour is Rs.10, he can buy 50 units of labour. If the price of unit of capital is Rs.5, he can buy 100 units of capital. Thus Iso-Cost curve moves upwards.

Combinations	Labour	Capital	Cost (Rs.)
A	1	20	1000
B	2	15	1000
C	3	11	1000
D	4	8	1000



An **isocost line** (equal-cost line) is a Total Cost of production line that recognizes all combinations of two resources that a firm can use, given the Total Cost (TC). Moving up or down the line shows the rate at which one input could be substituted for another in the input market.

MARGINAL RATE OF TECHNICAL SUBSTITUTION

The slope of the isoquant has a technical name known as Marginal Rate of Technical Substitution (MRTS) or sometimes the marginal rate of substitution in production. It refers to the rate at which one input factor is substituted with other to attain given level of output i.e. lesser units of one input must be combined with increasing amount of other input.

In other words, it is the ratio of small decrease in the amount of labour and a small increase in the amount of capital so as to keep the same level of output. Thus, in terms of inputs of capital services 'K' and Labour 'L'.

$$MRTS = \frac{\text{change in one input}}{\text{change in other input}} = \frac{\Delta K}{\Delta L}$$

MRTS is similar to MRS, I.e., Marginal Rate of Substitution, (which is slope, of an indifference curve).

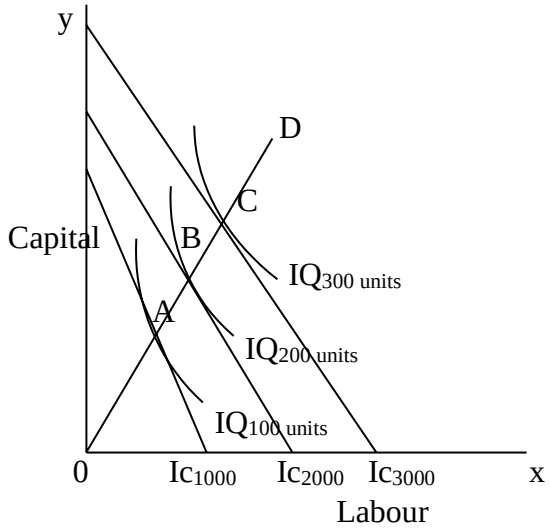
$$MRTS = \frac{2-1}{20-15} = \frac{1}{5} = 1:5$$

Combinations	Labour	Capital	MRTS
A	1	20	-
B	2	15	5:1
C	3	11	4:1
D	4	8	3:1

The table presents the ratio of MRTS between two input factors, capital and labour. 5 units of decrease in labour are compensated by an increase of 1 unit of capital i.e. 5:1. It is also important to note that the marginal rate of technical substitution is the ratio of marginal productivity of labour to marginal productivity of capital.

LEAST COST COMBINATION OF INPUTS

Maximizing profits by combining the factors of production in such a way that the cost involved in inputs is minimum or least and get maximum return is known as least cost combination. The Iso-costs and Iso-quants can be used to determine the input usage that minimizes the cost of production. When an Iso-quant curve is equal to Iso-cost, there lies the lowest point of cost of production. This can be observed by improving Iso-costs and Iso-quant curves. The points A, B, C on each curve represent the least cost combination of inputs, yielding maximum level of output. Any output lower or higher will result in higher cost of production. So, the obvious choice for the producer is 'Q' combination of inputs on IQ_2.



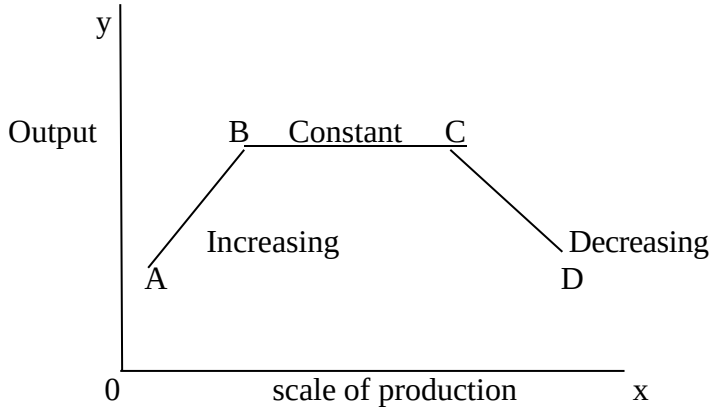
LAW OF RETURNS TO SCALE

The law of variable proportion analyses the behaviour of output when one input factor is variable and the other factors are held constant. Thus it is a short run analysis. But in the long run all factors are variable. When all factors are changed in same proportion, the behaviour of output is analysed with laws of returns to scale. Thus law of returns to scale is a long run analysis. The law of returns to scale seeks to analyse the effects of scale on the level of output. If the firm increases the units of both factors labour and capital, its scale of production increases.

Returns to scale describes the relationship between outputs and scale of inputs in the long run when all the inputs are increased in the same proportion. To meet a long run change in demand, the firm increases its scale of production by using more space, more machines and laborers in the factory. Returns to scale are categorized as: Increasing returns to scale, Constant return to scale and Decreasing returns to scale.

This can be shown using the following table:

Scale of production L + C	Total production	Marginal production	scale
1 + 2	4	4	Increasing
2 + 4	10	6	
3 + 6	18	8	
4 + 8	28	10	Constant
5 + 10	38	10	
6 + 12	48	10	
7 + 14	56	8	Decreasing
8 + 16	62	6	



It consists of three stages:

1. **Increasing Returns to Scale:** It state that the volume of output keeps on increasing with every increase in input. Where a given increase in input leads to a more proportionate increase in output, it is increasing returns to scale i.e. total product increases at increasing rate.
2. **Constant Returns to Scale:** It states that the rate of increase or decrease in volume of output is same to that of increase or decrease in input. When the scope of labour gets restricted, the rate of increase in the total output remains constant i.e. Constant returns to scale.
3. **Decreasing Returns to Scale:** When the proportionate increase in inputs does not lead to equivalent increase in output, i.e. output increases in decreasing rate it is Diminishing returns to scale.

COST ANALYSIS

Cost refers to the expenditure incurred to produce a particular product or service. The costs may be monetary or non-monetary, tangible or intangible etc. The cost of production includes cost of raw materials, labour, and other expenses. This cost is known as Total Cost (TC) and it is compared with Total Revenue (TR) which is realized on sale of products and the difference is Profit (P).

P = TR – TC

Profit is the ultimate aim of any business. The firm should therefore aim at controlling and minimizing cost.

COST CONCEPTS

A managerial economist must have a clear understanding of the different cost concepts for clear business thinking and proper application. The various relevant concepts of cost are:

Actual Cost and Opportunity Cost:

Actual costs are those that involve financial expenditure incurred for acquiring inputs for producing a commodity. These expenditures are recorded in the books of accounts of the firm. The expenditures are wages, payment made for the purchase made for the purchase of raw materials machinery etc. These costs are called actual costs or outlay costs or real costs. The real cost of production has been interpreted in different forms.

Opportunity cost refers to the expected benefit foregone in sacrificing one alternative for another. It exists when resources are scarce and there are alternative uses for them. When they are no alternative, there is no opportunity cost. This concept is useful for long run decisions. When one is selected it means that opportunity cost of gaining benefits from other alternatives. Ex: If one acre of land produces rice worth Rs.5000 and when of Rs.8000, so the producer will forego rice for wheat.

Fixed Cost and Variable Cost:

Fixed cost is that cost which remains constant for a certain level to output in short run. These are incurred even the production is stopped. It is not affected by the changes in the volume of production. But fixed cost per unit decrease when the production is increased. Fixed cost includes salaries, Rent, Administrative expenses, taxes, depreciations etc.

Variable is that which varies directly with the variation is output. It exists only when there is production. An increase in total output results in an increase in total variable costs and decrease in total output results in a proportionate decline in the total variables costs. The variable cost per unit will be constant. Ex: Raw materials, labour, direct expenses, etc.

Short Run and Long Run Costs:

Short-run costs are those costs, which change with the variation in output, the size of the firm remaining the same. In other words, short-run costs are the same as variable costs. Long-run costs, on the other hand, are the costs, which are incurred on the fixed assets like plant, building, machinery, etc.

Long-run costs are, by implication, same as fixed costs. In the long-run, however, even the fixed costs become variable costs as the size of the firm or scale of production increases. Broadly speaking, the short-run costs are those associated with variables in the utilization of fixed plant or other facilities whereas long-run costs are associated with the changes in the size and type of plant.

Incremental Costs and Sunk Costs:

Incremental costs are the added costs of a change in the level of production or the nature of activity. It may be adding a new product or changing distribution channel, or adding new machinery, etc. It appears to be similar to marginal cost, but it is not managerial cost. Marginal cost refers to the cost on added unit of output.

Sunk costs are costs which cannot be altered in any way. Sunk costs are costs which have already been uncured. For example, cost incurred in constructing a factory. When the factory building is constructed costs have already been incurred. The building has to be used for which originally envisaged. It cannot be altered when operations are increased or decreased. Investment on machinery is an example of sunk cost.

Historical and Replacement Costs:

Historical cost refers to the cost of an asset acquired in the past whereas replacement cost refers to the outlay, which has to be made for replacing an old asset. These concepts own their significance to unstable nature of price behaviour. Stable prices over a period of time, other things given, keep historical and replacement costs on par with each other. Instability in asset prices, however, makes the two costs differ from each other. Historical cost of assets is used for accounting purposes, in the assessment of net worth of the firm.

Explicit Cost and Implicit Cost:

Explicit costs are those expenses that involve cash payments. These are the actual or business costs that appear in the books of accounts. These costs include payment of wages and salaries, payment for raw-materials, interest on borrowed capital funds, rent on hired land, Taxes paid etc. These are known as Out-of-Pocket Costs.

Implicit costs are the costs of the factor units that are owned by the employer himself. It does not involve payment of cash as they are not actually incurred. It is incurred in the absence of employment of self – owned factors. The implicit costs are depreciation, interest on capital, rent of own premises, savings from salary, etc. These are known as Imputed Cost or Book Cost.

Total Cost, Average Cost & Marginal Cost:

Total cost is the total cash payment made for the input needed for production. It is the sum total of the fixed and variable costs. TC = FC + VC.

Average cost is the cost per unit of output. If is obtained by dividing the total cost (TC) by the total quantity produced (Q).

Marginal cost is the additional cost incurred to produce and additional unit of output or it is the cost of the marginal unit produced. It is ascertained for one additional product.

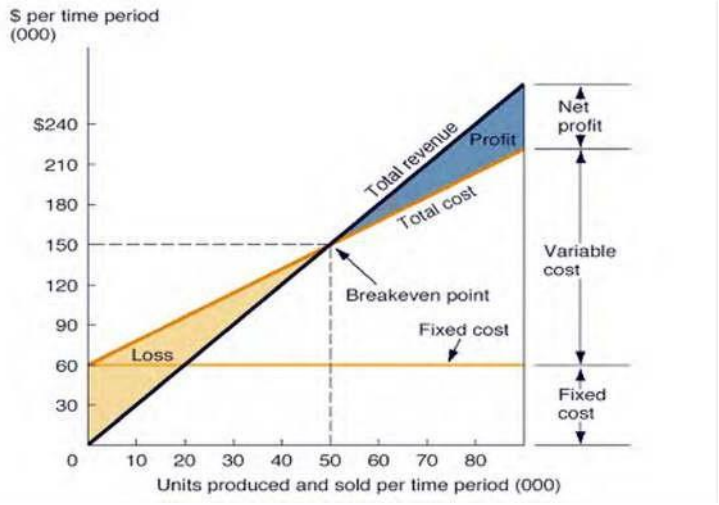
BREAK EVEN ANALYSIS

Break even analysis helps to identify the level of output and sales volume at which the firm 'breaks even'. It means the revenues are sufficient to cover all costs of production. Various managerial decisions of firms are taken by the managers based on the break- even point. It refers to the analysis of Break Even Point (BEP) i.e. no profit or no loss point.

It is a study of cost, revenues and sales of a firm and finding out the volume of sales where the firm's costs and revenues will be equal. There is no profit and no loss. The total revenue is equal to the total cost of production. The amount of money which the firm receives by the sale of its output in the market is known as revenue.

Output (units)	Total Revenue	Total Fixed Cost	Total Variable Cost	Total Cost
0	0	300	0	300
100	400	300	300	600
200	800	300	600	900
300	1200	300	900	1200
400	1500	300	1200	1500

Graph – Break Even Point



The above graph shows the break- even point of an organization. The total revenue curve (TR) and total cost curve (TC) is given. When they produce 50 units the total cost and total revenue is equal that is Rs.150000 which is at the intersecting point of the curves. Breakeven point always denotes the quantity produced or sold to equalize the revenue and cost.

When the firm produces less than 50 units the revenue earned is less than the cost of production (TR<TC) therefore in the initial period the firm incurs loss which is shown in the graph. Through selling more than 50 units the revenue increases more than the cost of production therefore the difference increases and provides profit to the organization (TR>TC).

Significance of Break-Even Analysis:

Break Even Analysis is an important tool for a business for decision making. It helps in identifying various components of costs and their impact on product of a firm. It helps in arriving at effective decisions relating to product mix, make or buy decisions, etc.:

1. It helps in determining contribution of each product.
2. It helps in determining required sales at a given level of profit.
3. To compare efficiency of different firm.
4. To decide whether to add a product to the existing or drop one from it.
5. To access the impact of changes in Fixed Cost, Variable Cost & Selling price on BEP and profits during a period.

Limitations of Break-Even Analysis:

1. Break Even Point is based on Fixed Cost, Variable Cost and Total Revenue. A change in one variable effects BEP.
2. All costs cannot be classified as Fixed & variable as there are certain semi variable costs.
3. It is based on fixed cost, so it is applicable only in short run.
4. If business conditions are volatile, BEP cannot give stable results.
5. It is applicable to single product firm; there are problems in application of multi product firms.

applicable for single product firms(not for multi product firms)
only for short run
when business conditions are volatile then it is unstable
all cost concepts cant be classified into fixed and variable costs
bep is based on variable cost,fixed cost anf total revenue.any change in any one of these effects the bep value.

make or buy decisions , determination of product mix , change in variable cost and sales , drop or add of decisions.

Application of Break-Even Analysis:

1. **Make or Buy Decisions:** The decision involves choice between the options to purchase the input from market or to manufacture by its own.
2. **Determination of product mix when there is limiting factor:** When a company manufactures a combination of two or more products using same plant or machinery, the managers have to arrive at optimum product mix.
3. **Drop or Add Decisions:** Break Even Analysis helps to know whether to add a new product to existing or drop one product from existing one.
4. **When there is change in sales & variable cost:** When there is change in price of a product the variable cost per unit will remain the same. If price is reduced there is no change in quantity sold.

DETERMINATION OF BREAK EVEN POINT

Sales = Total Cost (TC) + Profit (P) (or)

Sales = Fixed cost + Variable cost + Profit

Contribution = Sales – Variable cost (or)

Contribution = Fixed cost + Profit (or)

Contribution per unit = Sales (per unit) – VC (per unit) (or)

Contribution Ratio = (S – V / S) x % of sales (or)

Total Contribution = Total sales (Rs.) x Total Contribution Ratio

P/V Ratio = Contribution / Sales x 100 (or)

Change in Profit / Change in Sales (or)

Δ Contribution / Δ Sales (or)

S – V / S x 100

Breakeven point (units) = Fixed cost / Contribution (per unit) (or)

BEP (units) = FC / C (per unit)

Breakeven point (Value) = Fixed cost / PV Ratio (or)

BEP (Rs.) = BEP (units) x Selling price per unit (or)

BEP (Rs.) = FC / Contribution ratio

Margin of Safety (units) = Actual Sales (units) – Sales at BEP (units)

Margin of Safety (Rs.) = Actual Sales (Rs.) – Sales at BEP (Rs.) (or)

Profit / PV Ratio (or)

MoS (units) x Selling price (per unit)

Sales when profit is 'x':

Sales (units) = Fixed cost + Profit / Contribution (per unit) (or)

= F + P / S (p.u.) – V (p.u.) (or)

F + P / C (per unit)

Sales (Rs.) = Fixed cost + Profit / PV Ratio (or)

= F + P / PV Ratio

Calculation of Profit = S – VC – FC (or)

Sales (No. of units x selling price per unit)	= xxx
(-) VC (No. of units x variable cost per unit)	= xxx
Contribution	= xxx
(-) Fixed Cost	= xxx
Profit / Loss	= xxx

ILLUSTRATIONS

1. If sales are 10,000 units and selling price is Rs. 20 per unit, variable cost Rs. 10 per unit and fixed cost is Rs. 80,000. Find out BEP in units and sales revenue. What is profit earned? What should be the sales for earning a profit of Rs. 60,000/-.

Solution:

(a) BEP (units) = FC / Contribution
= 80000 / 10 = 8000 units
Contribution = Sales – VC = 20 – 10 = 10

(b) Sales = BEP (units) x Selling price per unit
= 8000 units x Rs.20 = Rs.160000

(c) Sales when profit is Rs.60000
S = F + P / S - V
= 80000 + 60000 / 20 - 10
= 140000 / 10 = 14,000 units
Sales = 14,000 units x 20 = Rs.2,80,000

Verify:

Profit = Sales – VC – FC
= 280000 – (14000 x 10) – 80000
= 280000 – 140000 – 80000 = 60000

2. XYZ Company has supplied you the following information.
Selling price per unit Rs. 30,
No. of units sold 20,000 units
Fixed cost Rs. 2, 40, 000

Variable cost per unit Rs. 15
Find out: (i) BEP in units & Rs.
(ii) Margin of safety
(iii) Sales to get a profit of Rs. 2,00,000
(iv) Verify the results in all the above cases

Solution:

(i) BEP (Units) = Fixed Cost / Contribution per unit
= 240000 / (30-15) = 16000 units

BEP (Rs.) = Fixed Cost / PV Ratio
= 240000 / 0.50 = Rs.480000
P/V Ratio = Contribution / Sales x 100
= 15 / 30 x 100 = 0.50 or 50%

(ii) Margin of Safety (units) = Actual Sales – BEP Sales (units)
= 20000 – 16000 = 16000 units

Margin of Safety (Rs.) = Actual Sales – BEP Sales (Rs.)
= (20000 units x 30) - 480000
= 600000 – 480000 = Rs.120000

(iii) Sales to get a profit of Rs.200000
S = F + P / C
= 240000 + 200000 / 15
= 440000 / 15 = 29333.33 units
Sales = 29333.33 units x 30 = Rs.880000
(or)
Sales + VC = FC + Profit
Let no. of units = x
30x - 15x = 240000 + 200000
15x = 440000
x = 440000/15
x = 29333.33
Therefore, Sales = 29333.33 x 30 = Rs.880000

(iv) Verification:
i) Contribution at BEP – FC = 0
(16000 units x 15) – 240000 = 0
ii) Sales – BEP sales
(20000 units x 30) – (16000 x 30) = Rs.120000
iii) Profit = C – FC
(880000 x 50%) - 240000 = Rs.200000

3. A firm manufactures two products viz. P and Q. The firm wants to drop the product Q as it is yielding less contribution per unit and add the product R. By adding the product R, the new fixed cost is likely to be Rs. 2,50,000/- and the sales volume will increase to Rs.18,00,000/- Consider the following information and suggest whether the firm should change the product or not.

Existing Product-mix

Product	Selling price/ per unit (Rs.)	Variable cost/ per unit (Rs.)	% of sales
P	80	32	60
Q	100	40	40

The total fixed cost during the year is Rs. 200,000/- and sales are Rs. 16,00,000/-

Proposed Product-mix

Product	Selling price/ per unit (Rs.)	Variable cost/ per unit (Rs.)	% of sales
P	100	40	30
R	120	48	70

Solution:

(b) Existing Product-mix

Contribution ratio for product P & Q =

(Selling price – Variable cost / Selling price) x percentage of total sales

Product P = (80 – 32 / 80) x 0.60 = 0.36

Product Q = (100 – 40 / 100) x 0.40 = 0.24

Total contribution ratio for P & Q = P + Q = 0.36 + 0.24 = 0.60

Total contribution = sales x contribution ratio = 1600000 x 0.60 = 960000

Profit = total contribution – fixed cost = 960000 – 200000 = 760000

(b) Proposed Product-mix

Contribution ratio for product P & R =

(Selling price – Variable cost / Selling price) x percentage of total sales

Product P = (100 – 40 / 100) x 0.30 = 0.18

Product R = (120 – 48 / 120) x 0.70 = 0.42

Total contribution ratio for P & Q = P + Q = 0.18 + 0.42 = 0.60

Total contribution = sales x contribution ratio = 1800000 x 0.60 = 1080000

Profit = total contribution – fixed cost = 1080000 - 250000 = 830000

Recommendation:

The profit in proposed product-mix is higher than the existing product mix and hence the firm can change the product mix.

4. A company estimates its fixed costs for the year at Rs. 8, 00,000 and its profit target at Rs.2,00,000. Each unit of product is sold at Rs. 10 and variable cost per unit is Rs.8. What sales level must the company achieve in order to realize its profit goal?

   Solution:

   Sales to get a profit of Rs.200000

   S = F + P / C

   = 800000 + 200000 / (10-8)

   = 1000000 / 2 = 500000 units

   Sales = 500000 units x 10 = Rs.5000000

Verify:

Profit = Sales – VC – FC
= 5000000 – (500000 x 8) – 800000
= 5000000 – 4000000 – 800000
= 200000

MARKET STRUCTURES

Market generally means a place or a geographical area, where buyers with money and sellers with their goods meet to exchange goods for money. In Economics market refers to a group of buyers and sellers who involve in the transaction of commodities and services.

Market structure can be defined as a group of industries characterised by number of buyers and sellers in the market, level and type of competition, degree of differentiation in products and entry and exit of organisations from the market. The study of market structure helps organisations in understanding the functioning of different firms under different circumstances. Based on the study, organisations can make effective business decisions. Based on the competition, the market structures can be classified as:

1. Perfect competition
2. Monopoly
3. Monopolistic competition

PERFECT COMPETITION

Perfect competition refers to a market structure where competition among the sellers and buyers prevails in its most perfect form. In a perfectly competitive market, a single market price prevails for the commodity, which is determined by the forces of total demand and total supply in the market.

- In the words of Spencer, "Perfect competition is the name given to an industry or to a market characterised by a large number of buyers and sellers all engaged in the purchase and sale of a homogeneous commodity, with perfect knowledge of market price and quantities, no discrimination and perfect mobility of resources."
- According to Bilas, "The perfect competition is characterised by the presence of many firms. They all sell identical products. The seller is a price taker, not price maker."
- In the words of Prof. Leftwitch, "Perfect competition is a market in which there are many firms selling identical products with no firm large enough relative to the entire market to be able to influence the market price."

Thus, from the definitions it can be concluded that perfect competition is a market where various firms selling identical products exist along with a large number of buyers who are well aware of the prices. However, the existence of perfect competition is not possible in the real world.

Features of Perfect Competition:

1. **Large number of buyers and sellers:** There are a large number of buyers and sellers in a perfect competitive market that neither a single buyer nor a single seller can influence the price. The price is determined by market forces namely the demand for and the supply of the product. There will be uniform price in the market. Sellers accept this price and adjust the quantity produced to maximise their profit. Thus, the sellers in the perfect competitive market are price- takers and quantity adjusters.

2. **Homogeneous Product:** The products produced by all the firms in the perfectly competitive market must be homogeneous and identical in all respects i.e. the products in the market are the same in quantity, size, taste, etc. The products of different firms are perfect substitutes and the cross elasticity is infinite.
3. **Perfect knowledge about market conditions:** Both buyers and sellers are fully aware of the current price in the market. Therefore, the buyer will not offer high price and the sellers will not accept a price less than the one prevailing in the market.
4. **Free entry and Free exit:** There must be complete freedom for the entry of new firms or the exit of the existing firms from the industry. When the existing firms are earning super-normal profits, new firms enter into the market. When there is loss in the industry, some firms leave the industry. The free entry and free exit are possible only in the long run. That is because the size of the plant cannot be changed in the short run.
5. **Perfect mobility of factors of production:** The factors of productions should be free to move from one use to another or from one industry to another easily to get better remuneration. The assumption of perfect mobility of factors is essential to fulfil the first condition namely large number of producers in the market.
6. **Absence of transport cost:** In a perfectly competitive market, it is assumed that there are no transport costs. Under perfect competition, a commodity is sold at uniform price throughout the market. If transport cost is incurred, the firms nearer to the market will charge a low price than the firms far away. Hence it is assumed that there is no transport cost.
7. **Absence of Government or artificial restrictions or collusions:** There are no government controls or restrictions on supply, pricing etc. There is also no collusion among buyers or sellers. The price in the perfectly competitive market is free to change in response to changes in demand and supply conditions.

MONOPOLY

Monopoly can be defined as a market structure, wherein a single producer or seller has a control on the entire market. The term monopoly has been derived from a Greek word Monopolian, which means a single seller. Thus, in monopoly, a single seller deals in the products that have no close substitutes in the market.

- In the words of Prof. chamberlain, “Monopoly refers to the control over supply.”
- According to Prof. Thomas, “Broadly, the term monopoly is used to cover any effective price control, whether of supply or demand of services or goods; narrowly it is used to mean a combination of manufacturers or merchants to control the supply price of commodities or services.”
- In the words of Robert Triffin, “Monopoly is a market situation in which the firm is independent of price changes in the product of each and every other firm.”

A single firm in the industry can control either supply or price of a product but cannot control demand. If it decides price it cannot determine supply, vice versa. Monopoly exists where there are restrictions on entry of other firms in to business or where there are no close substitutes for a product. Interpretation can be made by two approaches:

1. When there is only one supply it is pure monopoly. Ex: RBI
2. Where the firm is supplying half of the total market may have greater market power, rest of market is shared by other firms.

Features of Monopoly:

1. **Single Seller:** Under monopoly market structure, there is always a single seller producing large quantities of the products. Due to availability of only one seller, buyers are forced to purchase from the only seller. This results in total control on the supply of products by the seller in the market. Moreover, the seller has complete power to decide the price of products.
2. **Absence of Substitutes:** Another important characteristic of monopoly is the absence of substitutes of the products in the market. In addition, differentiated products are absent in the case of monopoly market.
3. **Price**: The monopolist has control over the supply so as to increase the price. Sometimes he may adopt price discrimination. He may fix different prices for different sets of consumers. A monopolist can either fix the price or quantity of output; but he cannot do both, at the same time.
4. **Barriers to Entry:** There is no freedom to other producers to enter the market as the monopolist is enjoying monopoly power. There are strong barriers for new firms to enter. There are legal, technological, economic and natural obstacles, which may block the entry of new producers.
5. **Limited information:** Under monopoly, information cannot be disseminated in the market and is restricted to the organization and its employees. Such information is not easily available to public or other organisations. This type of information generally comes in the form of patents, copyrights or trademarks.
6. **Firm and Industry:** Under monopoly, there is no difference between a firm and an industry. As there is only one firm, that single firm constitutes the whole industry.

MONOPOLISTIC COMPETITION

Monopolistic competition, as the name itself implies, is a blending of monopoly and competition. Monopolistic competition is a type of imperfect competition, wherein a large number of sellers are engaged in offering heterogeneous products for sale to buyers. Edward. H. Chamberlain of Harward University developed the theory of monopolistic competition, which presents a more realistic picture of the actual market structure and the nature of competition.

In the words of J.S. Bains, “Monopolistic competition is a market structure where there are a large number of small sellers, selling differentiated, but close substitute products.”

Monopolistic competition refers to the market situation in which a large number of sellers produce goods which are close substitutes of one another. The products are similar but not identical. The particular brand of product will have a group of loyal consumers. In this respect, each firm will have some monopoly and at the same time the firm has to compete in the market with the other firms as they produce a fair substitute. The essential features of monopolistic competition are product differentiation and existence of many sellers.

The following are the examples of monopolistic competition in Indian context.

- Shampoo - Sun Silk, Clinic Plus, Ponds, Chik, Velvette, Kadal, Head and Shoulder, Pantene, Vatika, Garnier, Meera
- Tooth Paste - Binaca, Colgate, Forhans, Close-up, Promise, Pepsodent, Vicco Vajradanti, Ajanta, Anchor, Babool.

Features of Monopolistic Competition:

1. **Existence of large number of firms:** Under monopolistic competition, the number of firms producing a commodity will be very large. The term 'very large' denotes that contribution of each firm towards the total demand of the product is small. Each firm will act independently on the basis of product differentiation and each firm determines its price-output policies. Any action of the individual firm in increasing or decreasing the output will have little or no effect on other firms.
2. **Product Differentiation:** Products can be differentiated by means of unique facilities, advertising, brand loyalty, and so on. Through heavy advertisement budgets, Pepsi and Coco Cola make it very expensive for a third competitor to enter the cola market.
3. **Large Number of Buyers:** There are a large number of buyers in the market. But the buyers have their own brand preferences. Each seller has to plan various incentive schemes to retain the customers who patronize his products.
4. **Free Entry and Exit of Firms:** There is freedom of entry and exit. That is, there is no barrier as found under monopoly.
5. **Restricted mobility:** Dissimilar to perfect competition, the factors of production are not perfectly mobile in monopolistic competition. This is due to organisation's willingness to pay heavy transportation costs to move the factors of production or goods and services. This results in difference in the prices of products of organisations.
6. **Price control policy:** Under monopolistic competition, organisations do not have much control over the price of the product. If the prices of products are higher, then the buyers would switch to other sellers due to close substitutability of products. Therefore, the price policy of competitors greatly influences the price policy of an organisation.
7. **Imperfect Knowledge:** Imperfect knowledge about the product leads to monopolistic competition. If the buyers are fully aware of the quality of the product they cannot be influenced much by advertisement or other sales promotion techniques.
8. **Non-Identical Products:** Under monopolistic competition, the products of various firms are not identical though they are close substitutes. Prof. Chamberlain calls these collections of firms producing close substitute products as a group.

IMPORTANT QUESTIONS

1. Define production function. What are the types of production function?
2. What are Laws of Variable Proportions? Explain with an illustration.
3. Explain the concepts of Iso-Quants and Iso-Costs. Analyze how the manufacturer reaches the least cost combination of inputs. Illustrate.
4. Define returns to scale. What is the significance of increasing, decreasing and constant returns to scale?
5. Explain different cost concepts which are essential for business decisions.
6. What is meant by Break Even Analysis? Explain with graphical representation.
7. Discuss the managerial implications of Break-Even analysis. Explain its significance and limitations?
8. What is perfect competition? Explain the features of perfect competition.
9. What is a monopoly? Explain the features of a monopoly market structure.
10. What is monopolistic competition? Explain the features of monopolistic competition.

EXERCISES

1. From the following information calculate:
   i) Margin of Safety, ii) Total sales, and iii) Variable cost
   Fixed costs Rs. 12,000
   Profit Rs. 1,000
   Break-Even Sales Rs.60,000

2. The information about Raj and Co., are given below:
   i. Profit-Volume Ratio is 20%
   ii. Fixed costs Rs. 36000
   iii. Selling price per unit Rs. 150

   Calculate:
   i) BEP (in units & value)
   ii) Variable Cost per Unit
   iii) Selling Price per Unit

3. A company reported the following results for two periods.

Period	Sales	Profit
I	Rs.20,00,000	Rs.2,00,000
II	Rs.25,00,000	Rs.3,00,000

   Ascertain the BEP, P/V Ratio, Fixed cost and Margin of Safety.

4. Sales are Rs.1,10,000 yielding a profit of Rs. 4,000 in period-I;
   Sales are Rs.1, 50,000 with a profit of Rs. 12,000 in period-II.
   Determine BEP and Fixed Cost.

5. The P/V Ratio of Matrix Books Ltd is 40% and the Margin of safety is 30%. You are required to work out the BEP and Net Profit, if the Sales Volume is Rs.14,000.

6. ABC Company has supplied the following data:
   No. of units sold 30,000
   Fixed cost Rs. 1,50,000
   Variable cost per unit Rs. 10
   Selling price per unit Rs. 20

   Find out:
   (a) BEP in units and in Rupees
   (b) Margin of safety
   (c) Sales to get a profit of Rs. 3,00,000
   (d) Profit when the variable cost increases by 5%
   (e) BEP and Margin of safety when selling price increases by 5%

7. A Company prepares a budget to produce 3,00,000 Units, with fixed costs as Rs.15, 00,000 and average variable cost of Rs.10 per unit. The selling price is to yield 20% profit on cost. You are required to calculate:
   a) P/V Ratio
   b) BEP in Rs and in Units.

8. If sales are 20,000 units and selling price is Rs 15 per unit, variable cost Rs. 10 per unit and fixed cost is Rs. 1, 00,000. Find out BEP in units and in sales rupee value. What is profit earned? What should be the sales for earning a profit of Rs. 50,000.

9. ABC company has supplied the following data:
   No. of units sold 40,000 units
   Fixed cost Rs. 2, 20,000
   Variable cost per unit Rs. 10
   Selling price per unit Rs. 30
   Find out: (1) BEP in units & value
   (2) Margin of safety
   (3) Sales to get a profit of Rs. 3,00,000
   (4) Profit when sales are 45,000 units
   (5) BEP and Margin of safety when variable cost increases by 10%
   (6) BEP and Margin of safety when selling price increases by 5%

10. You are given the following information about two companies.

Particulars	Company A	Company B
Sales	Rs.50,00,000	Rs.50,00,000
Fixed Expenses	Rs.12,00,000	Rs.17,00,000
Variable Expenses	Rs.35,00,000	Rs.30,00,000

You are required to Calculate (For Both Companies)

a) BEP (in Rs.)
b) P/V Ratio
c) Margin of safety
d) BEP and Margin of safety when selling price increases by 10%
e) Profit when the variable cost is increased by 5%