30/08/2023

UNIT - I

INTRODUCTION TO MANAGERIAL ECONOMICS, DEMAND AND DEMAND FORECASTING.

Managerial Economics

Managerial Economics is defined as application of economic principles, tools and techniques in the business, decision making process.

» Management is the art of organizing things in a manner such that the desired goal is achieved.

» It is the process of achieving objectives, effectively & efficiently. Process includes various tasks like managing resources, people.

» Economics : It is the optimal way of utilizing the resources which results in the maximum benefits.

Steps in Decision making process

- define the problem
- analyze the problem
- identify the appropriate solutions
- analyze each solution of course of action
- select the best course of action.
- implement the course of action.

Managerial economics help to perform the above steps.

Nature of managerial economics

It provides the optimal solution for the business problem.

1) Micro Economics in nature

» deals with individual companies or industry but not with aggregate problems

2) It is a normative economics

» works within the certain norms or set of policies ~~set~~ and rules specified

3) It is a prescriptive, rather than descriptive.

» ~~provide~~ prescribe what actions need to be done, how to utilize the resources. But doesn't ~~descriptive~~ describe about situations

4) It uses theory of firm

» Theory of firm is the branch of economics that deals with the firm that define the ways to earn maximum profits. It tells why & how the firm exists

5) It uses concepts of macro economics

» Macro economics deals with inflation, unemployment and other problems of country.

» These need to be considered during the decision making proce

05/9/2023

Management Decision problems

↓

Economics → managerial Economics ← Decisional sciences

↓

Optimal solution

~~Features~~

6) It is a pragmatic ie, deals with practical problems

Scope of managerial economics

1) Theory of demand

» understand and estimating the demand.

manufactured quantity, sold quantity are not demands.

» Demand is a quantity that the customer is willing to buy.

ways to increase demand :

» provide awareness to customers

» provide statistical data

» project the future using past details of trend.

» customer income, price etc. are the factors that influence demand.

2) Theory of production

» we learn cost minimization and product maximization techniques

» understand best combination of products to manufacture so that, maximum profits are gained.

3) Theory of exchange (or) Price Theory

» understand about markets, characteristics, players.

4) Theory of capital (or) and Investment

» understand the capital required

5) Theory of profit

» understand the amount of profits and how it should be re-invested.

6) Environmental Issues

social environment
economic
political
technological
legal

Importance of managerial Economics

» It integrates economic concepts with business administrative practice for smooth operations.

- helps to solve the problems regarding marketing, customer's behaviour

» Identifying the economic variables like demand, production quantity, income of the customer etc. and establishing the relationship among the variables.

» Prediction or forecasting the quantities of economic variables

» To understand the influence of various external factors

on business decisions. (factors include social, economic, govt)

» To set the business policies and strategies to achieve the objectives of business based on findings of managerial economics. ↳ (expanding business, diversifying, profit maximization). Helps to formulate the business process.

Demand Analysis

on business decisions. (factors include social, economic, govt)

» To set the business policies and strategies to achieve the objectives of business based on findings of managerial economics. ↳ (expanding business, diversifying, profit maximization). Helps to formulate the business process.

06/09/2023

Demand Analysis

» Demand is the quantity of product ~~whic~~ that the customer is willing to buy at a particular price and given point of time.

Elements of demand

1) Desire to purchase a product
2) willingness to pay
3) Ability to pay

When these 3 elements are satisfied, then the demand is said to have from the customer.

Identifying the demand is important to answer various questions.

Demand Function

» It is a functional relationship b/w the demand for a product and its determinants / factors.

$$D_x = f(\underbrace{P_x, P_y, P_z, I, A, E, T}_{\text{common determinants}}, \ldots U)$$

P_x → price; P_y → substitute (or) alternate; U → unknown factors

P_x : price of product If P_x ↑ses then D_x ↓ses $P_x \propto \frac{1}{D_x}$

P_y : price of product substitute / product alternate $P_y \propto D_x$

P_y ↑ then D_x ↑ses

Z : complementary item, that influences demand for x. This item must be used along with the actual product.

P_Z ↑ses then D_x ↓ses $P_Z \propto \frac{1}{D_x}$

Ex: Electricity ↑, demand on ACs ↓

I : Income of customer If I ↑ses then, D_x ↑ses $I \propto D_x$

A : Advertisements made by seller.

They ~~cho~~ manipulate the demand by agitating customers.

life cycle of product

Ex: mobiles.

landlines → Telephones → cellphones

(less demand) ------> (more demand)

more ads are required.

~~When sales get increa~~

When product reaches its ~~death~~ ~~mature~~ death/matured state then, ads make no impact. (Ex: BSNL)

T : Taste and preference of customers.

E : Expectations of customers.

Determinants of Demand

1) P_x : price of own product

2) P_y : price of substitute product

3) P_z : price of complimentary item.

4) I : Income/ budget

5) A : Advertisement / promotions

6) E : Expectations of customers

7) T : Taste / preference of customers

8) U : other unknown factors.

Types of demands.

① a) Individual demand : demand of a particular customer

b) Total demand : demands of aggregate of customer.

Climate conditions do not affect individual demand.

Income

~~Durable~~

② a) Demand for durable item

b) Demand for perishable item : Income has less influence.

③ a) Short period demand Ex: demand for function halls.

b) long period demand

④ a) Industry specific demand.

b) Firm specific demand

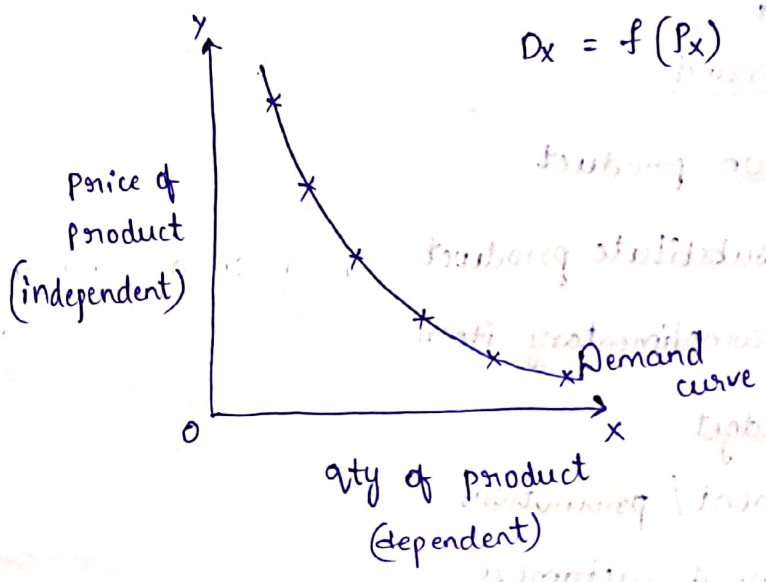
Law of Demand (Inverse relation b/w price & demand:)

» It states that when other factors remain same, higher the price, lower the quantity demanded ; smaller the price, higher the quantity demanded.

Ex: when $P_y, P_z, I, A, E, T, \ldots, U$ remain constant then,

if P_x ↑ses then D_x ↓ses and viceversa.

$D_x = f(P_x)$



demand is dependent var

Price is independent var

∵ price influences demand

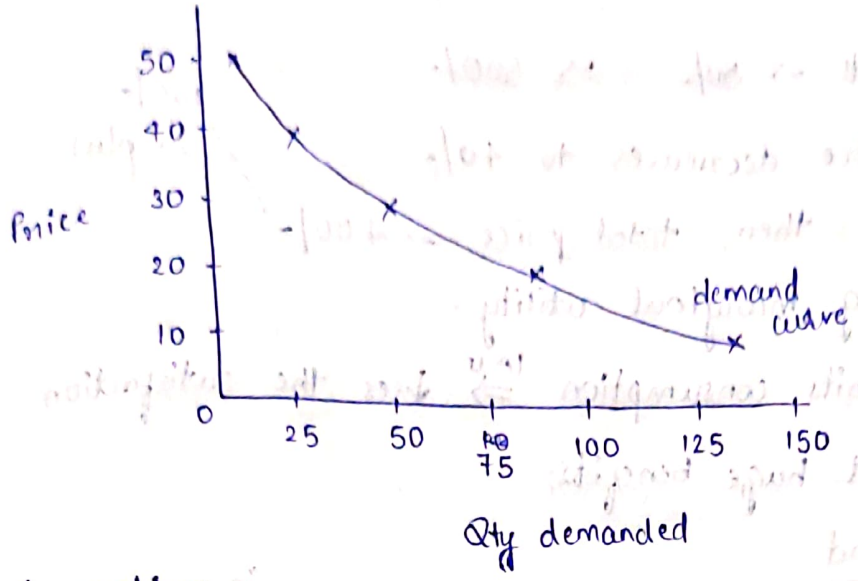
Assumptions of Law of demand

» It is assumed that remaining factors remain constant

12/09/2023

Demand schedule

P (₹)	Qty (units)
50/-	10
40/-	25
30/-	50
20/-	85
10/-	130

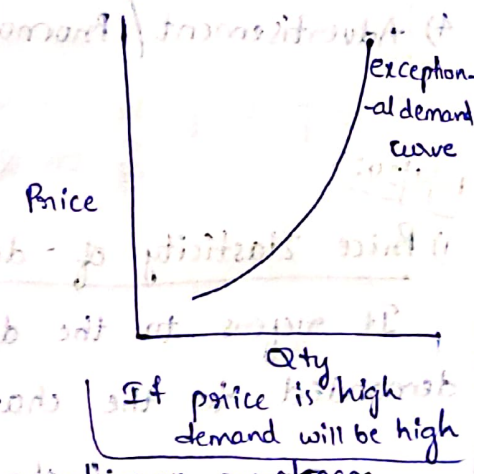


Assumptions

1) There is no change in prices of related products.
   ie, substitute item prices and complementary item prices.
2) There is no change in customer income level.
3) Advertisement level or budget is not going to change.
4) No change in customer's taste and preferences
5) No further expectations of customer

Exceptions

1) Inferior items or giffen goods — low quality items price ↓ demand is also low ↓
2) luxury items or veblen goods
   If Prices ↑ then, demand ↑ses



3) Necessary items or emergencies
4) Conspicuous necessities.
   ↳ assumed
   They are the assumed necessities.
5) ~~Wand~~ Bandwagon effect.
   Irrespective of need/necessity, customer purchases because of the influence that is being created.
   This doesn't follow law of demand

Reasons

Ex: for 10 units ⇒ 50/- ⇒ 500/-

let the price decreases to 40/-

then, total price ⇒ 400/-

100/- surplus.

⇒ Law of diminishing marginal utility.

additional units consumption leads ⇒ ↓ses the satisfaction unless they get huge benefits.

Elasticity of demand

It refers to the measure of responsiveness in quantity demanded for a given product to the changes in its determinants.

law of demand donot give to what extent the demand has decreased when prices are increased.

Types of Elasticity of demand

1) Price Elasticity of demand
2) Income Elasticity of demand
3) Cross Elasticity of demand — relation b/w P_y & Q_x
4) Advertisement / Promotional Elasticity → how ads budget influence demand

→ Impact of P_y on Q_x

P_z on Q_x

Elasticity Coefficient

If it is 1.5 then, for every 1% increase of price, there will be 1.5% decrease of demand.

13/9/2023

1) Price Elasticity of demand.

It refers to the degree of responsiveness in quantity demanded to the change in the price of the product.

$$EP \text{ (Elasticity of Price)} = \frac{\% \text{ change in qty demanded}}{\% \text{ change in price}}$$

$$= \frac{\Delta Q}{Q} \div \frac{\Delta P}{P} = \frac{\Delta Q}{\Delta P} \times \frac{P}{Q}$$

Ex:- P = 10/- Q = 100 units

P_1 = 11/- Q_1 = 85 units

$$EP = \frac{100-85}{11-10} \times \frac{10}{100} = \frac{-15}{10} = -1.5$$

It means, for 1% change (increase) in price, there is change (decrease) of 1.5% of qty and vice versa.

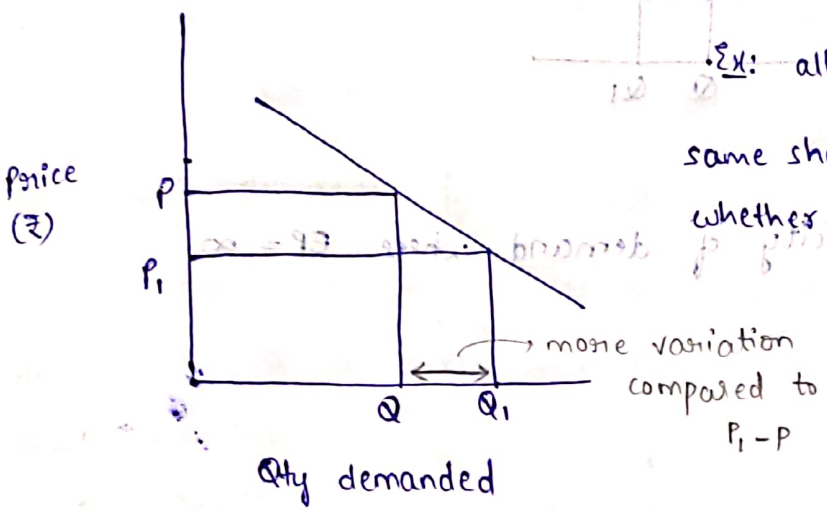
Types of Price Elasticity demand :-

(1) Relatively elasticity of demand where $EP > 1$

$$\frac{\Delta Q}{Q} > \frac{\Delta P}{P}$$

(Proportional change in qty is more than proportional change in price)

Ex: all comfort items.



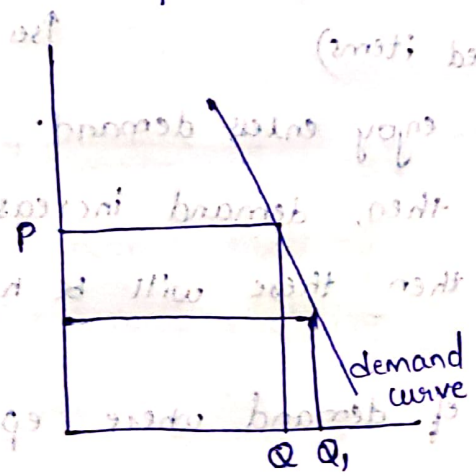
same shape of demand curve, whether it is ↑sed or ↓sed.

Ex: small discount of Amazon products, demand ↑ses more.

(or) Fabrics or Textile prices decreases, demand ↑ses.

(2) Relatively inelasticity of demand where $EP < 1$

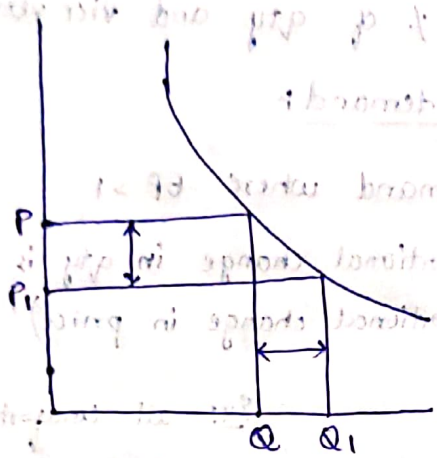
$$\frac{\Delta Q}{Q} < \frac{\Delta P}{P}$$



Even though prices ↓se hugely on groceries (essential items) there will be less variation in qty consumed:

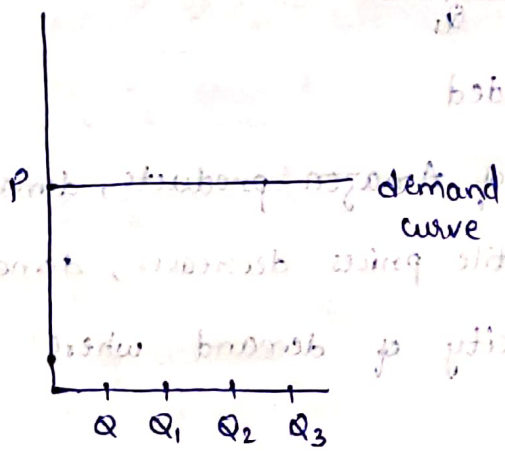
(3) Unitary Price Elasticity where, $EP = 1$

$$\frac{\Delta Q}{Q} = \frac{\Delta P}{P}$$



(4) Perfectly elasticity of demand where $EP = \infty$

$$\frac{\Delta Q}{Q} = \infty$$



endless demand whether price ↑ses or ↓ses.

Ex: Petrol (govt. regulated items)

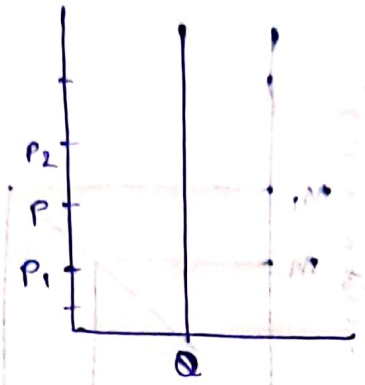
At given price, people enjoy enless demand.

If price increases then, demand increases

If price decreases then there will be no demand

(5) Perfectly inelasticity of demand where $ep = 0$

$$\frac{\Delta Q}{Q} = 0$$



same demand for any price.

Neutral items are not influenced by any factor

Ex: salt (All essential items)

~~whether~~ Irrespective of the price (10/-, 20/-, 50/- per kg); we consume same quantity.

2) Income Elasticity of demand.

It refers to the degree of responsiveness in qty demanded to a given change in monthly income of the customer.

em (elasticity of monthly income)

$$em = \frac{\% \text{ change in qty demanded}}{\% \text{ change in monthly income of customer}}$$

$$\Rightarrow em = \frac{\Delta Q}{Q} \div \frac{\Delta m}{m}$$

$$\Rightarrow em = \frac{\Delta Q}{\Delta m} \times \frac{m}{Q}$$

Types of income elasticity :-

(1) Positive income elasticity

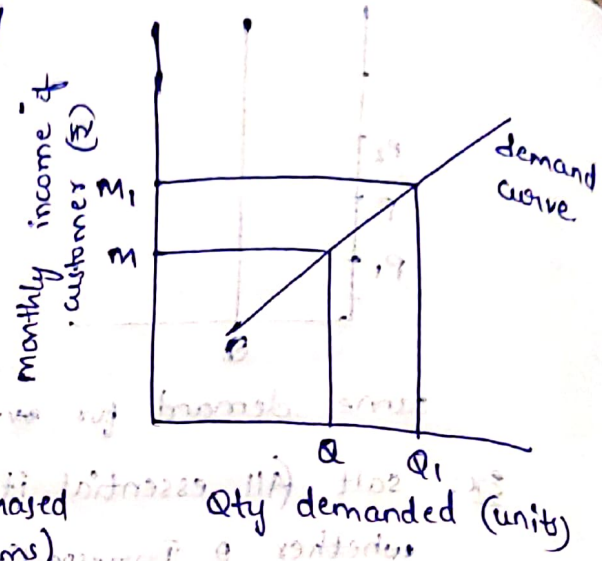
(2) Negative income elasticity

(3) Zero income elasticity.

(i) Positive income elasticity

(i) $e_m > 1$

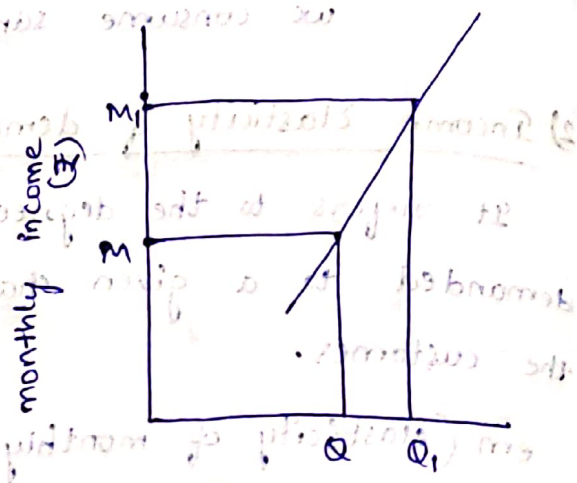
$$\frac{\Delta Q}{Q} > \frac{\Delta m}{m}$$



Ex:- With small rise in salary, more households are purchased (all comfort items)

(ii) $e_m < 1$

$$\frac{\Delta Q}{Q} < \frac{\Delta m}{m}$$

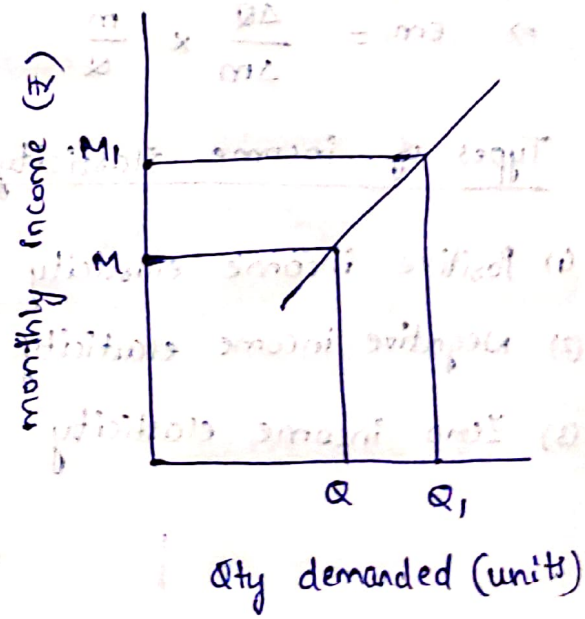


Ex:- If a person gets 50% more income, he will not buy 50% more items.

(iii) unitary income elasticity

$e_m = 1$

$$\frac{\Delta Q}{Q} = \frac{\Delta m}{m}$$

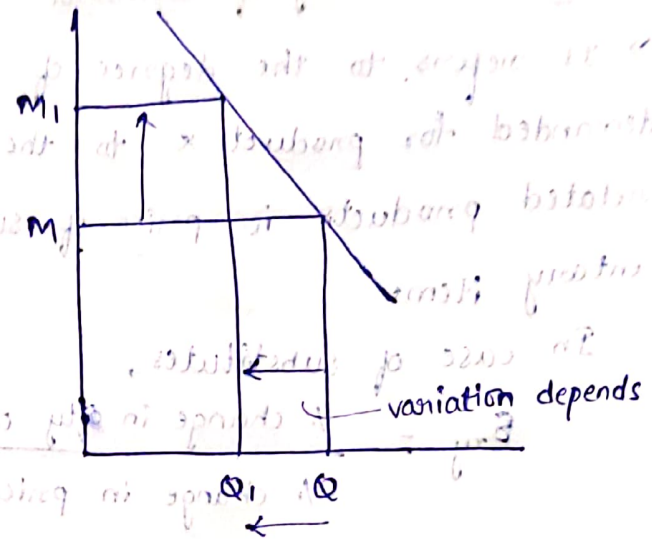


(2) Negative income elasticity

$e_m < 1$

$\frac{\Delta Q}{Q} < 1$

Ex: low quality items.



(3) Zero income elasticity

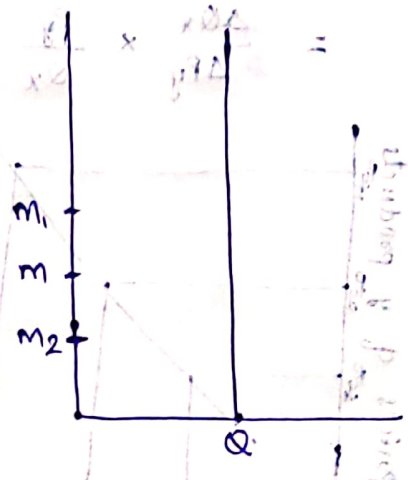
$e_m = 0$

$\frac{\Delta Q}{Q} = 0$

Ex: (Essential items
&
Neutral items)

demand - constant

monthly income may ↑se or ↓se



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3) Cross Elasticity of Demand

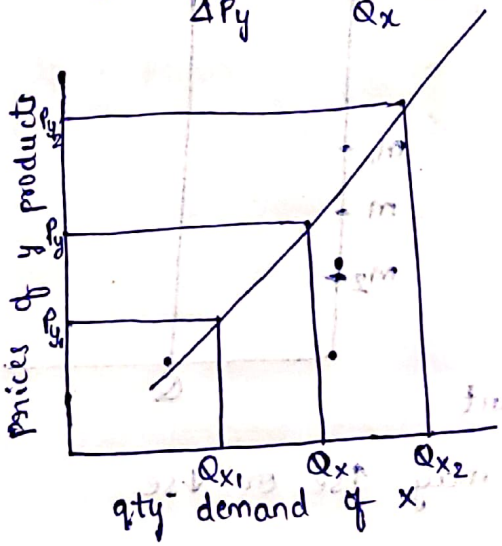
» It refers to the degree of responsiveness in quantity demanded for product x to the given change in prices of related products ie, price of substitute items or price of complementary items.

In case of substitutes,

$$E_{xy} = \frac{\text{\% change in qty of product x}}{\text{\% change in price of substitute item}}$$

$$= \frac{\Delta Q_x}{Q_x} \div \frac{\Delta P_y}{P_y}$$

$$= \frac{\Delta Q_x}{\Delta P_y} \times \frac{P_y}{Q_x}$$



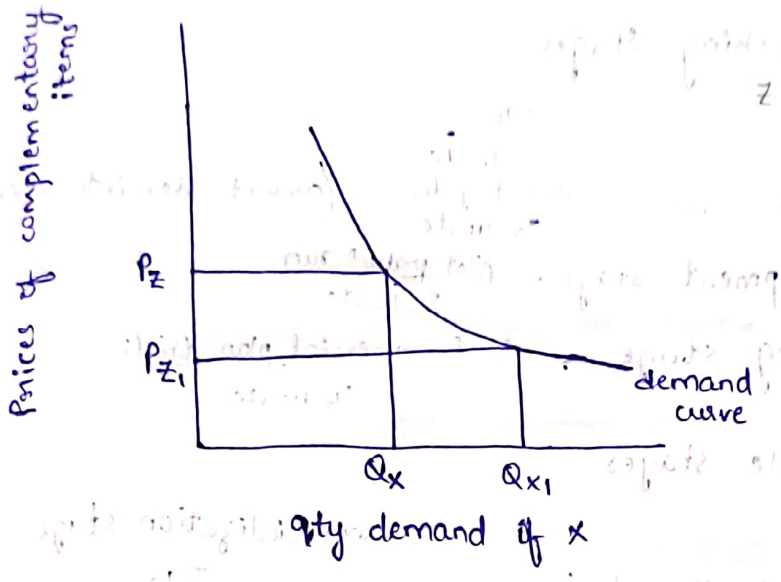
Ex: If price of coffee ↑se, demand for Tea ↑ses

In case of complementary items, (which must be used along with main item)

$$e_{xz} = \frac{\text{\% change in qty of product x}}{\text{\% change in prices of complementary items}}$$

$$= \frac{\Delta Q_x}{Q_x} \div \frac{\Delta P_z}{P_z}$$

$$= \frac{\Delta Q_x}{\Delta P_z} \times \frac{P_z}{Q_x}$$



Z must be accompanied with x

4) <u>Advertisement / Promotional elasticity of demand</u>

It refers to the degree of responsiveness in quantity demanded to the given change in advertisement budget or promotional expenditure.

$$e_a = \frac{\%\text{ change in advertisement budget}}{}$$

$$\text{AED} = \frac{\%\text{ change in qty demanded}}{\%\text{ change in spending on advertising}}$$

$$= \frac{\Delta Q_d}{Q_d} \div \frac{\Delta A}{A}$$

$$= \frac{\Delta Q_d}{\Delta A} \times \frac{A}{Q_d}$$

<u>Factors influencing Advertising Elasticity of Demand:</u>

1) Stage of Product's development
2) Degree of competition
3) Effects of Advertising in Terms of Time:
4) Effect of Advertising by Rival Firms

1) Product Pre Launching Stages

Idea stage — Idea, Evaluate

Concept stage — laboratory dev., Evaluate (convert idea into concept)

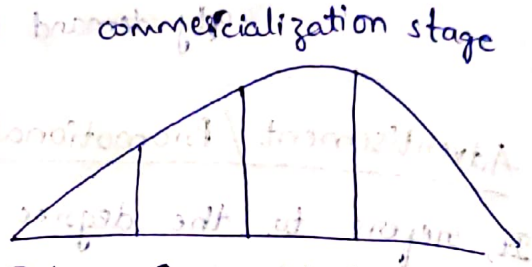
Product development stage — pilot product run, Evaluate

Test marketing stage — semi commercial plan trials, Evaluate

Product life cycle stages

Intro, Growth, Maturity } advertisement is necessary.

decline.



Intro → requires more advmt

Growth → innovative customers

Maturity → max sales ~~decrease~~

Decline → sales get decreased, no use of advmt

2) more competition ⇒ innovations ↑se

3)

4) advertising by competiting with other rival firms.

19/9/2023

Elasticity coeff

It measures the relative measure of demand w.r.to other factors. But, absolute quantity cannot be determined.

Demand forecasting (foresee the future demand)

Here, we estimate / predict the demand of future

- survey methods : take opinions from customers by interviewing
- statistical methods : we use past data to predict the future demand of data

Sales vs demand

Sales → quantity that has already been sold

demand → quantity that will be sold in future

Total Demand

Growth

Trend

Definition of Demand forecasting :-

It's the process of finding values ~~of~~ for demand in future time periods.

It's the process of making estimations about future customer demand over a defined period.

defined period → next year or next month or next 2 yrs.

Methods of Demand Forecasting

- Opinion Polling (Expensive) (surveys) method
  - ~~Customers~~ consumers survey method (customers)
    - Complete Enumeration
    - sample survey & test marketing
  - Sales force opinion method — sales men have complete info abt demand. They interact with middle men
  - Experts opinion method — consultant, Retail shopping, Technology provider
- Statistical method (not expensive)
  - Trend Projection method — identify trend values
    - fitting Trend line by observation
  - Barometric method — how economy is moving. Ex:- purchase/demand of tractors depends on income of farmers. past, present, future
  - Regression method — Independent vars, dependent vars
  - Simultaneous Equation method — to study the relation between independent & dependent vars. Ex: price influence demand. Also, Demand influence price

Demand forecasting enables an organization to take various business decisions, such as :

» planning production process
» purchasing raw materials
» managing funds and
» deciding the price of product

without estimating demand; we cannot determine

Steps of Demand Forecasting (DF)

Setting the objective → Determining Time period → selecting method for DF → Collecting data → Estimating Results

- objective - what is required
- for which period, demand is to be estimated
- select the simple method that gives best results. accuracy, cost, time, flexibility
- may be Primary (∞) which is not collected before; secondary which was used before for other purpose
- predict the results

~~Flexibility factors~~

Significance of demand forecasting

i) Fulfilling objectives : helps organizations to move forward to achieve the set goals by estimating current demand

ii) Preparing the budget : Budget specifies target to be achieved

iii) Stabilizing employment & production : helps organizatn to control its production and recruitment activities

iv) Expanding organizations : helps in deciding about expansion of business of the organization

v) Taking management decisions : helps in making critical decisions, such as plant capacity, raw material requirement

vi) Evaluating performance : helps in making corrections.

vii) Helping Government : enables govt. to coordinate imports & exports & international trade

Factors influencing DF

1) Types of products
   consumer goods, industrial products (machinery, raw materials,..)
   shelf life (durable/ perishable)
   for new products, demand forecasting is not possible

2) Level of Technology
   there will more scope
   when a product reaches its maturity state, new technologies are introduced to prolong its durability.

3) Competition level.
   more competition => more innovations. & new products are developed.

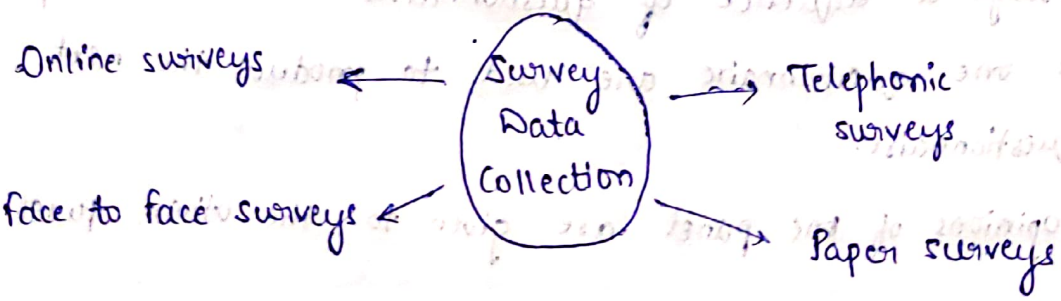
4) Economy level.
   identity the level of economy - (Ex recession), and for how long it remains.

5) Pricing policies
   - influence DF

Types of Demand Forecasting

1) Opinion Polling Methods

opinions of customers, sales person & Experts are taken through surveys.



a) Consumers Survey Method

→ Complete Enumeration Survey / Population method / Census method:

» consumes more time since, survey is done for every person

» requires more man power - costlier

» opinions of one consumer are influenced by other's opinions

→ Sample Survey & Test marketing :-

» consumes less time
» less expensive
» more accurate
» survey is taken from sample. ~~of~~
This sample must represent the entire population.
Ex:- opinions taken from ultra-rich do not match with the opinions taken from poor.

→ End use :-

» used in industrial purposes.

(b) Sales force Opinion Method

» sales men have more knowledge/idea about the product.

(c) Experts Opinion method

» experts are the people who are involved in the product marketing
» they have more idea about product - demand / movement
» "Delphi Technique" of investigation
↳ also known as
» It requires a panel of experts, who are interrogated through a sequence of questionnaires in which responses to one questionnaire are used to produce the next questionnaire.
» opinions of one panel are given to the other panel.

2) Statistical Methods

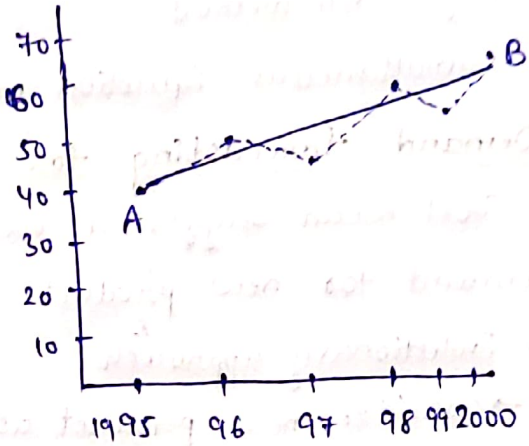
(a) Trend Projection Method – 5 methods (i, ii, iii, iv, v)

» we identify the trends of past data.

(i) Graphical Method

$\Sigma x'$

Year	Sales
1995	40
1996	50
1997	44
1998	60
1999	54
2000	62



— Trend line
---- original.

(ii) Least Square Method

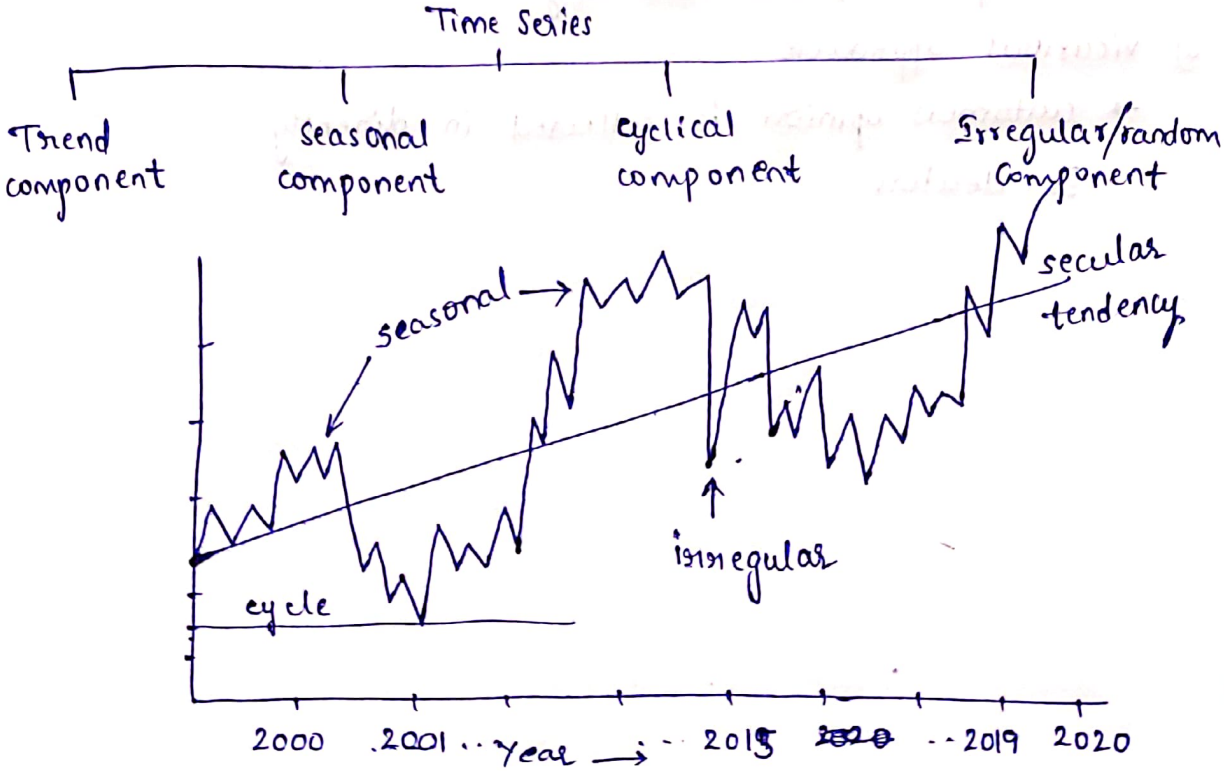
$y = a + bx$

$\Sigma y = na + b\Sigma x$

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

$x \rightarrow$ independent var
$y \rightarrow$ dependent var
$a \rightarrow$ intercept
$b \rightarrow$ impact of independent var

(iii) Time Series Analysis



Trend c :- overall, persistent, long-term movement

Seasonal c :- regular periodic fluctuations, usually within a 12-month period

irregular c :- erratic or residual fluctuations

cyclical c :- repeating swings or movements over more than one year

21/09/2023

(iv) Moving average and annual difference.

(b) Barometric method

(c) Regression method

(d) Simultaneous Equation method.

Demand forecasting for new products

Joel Dean suggested various approaches to forecast the demand for new product:

1) Evolutionary approach
→ consider new product as an outgrowth of existing product
Ex: mobile phone is outgrowth of telephone

2) Substitute approach
→ consider new product as a substitute for existing product.

3) Growth curve approach
→ identify trend values, growth.

4) Opinion Poll approaches

5) sales experience / test marketing

6) Vicarious approach
→ customers opinion is collected in directly
Ex: dealers.

26/09/2023 Time period — short period (≤ 1 year)
— long period (more than 1 year)

product^n categories

In Economics :-

we classify acc to product^n factors. (capital, labor, money) → any thing that assess product^n.

fixed factors :- do not change with o/p level. (planted machinery)

variable factors :- o/p level is determined w.r.t factors like labor, raw material. labor, ie., they change with o/p level.

short period — → fixed factors
→ variable factors.

long period requires more product^n and hence, we need more labor, raw materials, machinery acc to qty.

So, in long period, every thing is a variable factor.

→ In Economics, we take 3 product^n factors. They are :-
Land, labor, capital.

Land ⇓ piece of land, raw materials
labor ⇓ physical efforts of employees
capital ⇓ manmade assets.

short period => land is fixed.
labor, capital are variable

Production function refers to the relationship b/w physical ~~grades~~ rates of inputs and the quantity of output.

$$Q = f(\underbrace{a, b, c, d, \ldots n}_{\text{I/P factors}}, T)$$

T → Technology

how I/P factor contributes to the o/p } short time product^n func^n.

Ex:-

1 bag of urea => 5 bags of paddy
2 bags " " => 10 " " "
3 " " " => 15 " " "
4 " " " => 20 " " "

further ↑se in qty of i/p factor (urea) leads to zero benefits. Hence, there is a limited qty for input factors.

Law of variable proportions

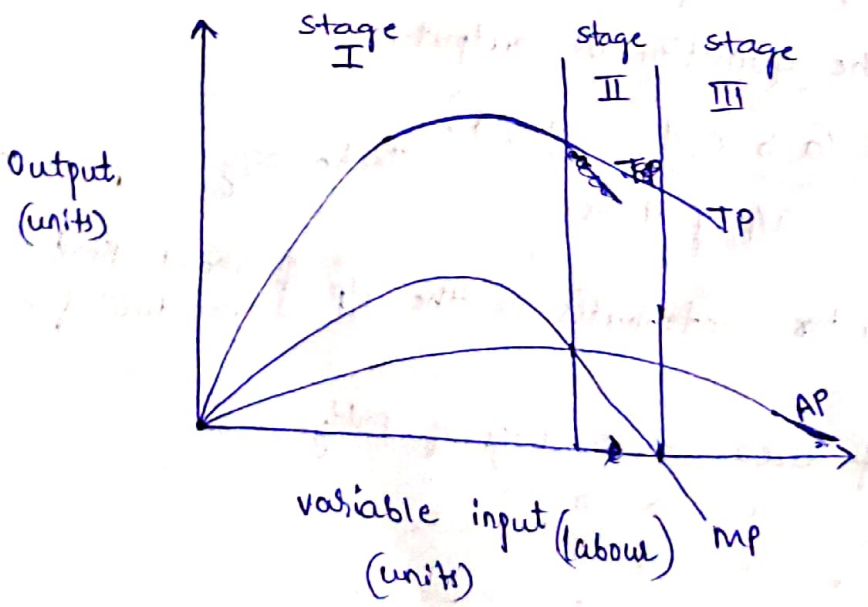
It states that, as the quantity of one factor is increased keeping the other factors fixed, the marginal product of that i/p factors increases and eventually declines.
↳ in the initial stages.

Land (in acres)	Labour (units)	Total Product^n (units) → aggregate	Average Product^n (units) $\frac{TP}{labour}$ → o/p for per labour	Marginal Product (units) → additional o/p obtained by additional I/p
1	1	10	10	10
1	2	25	12.5	15
1	3	37	12.3	12
1	4	47	11.8	10
1	5	55	11	8
1	6	60	10	5
1	7	63	9	3
1	8	63	7.9	0
1	9	60	6.6	-3

→ additional contribution

no use of 8th labour
It is efficient but not compatible

So, stop the production at 7th labourer



Long run production functions

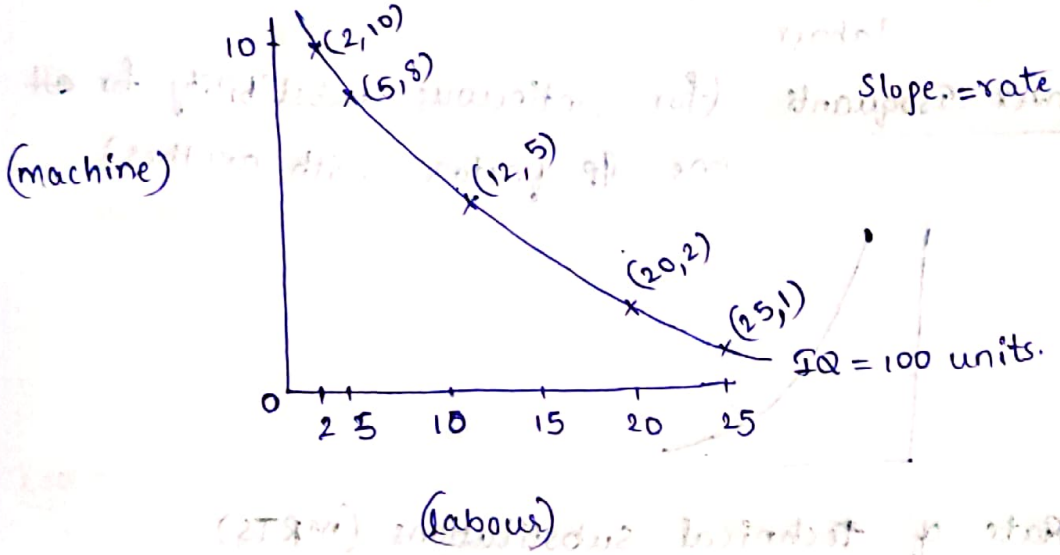
Isoquant

Isoquant is a curve which is the locus of all possible combinations of two input factors to produce the same level of output. (To obtain least cost)

27/09/2023

Combination	machine (units)	labour (units)	output (units)
A	10	2	100
B	8	5	100
C	5	12	100
D	2	20	100
E	1	25	100

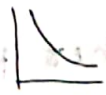
reduced ↓ increased ↑



Slope = rate of replacement

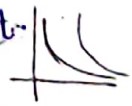
Properties of Isoquant (Equal product curve) (Producⁿ indifference curve) (Constant producⁿ curve)

» An isoquant slopes downwards.

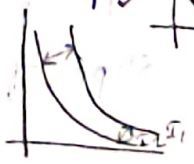


» Two isoquants do not intersect with each other. ✗

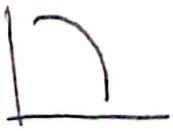
» A higher isoquant implies a higher level of output. ✓



» Isoquants are never parallel to each other.

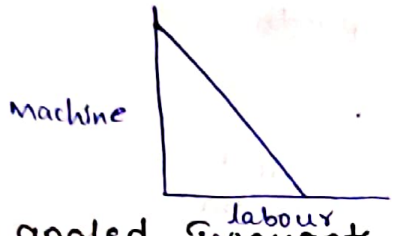


» Isoquants are convex to origin but not concave ✗



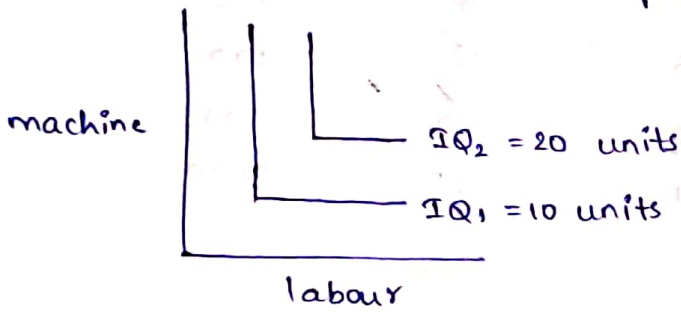
Types of Isoquants

Linear Isoquant curves (for perfect substitutable inputs).



Ex: for machines => we use completely labour.

Right-angled Isoquants (for strict complimentary inputs with fixed proportions)



Ex: without labour, machines can't be used

1 m 2 operators

2 m 4 operators

Smooth Convex Isoquants (for continuous substibility for ~~all~~ one i/p factor with another)

Marginal Rate of Technical Substitutions (MRTS)

(At which rate, we are replacing)

MRTS is defined as the rate at which one factor can be substituted for another factor to obtain the same level of output.

~~Slope of MRTS~~

$$\text{Slope of Isoquants (MRTS)} = \frac{\Delta L}{\Delta K} = \frac{MP\,L}{MP\,K}$$

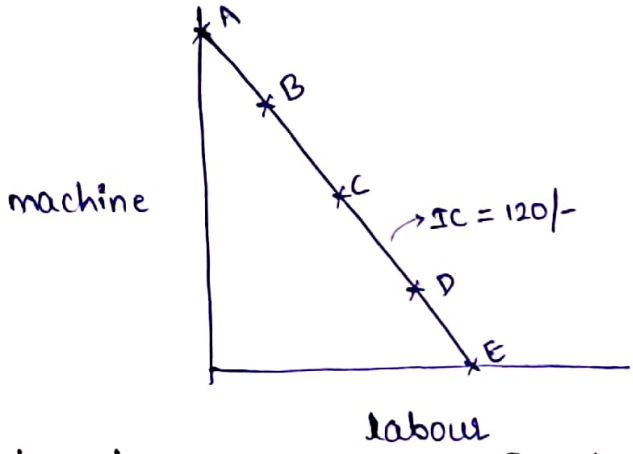
Isocost : Isocost is a curve or a line which represents all possible combinations of two input factors for the same budget or expenditure level.

Combination	machine (units) @15/-	labour (units) @10/-	Budget (or) Exp
A	8	0	120/-
B	6	3	120/-
C	4	6	120/-
D	2	9	120/-
E	0	12	120/-

$15 \times 6 = 90$

$120 - 90 = 30$

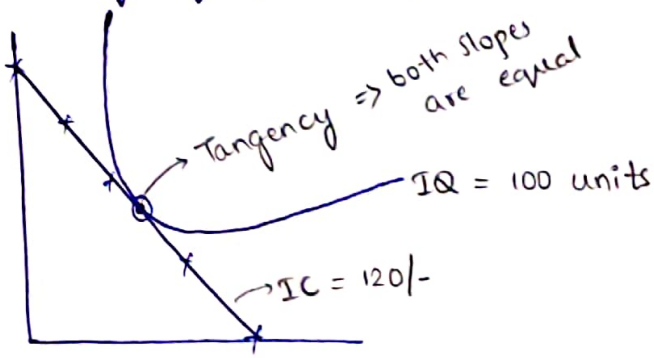
$\frac{30}{10} = 3$



$$\text{slope of Isocost} = \frac{\text{Price of labour}}{\text{Price of machine}} = \frac{P_L}{P_K}$$

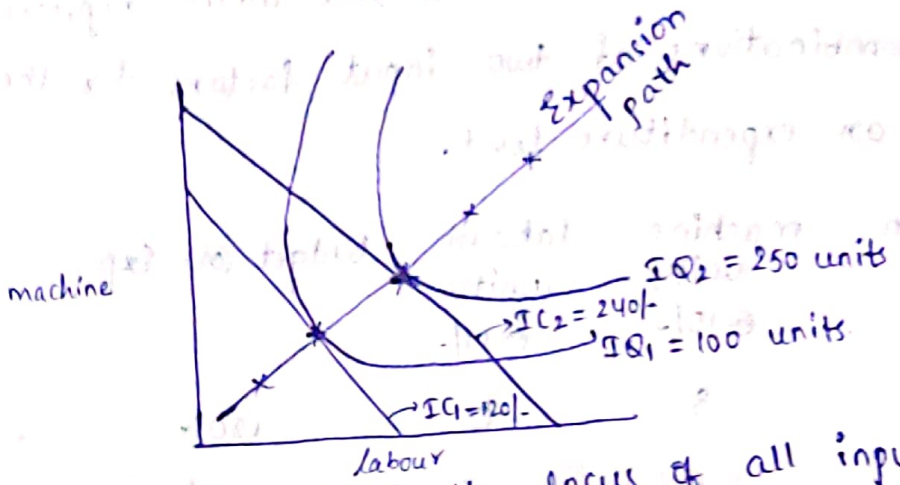
Least cost combinations of Inputs

The optimal combinations or least cost combinations can be identified by taking the ~~con~~ slope of Isoquant and Isocost at tangency point of both curves.



Here, $\frac{MP_L}{MP_K} = \frac{P_L}{P_K}$

$$\Rightarrow \frac{MP_L}{P_L} = \frac{MP_K}{P_K}$$



Expansion path: It is the locus of all input combinations for which MRTS is equal to the factor price ratio.

03/10/2023

Law of returns to Scale

(benefits/savings/economy) (product^n level)

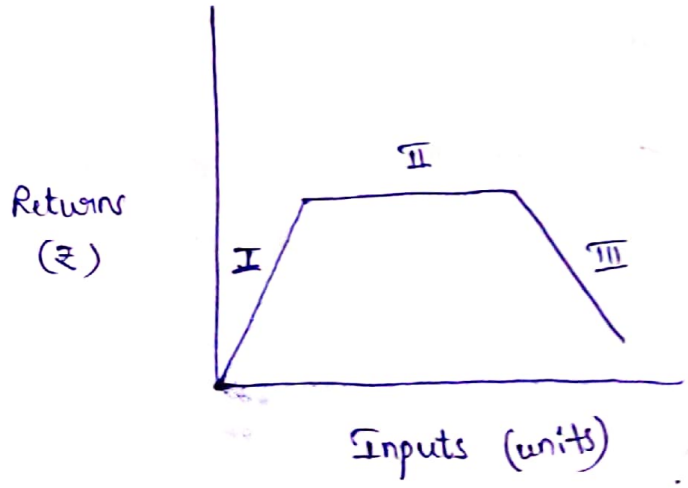
It describes the relationship b/w the changes in o/p or returns and proportionate change in all factors of production

stages

1) If I/p product^n ↑ses from 100 to 200 (200 L, 200 C) => o/p ~~400~~ 500
2) further ↑ses from 200 to 400 (400 L, 400 C) => o/p is 500 → diseconomy
3) 400 to 500 (500 labour, 500 capital) => o/p is 800 → diseconomy dominates.

Stages of Law of returns to Scale

1) Law of increasing returns
2) Law of constant returns
3) Law of negative returns / diminishing returns.



Internal Economy ⇒ benefits are only for firms
External Economy ⇒ " " to industry.

(i) small companies → use byproducts acc to demand.
(ii) large companies get additional benefits.
↳ can use large amount of byproducts.

Technical
labour efficienty is high in large companies.
↳ o/p is high.

large companies can spend high amt for advertisement
~~per unit~~

SCs cannot use high financial economies.

Cost of Production
Cost involved in each elem to produce product.

If raw material is not available :-
LCs find for alternatives
SCs do not find for alternatives.

LCs enjoy all economies — financial, labour, technical

04/10/2023

Break-Even Analysis / CDP Analysis
Level/stage at which no loss and no profit are achieved.

Impact of changes influence business.

→ Break-Even Analysis is a technique of determining the level of production or sales where, a firm get neither profit nor loss

Assumptions of Break-Even Analysis,

1) Total costs are divided into fixed costs and variable costs
↳ remain fixed. ↳ change with o/p

Ex: rent paid ~~for~~ ~~a~~ for factory building ⇒ fixed
labour — wages ⇒ variable
employees — salary ⇒ fixed

raw-material cost ⇒ variable

interest-paid on borrowed capital ⇒ fixed

2) Total fixed cost remain constant with any level of production ~~of~~ or sales.

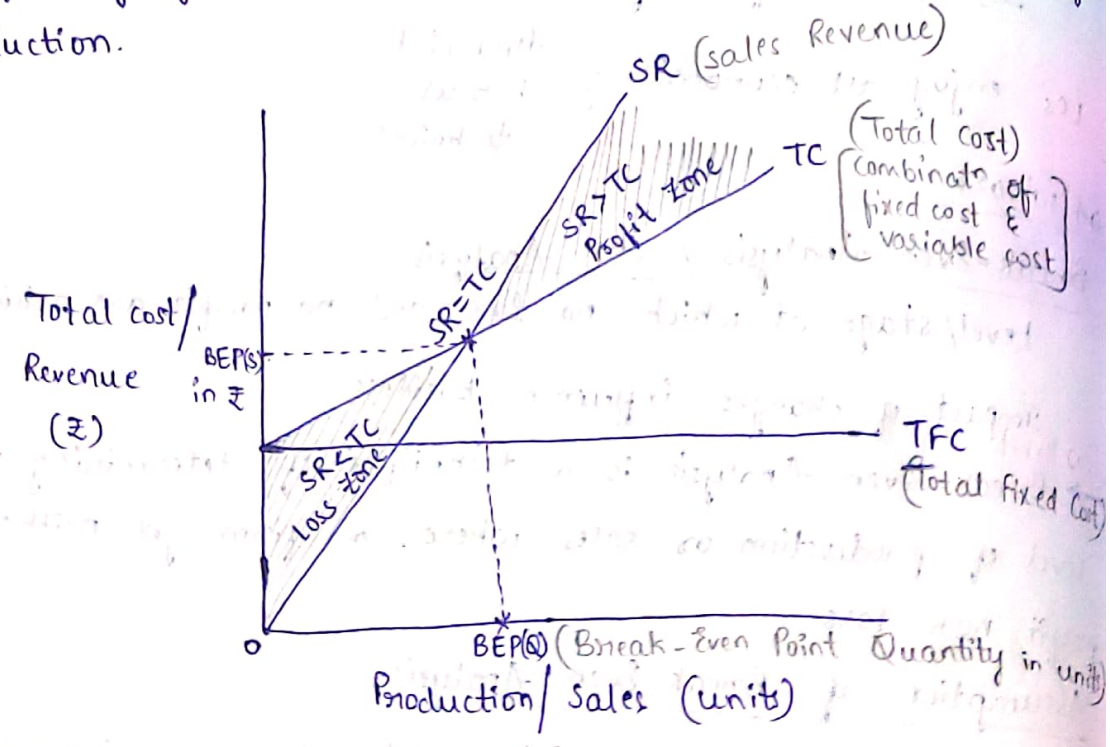
3) Total variable cost change with the production level. But, variable cost per unit remain constant.

4) Selling price (SP) of the product remain constant with every level of sales.

5) Perfect synchronization b/w production quantity and sales quantity ie, there will be no opening stock and closing stock.
↳ arises when unable to sell
↳ this becomes opening stock in the next yr

6) Only one product in the ~~pr~~ entire production. In case of multiple products, the production (of product) mix with the changed level of production.

7) Efficiency of the firm remains same with every level of production.



Sales Revenue (SR) = T.FC + PVC ± Profit/Loss

$\Rightarrow$ $SP \times Q = TFC + VC \times Q \pm P/L$

Q → Quantity

VC → variable cost per unit

at BEP,

$SP \times Q = TFC + VC \times Q + 0$ (∵ neither profit nor Loss)

$\Rightarrow$ $Q(SP - VC) = TFC$

$\Rightarrow$ $Q = \dfrac{TFC}{SP - VC}$

Q → Quantity of production at Break-Even

Given, SP = 100/- per unit

TFC = 10,000/- per year

VC = 60/- per unit

Then, $BEP(Q) = \dfrac{10000}{100 - 60} = \dfrac{10000}{40} = 250$ units

$SR = SP \times Q$

$= 100 \times 250$

BEP (₹) = SR = 25000

To find profit :-

25000 − TFC

= 25000 − 10000

= 15000.

Profit = (SP × Q) − TFC − (VC × Q)

= 25000 − 10000 − 15000

= 0

$VC \times Q = 60 \times 250 = 15,000$

∴ 15000 − 15000 = 0 profit

Here, BEP (Q) = 250

BEP (₹) = BEP (Q) × SP

05/10/2023

Applications of Break-Even Analysis

» It identifies minimum level of production or sales to be undertaken by a firm to avoid the losses.

» It identifies required sales to get a desired profit.

» It identifies impact of changes in variable costs, fixed cost and selling price on the profitability of the business.

» It identifies most profitable products for the business.

» It identifies the feasibility of add or drop product decision.

Formulae

1) Breakeven point (units), $BEP(Q) = \frac{TFC}{SP - VC}$

2) Breakeven point (₹), $BEP(₹) = BEP(Q) \times SP$ = Break Even Sales (₹)

$$\frac{TFC \times \text{actual sales } (₹)}{\text{actual sales } (₹) - TVC} = \text{Break Even Sales } (₹) = \frac{TFC}{P/V \text{ ratio}}$$

3) Sales required to earn ~~desised~~ desired profit

$$= \frac{TFC + \text{desired profit}}{P/V \text{ ratio}}$$

4) Margin of safety (MOS) = actual sales (₹) − Break Even Sales (₹)

$$MOS = \frac{\text{profit}}{P/V \text{ ratio}}$$

After or beyond Break Even there will be no FC we have only VC

P/V ratio formulae

» $P/V \text{ ratio} = \frac{SP - VC}{SP} \times 100$

» $P/V \text{ ratio} = \frac{TFC + \text{profit}}{\text{sales}} \times 100$

» $P/V \text{ ratio} = \frac{\text{sales} - TVC}{\text{sales}} \times 100$

If SR = 100

(TFC + P) = 40%

TVC = 60%

Contribution component

» P/V ratio $= \frac{\Delta \text{profits}}{\Delta \text{sales}} \times 100$

Q) A company produces a single product and the cost structure is as follows.

SP per unit = ₹ 40

VC per unit = ₹ 24

FC per annum = ₹ 16000

Calculate (i) BEP (units) (ii) BEP (sales) in ₹

(iii) P/V ratio (iv) Required sales to get a profit of ₹2000

(V) profit or loss at sales of ₹ 60,000

Sol:

(i) $BEPQ(\text{units}) = \frac{TFC}{SP - VC}$

$\Rightarrow BEPQ(\text{units}) = \frac{16000}{40-24} = \frac{\overset{1000}{16000}}{16} = 1000$

(ii) BEP Sales (₹) = BEP (Q) × SP

$= 1000 \times 40 = 40000$

(iii) $P/V \text{ ratio} = \frac{SP - VC}{SP} \times 100$

$\Rightarrow P/V \text{ ratio} = \frac{40-24}{40} \times 100 = \frac{\overset{4}{16}}{\cancel{40}} \times 10\cancel{0} = 40\%$

(iv) Sales required to earn profit of ₹2000

$= \frac{TFC + \text{desired profit}}{P/V \text{ ratio}}$

$= \frac{16000 + 2000}{0.4} = \frac{18000}{0.4} = ₹45000$

TFC + P = sales × P/V ratio

$TFC + P = 45000 \times \frac{40}{100} = 18000$

$\Rightarrow P = 18000 - TFC = 2000$

(V) profit or loss at sales of ₹ 60000

= (Sales × P/V ratio) − TFC

~~= (60000 × 0.4) − 16000 =~~

$= \left(6000\cancel{0} \times \frac{4\cancel{0}}{10\cancel{0}}\right) - 16000 = 24000 - 16000 = ₹8000$

(or)

$SR = TVC + TFC + P$

$60000 = 24 \times 1500 + 16000 + P$

$\Rightarrow P = ₹8000$

$\frac{16000}{40} = 400$

$\frac{60000}{40} = 1500$

10/10/2023

Q) From the following data of the product, find out

(i) Break even (₹), Break Even (units)

(ii) P/V ratio

(iii) sales required to earn a desired profit of ₹6 lakh

Selling price = ₹500 per unit

Variable cost = ₹300 per unit

Total fixed cost = ₹4,00,000 per year

Soln (i) $BEP\ (units) = \frac{TFC}{SP - VC} = \frac{400000}{500 - 300} = \frac{400000}{200} = 2000$

ie, By selling 2000 units, there would be neither profit nor loss

$BEP\ (₹) = BEP\ (units) \times SP = 2000 \times 500 = 10,00,000$

(ii) $P/V\ ratio = \frac{SP - VC}{SP} \times 100$

$= \frac{500 - 300}{500} \times 100 = \frac{200}{5} = 40\%$

(iii) $Required\ sales = \frac{TFC + desired\ profit}{P/V\ ratio}$

$= \frac{400000 + 600000}{0.4} = \frac{10,00000}{4} \times 10 = ₹25,00,000$

$no.\ of\ units = \frac{required\ sales}{SP}$

$= \frac{2500000}{500} = 5000\ units.$

Proof

WKT,

$TFC + P = sales \times P/V\ ratio$

$\Rightarrow 400000 + P = 2500000 \times \frac{40}{100}$

$\Rightarrow P = 1000000 - 400000$

$P = ₹600000$

TFC + P

⇓

Contribution

Beyond Break Even => no FC

=> contribution ≡ profit.

Q) From the following data, find out (i) BER (₹) and BEP (units) (ii) margin of safety (iii) sales required to get a desired profit of ₹90000 (iv) profit or loss at existing sales.

Actual sales (₹) = 600000 = Sales Revenue

Total variable cost = ₹ 375000

Total fixed cost = ₹ 180000 per year

Number of units produced & sold during the year = 15000

Sol^n (i) $BEP(units) = \frac{TFC}{SP - VC}$

$SP = \frac{\text{actual sales}}{\text{no. of units sold}} = \frac{600000}{15000} = ₹40$ per unit

lly, $VC = \frac{375000}{15000} = ₹25$ per unit

$BEP\ (units) = \frac{180000}{40-25} = \frac{180000}{15} = 12{,}000$ units

BEP (₹) = BEP (units) × SP

= 12000 × 40 = ₹4,80,000

(ii) Margin of safety = actual sales − BEP (₹)

= 600000 − 480000

= ₹1,20,000

(iii) required sales $= \frac{180000 + 90000}{P/V \text{ ratio}}$

$P/V \text{ ratio} = \frac{SP - VC}{SP} \times 100 = \frac{(40-25)}{40} \times 100 = \frac{15}{40} \times 100$

$= \frac{75}{2}$

$= 37.5\%$

=> required sales $= \frac{270000}{\left(\frac{37.5}{100}\right)}$

= ₹7,20,000

(iv) SR = TVC + TFC + Profit

$\Rightarrow$ ~~40 x 15000~~

$\Rightarrow$ 600000 = 375000 + 180000 + P

$\Rightarrow$ 600000 - 555000 = P

$\Rightarrow$ Profit = ₹ 45000

P = (Sales x P/V ratio) - TFC
= (600000 x 0.375) - 180000
= 225000 - 180000
= 45,000

~~(iii) Required sales =~~

Q) From the following data, find out

(i) P/V ratio

(ii) Total fixed cost

(iii) BEP (₹)

(iv) margin of safety in the yr 2017

Year	2016	2017
sales (₹)	2,00,000	3,00,000
profit (₹)	30,000	50,000

Solⁿ (i) P/V ratio $= \frac{\Delta \text{profits}}{\Delta \text{sales}} \times 100$

$\Rightarrow$ P/V ratio $= \frac{50,000 - 30,000}{3,00,000 - 2,00,000} \times 100$

$= \frac{20\cancel{000}}{1\cancel{00000}} \times 1\cancel{00} = 20\%$

(ii) P/V ratio $= \frac{\text{TFC} + \text{profit}}{\text{sales}} \times 100$

$20 = \frac{\text{TFC} + 30,000}{2,00,0\cancel{00}} \times 1\cancel{00}$

$\Rightarrow \left(\frac{20}{\cancel{10}} \times 200\cancel{0}\right) - 30000 = \text{TFC}$

$\Rightarrow$ TFC = 40000 - 30000

$\Rightarrow$ TFC = ₹ 10,000

(iii) BEP (₹) $= \frac{\text{TFC}}{\text{P/V ratio}}$

$= \frac{10,00\cancel{0}}{\left(\frac{20}{10\cancel{0}}\right)} = 50000$

(iv) margin of safety $= \frac{\text{Profit}}{\text{P/v ratio}} = \frac{50,000}{\left(\frac{20}{100}\right)} = 250000$

Q) From the following info find out

(i) P/v ratio (ii) sales (iii) margin of safety

Total fixed cost = ₹ 40,000 per year

Total profit during the year = ₹ 20,000

BEP (₹) = 80,000

Solⁿ (i) $\text{BEP (₹)} = \frac{\text{TFC}}{\text{P/v ratio}} = \frac{40000}{\text{P/v ratio}}$

$\Rightarrow$ P/v ratio $= \frac{40000}{80000} = 50\%$

(ii) $\text{sales} = \frac{\text{TFC + profit}}{\text{P/v ratio}}$

$\Rightarrow \text{sales} = \frac{40000 + 20000}{\left(\frac{50}{100}\right)} = \frac{60,000}{50} \times 100$

$= 1,20,000.$

(iii) Margin of safety $= \frac{\text{Profit}}{\text{P/v ratio}}$

$= \frac{20,000}{50} \times 100 = 40,000.$

11/10/2023

UNIT - 3

Market : place where goods are sold

It is a virtual place where buying and selling of products take place.

Buyers and sellers interact with each other to exchange the goods.

* Market is a set of conditions in which buyers and sellers interact with each other to exchange the goods & services.

* Market structure refers to the characteristics of the market either organisational or competitive that describes the nature of competition and the pricing policy followed in the market.

Major Classification of Markets

According to place :-

local → Ex: vegetable market

national market → Ex: food grains, textiles, electricity

international market → Ex: Tata motors, crude oil

According to timeperiod :- they influence only some factors.

very short → 1-day, 1-week → supply demand factors influence

Ex : no. of conventional halls acc to the no. of marriages.

∵ demand is more

supply is restricted

⇒ prices ↑ses

short → 3 ↓ → additional supply is possible even

long → have plenty of time to supply acc to the demand

According to competition :- imperfect, perfect

• Imperfect competitive markets Competition

monopoly → no competition, sole producer, imperfect market, Ex: Indian railways, single seller

duopoly → two sellers

oligopoly → few sellers, Ex: telecom markets, petrol stations

monopolistic competition, Ex: iPhone, despite of competitions, they create monopoly. Here, monopoly is being restricted.

• perfect competetive markets. large no. of sellers & buyers.

Major determinants of the market structure

1) No. of sellers operating in the market (1 seller is forced to buy)
2) No. of buyers in the market. (1 buyer ⇒ Govt)
3) Nature of goods and services. (differentiated / identical products)
4) Price fixation power. In monopoly; seller cannot fix the price
5) Entry and Exit Barriers. (It should be more.) → restrictions → Ex: Govt. permissions → Telecom Space.

» For a market to gain max profits, it should understand the impact of all factors.

» Buyer should also understand the market.

» Regulatory body needs to understand the market.

Perfect Competition

It refers to a market structure in which the no. of buyers & sellers are very large, all are engaged in buying & selling a homogeneous product without any entry restrictions and all sellers are price takers. (Ex: rice & other commodities)

Sellers cannot fix the price.

Features of perfect Competition

Market/Industry fixes the price

» large no. of sellers.

» No single seller can influence the supply

» Large no. of buyers.

No single buyer can influence the demand.

Individual buyer's purchasing qty is negligible when compared to the total qty

» Homogeneous Commodity.

The products offered in the market are identical from one seller to another seller.

» Every firm/seller is a price taker

(demand & supply are the factors that influence price)

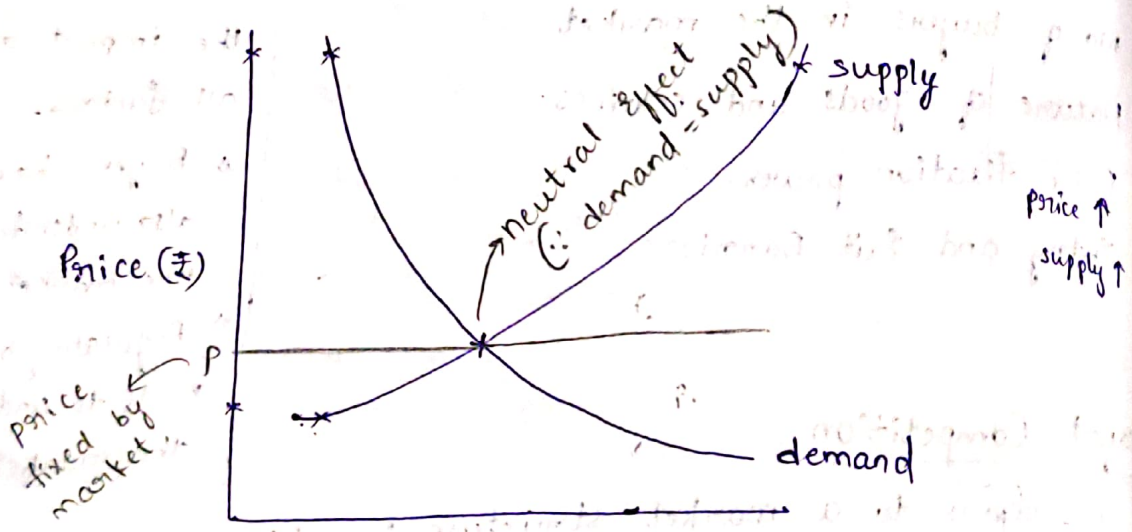
As long as demand equals supply ⇒ price do not change

» Free Entry and Exit of Sellers.

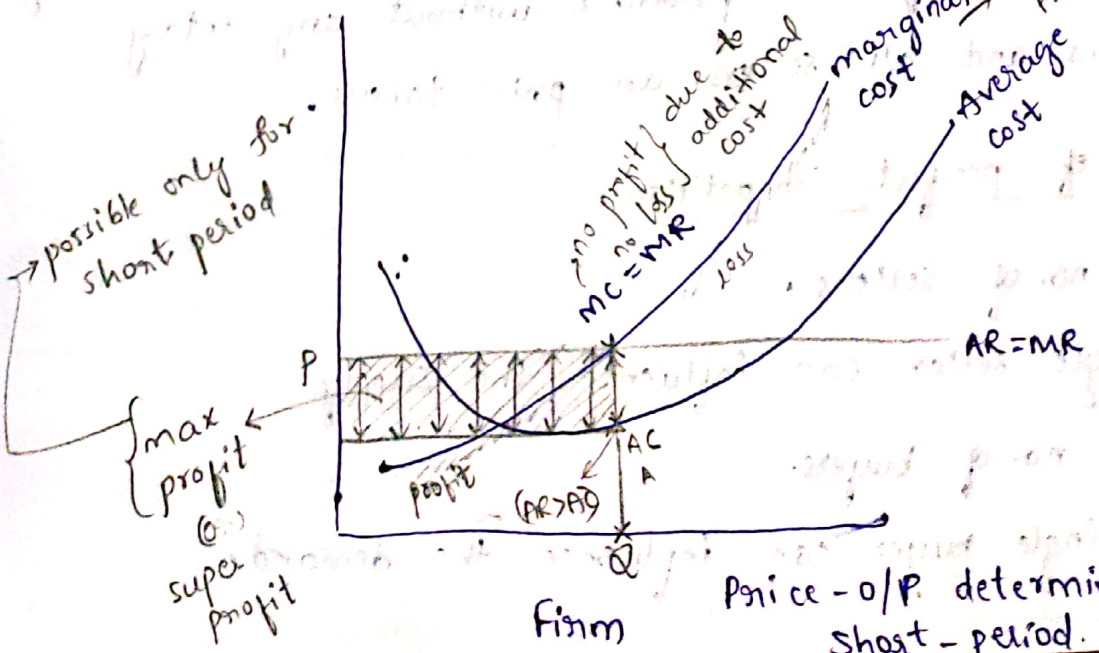
» Complete market information to every participant of the market

» Absence of transportation cost.

» No taxes and government intervention.



Price ↑
supply ↑



To find profit, deduct the cost from avg rev

Price - o/P determination.
Short - period.

Equilibrium level of o/p :- where a firm gets max profit. (MC = MR)

18/10/2021 at this point, there will be no intention to ↑se/↓ the (o/p level) production.

Profit depends on AC, AR

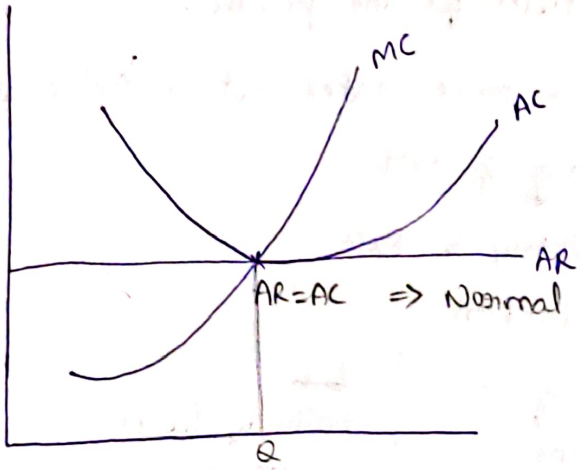
AR > AC → super profit

AR = AC → Normal profit
40 = 40

AR < AC → Loss

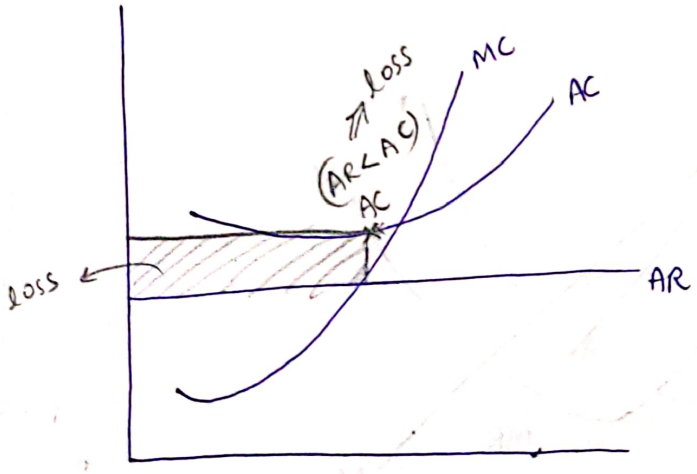
[here, basic remuneration is included that brings profit]

cost of produc^n → 40 = avg cost
raw material 20
labour cost 10
remuneration paid to mgmt 10
avg revenue = 50/-



⇒ Normal profit.

firm long-run



In perfect competition

Equilibrium Condition/level :-

MC = MR

Imperfect Competition

1) Monopoly

Monopoly is a market structure where a single firm produce and sell a commodity without any substitute for it, and there are Entry and Exit Barriers.

Ex: Indian Railways (Controlled by Govt.)

Features of Monopoly :-

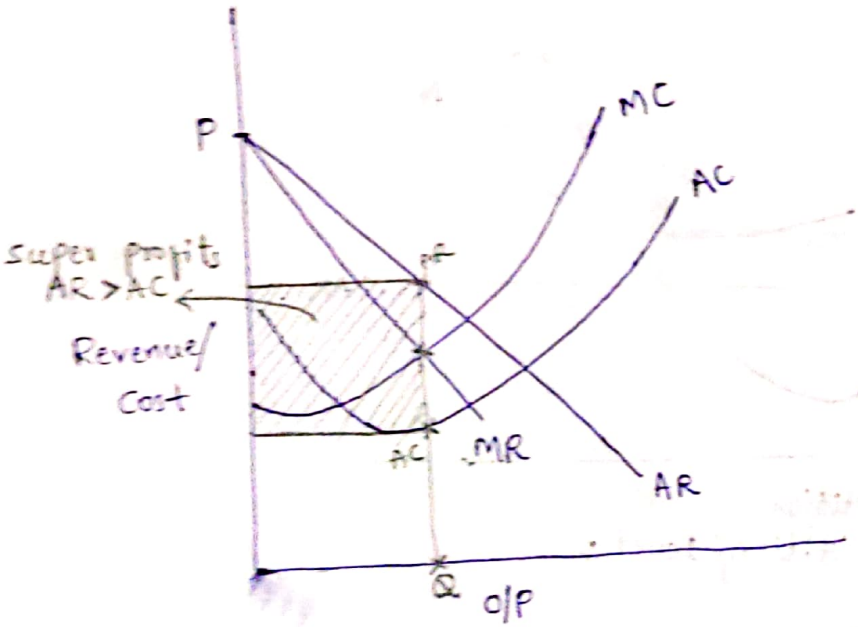
1) Single seller of the product
2) No close substitutes for the product
3) Monopolist is a price maker, not a Price taker.

~~Barriers to Entry & Exit~~

4) Barriers to Entry & Exit
5) Price Discrimination

acc to qty of service
acc to seasons
} railway fares vary.

- Legal
- Economical
- technical
- Barrier of reputation

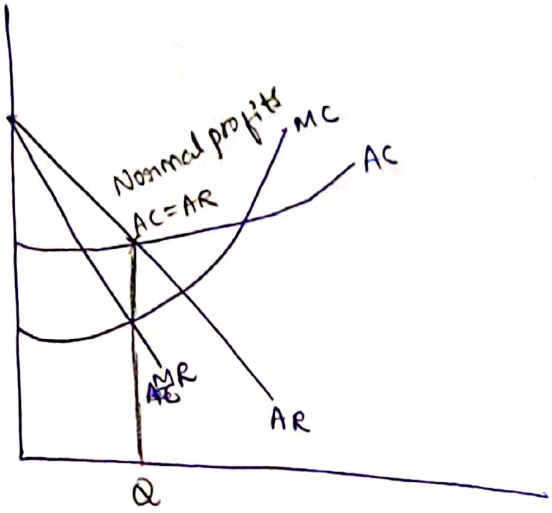


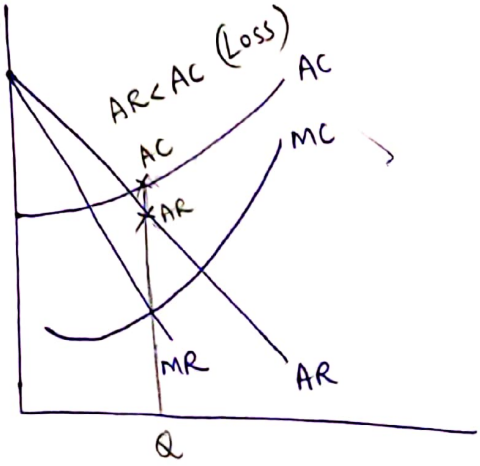
As the qty of producn ↑ses, monopoly offers discount & thus AR ↓ses

Additionally :- If further produc is to be ↑sed, further discount have to be given.

Initially, AC is high

As producn ↑ses ; AC ↓ses


Normal profit
MC
AC
AC=AR
MR
AR
Q


AR<AC (Loss)
AC
AC
MC
AR
MR
AR
Q

Break-Even Analysis Problems

Roll Number: 21B81A1207

1) From the following data calculate Break-Even Units

Selling price per unit = Rs.50
Variable cost per unit= 30
Fixed Cost = Rs.400000

2) A company produced and sold 1000 units of a product. The following data is related to the product
Actual Sales = Rs.600000
Variable cost = Rs.360000
Total Fixed cost = Rs.180000

calculate i) BEP units and BEP amount (Rs) ii) P/V Ratio iii) Margin of safety iv) Sales required to earn a desired profit of 12000 Rs.

3) From the following information find out the i) Amount of profit earned during the year and ii) BEP Units

Fixed cost = Rs300000
Selling price per unit = Rs.25
Variable cost per unit = Rs.15
Output level = 25000 units

4)From the following data, calculate i) P/v Ratio ii) Break-even point Units and Rs iii) Margin of safety iv) Sales Required to earn a Profit of Rs 400000

Sales = Rs.800000
Number of Units produced and Sold = 4000
Fixed Expenses Rs.200000
Variable expenses:
Direct material = Rs 180000
Direct Labor = Rs 120000
Other variable Expenses = Rs 100000

Total VC = Rs.400000

5) The operating results of a company for the last two years are as follows:

YEAR	SALES(Rs)	PROFIT(Rs)
2017	270000	6000
2018	300000	9000

Calculate 1) P/v ratio 2) Fixed Cost 3) BEP (Rs) 4) Margin of Safety

6) the following data are obtained from the records of a manufacturing company:

YEAR	SALES(Rs)	Total Cost (Rs)
2015	80000	70000
2016	90000	76000

Calculate 1) P/v ratio 2) BEP

7) The operating result of a company for the last Two periods are as follows:

PERIOD	SALES(Rs)	PROFIT(Rs)	Loss(Rs)
I	270000	--	10000
II	300000	5000	--

Calculate:

1) BEP
2) Sales required to earn a profit of Rs.10000

① $BEP\ (Q) = \frac{TFC}{SP - VC}$

$= \frac{400000}{50-30} = \frac{4000000}{20} = 20000$ units.

② (i) $BEP\ units = \frac{TFC}{SP - VC}$

$Q = 1000$, $SR = 600000$, $VC = 360000$

$TFC = 180000$ actual sales. VC per unit $= \frac{360000}{1000} = 360$

$SR = SP \times Q$

$\Rightarrow 600000 = SP \times 1000$

$\Rightarrow SP = 600$

$600 - 360 = 240$

$BEP\ units = \frac{180000}{600-360} = \frac{180000}{240} = 750$ unit.

$BEP\ amount = BEP\ units \times SP$

$= 750 \times 600$

$= ₹\ 4,50,000.$

$600000 - 450000 = 150000$

(ii) $P/V\ ratio = \frac{SP - VC}{SP} \times 100$

$= \frac{600-360}{600} \times 100 = \frac{240}{6} = 40\%$

(iii) $MOS = Actual\ sales - BEP\ sales$

$= 600000 - 450000$

$= ₹1,50,000$

(iv) sales required to earn a desired profit of ₹12000 $= \frac{TFC + desired\ profit}{P/V\ ratio}$

$$= \frac{180000 + 12000}{\left(\frac{4}{10}\right)} = \frac{192000 \times 10}{4}$$

$$= 2,80,000$$

③ $SP \times Q = TFC + (VC \times Q) + Profit$

$$25 \times 25000 = 300000 + (15 + P \times 25000) + P$$

$$625000 - 300015 = P$$

$$\Rightarrow 625000 = 300000 + 375000 + P$$

$$\Rightarrow P = -50,000$$

$$P/V \text{ ratio} = \frac{SP - VC}{SP} \times 100$$

$$= \frac{(25-15)}{25} \times 100 = 40$$

③ (i) $SP \times Q = TFC + TVC + P$

$$\Rightarrow 25 \times 25000 = 300000 + (15 \times 25000) + P$$

$$\Rightarrow P = -50,000$$

(ii) $$BEP \text{ units} = \frac{TFC}{SP - VC}$$

$$= \frac{300000}{25-15} = \frac{300000}{10} = 30000$$

④ (i) $$P/V \text{ ratio} = \frac{\text{sales} - TVC}{\text{sales}} \times 100$$

$$= \frac{800000 - 400000}{800000} \times 100$$

$$= \frac{400000}{8000} = 50\%$$

(ii) $$BEP \text{ (units)} = \frac{TFC}{SP - VC}$$

$$SP = \frac{\text{sales}}{Q} = \frac{800000}{4000} = ₹200$$

$$VC = \frac{400000}{4000} = ₹100$$

BEP units $= \frac{200000}{200-100} = \frac{200000}{100} = 2000$.

(iii) MOS = Actual sales − BEP sales

$= 800000 - (\text{BEP units} \times SP)$

$= 800000 - (2000 \times 200)$

$= 800000 - 400000$

$= ₹\,400000$.

(iv) sales req $= \frac{\text{TFC + desired profit}}{\text{P/V ratio}}$.

~~P/V rat~~ $= \frac{200000 + 400000}{\left(\frac{5}{10}\right)}$

$= \frac{600000 \times 10}{5}$

$= ₹\,1200000$.

(5) (1) P/V ratio $= \frac{\Delta \text{profit}}{\Delta \text{sales}} \times 100$

$= \frac{9000 - 6000}{300000 - 270000} \times 100$

$= \frac{3000}{30000} \times 100$

$= 10\%$

(2) P/V ratio $= \frac{\text{TFC + Profit}}{\text{sales}}$

$\Rightarrow \frac{1}{10} = \frac{\text{TFC} + 6000}{270000}$

$\Rightarrow 27000 = \text{TFC} + 6000$

$\Rightarrow \text{TFC} = 27000 - 6000 = ₹\,21000$

(3) ~~BEP (Rs) = BEP units × SP~~

~~BEP units =~~

(3) $BEP\ (Rs) = \frac{TFC}{P/V\ ratio} = \frac{21000}{1} \times 10 = 210{,}000$

(4) $MOS = \frac{Profit}{P/V\ ratio} = \frac{6000}{\left(\frac{1}{10}\right)} = ₹60000 \Rightarrow$ Year 2017

$MOS = \frac{9000}{\left(\frac{1}{10}\right)} = ₹90000 \Rightarrow$ 2018 Year

(6) ~~(1) P/V ratio = sales − TVC~~

(1) Profit = sales − Total cost

2015 :- Profit = 10000 (∵ 80000 − 70000)

2016 :- Profit = 14000.

$$\begin{array}{r} 90000 \\ 76000 \\ \hline 14000 \end{array}$$

$P/V\ ratio = \frac{\Delta profit}{\Delta sales} \times 100$

$= \frac{4000}{10000} \times 100 = 40\%$

(2) $P/V\ ratio = \frac{TFC + profit}{sales}$ ~~×100~~

$\frac{40}{100} = \frac{TFC + 10000}{80000}$

$\Rightarrow 32000 - 10000 = TFC$

$\Rightarrow TFC = ₹22000.$

$BEP\ (₹)$ ~~units~~ $= \frac{TFC}{P/V\ ratio} = \frac{22000 \times 10}{4} = ₹55000$ ~~units~~

(7) (1) $BEP (₹) = \frac{TFC}{P/V \text{ ratio}}$

$P/V \text{ ratio} = \frac{\Delta \text{profit}}{\Delta \text{sales}}$

$= \frac{5000 - (-10000)}{300000 - 270000} = \frac{\cancel{15000}^{1}}{\cancel{30000}_{2}} = 50\%$

~~(2) sales req =~~ ~~BEP (₹) =~~

$P/V \text{ ratio} = \frac{TFC + P}{SR}$

$\Rightarrow \frac{50}{\cancel{100}} = \frac{TFC + (-10000)}{270000}$

$135000 + 10000$

$\Rightarrow 135000 + 10000 = TFC$

$\Rightarrow TFC = ₹145000$

$\therefore BEP (₹) = \frac{145000 \times \cancel{100}^{2}}{\cancel{50}} = ₹ 290,000$

(2) $\text{sales req} = \frac{TFC + \text{desired profit}}{P/V \text{ ratio}}$ ~~×100~~

$= \frac{(145000 + 10000) \times \cancel{100}^{2}}{\cancel{50}}$ ~~×100~~

$= 155000 \times 2 = ₹3,10,000$

~~3,100,000~~

~~(2)~~