UNIT – IV
INTRODUCTION TO MANAGERIAL ECONOMICS AND DEMAND ANALYSIS

MANAGERIAL ECONOMICS

Managerial economics is an offshoot of two distinct disciplines: Economics and Management. Economics is a study of human activity both at individual and national level. Every one of us in involved in efforts aimed at earning money and spending this money to satisfy our wants such as food, clothing, shelter, and others. Such activities of earning and spending money are called "Economic activities".

Management is the science and art of getting things done through people in formally organized groups. It is necessary that every organization be well managed to enable it to achieve its desired goals. Management includes a number of functions like planning, organizing, staffing, directing, and controlling.

Meaning:

Managerial economics has been generally defined as the study of economic theories, logic and tools of economic analysis, used in the process of business decision making. Managerial Economics is also called as "Industrial Economics" or "Business Economics" or "Economics of Management".

The Economic Principles, Concepts, tools and techniques that can be applied practically to solve the problems of business is known as Managerial Economics.

Here two aspects are involved i.e.,

- **Decision Making:** It involves selection of best alternative, estimating the cost, and
- **Forward Planning:** It is a projected blue print of operations with their costs and benefits.

Definition:

1. **M. H. Spencer and Louis Siegelman** explain the "Managerial Economics is the integration of economic theory with business practice for the purpose of facilitating decision making and forward planning by management".
2. **Edurin Mansfield**, "Managerial Economics is concerned with the application of economic concepts and economic analysis to the problem of formulating rational managerial decisions".

CHARACTERISTICS / NATURE OF MANAGERIAL ECONOMICS

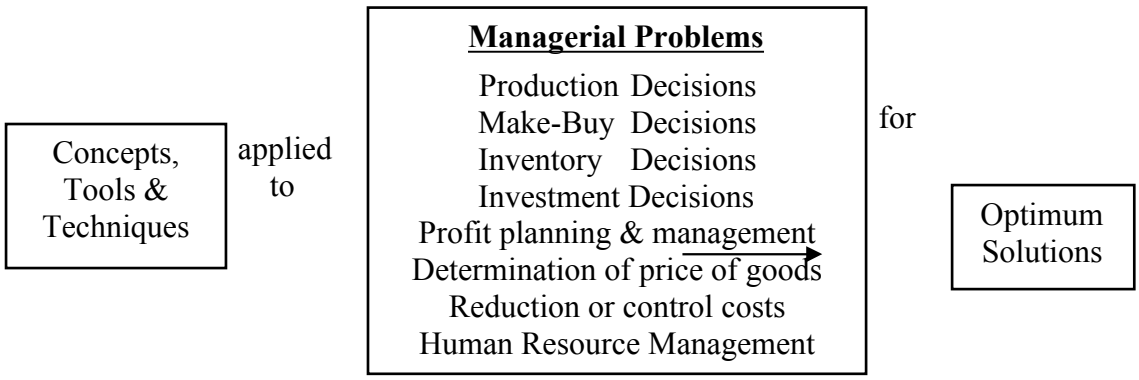
As it originates from Economics, it has the basis features of economics, such as assuming that other things remaining the same. The features of managerial economics are explained as below:

1. **Close to Micro Economics**: Managerial economics is concerned with finding the solutions for different managerial problems of a particular firm. It studies how the firm can use resources to produce more output with minimum cost and maximum profit.
2. **Operates against the backdrop of Macro economics**: The managerial economist has to be aware of the limits set by the macroeconomics conditions such as government industrial policy, inflation and so on.

3. **Concerned with Normative Economics**: A normative statement usually includes or implies the words 'ought' or 'should'. It suggests the business firm to do certain things which will benefit them and not to do certain things which leads to losses.
4. **Prescriptive actions**: Prescriptive action is goal oriented. Given a problem and the objectives of the firm, it suggests the course of action from the available alternatives for optimal solution.
5. **Application Oriented**: Managerial Economics solves complicated problems and decision making skills can be improved by applying some principles and concepts. We also employ case study methods to conceptualize the problem, identify that alternative and determine the best course of action.
6. **Interdisciplinary**: The tools and techniques of managerial economics are drawn from different subjects such as economics, management, mathematics, statistics, accountancy, psychology, organizational behavior, sociology and etc.
7. **Assumptions and limitations**: Every concept and theory of managerial economics is based on certain assumption and as such their validity is not universal. If there is change in assumptions, the theory may not hold good.

SCOPE OF MANAGERIAL ECONOMICS

The scope of managerial economics refers to its area of study. The main focus of Managerial economics is to find an optimal solution to a given managerial problem. The managerial economist makes used of concepts, tools and theories of economics and other related disciplines to find the solution to given problems.



1. **Demand Decisions:** Demand analysis should be a basic activity of the firm because many of the other activities of the firms depend upon the outcome of the demand forecast. The implications are like need of customers, change in price or supply. The impacts of these are assessed and the decisions are taken to maximize the profits.
2. **Profit related Decisions:** Profit making is the major goal of firms. There are several techniques such as Break-Even analysis, cost reduction, cost control and ratio analysis to ascertain level of profits. In BEP we are concerned with profit planning and control. If a firm produces less than BEP it gets losses.
3. **Pricing – Output Decisions:** Pricing decisions have been always within the preview of managerial economics. Here the production is ready and the task is to determine the price in different market situations as perfect and imperfect market ranging from monopoly, duopoly and oligopoly. The pricing policies, methods, strategies and practices constitute part of the study.

4. **Input – Output Decisions:** The costs of inputs in relation to output are studied to optimize profits. The behaviors of costs at different levels of production are assessed here. Some costs are fixed, semi-variable and variable. It is necessary to know the relationship between costs and output both in short and long run.
5. **Capital or investment Decisions:** Capital is the foundation of business. Lack of capital may result in small size of operations. Availability of capital from various sources like equity capital, banks, institutional finance etc. may help to undertake large-scale operations. Hence efficient allocation and management of capital is one of the most important tasks of the managers.
6. **Economic forecasting & Planning:** Economic forecasting leads to forward planning. The firm operates in an environment dominated by external and internal factors. External factors include government policies, competition, employment, price and income levels. Internal factors include policies and procedures relating to production, finance and marketing. This will minimize the risk & uncertainty about the future.

LINKS WITH OTHER DISCIPLINES

Many new subjects have evolved in recent years due to the interaction among basic disciplines. It is necessary to trace its roots and relationship with other disciplines. A successful managerial economist must be a mathematician, a statistician and an economist.

1. **Economics:** Managerial Economics if the offshoot of economics. Economics deals with theoretical concepts where as Managerial economics deal with application of these in real life. The relationship between them may be viewed from the point of view of the two approaches to the subject viz., Micro Economics and Marco Economics. Managerial economics is rooted in Micro Economic theory.
2. **Management and Accounting:** Managerial economics has been influenced by the developments in management theory and accounting techniques. Accounting refers to the recording of transactions of the firm in certain books. It provides information relating to costs, revenues, receivables, payables, profit & loss, etc. It is known as Managerial Accounting.
3. **Mathematics:** Mathematical concepts and techniques are widely used in economic logic to solve these problems. Also mathematical methods help to estimate and predict the economic factors for decision making and forward planning. The concepts like logarithms, exponentials, geometry, Algebra and calculus vectors etc., are widely used. Advanced techniques like linear programming, inventory models and game theory are also used.
4. **Statistics:** Managerial Economics needs the tools of statistics in more than one way. A successful businessman must correctly estimate the demand for his product. Statistical tools like probability, averages correlation, regression, time series, etc are used in collecting data and analyzing them to help in the decision making process.
5. **Operations Research:** Managerial Economics focuses on problems on decision making. It is a tool for finding the solutions for managerial problems such as linear programming, queuing, transportation, optimization techniques. The varied tools of operations Research are helpful to managerial economists in decision-making.
6. **Computer Science:** Computers have changes the way of the world functions and economic or business activity is no exception. Computers are used in data and accounts maintenance, inventory and stock controls and supply and demand predictions.
7. **Psychology:** Consumers psychology is the basis on which managerial economist acts upon i.e. how the customer reacts when there is a change in price, supply, income, etc.

1. End user survey Method:

The end-use method applies for forecasting the demand for intermediate products. These are products used in the manufacture of some other final goods. The demand for the final product is an indicator of the demand for intermediate product, subject to the availability

DEMAND ANALYSIS

Demand means the quantity of goods or service which the consumer would buy in the market at a given time and given place. Every want supported by the willingness and ability to buy constitutes demand for a product or service a product or service is said to have demand when three conditions are satisfied:

- Desire for specific commodity
- Willingness to pay for it
- Ability to pay for certain price, place & time.

Definition:

According to Benham, "The demand for anything, at a given price, is the amount of it, which will be bought per unit of time at that price.

Demand Schedule:

The tabular presentation of relationship between price and demand for a commodity is known as Demand Schedule.

Demand Curve:

The graphical representation of demand schedule or relationship between price and demand for a product is known as Demand Curve

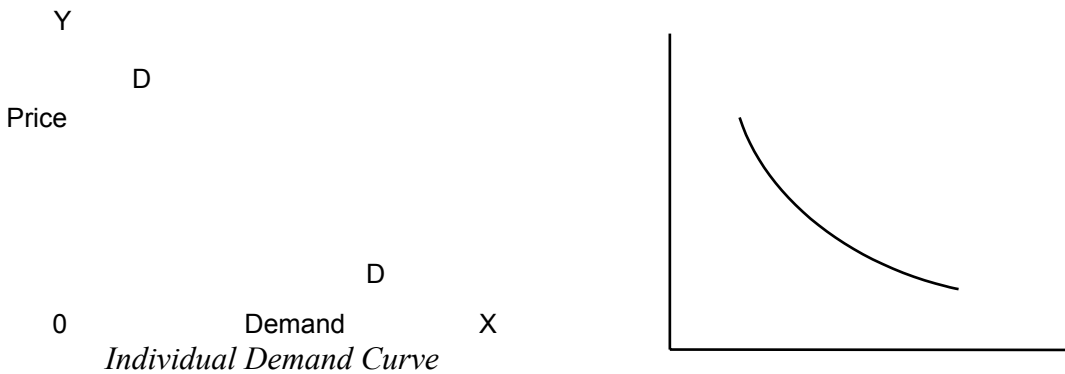
INDIVIDUAL DEMAND

It shows the quantities of demand for a commodity by a particular consumer at various prices of that commodity.

Ex: Mohan's demand for milk given below. Draw an Individual demand curve

Individual Demand Schedule

Price of Milk	Mohan's Demand
15	2
14	3
13	5



Individual Demand Curve

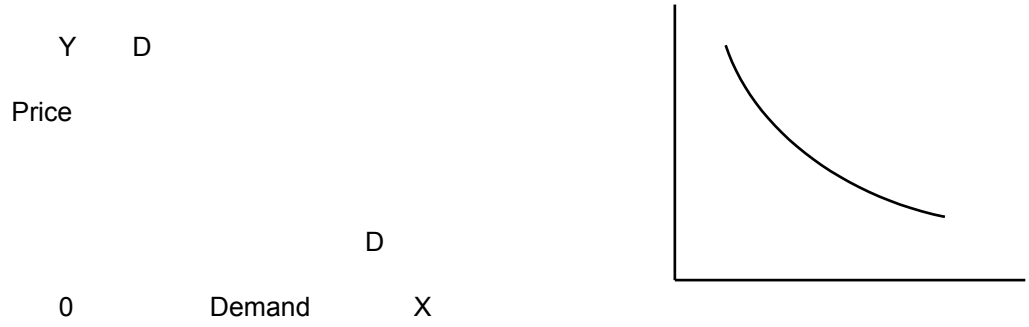
MARKET DEMAND

The demand of the whole market at various prices of the commodity is known as market demand. It is shown by market demand schedule and demand curve. By adding individual demand schedules we get market demand schedule.

Ex: X's & Y's demand for milk.

Market Demand Schedule

Price of Milk	X's Demand	Y's Demand	Market Demand
15	2	1	3
14	3	2	5
13	5	4	9
12	6	5	11



Market Demand Curve

INCOME DEMAND

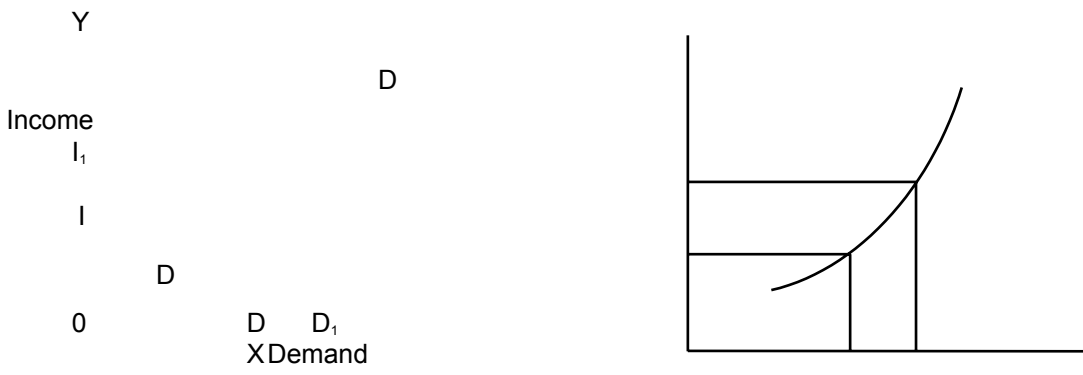
It indicates the relationship between income of the consumer and the quantity of commodity demanded, other things remaining constant like price, taste, nature, etc.

(a) Demand for Normal Goods:

Normal goods are those goods whose demand increases with rise in income and decreases with fall in income. The income demand curve has a positive slope. It is an upward sloping curve. Normal goods are price negative, with increase in price demand falls and vice-versa.

Ex: bread, wheat, milk, etc.

Income	Demand
10,000	100
20,000	200

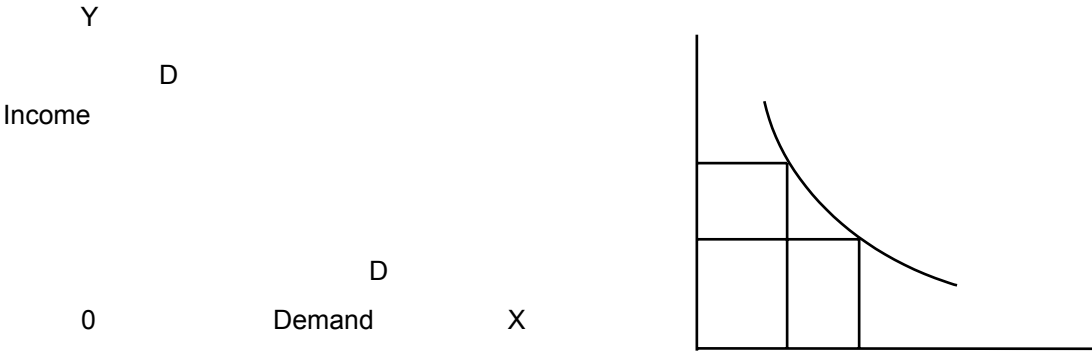


(b) Demand for Inferior Goods:

The demand for these goods decreases with the rise in consumer's income. In this case, there is inverse relation between income and demand. The income demand curve has negative slope.

Ex: ghee, grain, etc.

Income	Demand
10,000	100
20,000	50



CROSS DEMAND

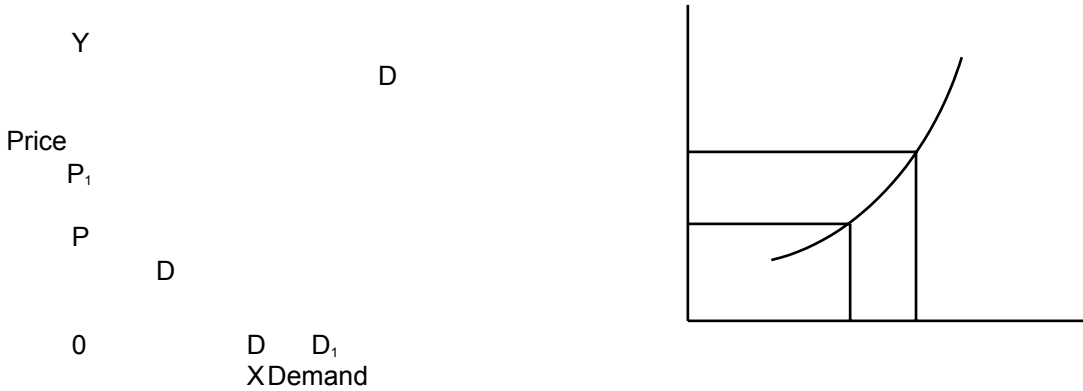
When a change in the price of one commodity results in the change of demand of other commodity, it is known as Cross Demand. It indicates how the prices of related goods are affected by the changes in demand.

(a) Demand for Substitute or Competitive goods:

Commodities which can be used in place of other goods are known as substitute goods. With a rise in price of product A the demand for it decreases and demand for product B increases.

Ex: Tea & Coffee, bread & rice, etc.

Price of Coffee	Demand for Tea
100	20
200	25

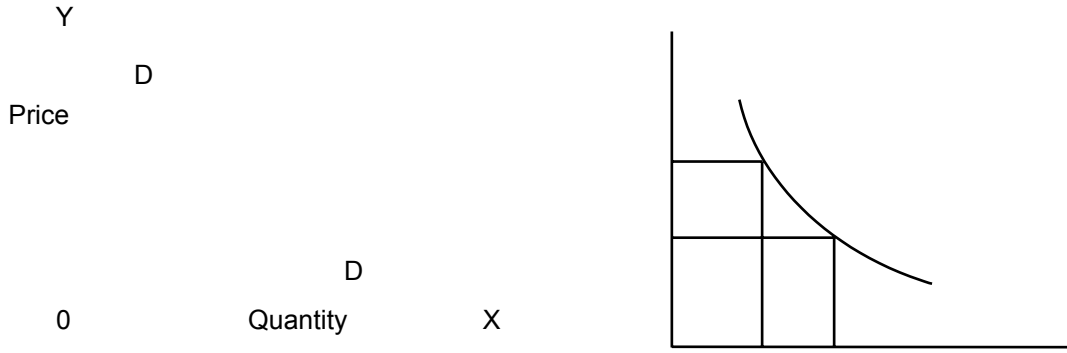


(b) Demand for Complementary Goods:

Commodities which are required jointly are termed as complementary goods. A fall in price of commodity A brings rise I demand for commodity B. These products have joint demand.

Ex: Pen & paper, car & petrol, printer & cartridge, etc.

Price of petrol	Demand for car
100	10
200	20



DEMAND DISTINCTIONS

1. Consumer goods Vs. Producer goods:

- Consumer goods refer to such products and services which are capable of satisfying human needs. These are available for ultimate consumption. These give direct and immediate satisfaction. Ex: bread, apple, rice, milk, etc.
- Producer goods are those which are used for further process of production of goods or services to earn income. Ex: machinery, tractor, etc.

2. Durable goods Vs. Perishable goods:

- Durable goods are those which give service relatively for a long time. Ex: TV, refrigerator, etc.
- Perishable goods are those which have short life time, it may be in hours or days. Ex: milk, vegetables, fish, etc.

3. Short-run Demand Vs. Long-run Demand:

- The demand for a product or service in a given region for a particular day is short-run demand. The demand which has immediate reaction to changes in price, income is called short-run.
- The demand for a longer period for the same region can be viewed as long-run. The demand which will ultimately exist as a result of changes in price, promotion or product improvement is long run demand.

4. Firm Demand Vs. Industry Demand:

- The firm is a single business unit. The quantity of goods demanded by a single firm is called firm demand.
- Industry refers to a group of firms carrying on similar business activity. The quantity demanded by the industry as a whole is called Industry demand.

5. Autonomous Demand Vs. Derived Demand:

- Autonomous refers to the demand for products directly. Ex: Hospitals, schools, etc.
- Derived refers to the demand for a product arises out of purchase of parent product. Ex: Hotels, etc. Demand for house is autonomous and demand for units like brick, sand, cement, iron etc are derived.

6. New Demand Vs. Replacement Demand:

- New refers to the demand for new products and it is addition to existing stock. Ex: cars, bikes, etc.
- Replacement refers to the item purchased to maintain the asset in good condition or replacing the existing one. Ex: TC, washing machine, etc.

7. Total Market Demand Vs. Segment Market Demand:

- The total demand for a product in a region in known as total market demand. Ex: sugar, etc.
- The demand for a product for a firm or industry from this region is segment market demand. Ex: demand for sugar for sweet making industry.

DEMAND FUNCTION

It is a function which describes a relationship between one variable and its determinants. It describes how much quantity of goods are brought at alternative prices of goods and its related goods, alternative income levels, alternative values of other variables. Thus the above factors can be built up into a demand function.

Mathematically, the demand function for a product can be explained as:

$$Q_d = f(P, I, T, P_R, E_P, E_I, S_P, D_C, A, O)$$

Where,

Q_d refers to quantity of demand and it is a function of the various determinants

Demand Determinants:

1. **Price of the product (P):** The price of the product and its quantity demanded is inversely related. If there is a fall in the price of the product, there is a rise in the demand for that product and vice-versa.
2. **Income of the consumer (I):** A consumer with an average income spends to buy some commodities. As he becomes richer he spends his money to buy adequate quantities so that he becomes satisfied quantitatively. Once he is satisfied quantitatively he spends his increased income to improve quality consumption. The former type of goods are called inferior goods and latter are called superior goods.
3. **Tastes & Preferences (T):** Taste and preference depend on the changing life-style, customs, religious values attached to a good, habit of the people, the general levels of living of the society and age and sex of the consumers. Change in these factors changes consumer's taste and preferences.
4. **Prices of related goods (P_R):** Goods and services have two kinds of relationships - substitute goods or complementary goods. When there is a fall in the price of a commodity x, the demand for it (x) goes up. This further leads to a fall in the demand for its substitute goods and vice versa. With a fall in the price of x, increases the demand for its complementary goods.
5. **Expected change in future Prices (E_P):** If consumers expect a rise in the price of a storable good, they would buy more of it at its current price with a view to avoiding

the possibility of price rise future. If he expects a fall in the price of certain goods, they postpone their purchase to take advantage of lower prices in future.

Expected change in future Income (E_I): If the consumer expects that his income will be higher in the future the consumer may buy the good now. In other words, positive expectations about future income may encourage present consumption.

6. **Size of Population (S_P):** As the consumption habits vary from region to region the demand for a product depends positively upon the size of population i.e. children and adults, male and female, rich and poor.
7. **Distribution to Customers (D_C):** The distribution changes from region to region which depends on the demand for a product and it also changes with the needs of children and adults, and rich and poor. Thus demand is affected by various sections of a community.
8. **Advertisement (A):** Advertisement costs are incurred with the objective of promoting sale of the product. It helps in increasing the demand for the product through various media like T.V, radio, newspapers, etc.
9. **Other factors (O):** With a change in other factors like nature, quality and quantity also the demand for the product changes from time to time.

LAW OF DEMAND

Law of demand shows the relation between price and quantity demanded of a commodity in the market with an assumption that all the other demand determinants remain same or do no change. In the words of Marshall, "the amount demand increases with a fall in price and diminishes with a rise in price".

The demand curve slopes downward from left to right and with a fall in price of a product the demand goes on increasing and vice-versa.

Assumptions of Law of Demand:

Law is demand is based on certain assumptions:

1. No change in consumers income or remain constant.
2. No change in consumers taste and preferences.
3. No change in Prices of other related goods.
4. There should be no substitute for the commodity.
5. No change in the size of population.

Exceptions of Law of Demand:

There are certain exceptions to the law of demand as follows:

1) **Giffen Paradox or Inferior Goods:** When the price of an inferior good falls, the demand may not increase, instead they buy the same quantity and use the savings for purchase of better goods like meat, etc. Thus a fall in price is followed by reduction in quantity demanded and vice versa. "Giffen" first explained this and therefore it is called as Giffen's paradox. Ex: bread, cloth, broken rice, etc.
2) **Veblen Effect or Conspicuous consumption:** This law will not apply in case of costly items. Rich people buy certain good because it gives social distinction or prestige. It the price of diamonds falls poor also will buy is hence they will not give prestige. These products have demand even if the prices go higher. This effect is called Veblen effect. Ex: Diamond, Gold, etc.

3) **Ignorance:** Sometimes the quantity of the product is judged by its price. If the consumer is not aware of the competitive price of the product that is prevailing in the market, he may purchase more even at a higher price. Consumers think that the product is superior if the price is high and they buy more at a higher price. Ex: Exhibitions
4) **Speculative Effect or Expected changes in prices:** The law of demand does not operate in case of speculative demand. When there is an expectation of further rise in the price of a product or service, the demand increases more and more even with a rise in price. Similarly, if there is an expectation that the price of a product or service falls in future the demand also falls. *Ex: Shares*
5) **Extra ordinary situations:** During the times extra ordinary situations such as emergency, wars, famines, riots, floods, strikes, etc., the consumer becomes abnormal and buys products at any price available in the market. Due to the fear of scarcity of products they buy more at higher prices.
6) **Change in tastes and preferences:** The changes in consumer needs, fashions, tastes, preferences, customs, beliefs, etc., are also responsible to make the law of demand ineffective. The quantity demanded will remain same irrespective of the change in price.

ELASTICITY OF DEMAND

Elasticity of demand explains the relationship between a change in price and consequent change in amount demanded. "Marshall" introduced the concept of elasticity of demand. Elasticity of demand shows the extent of change in quantity demanded to a change in price.

In the words of "Marshall", "The elasticity of demand in a market is great or small according as the amount demanded increases much or little for a given fall in the price and diminishes much or little for a given rise in Price".

$$\text{Elasticity} = \frac{\text{Percentage change in the dependent variable}}{\text{Percentage change in the independent variable}}$$

- **Elastic demand:** A small change or no change in price may lead to a great or infinite change in quantity demanded. In this case, demand is "Elastic" ($E_d>1$).
- **In-elastic demand:** If a large change in price is followed by a small change or no change in quantity demanded then the demand in "Inelastic" ($E_d<1$).
- **Unitary demand:** If the change in demand is exactly equal or proportionate to the change in price, then it is "Unitary" ($E_d=1$).

Factors affecting Elasticity of Demand:

1. **Nature of the Commodity:** Based on their nature, the products and services are classified as Necessaries, Comforts and Luxuries. Necessaries imply basic things like food, clothing and shelter. Comforts imply TV, DVD players, etc. Luxuries refer to gold, diamonds, etc. These change from person to person, time to time and place to place.
2. **Time period:** The demand for a commodity is always related to same period of time, say a day, a week, a month, etc. Elasticity of demand varies with the length of time periods. Generally longer the duration of period, greater will be the elasticity of demand and vice-versa.

3. **Change in Income:** The demand for various commodities are affected in different degrees due to change in income. The change in income in case of comforts is less elastic and incase of necessaries it is probably inelastic.
4. **Postponement of Consumption:** The demand for commodities, whose consumption can be postponed for sometime, is elastic Ex: VCR, TV, etc. if prices are higher. The demand for necessities such as food grains are inelastic, they cannot be postponed.
5. **Tastes and Preferences:** When a customer is particular about his taste and preference, the product is said to be in elastic. Ex: Colgate, Tate Tea, etc.
6. **Complementary products:** In case of complementary goods having joint demand the elasticity is low.
7. **Availability of Substitutes:** The demand for commodities having substitutes is elastic, because if there is increase in price of a product, we use other products. Ex: gas, kerosene, coal, electricity, etc. The commodities having no substitutes are inelastic.
8. **Price level:** Generally the demands for very costly or very cheap goods are inelastic. Ex: Car and salt. The increase in price of car by Rs.10,000 will not make any difference in its demand. Similarly changes in very cheap goods do not have any effect on demand.
9. **Durability of the product:** Where the product is durable in case of consumer durables such as TC, the demand is elastic. In case of perishable goods it is inelastic.
10. **Government Policy:** When the policy is liberal, the demand for the product is elastic demand and vice-versa.

TYPES OF ELASTICITY OF DEMAND

There are four types of Elasticity of Demand:

1. Price Elasticity of Demand
2. Income Elasticity of Demand
3. Cross Elasticity of Demand
4. Advertisement Elasticity of Demand

I. PRICE ELASTICITY OF DEMAND:

Marshall was the first economist to define price elasticity of demand. Price elasticity of demand measures changes in quantity demand to a change in Price. It is the ratio of percentage change in quantity demanded to a percentage change in price. Price elasticity is always negative which indicates that the consumer tends to buy more with every fall in price.

$$\text{Price Elasticity} = \frac{\text{proportionate/percentage change in quantity demand for product 'X'}}{\text{proportionate/percentage change in price of product 'X'}}$$

The formula is mathematically presented as:

$$E_d = \frac{(Q_2 - Q_1)/Q_1}{\Delta Q \quad P}$$

$$E_d = (P_2 - P_1)/P_1$$

or

$\Delta P \times Q$

where, ΔQ = change in quantity demanded or difference in $Q_2 - Q_1$
ΔP = change in price or difference in $P_2 - P_1$
P = Base price of product
Q = Base quantity demanded

Example:

Price	Quantity
8	10
4	12

$\Delta Q = 2$

$\Delta P = 4$

$P = 8$

$Q = 10$

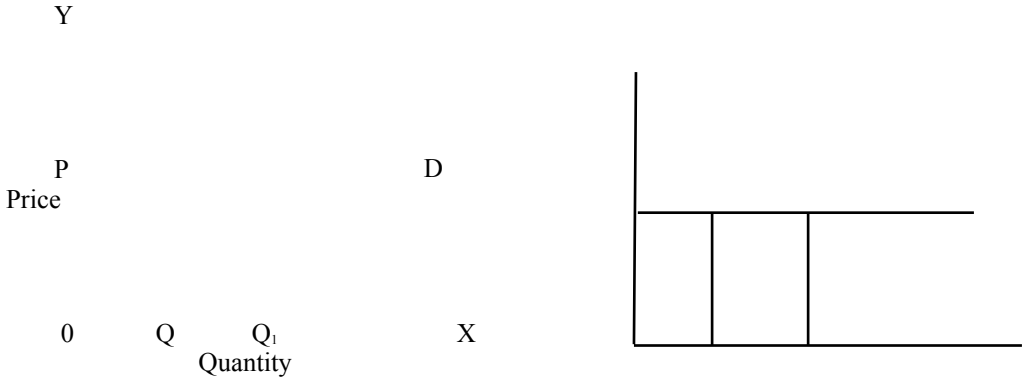
$$E_d = \frac{2/10}{4/8} \text{ or } \frac{2}{4} \times \frac{8}{10} = 0.4 \text{ (Inelastic)}$$

Degrees/Types of Price Elasticity of Demand:

The Measures of Elasticity of Demand are divided in to five categories. It is also referred as Degrees or Types of Price Elasticity of Demand:

1. Perfectly Elastic demand (Ed=∞):

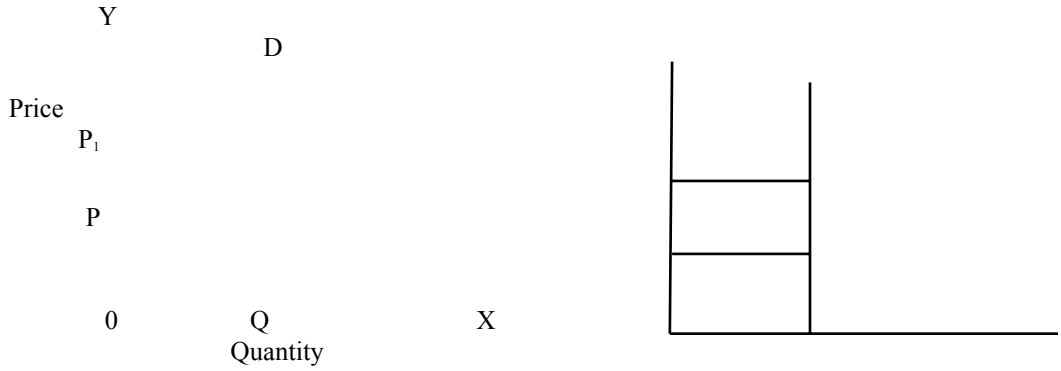
It is also known as Infinite Elasticity of demand. When small change in price leads to an infinitely large change is quantity demand, it is called perfectly or infinitely elastic demand. In this case Ed=∞.



The demand curve DD is horizontal straight line or parallel to X-axis. It shows the at "OP" price any amount is demand and if price increases, the consumer will not purchase the commodity.

2. Perfectly Inelastic Demand (Ed=0):

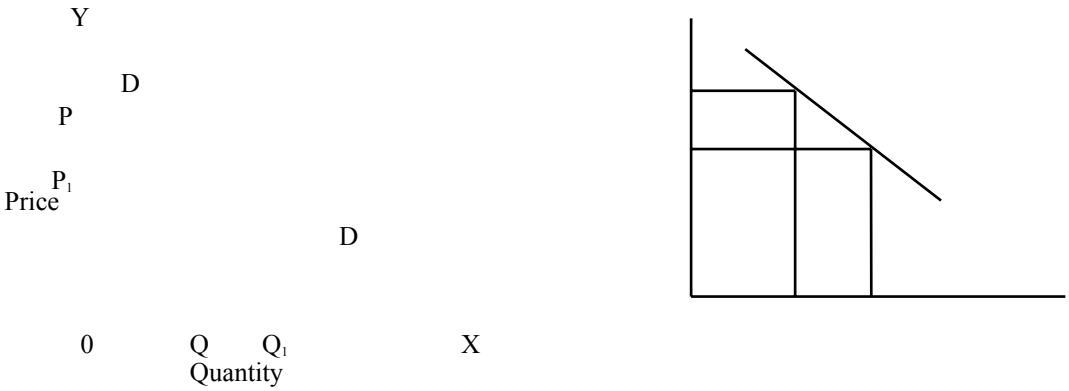
It is also known as Zero Elasticity of demand. In this case, even a large change in price fails to bring about a change in quantity demanded or demand remains constant. Ex: Salt. In this case Ed=0.



The demand curve DD is parallel or vertical to Y-axis. When price increases from 'OP' to 'OP_1', the quantity demanded remains the same. In other words the response of demand to a change in Price is nil.

3. Unitary Elasticity of Demand (Ed=1):

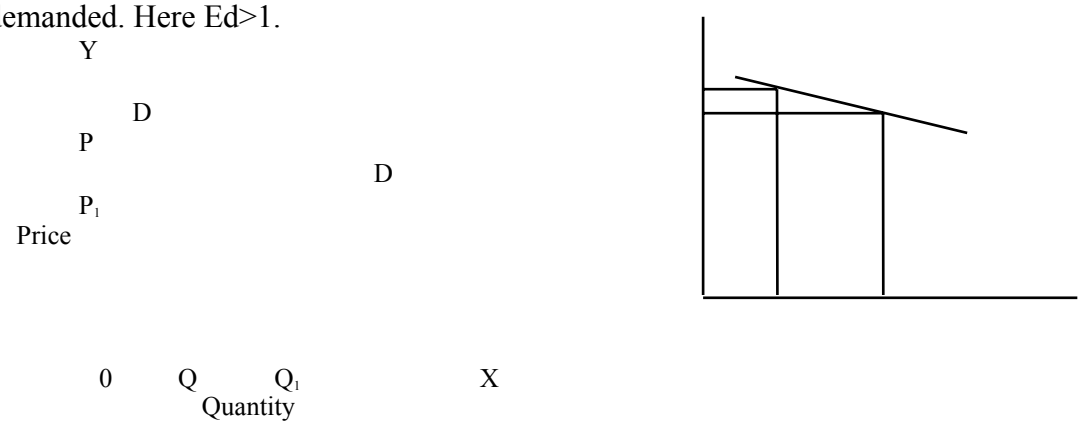
The change in demand is exactly equal to the change in price. When both are equal Ed=1 and elasticity is said to be unitary.



The demand curve DD is in the shape of Rectangular Hyperbola. When price falls from 'OP' to 'OP_1' quantity demanded increases from 'OQ' to 'OQ_1'. Thus a change in price has resulted in an equal change in quantity.

4. Relatively Elastic Demand (Ed>1):

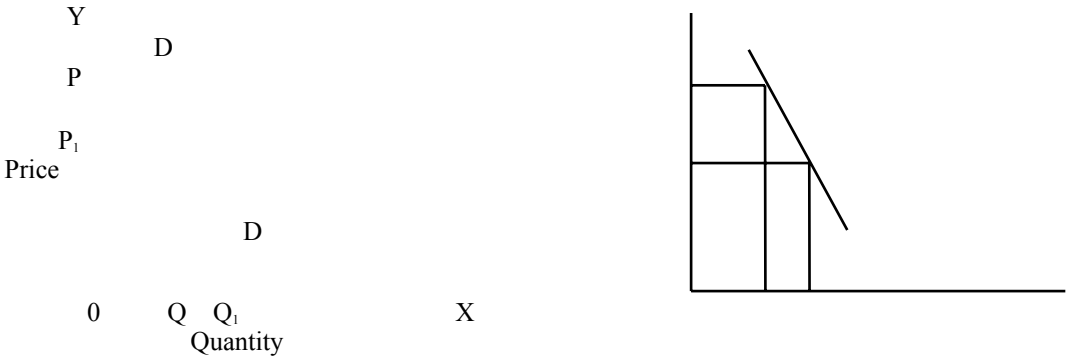
It is also referred as More than unitary Elasticity of demand. Demand changes more than proportionately to a change in price. i.e. a small change in price leads to a very big change in the quantity demanded. Here Ed>1.



Here the demand curve is inclined to X-axis or curve will be flatter. When price falls from 'OP' to 'OP_1', amount demanded increase from 'OQ' to 'OQ_1' which is larger than the change in price.

5. Relatively In-Elastic Demand (Ed<1):

Quantity demanded changes less than proportional to a change in price. A large change in price leads to small change in amount demanded. Here Ed<1.



Here the demand curve is inclined towards Y-axis or the curve will be steeper. When price falls from 'OP' to 'OP_1', amount demanded increases from OQ to OQ_1, which is smaller than the change in price.

II. INCOME ELASTICITY OF DEMAND

It refers to the quantity demanded of a product in response to given change in income of the consumer. It is normally positive, which indicates the consumer tends to buy more and more with every increase in income.

$$\text{Income Elasticity} = \frac{\text{proportionate change in quantity demanded for product 'X'}}{\text{proportionate change in consumers income}}$$

The formula is mathematically presented as:

$$E_d = \frac{(Q_2 - Q_1)/Q_1}{\frac{\Delta Q}{I}} \quad \text{or} \quad (I_2 - I_1)/I_1$$

$\Delta I \times Q$

where, ΔQ = change in quantity demanded or difference in Q_2-Q_1
ΔI = change in income or difference in I_2 - I_1
I = Income of the consumer
Q = Quantity demanded

Example:

Income	Quantity
4000	20
5000	25

$\Delta Q = 5$
$\Delta I = 1000$
$I = 4000$
$Q = 20$

$$E_d = \frac{5/20}{1000/4000} \text{ or } \frac{5}{1000} \times \frac{4000}{20} = 1 \text{ (unitary)}$$

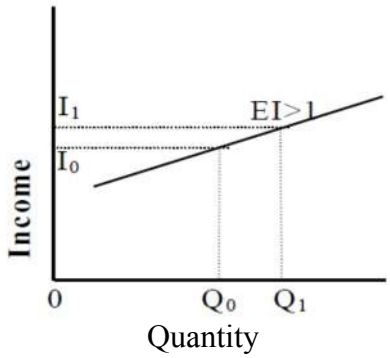
Degrees/Types of Income Elasticity of Demand:

The income elasticity of demand is positive for superior/normal goods and negative for inferior goods. The income elasticity of demand is shown as follows:

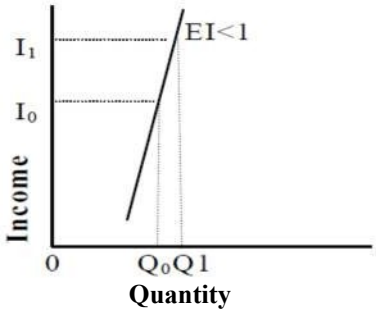
1. Positive income elasticity of demand:

The income elasticity of demand is positive when change in income leads to a direct and more than proportionate change in quantity demanded. It is as follows:

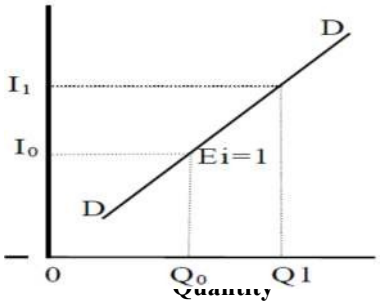
(a) Income elasticity of demand greater than unity: For a given proportionate rise in the consumer's income, there is a greater proportionate rise in the quantity demanded of a commodity. E_I is greater than unity. This is in case of luxuries. ($E_I > 1$).



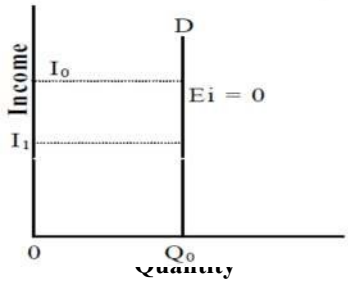
(b) Income elasticity of demand less than unity: For a given proportionate rise in the consumer's income, there is a smaller proportionate rise in the quantity demanded of a commodity. The income elasticity of demand is less than unity in case of necessaries. ($E_I < 1$).



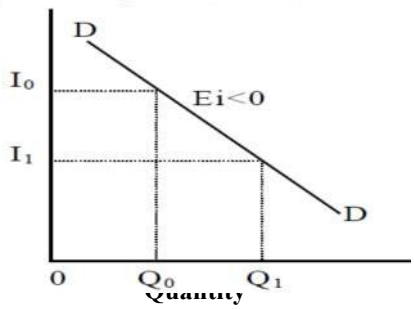
(c) Unitary income elasticity: A given proportionate rise in the consumer's income is accompanied by an equally proportionate rise in the quantity demanded of a commodity and vice versa (E_I=1).



2. **Zero Income Elasticity:** A given increase in the consumer's income does not result in any increase in the quantity demanded of a commodity (E_I=0).



3. **Negative income elasticity:** A given increase in the consumer's money income is followed by an actual fall in the quantity demanded of a commodity. This happens in the case of economically inferior goods ($E_I < 0$).



The income elasticity of demand is negative, when an increase in income leads to decrease in quantity demanded.

III. CROSS ELASTICITY OF DEMAND:

Cross-price elasticity of demand (*EXY*) measures the responsiveness of quantity demanded of good *X* to changes in the price of related good *Y*, holding the price of good *X* & all other demand determinants for good *X* constant. These are substitute or complimentary goods.

$$\text{Cross Elasticity} = \frac{\text{proportionate change in demand for product 'X'}}{\text{proportionate change in price of product 'Y'}}$$

The formula is mathematically presented as:

$$E_d = \frac{(Qx_2 - Qx_1)/Qx_1}{\Delta Qx \quad Py} \Big/ \frac{}{} \quad \text{or} \quad E_d = (Py_2 - Py_1)/Py_1$$

$\Delta Py \times Qx$

where, ΔQx = change in quantity demanded or difference in $Qx_2 - Qx_1$
ΔPy = change in price or difference in $Py_2 - Py_1$
Py = price of product y
Qx = quantity demanded for product x

Example:

Price of Y	Quantity of X
20	100
30	120

$\Delta Qx = 20$
$\Delta Py = 10$
$Py = 20$
$Qx = 100$

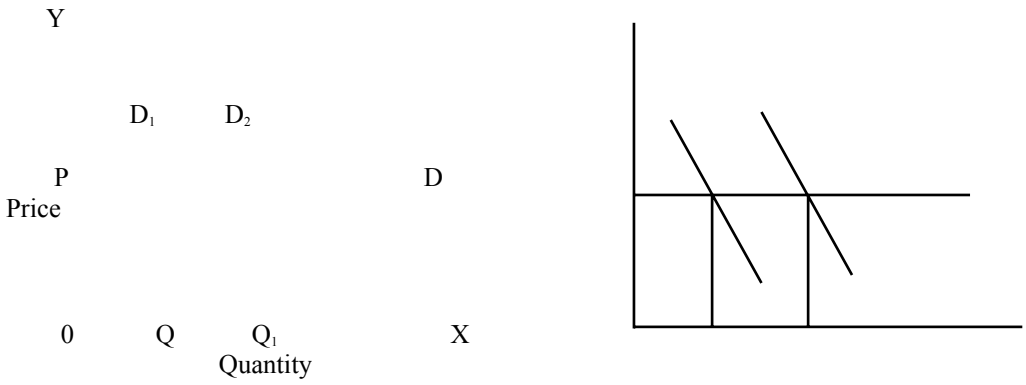
$$E_d = \frac{20/100}{10/20} \text{ or } \frac{20}{10} \times \frac{20}{100} = 0.4 \text{ (Inelastic)}$$

Degrees/Types of Cross Elasticity of Demand:

Cross elasticity of demand is always referred to substitute and complements. It should be noted that greater the cross elasticity, the more related the two goods are. The cross elasticity will be zero, if the two goods have no relationship.

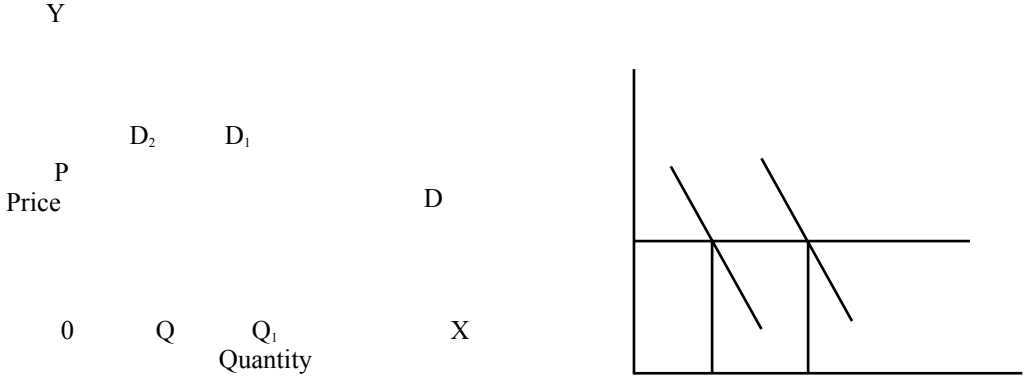
1. **Substitutes:** Substitutes in consumption are goods that can be used in place of each other. The cross elasticity for substitutes in consumption is positive. This is because a rise in the price of good Y will cause people to substitute the cheaper good X for Y. Example: Pepsi & Coke.

Price of Coke	Price of Pepsi	Quantity of Pepsi
20	25	10
30	25	20



2. **Complements:** Complements are goods that are consumed together. The cross elasticity for complements in consumption is negative. This is because a rise in the price of good Y will cause people to consume less of good Y. since they consume X & Y together, they will consume less of good X as well. Example: Coffee & Sugar.

Price of Petrol	Price of Car	Quantity demanded Car
70	100	10
80	100	20



IV. ADVERTISING ELASTICITY OF DEMAND:

It measures the response of quantity demanded to change in the expenditure on advertising and other sales promotion activities. Advertising elasticity is always positive. The advertisement-elasticity of sales varies between zero and infinity. Thus, $0 \leq E_A \leq \infty$.

$$\text{Advertising Elasticity} = \frac{\text{proportionate change in quantity demanded for product 'X'}}{\text{proportionate change in advertising costs}}$$

The formula is mathematically presented as:

$$E_d = \frac{(Q_2 - Q_1)/Q_1}{(A_2 - A_1)/A_1} \text{ or } \frac{\Delta Q}{\Delta A} \times \frac{A}{Q}$$

where, ΔQ = change in quantity demanded or difference in $Q_2 - Q_1$
ΔA = change in advertisement cost or difference in $A_2 - A_1$
A = Advertisement costs
Q = quantity demanded

Example:

$$E = \quad 100/300$$

Advertisement	Quantity
10000	300
5000	200

$\Delta Q = 100$
$\Delta A = 5000$
$A = 10000$
$Q = 300$

or $\frac{100}{5000/10000} \times \frac{10000}{300} = 0.66$ (Inelastic)

$_d$

Degrees/Types of Advertisement Elasticity of Demand:

1. **Zero Elasticity of Demand (E_A=0):** The sales do not respond to advertisement expenditure.
2. **Less than Elasticity of Demand ($0 < E_A < 1$):** The increase in total Sales is less than proportionate to the increase in advertisement expenditure.

3. **More than Elastic Demand (E_A>1):** The sales increase at a higher rate than the rate of increase in advertisement expenditure.
4. **Unitary Elasticity of Demand (E_A=1):** The sales increase in proportion to the increase in expenditure on advertisement.

SIGNIFICANCE OF ELASTICITY OF DEMAND

The concept of elasticity of demand is much of practical importance:

1. **Price fixation:** The demand for any product depends upon its price. Hence, the price fixed for any product must suit the market conditions, more precisely, the consumers' expectations and prices of competing brands. Before launching any product, the enterprise must analyze carefully the price elasticity for it in order to match market expectations. A mismatch may result in failure of the product. Thus, a product having more elasticity cannot be priced high. On the other hand, low price level is always desirable to the product with less elasticity.
2. **Price discrimination:** If the monopolist finds that the demand for his commodities is inelastic, he will at once fix the price at a higher level in order to maximize his net profit. In case of elastic demand, he will lower the price in order to increase his sale and derive the maximum net profit.
3. **Taxation Policy:** Tax authorities study the price elasticity of each type of product before fixing its rate of tax, as levying a higher rate of tax for a relatively elastic product will lead to increase in price and consequently reduce its sales and thus tax revenues. They have to see whether the demand for that commodity is elastic or inelastic.
4. **Distribution:** Elasticity provides a guideline to the producers for the amount to be spent on advertisement. If the demand for a commodity is elastic, the producers shall have to spend large sums of money on advertisements to increase sales.
5. **International trade:** This concept helps in finding out the terms of trade between two countries. Terms of trade means rate at which domestic commodities is exchanged for foreign commodities. The rate of foreign exchange is also considered on the elasticity of imports and exports of a country.
6. **Production:** Producers generally decide their production level on the basis of demand for their product. Hence elasticity of demand helps to fix the level of output. The factors of production which have inelastic demand can obtain a higher price in the market then those which have elastic demand. This concept explains the reason of variation in factor pricing.
7. **Help to trade unions:** The trade unions can raise the wages of the labor in an industry where the demand of the product is relatively inelastic. On the other hand, if the demand, for product is relatively elastic, the trade unions cannot press for higher wages.
8. **Importance to businessmen:** The concept of elasticity is of great importance to businessmen. When the demand of a good is elastic, they increases sale by towering its price. In case the demand' is inelastic, they are then in a position to charge higher price for a commodity.
9. **Others Factors:** The concept elasticity of demand also helping in taking other vital decision Ex: Determining the price of joint product, take over decision etc.

DEMAND FORECASTING

Demand Forecasting refers to an estimate of future demand for the product. It is an "objective assessment of the future course of demand". Forecasting helps the firm to assess the probable demand for its products and plan its production accordingly.

Demand forecasting is helpful not only at firm level but also at national level. It is the key driver for success or failure. It is essential to guard the future against any surprises. Demand forecast relate to production inventory control, timing, reliability of forecast, etc. It is an essential element to make business decisions to foresee the future and act accordingly.

Demand forecasting may be undertaken at three different levels:

1. **Firm level:** It is more important from managerial view point as it helps the management in decision making with regard to the firms demand and production.
2. **Industry Level:** It is prepared by different trade association in order to estimate the demand for particular industries products. Industry includes number of firms. It is useful for inter- industry comparison.
3. **Macro leve**l: Micro level demand forecasting is related to the business conditions prevailing in the economy as a whole.

TECHNIQUES OF DEMAND FORECASTING

Demand forecasting plays an important role in decision making. It is crucial to use the best technique to minimize forecast inaccuracy. However there is no unique method, which always guarantees the best result. The choice of a method often depends upon data availability, urgency of forecast, etc.

Demand forecasting techniques range from the simple to the extremely complex. There are two approaches to the problem of business forecasting. One is to obtain information about the intentions of the consumers through collecting expert's opinion known as qualitative method and the other is to use past experience as a guide and, by extrapolating past statistical relationships to suggest the level of future demand called as quantitative method. The various forecasting methods are:

Qualitative Techniques (Survey Method):

1. Consumer's opinion survey
   - Census Method
   - Sample Method
2. Sales force opinion method
3. Expert opinion Method or Delphi Method
4. Test Marketing
5. End-Use Method

Quantitative Techniques (Statistical Methods):

1. Trend Projection Method
   a) Trend line by observation
   b) Least Square Method
   c) Time Series Analysis
   d) Moving Average Method
   e) Exponential Smoothing
2. Barometric Method
3. Simultaneous Equation Method
4. Correlation and Regression Method

QUALITATIVE TECHNIQUES (SURVEY METHODS)

When sufficient data for statistical analysis are not available, it may become necessary to perform marketing research in which the analyst obtain certain information directly from the consumer rather than from statistical data. The following are the qualitative techniques for demand forecasting:

2. Consumer's opinion survey:

Individuals and companies plan in advance for their future purchases. For this it is important that buyers should be approached and asked as how much they intend to buy a particular product, at a particular point of time. This is the most effective method as the buyer is the ultimate decision maker, so we are collecting the information directly from him. Consumer surveys can be used to ask consumers about buying behaviors, using a number of ways like face to face, telephone, direct mail, internet, spot survey, etc.

Consumer survey can be done in two ways:

- **Census Method:** When the total population of potential buyers in a nation or region is surveyed it is known as census method. This is possible when the total number of buyers is limited.
- **Sample Method:** When only a portion/group of total population of potential buyers in a region is surveyed it is called sample method. It is less tedious and less costly.

3. Sales force opinion method:

In this method, the firm will extract the opinions of the sales team, which is on the payrolls of the company about the future demand for the product. The sales personnel are very close to the consumers and dealers. They express their opinions about the future demand for the product. The opinions so gathered are tabulated and the demand forecasts will be arrived at. However, care be taken before forming an opinion about the future demand.

4. Expert Opinion Method or Delphi Method:

Expert opinion method is a variant of the consumer's opinion survey method. It was also popular as Delphi method and first used by Rand Corporation in USA for predicting the demand under conditions of intractable technological changes. It is used under conditions of nonexistence of data or when a new product is being launched. Experts are the outside persons and they do not have any interest in results of particular survey. It is used for predicting the demand under conditions of technological changes. It is under conditions of non-existence of data or when a new product is launched.

5. Test Marketing:

Firms resort to test marketing while launching a new product or likely to change the design or model of the existing products. This is also known as controlled experimentation method as the product is likely to be launched in a segmented market to identity its demand potential. The essential prerequisites of test marketing are that the product price, its design, quality, level of advertisement and sales promotion campaign should be equal in promotion to that of what the firm is likely to incur had it been released in the national market.

of the input-output coefficients. Once the demand for the final goods estimated, the demand for the intermediate product can be easily arrived at using the input-output coefficients.

QUANTITATIVE TECHNIQUES (STATISTICAL METHODS)

These are based on the assumption that future patterns tend to be extensions of past ones and that one can make useful predictions by studying the past behaviour i.e. the factors which were responsible in the past will also be operative to the same extent in future.
The following are the statistical techniques for demand forecasting:

1. Trend Projection Method:

It is also referred as Mechanical Extrapolations Method. These are generally based on analysis of past sales data. For forecasting the demand for goods in long-run, statistical and mathematical methods are used for considering past data.
The mechanical extrapolation methods used for demand forecasting are:

a) Time Series Analysis:

Where the surveys or market tests are costly and time consuming, statistical analysis provides another method to prepare forecasts, i.e. time series analysis. In this the product should have been traded in the market in the past i.e. data on performance should be available. It can forecast future values of time series by examining past observations only. There are four major components for forecasting demand:

1. **Trend (T):** It results in developments in population, capital and technology. It refers to increase or decrease in time series data. It relates to over a period of long time say five to 10 years.
2. **Cyclic Trend (C):** These are variations caused by economic cycles like boom, depression, recovery. These economic changes causes severely the firms sales graph move upward and downward depending on the economic cycle the firm is operating.
3. **Seasonal Trend (S):** It refers to a consistent pattern of sales movements within a year. More goods are sold during festival seasons. It may be related to weather factors, holidays, etc.
4. **Erratic Trend (E):** It results from occurrence of strikes, riots, wars, natural disasters, etc. These make forecasting process more complex or difficult.

Time series involves process of decomposing original sales series (y) in to components T,C,S,E. There are different models while one model states Y=T+C+S+E, another states that Y=T*C*S*E. It can be projected in a graph i.e. sales on Y axis and time on X axis. It is very simple and inexpensive.

b) Trend line by observation:

This method of forecasting trend is easy and quick as it involves the plotting the actual sales data on a chart and their estimating by observation where the trend line lies from the graph. In this method based on the Time series data, for the period is taken on x-axis and the corresponding sales values on y-axis and the points are plotted for given data on graph paper. It is a very simple, quick and inexpensive method.

c) Least Square Method:

This is one of the best methods to determine trend. In most cases, we try to fit a straight line to the given data. The line is known as ‘Line of best fit’ as we try to minimize the sum of the squares of deviation between the observed and the fitted values of the data. The basic assumption here is that the relationship between the various factors remains

unchanged in future period also. Certain statistical formulae are used to find the trend line which fits the available data. The estimating trend line is projected by a linear equation.

$$Y = a + bX$$

where,

Y = future sales

X = period for a certain commodity

a = Y axis intercept i.e, constant

b = Coefficient of the determining variable x

The value of a & b can be calculated as follows:

$$\Sigma y = Na + bx$$

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

where,

N = No. of years or months for which data is available.

d) Moving Average Method:

This method can be used to determine the trend values for given data without going into complex mathematical calculations. The calculations are based on some predetermined period in weeks, months, years, etc. A moving average is an average of some fixed or pre-determined number of observations (given by the period) which moves through the series by dropping of top item of the previous averaged group and adding the next item below in each successive average. The calculation depends upon the period to be odd or even. It is simple to use and easy to understand.

e) Exponential Smoothing:

This technique is an improvement over moving averages method. Unlike in moving averages method, all the time periods are assigned weights in order that nearest one gets higher weight and distant one gets lower weight. This method proves more realistic when the data is consistent all through the year, unaffected by wide seasonal fluctuations. It is used for short run demand forecasts. The formula for exponential smoothing is:

$$S_{t+1} = cS_t + (1 - c)\, Sm_t$$

Where,

S_{t+1} = exponentially smoothed average for a new year

S_t = actual data in the most recent past

Sm_t = most recent smoothed forecast

c =smoothing constant

2. Barometric Technique or Lead-Lag Indicators Method:

Barometric Technique refers to the time series data on important business and economic activities in key sectors of the economy. These time series are representative, in one way or the other, of the aggregate business and economic activity in the economy as a whole. An intelligent analysis and understanding of the time duration and the amplitude of cyclical ups and downs in the selected indicators provide useful information regarding the future behaviour of overall cyclical movements.

In this one set of data is used to predict another set. It focuses on cyclical variations caused due to changes in economic environment (i.e. boom, depression and recovery). That is why, this method it called barometric method. It evolves over a period of time which is driven by changes in government policies, prices, inflation, employment, income, etc. It is a simple method. It is a useful method for short-term forecasting. It is not applicable for long-term forecasting.

3. Simultaneous Equation Method:

This method of demand forecasting involves the estimation of several simultaneous equations. These equations are, generally, behavioural equations, mathematical identities, and market-clearing equations. The simultaneous equations method is a complete and systematic approach to forecasting in general. This is a simple way to forecast demand. The first step is to identify the factors which effect demand of a product. The forecaster needs to estimate the future values of only the exogenous variables. The firm usually indicates demand in quantity as a function of Price (P), Income (I), Tastes & Preferences (T), etc as: Qd = f (P, I, T, PR, EP, EI, SP, D_C, A, O).

4. Correlation and Regression Method:

Correlation and regression methods are statistical techniques. Correlation describes the Correlation is used to indicate the relationship between two variables. When one variable increased with increase in other variable it is positive correlation and decreases it is negative correlation. Demand forecasting can be done by relationship between demand and other variables like Price, Income, etc.

Regression tries to explain the extent of this relationship. In this past data of two variables is collected and converted in to equation to forecast demand for future. For example, demand for cold drinks in a city may be said to depend largely on 'per capita income' of the city and its population. Here, demand for cold drinks is a 'dependent variable' and 'per capita income' and 'population' are the 'explanatory' variables. In this past data of two variables is collected and converted in to equation to forecast demand for future.

$$Y = a + bx$$

Where,

Y= demand
a= fixed demand
b= rate of change of demand
X=value of related variables like price, income, etc.

IMPORTANT QUESTIONS

1. Define Managerial Economics. Explain its nature and scope.
2. What is Demand? Explain the various determinants of demand.
3. What is law of demand? Explain the exceptions of law of demand.
4. What is elasticity of demand? Explain the factors governing it.
5. Describe the types of elasticity of demand with suitable examples.
6. What is price elasticity of demand? Explain the types of price elasticity of demand diagrammatically.
7. Discuss the significance of elasticity of demand.
8. What is demand forecasting? Explain different methods of demand forecasting.