BUSINESS ECONOMICS AND FINANCIAL ANALYSIS TEXT BOOK EXTRACTS

CVR

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1. Theory of Demand

1.1 Introduction

Demand theory is one of the core theories of microeconomics and consumer behavior. It attempts at answering questions regarding the magnitude of demand for a product or service based on its importance to human wants. It also attempts to assess how demand is impacted by changes in prices and income levels and consumers preferences/utility. Based on the perceived utility of goods and services to consumers, companies are able to adjust the supply available and the prices charged. In economics, demand has a specific meaning distinct from its ordinary usage. In common language we treat 'demand' and 'desire' as synonymously. Effective demand which implies three things:

• Desire for a commodity

• Willingness to spend money to acquire that commodity

• The ability to pay

This substantiates that a want or a desire does not develop into a demand unless it issupported by the ability and the willingness to acquire it. For instance, a person may desire to own a scooter but unless he has the required amount of money with him and the willingness to spend that amount on the purchase of a scooter, his desire shall not become a demand. The following should also be noted about demand:

• Demand always alludes to demand at price. The term 'demand' has no meaning unless it is related to price. For instance, the statement, 'the weekly demand for potatoes in city X is 10,000 kilograms' has no meaning unless we specify the price at which this quantity is demanded.

• Demand always implies demand per unit of time. Therefore, it is vital to specify the period for which the commodity is demanded. For instance, the statement that demand for potatoes in city X at Rs. 8 per kilogram is 10,000 kilograms again has no meaning, unless we state the period for which the quantity is being demanded.

Definition of Demand: "The demand for a commodity at a given price is the amount of it which will be bought per unit of time at that price".

2.2 Demand Function

Demand function is a comprehensive formulation which specifies the factors that influence the demand for the product. What can be those factors which affect the demand?

For example,

Dx = f (Px, Py, Pz, I, W, A, E, T, U)

Dx stands for demand for item x (say, a car)

PX, its own price (of the car)

Py, the price of its substitutes (other brands/models)

Pz, the price of its complements (like petrol)

I= income (budget) of the purchaser (user/consumer)

W, the wealth of the purchaser

A, the advertisement for the product (car)

E, the price expectation of the user

T, taste or preferences of user

U, all other factors.

2.3 Determinants of Demand

The determinants of demand are:

1. The price of the good or service.
2. Prices of related goods or services. These are either complementary, those purchased along with a particular good or service, or substitutes, those purchased instead of a certain good or service.
3. Income of buyers.
4. Tastes or preferences of consumers.
5. Expectations. These are usually about whether the price will go up.

6. Advertisements and other sales promotional level.

3 LAW OF DEMAND

We have considered various factors that fashion the demand for a commodity. As explained the first and the most important factor that determines the demand of a commodity is its price. If all other factors remain constant, it may be said that as the price of a commodity increases, its demand decreases and as the price of a commodity decreases its demand increases. This is a general behavior observed in a market. This gives us the law of demand:

"The demand for a commodity increases with a fall in its price and decreases with a rise in its price, other things remaining the same".

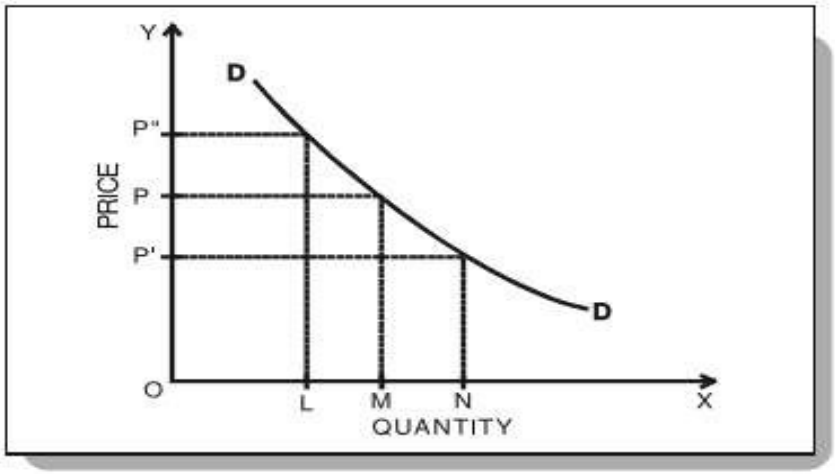


Fig. 1

The law of demand thus merely states that the price and demand of a commodity are inversely related, provided all other things remain unchanged or as economists put it ceterisparibus.

3.1 Assumptions of the Law of Demand

The above statement of the law of demand, demonstrates that that this law operates only when all other things remain constant.

These are then the assumptions of the law of demand. We can state the assumptions of the law of demand as follows:

1. Income level should remain constant: The law of demand operates only when the income level of the buyer remains constant. If the income rises while the price of the commodity does not fall, it is quite

likely that the demand may increase. Therefore, stability in income is an essential condition for the operation of the law of demand.

2. Tastes of the buyer should not alter: Any alteration that takes place in the taste of the consumers will in all probability thwart the working of the law of demand. It often happens that when tastes or fashions change people revise their preferences. As a consequence, the demand for the commodity which goes down the preference scale of the consumers declines even though its price does not change.

3. Prices of related goods should remain constant: If some new substitutes for a commodity appear in the market, its demand generally declines. This is quite natural, because with the availability of new substitutes some buyers will be attracted towards new products and the demand for the older product will fall even though price remains unchanged. Hence, the law of demand operates only when the market for a commodity is not threatened by new substitutes.

4. Price rise in future should not be expected: If the buyers of a commodity expect that its price will rise in future they raise its demand in response to an initial price rise. This behavior of buyers violates the law of demand. Therefore, for the operation of the law of demand it is necessary that there must not be any expectations of price rise in the future.

5. Advertising expenditure should remain the same: If the advertising expenditure of a firm increases, the consumers may be tempted to buy more of its product. Therefore, the advertising expenditure on the good under consideration is taken to be constant.

3.2 Exceptions to Law of Demand

The following products or situations do not follow Law of Demand.

1. Giffen Goods: Giffen goods are the inferior goods whose demand increases with the increase in its prices. There are several inferior commodities, much cheaper than the superior substitutes often consumed by the poor households as an essential commodity. Whenever the price of the Giffen goods increases its quantity demanded also increases because, with an increase in the price, and the income remaining the same, the poor people cut the consumption of superior substitute and buy more quantities of Giffen goods to meet their basic needs.
2. Veblen Goods: Another exception to the law of demand is given by the economist Thorstein Veblen, who proposed the concept of "Conspicuous Consumption." According to Veblen, there are a certain group of people who measure the utility of the commodity purely by its price, which means, they think that higher priced goods and services derive more utility than the lesser priced commodities.

   For example, goods like a diamond, platinum, ruby, etc. are bought by the upper echelons of the society (rich class) for whom the higher the price of these goods, the higher is the prestige value and ultimately the higher is the utility or desirability of them.

3. Emergencies: During emergencies such as war, natural calamity- flood, drought, earthquake, etc., the law of demand becomes ineffective. In such situations, people often fear the shortage of the essentials and hence demand more goods and services even at higher prices.
4. Conspicuous Necessities: There are certain commodities which have become essentials of the modern life. These are the goods which consumer buys irrespective of an increase in the price. For example TV, refrigerator, automobiles, washing machines, air conditioners, etc.
5. Bandwagon Effect: This is the most common type of exception to the law of demand wherein the consumer tries to purchase those commodities which are bought by his friends, relatives or neighbors. Here, the person tries to emulate the buying behavior and patterns of the group to which he belongs

irrespective of the price of the commodity. For example, if the majority of group members have smart phones then the consumer will also demand for the smart phone even if the prices are high.

Thus, these are some of the exceptions to the law of demand where the demand curve is upward sloping, i.e. the demand increases with an increase in the price and decreases with the decrease in price.

3.3 Following are the main causes responsible for this relationship and downward slope of the demand curve.

1. Effect of the law of diminishing marginal utility:

The law states that a consumer derives less and less satisfaction (utility) from the every additional increase in the stock of a commodity.

This means that the consumer will be ready to pay less and less price to acquire every additional unit that he intends to buy. This means that he will buy more and more units, if and only if the price of the commodity under consideration falls. This, in its turn, means that price change and quantity change are in the opposite direction or, in other words, the quantity demanded of a commodity varies inversely with its price. This is the essence of the law of demand.

2. Income effect:

When the price of a commodity changes, the consumer's real income or purchasing owner of his money income changes leading to a change in quantity demanded. This is called income effect. When the price of a commodity falls, it increases the real income or purchasing power. This increase in real income induces the consumer to buy more of the same commodity or the same quantity of the commodity by spending less amount of money.

3. Substitution effect:

Substitution effect also leads the demand curve to slope from left to right. As the price of a commodity falls, prices of its substitute goods remains the same, the consumer will buy more of that commodity. For instance, tea and coffee are substitute goods. If the price of tea goes down, the consumers may substitute tea for coffee, although price of coffee remains the same.

Therefore, with a fall in price, the demand will increase due to favorable substitution effect. On the other hand, with the rise in price, the demand falls due to unfavorable substitution effect. This is nothing but the application of law of demand.

4. Alternate Uses of the Product: Falling prices of the product attracts the consumers to buy more quantity of the product as they find alternate uses of product.

4. Elasticity of Demand

While the law of demand establishes a relationship between price and quantity demanded for a product, it does not tell us exactly as how strong or weak the relationship happens to be. This relation, as already discussed, is inverse baring some rare exceptions. However, a manager needs an exact measure of this relationship for appropriate business decisions. Elasticity of demand is a measure, which comes to the rescue of a manager here. It measures the responsiveness of demand to changes in prices as well as changes in income. A manager can determine almost exactly how the demand for his product would change when he changes his price or when his rivals alter prices of their products. He can also determine how the demand for his product would change if incomes of his consumers go upon down. Elasticity of demand concept and its measurements are therefore very important tools of managerial decision making.

From decision-making point of view, however, the knowledge of only the nature of relationships is not sufficient. What is more important is the extent of relationship or the degree of responsiveness of demand to changes in its determinants. The responsiveness of demand for a good to the change in its determinants is called the elasticity of demand. The concept of elasticity of demand was introduced into the economic theory by Alfred Marshall. The elasticity concept plays an important role in various business decisions and government policies.

Elasticity of Demand refers to the degree of responsiveness of quantity demanded to the changes in the determinants of demand.

Applications of Elasticity of Demand Concept

- Elasticity measures help the sales manager in fixing the price of his product.
- The concept is also important to the economic planners of the country. In trying to fix the production target for various goods in a plan, a planner must estimate the likely demand for goods at the end of the plan.
- The price elasticity of demand as well as cross elasticity would determine the substitution between goods and hence useful in fixing the output mix in a production period.
- The concept is also useful to the policy makers of the government, in particular in determining taxation policy, minimum wages policy, stabilization program for agriculture, and price policies for various other goods (where administered prices are used).
- The managers are concerned with empirical demand estimates because they provide summary information about the direction and proportion of change in demand, as a result of a given change in its explanatory variables. From the standpoint of control and management of external factors, such empirical estimates and their interpretations are therefore, very relevant.

The following are the types of demand elasticity.

1 Price Elasticity: Elasticity of demand for a commodity with respect to change in its price.

1. Income Elasticity: Elasticity of demand with respect to change in consumer's income.
2. Cross Elasticity: Elasticity of demand for a commodity with respect to change in the price of its substitutes.
3. Advertisement or Promotional Elasticity.

5.PRICE ELASTICITY OF DEMAND

The price elasticity of demand is delineated as the degree of responsiveness or sensitiveness of demand for a commodity to the changes in its price. More precisely ,elasticity of demand is the percentage change in the quantity demanded of a commodity as a result of a certain percentage change in its price. A formal definition of price elasticity of demand (e) is given below:

$$e_p = \frac{\text{Percentage change in quantity demanded}}{\text{Percentage change in price}}$$

Price Elasticity of demand is the degree of responsiveness of demand to a change in its price. In technical terms it is the ratio of the percentage change in demand to the percentage change in price. Thus,
Ep = Percentage change in quantity demanded/Percentage change in price

In mathematical terms it can be represented as:

$$\mathbf{ep} = \frac{\Delta Q}{Q} \div \frac{\Delta P}{P}$$

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

From the definition it follows that

1. when percentage change in quantity demanded is greater than the percentage change in price then, price elasticity will be greater than one and in this case demand is said to be elastic.
2. when percentage change in quantity demanded is less than the percentage change in price then, price elasticity will be less than one and in this case demand is said to be inelastic.
3. when percentage change in quantity demanded is equal to the percentage change in price then price elasticity will be equal to one and in this case demand is said to be unit elastic.

Numerical example

Let us consider a situation where Price of tea has increased from Rs.7 to Rs 8and as a result of this demand for tea has declined from 50 cups to 48 cups.
The price elasticity in this case can be calculated as follows:
Percentage change in demand = (New demand – Old demand)/Old demand
= (48-50)/50
= -0.04
Percentage change in price = (New price –Old Price)/ Old price
= (8- 7)/ 7
= o.14
Price elasticity of demand = (percentage change in demand)/(Percentage change in price)
= - 0.04 /0.14
= -0.28
Since the Elasticity of Demand is less than one Demand is inelastic . In other words we can say that for a 14% increase in price ,demand has declined only by 4% . The negative sign indicates the inverse relationship between demand and price.

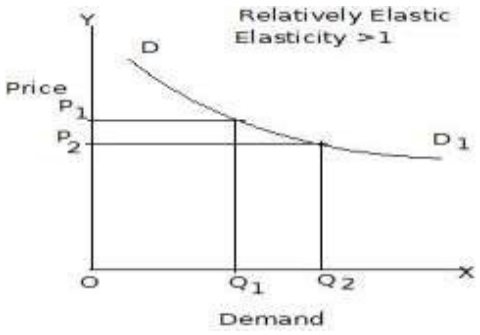
4.1.2 Types or degrees of price elasticity of demand

1. Relatively Elastic Demand (EP> 1)
2. Relatively Inelastic Demand (Ep< 1)
3. Unitary Elastic Demand (Ep = 1)
4. Perfectly Elastic Demand (EP = ∞)
5. Perfectly Inelastic Demand (EP = 0)

1.Relatively Elastic Demand (EP> 1)

Relatively Elastic Demand (EP> 1) is the Percentage change in demand is greater than the percentage change in price

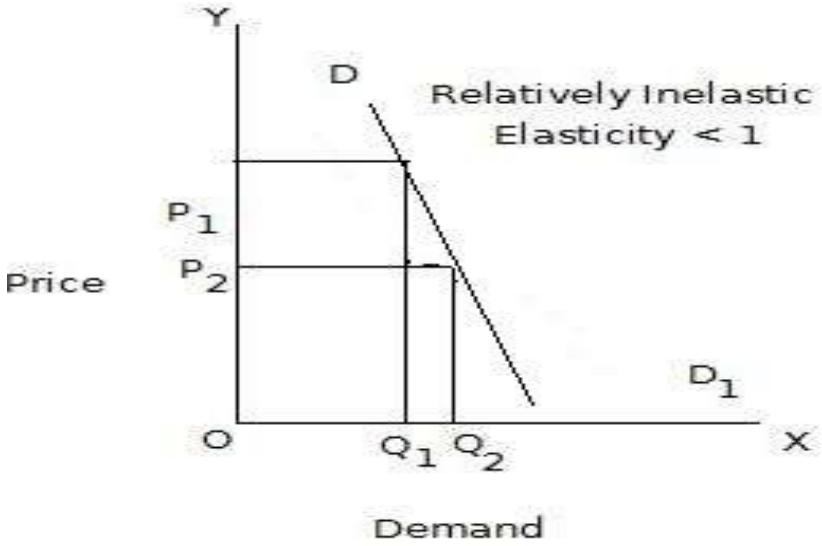
Ep >1 when $\frac{\Delta Q}{Q} > \frac{\Delta P}{P}$



2. Relatively Inelastic Demand (Ep< 1)

1.Relatively Inelastic Demand (Ep< 1)is the Percentage change in quantity demanded is less than the percentage change in price

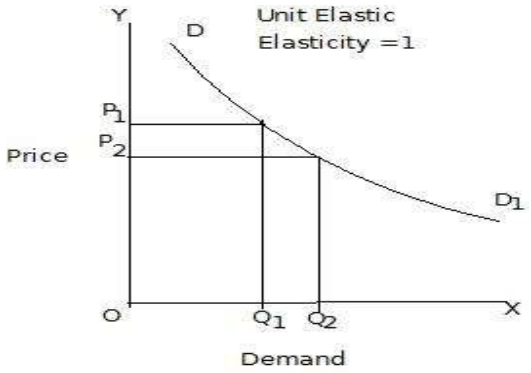
Ep <1 when $\frac{\Delta Q}{Q} < \frac{\Delta P}{P}$



3.Unitary Elastic Demand (Ep =1)

Unitary Elastic Demand (Ep = 1) Percentage change in quantity demanded is equal to the percentage change in price

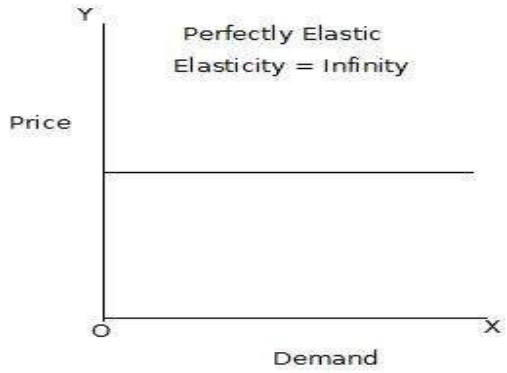
Ep = 1 when $\frac{\Delta Q}{Q} = \frac{\Delta P}{P}$



4.Perfectly Elastic Demand (EP = ∞)

Perfectly Elastic Demand (EP = ∞) The quantity demanded increases infinitely (or by unlimited quantity) with a small fall in price or quantity demanded falls to zero with a small rise in price.

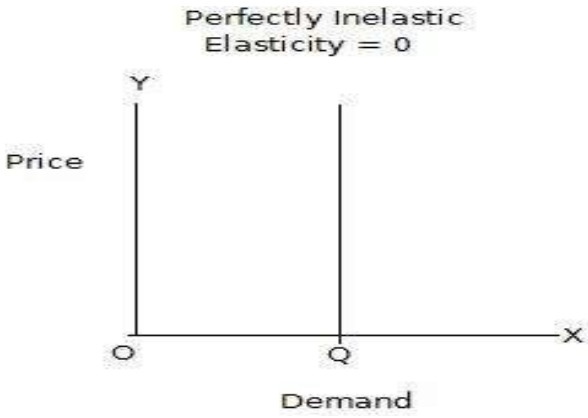
Ep = ∞ when $\frac{\Delta Q}{Q} = \infty$



5. Perfectly Inelastic Demand (EP = 0)

Perfectly Inelastic Demand (EP = 0) The demand remains constant whatever may be the price (i.e. price may rise or fall)

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



6.Measurement of Elasticity of Demand

The following methods are useful in the measurement of Price Elasticity of Demand

i. Percentage Method.

i. Point Elasticity Method.

iii. Arc Elasticity.

Let us discuss each of these measures in detail.

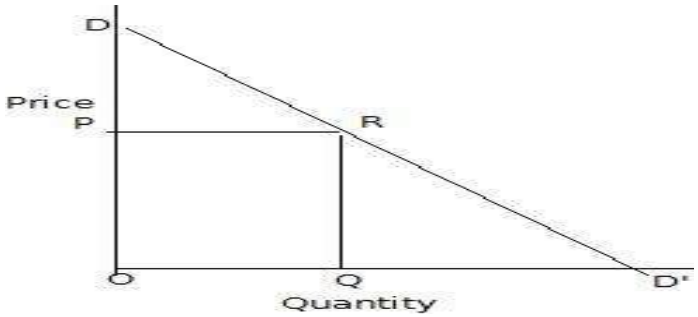
i)Percentage Method

Price elasticity can be measured by dividing the percentage change in quantity demanded in response to a small change in price ,by the percentage change in price. The definition and the numerical example discussed earlier explains the percentage method. Mathematically , price elasticity of demand ha s a negative sign since the change in quantity demanded is in opposite direction to the change in its price. Only goods which do not confirm to the Law of Demand like Veblen good or Giffen good have positive price elasticity of demand. Hence for sake of convenience in understanding the magnitude of response of quantity demanded of a good to a change in its price we ignore the negative sign and take into account only the numerical value of the elasticity. The accuracy of the percentage method is questioned on the ground that the value of the elasticity depends on which value is taken as the starting point in the calculation of percentage. For example, if quantity demanded increases from 10 units to 15 units, the percentage change is 50%, i.e., (15 − 10) ÷ 10 (converted to a percentage). But if quantity demanded decreases from 15 units to 10 units, the percentage change is −33.3%, i.e., (15 − 10) ÷ 15.Two alternative measures avoid or minimize the shortcoming of the percentage method.

ii) Point Elasticity Method

Measuring Elasticity Of Demand on a Linear demand Curve

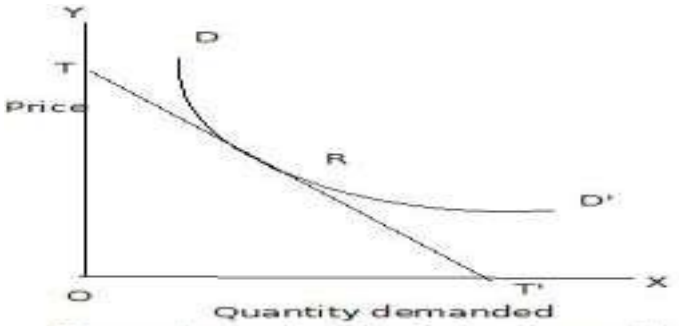
Let a straight line demand curve DD' be given and we have to measure price elasticity of demand at the point R on this demand curve.



The measure of price elasticity of demand is given by : Ep =(Δq/Δp) (p/q) The first term in this formula ,(Δq/Δp) is the reciprocal of the slope of the demand curve DD'(slope of the demand curve is equal to Change in price divided by change in quantity demanded and will be the same all along the straight line demand curve). The second term is the original price divided by the Original Quantity. Thus

Ep =(1/slope)(p/q)
Now at point R in the diagram, Original price p = OP and Original quantity q = OQ. Further ,slope of the demand curve DD' is Δp/Δq = PD/PR
Substituting these in the above formula we have
Ep =[1/(PD/PR)](OP/OQ) = (PR/PD)(OP/OQ)
However PR =OQ and they will get cancelled and therefore
Ep = OP/PD
This represents the ratio of the distances on the vertical axis.
In a right angled triangle ODD',PR is parallel to OD'.
Therefore
Ep = OP/PD =RD'/RD
RD' is the lower segment of the demand curve DD' at point R and RD is its upper segment.
Therefore,
Ep = RD'/RD =Lower segment/Upper segment.

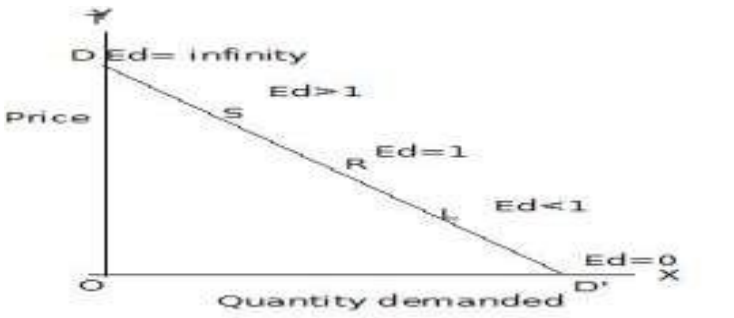
Measuring Price elasticity on a non –linear demand curve.



Measuring price elasticity at a point on a Non-Linear Demand curve

In order to measure elasticity in case of a non linear curve we draw a tangent at the given point R on the demand curve DD' and then measure price elasticity by finding out the value of RT'/RT.

On a Linear Demand curve price elasticity varies from Zero to infinity. This can be represented diagrammatically as follows.In this diagram elasticity is being calculated at five points D,S,R,L and D'.



On a linear demand curve price elasticity variesfrom infinity to zero

iv)Arc Elasticity Method

Arc Elasticity of demand When price changes are large or we have to measure elasticity over an arc of the demand curve rather than at a specific point on the demand curve, the point elasticity method does not provide a true or correct measure of price elasticity of demand . Further, in such cases, the elasticity would be different depending on whether we choose original price and original demand or the subsequent price and quantity demanded as the basis for measurement of elasticity of demand. The outcome would be different under the two situation . Hence , when the change in price is quite large then accurate measure of price elasticity can be obtained by taking the average of original price and new price as well as average of the old quantity and new quantity as the basis of measurement of percentage changes in price and quantity. Thus if the price of a good declines from p1 to p2 and as a result the quantity demanded increases from q1 to q2 the average of the two prices is given by (p1+p2)/2 and Average of the two quantities is given by (q1+q2)/2 .

Thus the formula for measuring Arc elasticity Is given by

$E_p = \{\Delta q/(p1+p2)/2\} / \{\Delta p/(q1+q2)/2\}$

$= \{ \Delta q/(q1+q2)\} \{\Delta p/(p1+p2)\}$

$= (\Delta q/\Delta p) \{(p1+p2)/(q1+q2)\}$

7. INCOME ELASTICITY OF DEMAND

Aside from the price of a product and its substitutes, another vital element of demand for a product is consumer's income. As noticed previously, the relationship between demand for regular and luxury goods and consumer's income is of positive nature, not like the negative price-demand relationship. I.e, the demand for regular goods and services rises with the rise in consumer's income and vice versa.
The reaction of demand to the change in consumer's income is known as income elasticity of demand. Income elasticity of demand for a product, say X (i.e., ex) is defined as

$$em = \frac{\Delta Q}{Q} \div \frac{\Delta M}{M}$$

Where em = Elasticity of Income; M = Monthly income; Q = quantity demanded

Unlike price elasticity of demand (which is negative except in case of Giffen goods),income elasticity of demand is positive because of a positive relationship between income and demand for a product. There is an exception to this rule. Income elasticity of demand for an inferior good is negative, because of negative income-effect. The demand for inferior goods reduces with the rise in consumer's income and vice versa. When income is more, consumers change over to the consumption of superior commodities. I.e. they replace inferior goods for superior ones. For instance, when income increases, people would rather purchase more of rice and wheat and less of inferior food grains like bajara, ragi and use more of taxi and less of bus service and so on.

Characteristics:

Em> 1, Qd and income are directly related. This is a normal good and it is income elastic.

0< Em<1, Qd and income are directly related. This is a normal good and it is income inelastic.

Em< 0, Qd and income are inversely related. This is an inferior good.

Types of Income Elasticity of Demand:

Like price elasticity of demand, the degree of responsiveness of demand with change in consumer's income is not always the same. The income elasticity of demand is different for different products.

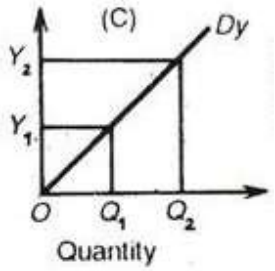
On the basis of numerical value, income elasticity of demand is classified into three groups, which are as follows:

i. Positive Income Elasticity of Demand:

Refers to a situation when the demand for a product increases with increase in consumer's income and decreases with decrease in consumer's income. The income elasticity of demand is positive for normal goods.The positive income elasticity of demand can be of three types, which are discussed as follows:

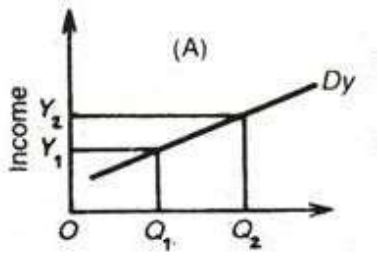
a. Unitary Income Elasticity of Demand:

Implies that positive income elasticity of demand would be unitary when the proportionate change in the quantity demanded is equal to proportionate change in income. For example, if income increases by 50% and demand also rises by 50%, then the demand would be called as unitary income elasticity of demand. In such a case, the numerical value of income elasticity of demand is equal to one ($e_y = 1$).



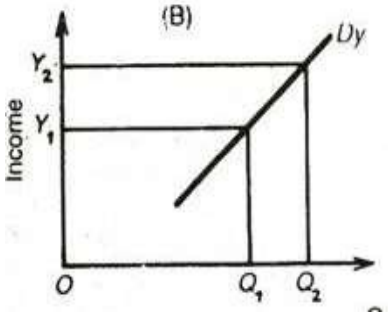
b. More than Unitary Income Elasticity of Demand:

Implies that positive income elasticity of demand would be more than unitary when the proportionate change in the quantity demanded is more than proportionate change in income. For example, if the income increases by 50% and demand rises by 100%. In such a case, the numerical value of income elasticity of demand would be more than one ($e_y>1$).



c. Less than Unitary Income Elasticity of Demand:

Implies that positive income elasticity of demand would be less than unitary when the proportionate change in, the quantity demanded is less than proportionate change in income. For example, if the income increases by 50% and demand increases only by 25%. In such a case, the numerical value of income elasticity of demand would be less than one (e_y<1).



ii. Negative Income Elasticity of Demand:

Refers to a kind of income elasticity of demand in which the demand for a product decreases with increase in consumer's income. The income elasticity of demand is negative for inferior goods, also known as Giffen goods. For example, if the income of a consumer increases, he would prefer to purchase wheat instead of millet. In such a case, the millet would be inferior to wheat for the customer.

Negative income elasticity of demand is shown with the help of Figure-13:

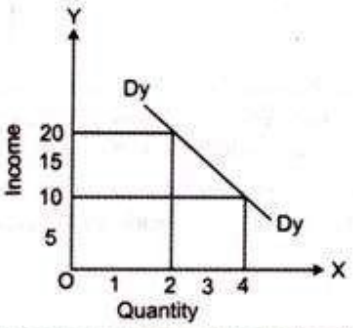


Figure-13: Negative Income Elasticity of Demand

Figure-13 shows that when income is Rs. 10, then the demand for goods is 4 units. On the other hand, when the income increases to Rs. 20, then the demand is 2 units. In Figure-13, the slope of the curve is

downward from left to right, which indicates that the increase in income causes decrease in demand and vice versa. Therefore, in such a case, the elasticity of demand is negative.

iii. Zero Income Elasticity of Demand:

Refers to the income elasticity of demand whose numerical value is zero. This is because there is no effect of increase in consumer's income on the demand of product. The income elasticity of demand is zero ($e_y = 0$) in case of essential goods. For example, salt is demanded in same quantity by a high income and a low income individual.

Figure-14 shows the zero income elasticity of demand:

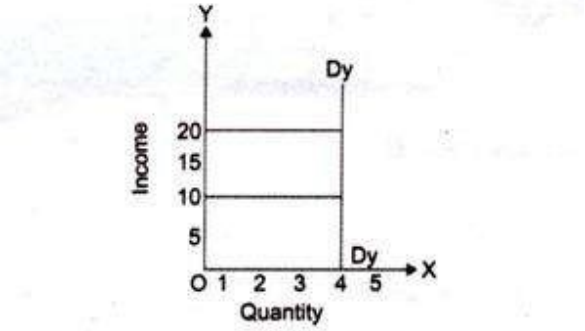


Figure-14: Zero Income Elasticity of Demand

Figure-14 shows that when income increases from Rs. 10 to Rs. 20, then the demand for goods is remain same, 4 units. In Figure-14, the slope of the curve is parallel to Y-axis (income side), which indicates that the increase in income causes no effect in demand. Therefore, in such a case, the elasticity of demand is zero.

Use of Income Elasticity in Business Decisions:

The income elasticity of a product has great significance in long-term planning and in the solution of strategic problems, particularly during trade cycles.

8.CROSS-ELASTICITY OF DEMAND

The cross-elasticity is the measure of responsiveness of demand for a commodity to the changes in the price of its substitutes and complementary goods.Cross elasticity (Exy) tells us the relationship between two products. it measures the sensitivity of quantity demand change of product X to a change in the price of product Y.

Price elasticity formula: Exy = percentage change in Quantity demanded of X / percentage change in Price of Y..

Characteristics:

Exy > 0, Qd of X and Price of Y are directly related. X and Y are substitutes.

Exy approaches 0, Qd of X stays the same as the Price of Y changes. X and Y are not related.

Exy < 0, Qd of X and Price of Y are inversely related. X and Y are complements.

Example:

1. If the price of Product A increased by 10%, the quantity demanded of B increases by 15 %. Then the coefficient for the cross elasticity of the A and B is :

Exy = percentage change in Qx / percentage change in Py = (15%) / (10%) = 1.5 > 0, indicating A and B are substitutes.

2. If the price of Product A increased by 10%, the quantity demanded of B decreases by 15 %. Then the coefficient for the cross elasticity of the A and B is :

Exy = percentage change in Qx / percentage change in Py = (- 15%) / (10%) = - 1.5 < 0, indicating A and B are complements.

$$Eba = \frac{\textit{Percentage change in quantity of } X}{\textit{Percentage change in price of } Y}$$

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

Where, Q_x = Quantity of good X, P_Y = Price of good Y and Δ = change.
Given the price of X, this formula measures the change in the quantity demanded of X as a result of change in the price of Y.

The cross elasticity of demand for good X may be positive, negative or zero which depends on the nature of relation between the goods X and Y. This relation may be as substitutes, complementary or unrelated goods.

1. Substitute Goods:

If X and 7 are substitute goods, a fall in the price of good Twill reduce the quantity demanded of good X. Similarly, an increase in the price of good Y will raise the demand for good X. Their cross elasticity is positive because, given the price of X, a change in the price of Twill lead to a change in the quantity demanded of X in the same direction as in the price of Y.

The cross elasticity of substitute goods is explained in Table 5.

Table 5 : Cross Elasticity of Substitutes

Commodity	*Before Change*		*After Change*	
	Price in Rs. Per K.G	*Quantity (K.G)*	*Price in Rs. Per (K.G.)*	*Quantity (K.G.)*
X (Tea)	20	400	20	500
Y (Coffee)	30	500	40	300

$$E_{xy} = \frac{\Delta Q_x}{\Delta P_y} \times \frac{P_y}{Q_x} = \frac{500-400}{40-30} \times \frac{30}{400}$$

$$= \frac{100}{10} \times \frac{30}{400} = (+)\frac{3}{4} \text{ or } (+)\,0.75.$$

It is clear from the above that the coefficient of cross elasticity of substitute goods such as tea (X) and coffee (Y) is positive (+0.75) when with the rise in price of coffee, the price of tea being constant, the demand for tea also increases.

This is shown in Fig. 6 where the quantity of good X (tea) is taken on X-axis and the quantity of good Y is plotted on Y-axis. When the price of Y increases from OY to OY_1, the quantity demanded of X rises from OX to OX_1. The slope of the demand curve downwards to the right shows positive elasticity of both the goods.

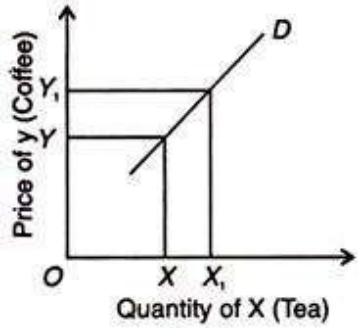


Fig. 6

2. Complementary Goods:

If two goods are complementary (jointly demanded), rise in the price of one leads to a fall in the demand for the other. Rise in the prices of cars will bring a fall in their demand together with the demand for petrol. Similarly, a fall in the prices of cars will raise the demand for petrol. Since price and demand vary in the opposite direction, the cross elasticity of demand is negative.

The cross elasticity of complementary goods is explained in Table 6.

Table 6 : Cross Elasticity of Complementary

Goods	Before the Price Change		After the Price Change	
	Price in Rs. Per K.G.	Quantity (K.G.)	Price in Rs. Per K.G.	Quantity (K.G.)
X (Tea)	150	40	150	30
Y (Sugar)	15	100	20	80

$$E_{xy} = \frac{\Delta Q_x}{\Delta P_y} \times \frac{P_y}{Q_x} = \frac{30-40}{20-15} \times \frac{15}{40}$$

$$= \frac{-10}{5} \times \frac{15}{40} = \frac{-15}{20} = \frac{-3}{4} = (-)\,0.75.$$

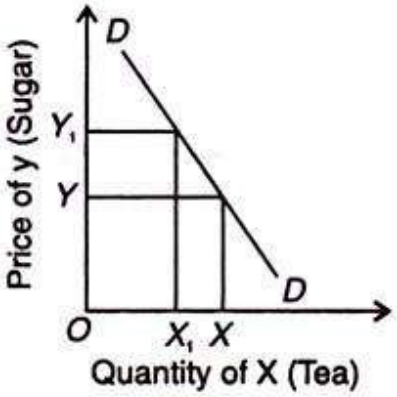


Fig. 7

In this case, the cross elasticity coefficient of complementary goods such as tea and sugar or car and petrol is negative.

This is explained in Fig.7 where with the rise in the price of Y (Sugar) from OY to OY_1 the demand for X (tea) falls from OX to OX_1. The slope of the demand curve downwards to the right indicates negative cross elasticity.

3. Unrelated Goods:

If the two goods are unrelated, a fall in the price of good Y has no effect whatsoever on the demand for good X. In such a case, the cross elasticity of demand is zero. For example, a fall in the price of tea has no effect on the quantity demanded of car. The cross elasticity of demand for unrelated goods is shown in Fig. 8. Even an increase in the price of good Y from OY to OY_1, the demand for good X remains the same as OD. Hence, the cross elasticity of demand for unrelated goods is zero.

Application of Cross Elasticity in management:

The cross elasticity of demand has much practical importance in the solution of various business problems.

1. In Production:

A firm wants to know the cross elasticity of demand for its goods while considering the effect of change in the price of its competitor's goods on the demand for its own goods. It is important for a firm to have a knowledge of it while making its production plan.

2. In Demand Forecasting and Pricing:

Its knowledge helps the firm in estimating the potential impact of the pricing decisions of its competitors and associates on its sales so that it prepares its pricing strategies.

3. In International Trade and Balance of Payments:

The utility of this concept is significant in the area of international trade and balance of payments. The government wants to know how the change in domestic prices affects the demand for imports.

Domestically produced goods being close substitutes if the cross elasticity of demand for imports is high and if the prices of domestic goods increase due to inflation, the demand for imports will increase substantially which will deteriorate the balance of payments position.

9. Advertising elasticity or Promotional Elasticity of Demand

Advertising elasticity of demand is a useful measure of advertising effectiveness. It measures the percentage change in demand for the product or service compared to the percentage change in the level of advertising expenditure.

$$AED = \frac{\%\text{ change in quantity demanded}}{\%\text{ change in spending on advertising}} = \frac{\Delta Q_d / Q_d}{\Delta A / A}$$

In the modern competitive or partial competitive market economy, advertising has a great significance. Under advertising, various visible or verbal activities are done by the firm for the purpose of creating or increasing demand for its goods or services. Informative advertising is very helpful for the consumer in making rational purchase decisions.But the extension of demand through advertising can be measured by advertising or promotional elasticity of demand (E_A) which measures the expected changes in demand as a result of change in other promotional expenses. The demand for some goods is affected more by advertising such as the demand for cosmetics.

Following is the formula for advertising elasticity,

$$E_A = \Delta Q/\Delta A \times A/Q$$

Where, Q = quantity sold of good X; A = units of advertising expenses on good X;

ΔQ = change in quantity sold of good X; and ΔA = change in advertising expenses on good X.

The elasticity of demand for a good should be positive because there is the possibility of extension of demand and market for the good with advertising expenditure. The higher the value of this elasticity, the greater will be the inducement of the firm to advertise that product. It is on the basis of advertising elasticity that a firm decides how much to spend on advertising a product.

Factors Influencing Advertising Elasticity of Demand:

The main factors influencing advertising elasticity are as follows:

1. Stage of Product's Development:

The advertising elasticity of demand for a product may vary with different levels of sales of the same product. It is different for new and established products.

2. Degree of Competition:

The advertising effect in a competitive market is also determined by the relative effect of advertising by competing firms.

3. Effects of Advertising in Terms of Time:

The advertising elasticity of demand depends upon the time interval between advertising expenditure and its effect on sales. This depends on general economic environment, selected media and type of the product. This time interval is large for durable goods than for non-durable goods.

4. Effect of Advertising by Rival Firms:

The advertising elasticity also depends as to how other rival firms advertise in comparison to the advertisement of the firm. This, in turn, depends on the levels of advertisement and advertisements done in the past and present by rival firms.

10. Demand Forecasting

Definitions of demand forecasting are as follows:
According to Evan J. Douglas, "Demand estimation (forecasting) may be defined as a process of finding values for demand in future time periods."

In the words of Cundiff and Still, "Demand forecasting is an estimate of sales during a specified future period based on proposed marketing plan and a set of particular uncontrollable and competitive forces."

Demand forecasting enables an organization to take various business decisions, such as planning the production process, purchasing raw materials, managing funds, and deciding the price of the product. An organization can forecast demand by making own estimates called guess estimate or taking the help of specialized consultants or market research agencies.

10.1 Objectives of Demand Forecasting:

Demand forecasting constitutes an important part in making crucial business decisions.

The objectives of demand forecasting are divided into short and long-term objectives, which are shown in Figure-1:

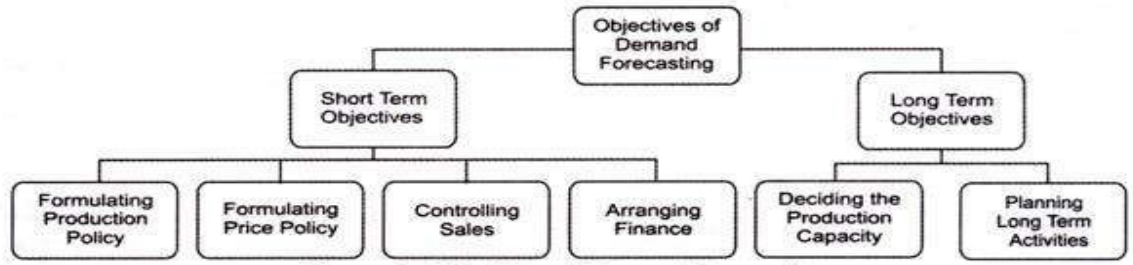


Figure-1: Objectives of Demand Forecasting

The objectives of demand forecasting (as shown in Figure-1) are discussed as follows:

i. Short-term Objectives:

Include the following:

a. Formulating production policy:Helps in covering the gap between the demand and supply of the product. The demand forecasting helps in estimating the requirement of raw material in future, so that the regular supply of raw material can be maintained. It further helps in maximum utilization of resources as operations are planned according to forecasts. Similarly, human resource requirements are easily met with the help of demand forecasting.

b. Formulating price policy:Refers to one of the most important objectives of demand forecasting. An organization sets prices of its products according to their demand. For example, if an economy enters into

depression or recession phase, the demand for products falls. In such a case, the organization sets low prices of its products.

c. Controlling sales:Helps in setting sales targets, which act as a basis for evaluating sales performance. An organization make demand forecasts for different regions and fix sales targets for each region accordingly.

d. Arranging finance:Implies that the financial requirements of the enterprise are estimated with the help of demand forecasting. This helps in ensuring proper liquidity within the organization.

ii. Long-term Objectives:

Include the following:

a. Deciding the production capacity:Implies that with the help of demand forecasting, an organization can determine the size of the plant required for production. The size of the plant should conform to the sales requirement of the organization.

b. Planning long-term activities:Implies that demand forecasting helps in planning for long term. For example, if the forecasted demand for the organization's products is high, then it may plan to invest in various expansion and development projects in the long term.

10.2 Factors Influencing Demand Forecasting:

There are a number of factors that affect demand forecasting.

Some of the factors that influence demand forecasting are shown in Figure-2:

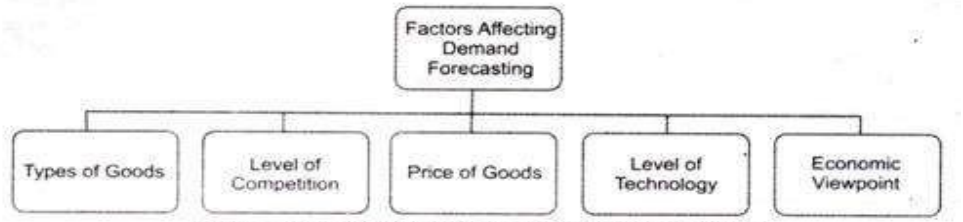


Figure-2: Factors Affecting Demand Forecasting

The various factors that influence demand forecasting ("as shown in Figure-2) are explained as follows:

i. Types of Goods:. Goods can be producer's goods, consumer goods, or services. Apart from this, goods can be established and new goods. Established goods are those goods which already exist in the market, whereas new goods are those which are yet to be introduced in the market.

ii. Competition Level: Influence the process of demand forecasting. In a highly competitive market, demand for products also depend on the number of competitors existing in the market. Moreover, in a highly competitive market, there is always a risk of new entrants. In such a case, demand forecasting becomes difficult and challenging.

iii. Price of Goods: Acts as a major factor that influences the demand forecasting process. The demand forecasts of organizations are highly affected by change in their pricing policies. In such a scenario, it is difficult to estimate the exact demand of products.

iv. Level of Technology: Constitutes an important factor in obtaining reliable demand forecasts. If there is a rapid change in technology, the existing technology or products may become obsolete

v. Economic Viewpoint: Play a crucial role in obtaining demand forecasts. For example, if there is a positive development in an economy, such as globalization and high level of investment, the demand forecasts of organizations would also be positive.

Other Factors

1.Time Period of Forecasts: Act as a crucial factor that affect demand forecasting. The accuracy of demand forecasting depends on its time period.

2.Level of Forecasts:

A demand forecast can be carried at three levels, namely, macro level, industry level, and firm level. At macro level, forecasts are undertaken for general economic conditions, such as industrial production and allocation of national income.

3.Nature of Forecasts:

Constitutes an important factor that affects demand forecasting. A forecast can be specific or general. A general forecast provides a global picture of business environment, while a specific forecast provides an insight into the business environment in which an organization operates.

11. Steps of Demand Forecasting:

It involves a number of steps, which are shown in Figure-3:

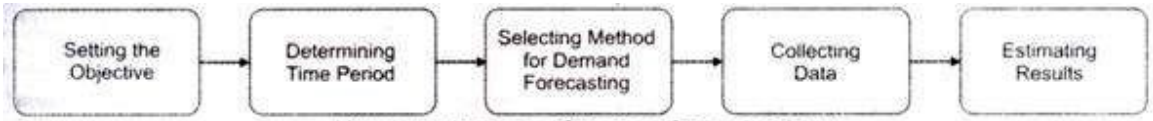


Figure-3: Process of Demand Forecasting

The steps involved in demand forecasting (as shown in Figure-3) are explained as follows:

1. Setting the Objective:

Setting objective of demand forecasting involves the following:

a. Deciding the time period of forecasting whether an organization should opt for short-term forecasting or long-term forecasting

b. Deciding whether to forecast the overall demand for a product in the market or only- for the organizations own products

c. Deciding whether to forecast the demand for the whole market or for the segment of the market

2. Determining Time Period:

Involves deciding the time perspective for demand forecasting. Demand can be forecasted for a long period or short period. In the short run, determinants of demand may not change significantly or may remain constant, whereas in the long run, there is a significant change in the determinants of demand. Therefore, an organization determines the time period on the basis of its set objectives.

3. Selecting a Method for Demand Forecasting:

Constitutes one of the most important steps of the demand forecasting process Demand can be forecasted by using various methods. The method of demand forecasting differs from organization to organization depending on the purpose of forecasting, time frame, and data requirement and its availability. Selecting the suitable method is necessary for saving time and cost and ensuring the reliability of the data.

4. Collecting Data: Requires gathering primary or secondary data. Primary' data refers to the data that is collected by researchers through observation, interviews, and questionnaires for a particular research. On the other hand, secondary data refers to the data that is collected in the past; but can be utilized in the present scenario/research work.

5. Estimating Results:

Involves making an estimate of the forecasted demand for predetermined years. The results should be easily interpreted and presented in a usable form. The results should be easy to understand by the readers or management of the organization.

12. Forecasting Demand for New Products:

The methods of forecasting demand for new products are in many ways different from those for established products. Since the product is new to the consumers, an intensive study of the product and its likely impact upon other products of the same group provides a key to an intelligent projection of demand.

Joel Dean has classified a number of possible approaches as follows:

(a) Evolutionary Approach:

It consists of projecting the demand for a new product as an outgrowth and evolution of an existing old product.

(b) Substitute Approach:

According to this approach the new product is treated as a substitute for the existing product or service.

(c) Growth Curve Approach:

It estimates the rate of growth and potential demand for the new product as the basis of some growth pattern of an established product.

(d) Opinion-Poll Approach:

Under this approach the demand is estimated by direct enquiries from the ultimate consumers.

(e) Sales Experience Approach:
According to this method the demand for the new product is estimated by offering the new product for sale in a sample market.

(f) Vicarious Approach:
By this method, the consumers' reactions for a new product are found out indirectly through the specialized dealers who are able to judge the consumers' needs, tastes and preferences.

13. Demand Forecasting Techniques:

Criteria for selection of a Good Forecasting Method:

There are certain criteria of Selection of best Forecasting Method, which are

(i) Accuracy, (ii) Plausibility, (iii) Durability, (iv) Flexibility, (v) Availability, (vi) Economy, (vii) Simplicity and (viii) Consistency.

(i) Accuracy of Results: The forecast obtained must be accurate. How is an accurate forecast possible? To obtain an accurate forecast, it is essential to check the accuracy of past forecasts against present performance and of present forecasts against future performance.

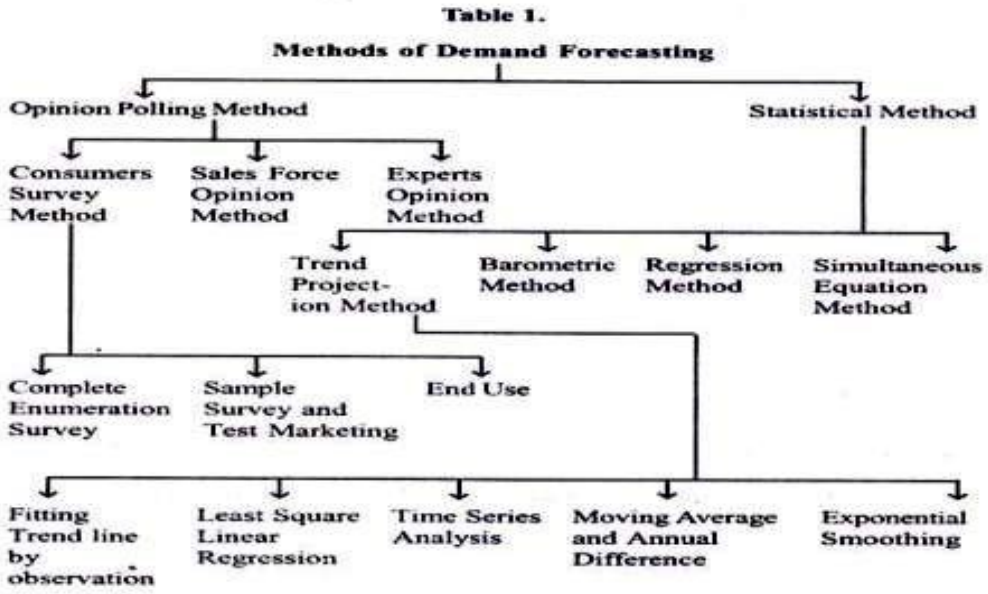
(ii) Plausibility: The executive should have good understanding of the technique chosen and they should have confidence in the techniques used. Understanding is also needed for a proper interpretation of results. Plausibility requirements can often improve the accuracy of results.

(iii) Durability: The durability of the forecasting power of a demand function depends partly on the reasonableness and simplicity of functions fitted, but primarily on the stability of the understanding relationships measured in the past. Of course, the importance of durability deter-mines the allowable cost of the forecast.

(iv) Flexibility: A set of variables could be adjusted from time to time to meet changing conditions in more practical way to maintain intact the routine procedure of forecasting.

Demand forecasting Methods can be summarized in the form of a chart as shown in Table 1.

Table 1.



13.1 Opinion Polling Methods:

In this method, the opinion of the buyers, sales force and experts could be gathered to determine the emerging trend in the market.

The opinion polling methods of demand forecasting are of three kinds:

(a) Consumer's Survey Method or Survey of Buyer's Intentions:

In this method, the consumers are directly approached to disclose their future purchase plans. I his is done by interviewing all consumers or a selected group of consumers out of the relevant population. This is the direct method of estimating demand in the short run. Here the burden of forecasting is shifted to the buyer. The firm may go in for complete enumeration or for sample surveys. If the commodity under consideration is an intermediate product then the industries using it as an end product are surveyed.

(i) Complete Enumeration Survey:

Under the Complete Enumeration Survey, the firm has to go for a door to door survey for the forecast period by contacting all the households in the area. This method has an advantage of first hand, unbiased information, yet it has its share of disadvantages also. The major limitation of this method is that it requires lot of resources, manpower and time.

In this method, consumers may be reluctant to reveal their purchase plans due to personal privacy or commercial secrecy. Moreover, at times the consumers may not express their opinion properly or may deliberately misguide the investigators.

(ii) Sample Survey and Test Marketing:

Under this method some representative households are selected on random basis as samples and their opinion is taken as the generalized opinion. This method is based on the basic assumption that the sample truly represents the population. If the sample is the true representative, there is likely to be no significant difference in the results obtained by the survey. Apart from that, this method is less tedious and less costly.

(iii) End Use Method or Input-Output Method:

This method is quite useful for industries which are mainly producer's goods. In this method, the sale of the product under consideration is projected as the basis of demand survey of the industries using this product as an intermediate product, that is, the demand for the final product is the end user demand of the intermediate product used in the production of this final product.

(b) Sales Force Opinion Method:

This is also known as collective opinion method. In this method, instead of consumers, the opinion of the salesmen is sought. It is sometimes referred as the "grass roots approach" as it is a bottom-up method that requires each sales person in the company to make an individual forecast for his or her particular sales territory.

These individual forecasts are discussed and agreed with the sales manager. The composite of all forecasts then constitutes the sales forecast for the organization. The advantages of this method are that it is easy and cheap. It does not involve any elaborate statistical treatment. The main merit of this method lies in the collective wisdom of salesmen. This method is more useful in forecasting sales of new products.

(c) Experts Opinion Method:
This method is also known as "Delphi Technique" of investigation. The Delphi method requires a panel of experts, who are interrogated through a sequence of questionnaires in which the responses to one questionnaire are used to produce the next questionnaire. Thus any information available to some experts and not to others is passed on, enabling all the experts to have access to all the information for forecasting.

13.2 Statistical Methods:

Statistical methods have proved to be immensely useful in demand forecasting. In order to maintain objectivity, that is, by consideration of all implications and viewing the problem from an external point of view, the statistical methods are used. The important statistical methods are:

I Trend Projection Methods

The Trend Projection Method is concerned with the movement of variables through time. The following methods are useful in identifying trend values to forecast the demand.

a) Graphical Method:

b) Least Square Method:

c)Time series Analysis

d. Method of Moving Average

e) Exponential Smoothing

a) Graphical Method:
This is the most simple technique to determine the trend. All values of output or sale for different years are plotted on a graph and a smooth free hand curve is drawn passing through as many points as possible. The direction of this free hand curve—upward or downward— shows the trend. A simple illustration of this method is given in Table 2.

Table 2: Sales of Firm

In Fig. 1, AB is the trend line which has been drawn as free hand curve passing through the various points representing actual sale values.

Year	Sales (Rs. Crore)
1995	40
1996	50
1997	44
1998	60
1999	54
2000	62

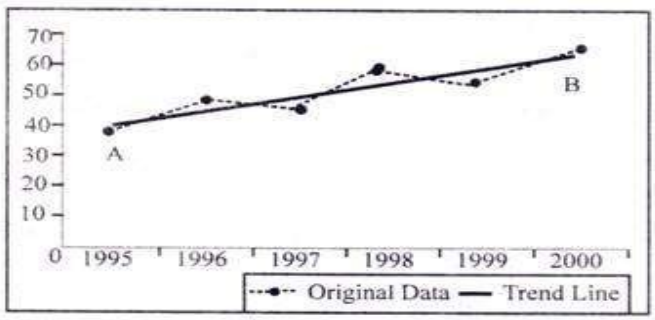


Fig. 1

(b) Least Square Method:

Under the least square method, a trend line can be fitted to the time series data with the help of statistical techniques such as least square regression. When the trend in sales over time is given by straight line, the equation of this line is of the form: y = a + bx. Where 'a' is the intercept and 'b' shows the impact of the independent variable. We have two variables—the independent variable x and the dependent variable y. The line of best fit establishes a kind of mathematical relationship between the two variables x and y. This is expressed by the regression y on x.

In order to solve the equation v = a + bx, we have to make use of the following normal equations:

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

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

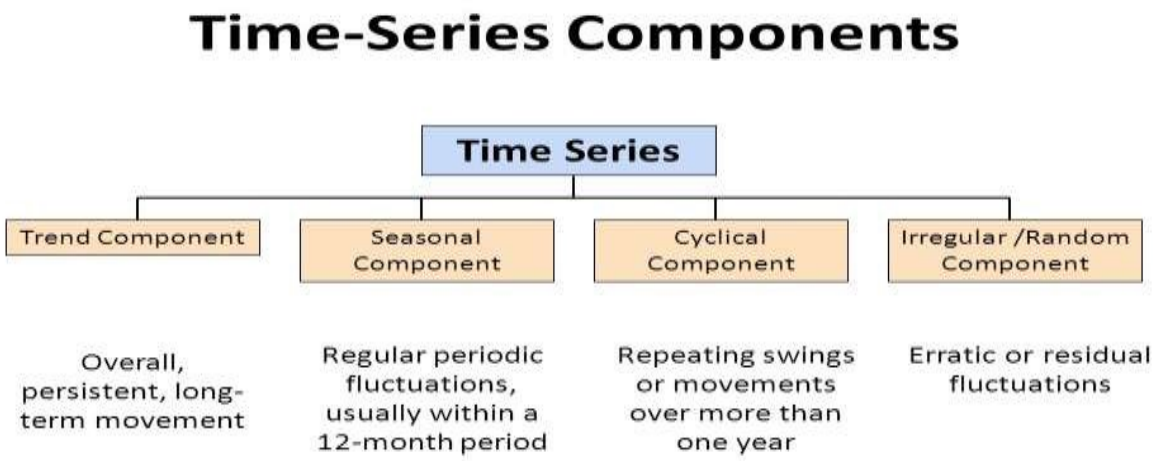
c)Time series Analysis

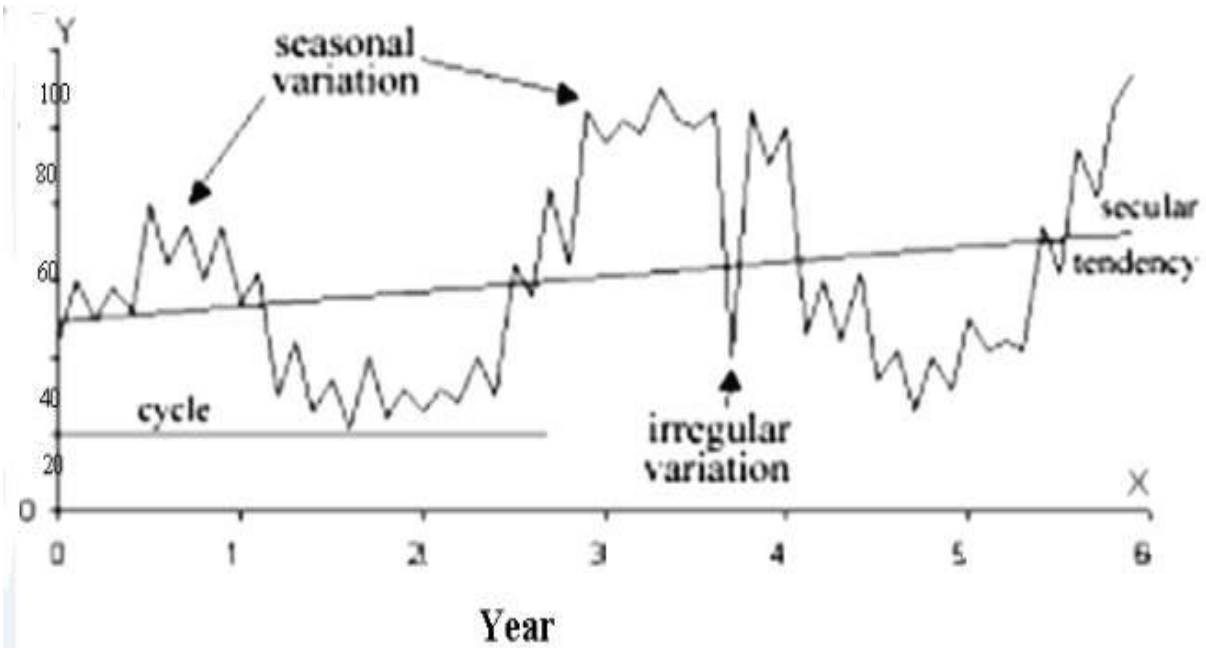
A firm existing for a long time will have its own data regarding sales for past years. Such data when arranged chronologically yield what is referred to as 'time series'. Time series shows the past sales with effective demand for a particular product under normal conditions. Such data can be given in a tabular or graphic form for further analysis. This is the most popular method among business firms, partly because it is simple and inexpensive and partly because time series data often exhibit a persistent growth trend.

Time series has got four types of components namely, Secular Trend (T), Secular Variation (S), Cyclical Element (C), and an Irregular or Random Variation (R). These elements are expressed by the equation y = TSCR. Secular trend refers to the long run changes that occur as a result of general tendency.

Seasonal variations refer to changes in the short run weather pattern or social habits. Cyclical variations refer to the changes that occur in industry during depression and boom. Random variation refers to the factors which are generally able such as wars, strikes, flood, and famine and so on.

When a forecast is made the seasonal, cyclical and random variations are removed from the observed data. Thus only the secular trend is left. This trend is then projected. Trend projection fits a trend line to a mathematical equation.





Additive Model for Time Series Analysis

According to the Additive Model, a time series can be expressed as

$$y_t = T_t + S_t + C_t + R_t.$$

y_t is the time series value at time t. T_t, S_t, C_t, and R_t are the trend value, seasonal, cyclic and random fluctuations at time t respectively.

This model assumes that all four components of the time series act independently of each other.

Multiplicative Model for Time Series Analysis

The multiplicative model assumes that the various components in a time series operate proportionately to each other. According to this model

$$y_t = T_t \times S_t \times C_t \times R_t$$

d. Method of Moving Average

This method uses the concept of ironing out the fluctuations of the data by taking the means. It measures the trend by eliminating the changes or the variations by means of a moving average. The mean used for the measurement of a trend is the arithmetic means (averages).

The moving average of a period (extent) m is a series of successive averages of m terms at a time. The data set used for calculating the average starts with first, second, third and etc. at a time and m data taken at a time. In other words, the first average is the mean of the first m terms. The second average is the mean of the m terms starting from the second data up to (m + 1)th term. Similarly, the third average is the mean of the m terms from the third to (m + 2) th term and so on.

II Barometric Technique:

A barometer is an instrument of measuring change. This method is based on the notion that "the future can be predicted from certain happenings in the present." In other words, barometric techniques are based on the idea that certain events of the present can be used to predict the directions of change in the future. This is accomplished by the use of economic and statistical indicators which serve as barometers of economic change. Generally forecasters correlate a firm's sales with three series: Leading Series, Coincident or Concurrent Series and Lagging Series:

(a) The Leading Series: The leading series comprise those factors which move up or down before the recession or recovery starts. They tend to reflect future market changes. For example, baby powder sales can be forecasted by examining the birth rate pattern five years earlier, because there is a correlation between the baby powder sales and children of five years of age and since baby powder sales today are correlated with birth rate five years earlier, it is called lagged correlation. Thus we can say that births lead to baby soaps sales.

(b) Coincident or Concurrent Series: The coincident or concurrent series are those which move up or down simultaneously with the level of the economy. Common examples of coinciding indicators are G.N.P itself, industrial production, trading and the retail sector.
(c) The Lagging Series: The lagging series are those which take place after some time lag with respect to the business cycle. Examples of lagging series are, labour cost per unit of the manufacturing output, loans outstanding, leading rate of short term loans, etc.

III Regression Analysis:
Regression Method: The regression analysis is the most common method used to forecast the demand for a product. To determine the relationship between a dependent variable (say, sales) and one or more independent variables (like price, income, advertisement etc.) Regression method is quite useful. For a single variable demand function, the simple regression equation is used while for multiple variable functions, a multi-variable equation is used for estimating the demand for a product.

IV Simultaneous Equations Model: Under simultaneous equation model, demand forecasting involves the estimation of several simultaneous equations. These equations are often the behavioral equations, market-clearing equations, and mathematical identities.

The regression technique is based on the assumption of one-way causation, which means independent variables cause variations in the dependent variables, and not vice-versa. In simple terms, the independent variable is in no way affected by the dependent variable. For example, D = a – bP, which shows that price affects demand, but demand does not affect the price, which is an unrealistic assumption.

On the contrary, the simultaneous equations model enables a forecaster to study the simultaneous interaction between the dependent and independent variables. Thus, simultaneous equation model is a systematic and complete approach to forecasting. This method employs several mathematical and statistical tools of estimation.

Supply Analysis

Supply is **the amount of a good or service that producers are willing to offer to consumers at a specific price.**

The supply of a product is influenced by various determinants, such as price, cost of production, government policies, and technology. It is governed by the Law of Supply , which states a direct relationship between the supply and price of a product, while other factors remaining the same.

Determinants of Supply

Determinants of supply are:

1. **Price of a product**
2. **Cost of production**
3. **Natural conditions**
4. **Transportation conditions**
5. **Taxation policies**
6. **Production techniques**
7. **Factor prices and their availability**

8. **Price of related goods**
9. **Industry structure**

Supply Function

Supply function is the mathematical expression of law of supply. In other words, supply function quantifies the relationship between quantity supplied and price of a product, while keeping the other factors at constant.

The Law of Supply states the nature of the relationship between quantity supplied and price of a product, while the supply function measures that relationship.

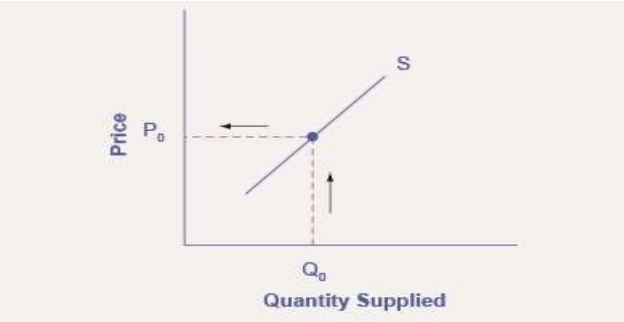
The supply function can be expressed as:

$$\boldsymbol{Q_s = f\,(P_a, P_b, P_c, T, T_p)}$$

Where,
Q_s = Supply
P_a = Price of the good supplied
P_b = Price of other goods
P_c = Price of factor input
T = Technology
T_p = Time Period

The law of supply

The law of supply is states that, when other things remain constant, an increase in the price of goods will result in increase the amount of supply and vice versa. ie., it states that there is direct proportional relationship between Price and supply .



Law of Supply Assumptions

The term “other things remaining the same” refers to the following assumptions in the law of supply:

1. No change in the state of technology.
2. No change in the price of factors of production.
3. No change in the number of firms in the market.
4. No change in the goals of the firm.
5. No change in the seller’s expectations regarding future prices.
6. No change in the tax and subsidy policy of the products.
7. No change in the price of other goods.