UNIT II
DEMAND AND SUPPLY ANALYSIS

DEMAND: Demand is the quantity of goods and services that customers are willing and able to purchase during a specified period under a given set of economic conditions. The period here could be an hour, a day, a month, or a year. The conditions to be considered include the price of good, consumer's income, the price of the related goods, consumer's preferences, and advertising expenditures and so on.

Demand is an **economic principle** that describes the willingness and desire of consumers to purchase specific goods or services at a specific **Ceteris Paribus** (all other things being unchanged or constant). For a new company, the demand analysis can tell whether a substantial demand exists for the product/service and given the other information like number of competitors, size of competitors, industry growth etc it helps to decide if the company could enter the market and generate enough returns to sustain and advance its business.

For instance, demand for Mercedes Benz can be considered as demand only when it is backed by desire, willingness, and ability to pay.

DETERMINANTS OF DEMAND

The demand for a commodity by a buyer is generally not a fixed quantity. It is affected by many factors. The factors that influence the demand are called the determinants of demand. The determinants of demand are also known as demand shifters.

The following factors affect an individual's demand for a commodity.

1. **Price of Commodity**
   a) Income Effect
   b) Substitution Goods effect
2. **Other factors which include:**
   a) Income of the consumer
   b) Consumer tastes and preferences
   c) Prices of related goods
   d) Expectations of future price changes
   e) Advertising efforts
   f) Quality of the product
   g) Distribution of income and wealth in the community
   h) Standard of living and spending habits
   i) Population
   j) Level of taxation and tax structure
   k) Climate or weather conditions
   l) Population

1. **Price of Commodity**

a) **Income Effect:** The income effect represents the change in an individual's or economy's income and shows how that change impacts the quantity demanded of a good or service. The relationship between income and quantity demanded is a positive one; as income increases, so does the quantity of goods and services demanded. For example, when an individual's income increases, that person demands more goods and services, thus increasing consumption, all things equal.

b) **Substitution Complementary goods effect:** The substitution effect is meant to represent the change in macroeconomic consumption patterns that arise due to a change in the relative price of goods. Consumers have the tendency to replace, or substitute, luxury items with cheaper alternatives when income decreases or prices increase. Conversely, the same consumers tend to substitute low-cost alternatives with higher-priced goods when income increases or as the price of luxury goods decreases.

2. **Other Factors**

a) **Income of the Consumer:** Price of Commodity remaining the same, an increase in the income of its buyer increases his purchasing power. In case of a normal good or superior good, there is a direct relationship between the income of its buyer and his demand for it. In case of inferior goods, there is an inverse relationship between the income of its buyer and his demand for it.

b) **Consumer Tastes and Preferences:** The demand for a good is also affected by the tastes and preferences of its buyer. If a consumer no longer likes a commodity, he/she will not buy it or may buy less of it. An increased taste in a product increases its demand. A decreased taste in a product decreases its demand.

c) **Expectations of Future Price Changes:** If people expect prices to rise in the near future, they will try to buy more now in order to avoid paying a higher price later and vice versa. If consumers expect a price increase in near future, demand increases and If consumers expect a price decrease in the near future, demand decreases.

d) **Advertisement:** A firm can influence the buying behavior of consumers through advertisement. Allocation of more budget for advertisement leads to more demand whereas Allocation of less budget for advertisement leads to less demand.

e) **Quality of the Product:** High quality of the product leads to high demand whereas Low quality of the product leads to less demand.

f) **Distribution of Income and Wealth in the community:** Equal distribution of income and wealth leads to greater demand and Unequal distribution of income and wealth leads to lesser demand.

g) **Standard of Living and Spending Habits:** High standard of living leads to high demand for comfort and luxury products and low standard of living leads to low demand for comfort and luxury products.

h) **Age structure and sex ratio of Population:** More population of females leads to high demand for female-used products and less population of females leads to low demand for female-used products.

i) **Level of Taxation and Tax structure:** High tax rate leads to low demand for goods whereas Low tax rate leads to high demand for goods

j) **Climate and Weather Conditions:** During a particular season, there is more demand for seasonal products and during an off-season, there is less demand for seasonal products.

k) **Population:** More consumers increase the product's demand and fewer consumers decrease the product's demand.

ELASTICITY

Perhaps one of the most useful concepts in demand and supply analysis, certainly from the point of view of a person interested in business strategy, is that of elasticity. Elasticity refers to the ratio of the relative change in a dependent to the relative change in an independent variable i.e. elasticity is the relative change in the dependent variable divided by the relative change in the independent variable. For example, the ratio of percentage change in quantity demanded to percentage change in some other factor like price or income.

ELASTICITY OF DEMAND

Elasticity is the concept in economics that measures the responsiveness of one variable in response to another variable. The best measure of this responsiveness is the proportional or percent change in the variables. Marshall introduced the concept of elasticity of demand.

The Law of demand explains what happens to the demand for a commodity for a change in price. The law merely explains the direction in which the demand changes for a change in price.

Elasticity is the ratio of the percentage change in the quantity demanded to the percentage change in other variable, may be price, income, etc.

The formula is:

Elasticity = Percentage change in the dependent variable/Percentage change in the independent variable

TYPES OF ELASTICITY OF DEMAND

Elasticity of demand can be divided into four types:

1. Price Elasticity of demand
2. Income Elasticity of Demand
3. Cross Elasticity of Demand
4. Promotional Elasticity of Demand

Price Elasticity of Demand

The law of demand indicates the direction of change in demand in response to a change in price. It does not express the magnitude of change in demand in response to a change in price. This information is provided by the tool of elasticity of demand. The concept of elasticity of demand refers to the degree of responsiveness of demand of a good to a change in its price. According to Marshall "the elasticity (or responsiveness) of demand in a market is great or small according as the amount demanded increases much or little for a given fall in price or diminishes much or little for a given rise in price". Elasticity of demand

differs with different commodities. For the same commodity, elasticity of demand differs from person to person. It may be noted that the elasticity of demand has a negative sign because of the negative relationship between price and demand.

The formula for calculating price elasticity is:

Ed = Change in Quantity Demanded/Change in Price

There are five cases of Elasticity of Demand in which it responds:

1. Perfectly elastic demand
2. Perfectly inelastic demand
3. Relatively elastic demand
4. Relatively inelastic demand
5. Unitary elastic demand

1. **Perfectly elastic demand:** The demand is said to be perfectly elastic when a very insignificant change in price leads to an infinite change in quantity demanded. A very small fall in price causes demand to rise infinitely. Likewise a very insignificant rise in price reduces the demand to zero. This case is theoretical which is never found in real life. The demand curve in such a situation is parallel to X-axis. Numerically, elasticity of demand is said to be equal to infinity. (Ed = infinity)

2. **Perfectly inelastic demand:** The demand is said to be perfectly inelastic when a change in price produces no change in the quantity demanded of a commodity. In such a case quantity demanded remains constant regardless of change in price. The amount demanded is totally unresponsive to change in price. The demand curve in such a situation is parallel to Y-axis. Numerically, elasticity of demand is said to be equal to zero. (Ed = 0)

3. **Relatively elastic demand:** The demand is relatively more elastic when a small change in price causes a greater change in quantity demanded. In such a case a proportionate change in price of a commodity causes more than proportionate change in quantity demanded. For example: If price changes by 10% the quantity demanded of the commodity changes by more than 10%. The demand curve in such a situation is relatively flatter. Numerically, elasticity of demand is said to be greater than 1. (Ed > 1) quantity demanded.

   The demand is said to be relatively inelastic when a proportionate change in price is greater than the proportionate change in quantity demanded. For example: If price falls by 20% quantity demanded rises by less than 20%. The demand curve in such a case is relatively steeper. Numerically, elasticity of demand is said to be less than 1. (Ed < 1)

4. **Unitary elastic demand:** The demand is said to be unit when a change in price results in exactly the same percentage change in the quantity demanded of a commodity. In such a situation the percentage change in both the price and quantity demanded is the same. For example: If the price falls by 25%, the quantity demanded rises by the same 25%. It takes the shape of a rectangular hyperbola. Numerically, elasticity of demand is said to be equal to 1. (Ed = 1).

Income Elasticity of Demand

According to Stonier and Hague: "Income elasticity of demand shows the way in which a consumer's purchase of any good changes as a result of change in his income." It shows the responsiveness of a consumer's purchase of a particular commodity to a change in his income. Income elasticity of demand means the ratio of percentage change in the quantity demanded to the percentage change in income.

Ey = Percentage Change in Quantity Demanded of Good X Percentage Change in Real Income of Consumer

It is noteworthy that sign of income elasticity of demand is associated with the nature of the good in question.

Normal Goods: Normal goods have a positive income elasticity of demand so as consumers' income rises, demand also increases.

- Normal necessities have an income elasticity of demand between 0 and 1. For example, if income increases by 10% and the demand for fresh fruit increases by 4%, then the income elasticity is +0.4. Demand is rising less than proportionately to income.

- Luxuries have an income elasticity of demand, Ed>1 i.e. The demand rises more than percentage change in income. For example, an 8% increase in income might lead to a 16% rise in the demand for restaurant meals. The income elasticity of demand in this example is +2. Demand is highly sensitive to income changes.

Inferior goods: Inferior goods have a negative income elasticity of demand. Demand falls as income rises. For examples, as income increases, the demand for cigarettes goes up against the low-priced local *bidis*.

Cross Elasticity of Demand

The change in the demand of a good x in response to a change in the price of good y is called 'cross elasticity of demand'. Its measure is

Ed = Change in Quantity Demanded of Good X/Change in Price of Good Y
Cross price elasticity may be infinite or zero.

- Cross price elasticity is infinite if the slightest change in the price of good Y causes a substantial change in the quantity demanded of good X. It is always the case with goods which are perfect substitutes.

- Cross price elasticity is positive if the change in the price of good Y causes a change in the quantity demanded of good X in same direction. It is always the case with goods which are substitutes.

- Cross price elasticity is negative if the change in the price of good y causes a change in the quantity demanded of good X in opposite direction. It is always the case with goods which are complements of each other.

- Cross price elasticity is zero, if a change in the price of good Y does not affect the quantity demanded good X. In the case of goods which are not related to each other, cross elasticity of demand is zero.

Promotional Elasticity of Demand

Advertising occupies an important place in a competitive market economy. One of the factors which influences demand is advertising. How far the demand for a product will be influenced by advertisement and other promotional activities may be measured by advertising elasticity of demand. The promotional elasticity measures the responsiveness of demand to changes in advertising or other promotional expenses.

The formula for advertising elasticity of demand is

Ea = Proportionate change in sales/Proportionate change in advertising expenditure

LAW OF DEMAND

The consumer's decisions are guided by several elements, such as price, income, tastes and preferences etc. Among the many causal factors affecting demand, price is the most significant and the price- quantity relationship called as the Law of Demand is stated as follows:

"The greater the amount to be sold, the smaller must be the price at which it is offered in order that it may find purchasers, or in other words, the amount demanded increases with a fall in price and diminishes with a rise in price". In simple words other things being equal, quantity demanded will be more at a lower price than at higher price. The law assumes that income, taste, fashion, prices of related goods, etc. remain the same in a given period.

The law indicates the inverse relation between the price of a commodity and its quantity demanded in the market.

Thus '*Ceteris Paribus'*;

- With a change in the price of the good, the consumer changes the quantity purchased by him. Normally, the consumer buys more of a good when its price falls and reduces the quantity when its price increases.

- The quantity demanded must be related to the time interval over which it is purchased. For example, it is meaningless to say that a consumer buys 5 kg of sugar when its price is Rs. 12 per kg. The quantity bought must specify the time period, i.e., per day, per week, per month, or over some other period.

- Factors determining demand for a commodity are: Price, Income of the consumer, Tastes & Preferences,

- Demographic factors, Seasonal factors etc.

Exceptions to the Law of Demand

The law of demand is widely applicable to a large number of goods. However, there are certain exceptions to it on account of which a change in the price of a good does not lead to a change in its quantity demanded in the opposite direction.

1. **Inferior Goods:** Some goods are consumed generally by poorer sections of the society. It is believed that with an increase in income such a consumer should move to a 'better' quality substitute good. For example, with an increase in income, a typical poor consumer shifts his demand from coarse grains to finer varieties of cereals. Therefore, with a fall in the price of a good (more so a necessity on which the consumer is spending a large part of his budget), the real income of the

consumer goes up. If, he considers the good under consideration an inferior good, he reduces its demand and buys more of its substitute(s).

2. **Giffen Goods:** Some special varieties of inferior goods are termed as Giffen goods. Cheaper varieties of this category like bajra, cheaper vegetable like potatoes come under this category. Sir Robert Giffen of UK first observed that people used to spend more their income on inferior goods like potato and less of their income on meat. But potatoes constitute their staple food. When the price of potato increased, after purchasing potato they did not have so many surpluses to buy meat. So the rise in price of potato compelled people to buy more potato and thus raised the demand for potato.

3. This is against the law of demand. This is also known as Giffen paradox. So giffen goods are products that people continue to buy even at high prices due to lack of substitute products.

4. **Veblen Goods:** A Veblen good is a luxury item whose price does not follow the usual laws of supply and demand. Usually, the higher the price of a particular good the less people will want it. For luxury goods, such as very expensive wines, watches or cars, however, the item becomes more desirable as it grows more expensive and less desirable should it drop in price. Veblen goods are named after the American economist and sociologist Thorstein Veblen. Veblen goods are not to be confused with Giffen goods which also rise in demand as they grow more expensive. Far from being luxury items Giffen goods tend to be staple food items, the increased demand for which is fuelled by poverty.

5. **Ignorance**: In some cases, the consumers suffer from the false notion that a higher priced good is of better quality. This happens mainly in the case of those goods where a typical consumer is not able to judge the quality easily. In such cases, the sellers may be able to sell more not by lowering the price but by raising it.

6. **Conspicuous Consumption:** Certain goods are meant for adding to one's social prestige. These form the part of 'status symbol' for showing that their user is a wealthy or cultured person. The consumers consider it as a distinction to have these goods. In other words, a commodity may be purchased not because of its intrinsic value but because it is expected to add to the social prestige of the buyer. For example: Diamonds and expensive jewellery, expensive carpets. Their demand falls, if they are inexpensive.

7. **Change in Fashion:** A change in fashion and tastes affects the market for a commodity. When a broad toe shoe replaces a narrow toe, no amount of reduction in the price of the latter is sufficient to clear the stocks. Broad toe on the other hand, will have more customers even though its price may be going up. The law of demand becomes ineffective.

8. **Complementary Goods:** Law of demand may be violated in the case of complementary goods also. For example: if the price of the DVD player falls leading to increase in its demand, in spite of rise in price of DVDs, their demand will increase.

MEASUREMENT AND SIGNIFICANCE OF ELASTICITY OF DEMAND

Measurement of Elasticity of Demand:

In the firms, it is more useful to find out to what extent the demand is elastic or inelastic. For that purpose it is essential to measure the elasticity. When people buy the same quantity irrespective of price changes, elasticity is zero. In this case, the demand is absolutely inelastic. On the other hand, whenever price changes quantity also changes. For Example, when price rises, purchases fall or stop. It is absolutely elastic. Between these two extremes(i.e. elastic and inelastic), there are varying degrees of elasticity.

There are four methods for the measurement of elasticity of demand.

1. Percentage Method
2. Total Outlay Method and
3. Geometric or point elasticity method
4. Arc Method

1. **Percentage Method:** According to this method, price elasticity is estimated by dividing the percentage change in quantity demanded by the percentage change in price of the commodity. Thus, given the percentage change of both quantity demanded and price; the elasticity of demand can be derived. If the percentage change in quantity demanded is greater that the percentage change in price, the elasticity will be greater than one. If percentage change in quantity demanded is less than percentage change in price, the elasticity is said to be less than one. But if percentage change of both quantities demanded and price is same, elasticity of demand is 1 said to be unit.

$$E_p = \frac{\% \ change \ in \ q}{\% \ change \ in \ p} = \frac{\Delta q / q}{\Delta p / p} = \frac{\Delta q}{\Delta p} \times \frac{p}{q}$$

2. **Total Expenditure Method:** Total expenditure method was formulated by Alfred Marshall. The elasticity of demand can be measured on the basis of change in total expenditure in response to a change in price. It is worth noting that unlike percentage method a precise mathematical coefficient cannot be determined to know the elasticity of demand. By the help of total expenditure method, it is determined whether the price elasticity is equal to one, greater than one, less than one. In this method, the initial expenditure before the change in price and the expenditure after the change in price are compared.

Total Outlay/ Expenditure = Price x Quantity Demanded

If, with a fall in price, it is found that the expenditure remains the same, elasticity of demand is said to be one (Ed = 1), if the total expenditure increases the elasticity of demand is said to be greater than one (Ed > 1), if the total expenditure diminishes with the fall in price, elasticity of demand is less than one (Ed < 1), and vice-versa.

Price	Total Expenditure	Elasticity of Demand
INCREASES	Increases	Less than 1
	Remains Same	Equal to 1
	Falls	More than 1
FALLS	Falls	Less than 1

	Remains Same	Equal to 1
	Increases	More than 1
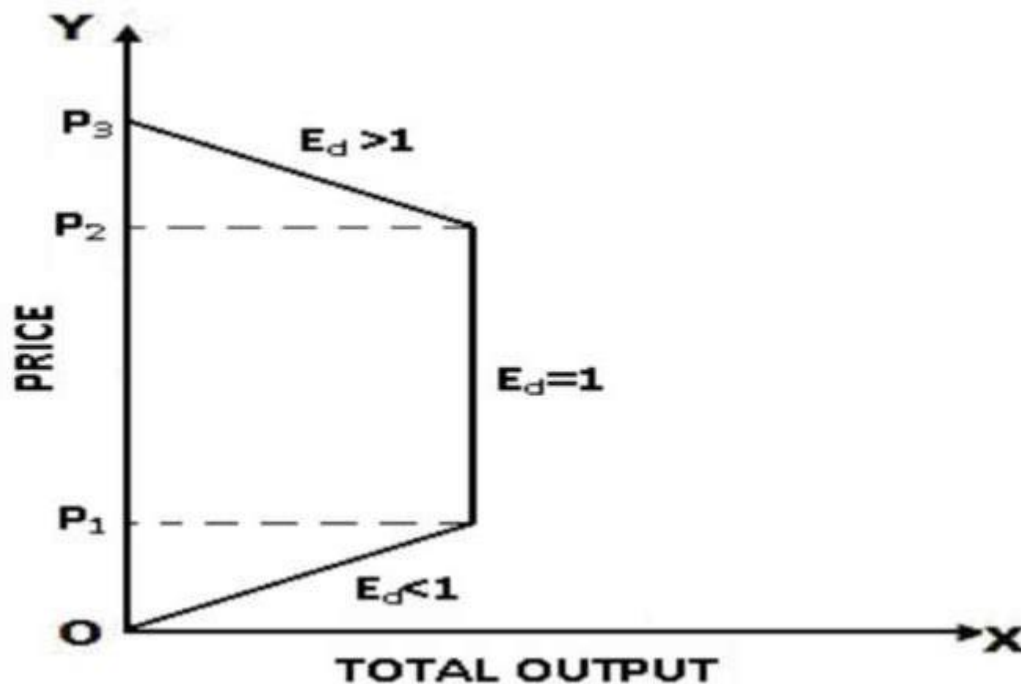
Demand for commodity X is unitary elastic over the price range OP1 to OP2 because total outlay or expenditure does not change with change in price. Demand is inelastic over the price range O to OP1 because total expenditure increases or decreases with increase or decrease in prices respectively. Demand is elastic over the price range OP2 to OP3 because total outlay increases with decrease in prices and decreases with increase in prices. Consider below table for understanding

| Price Per Unit	Quantity Demanded	Total Outlay or total revenue (in Rs.)	Ep	Elasticity of Demand
1.00	800	800	Less than 1	Inelastic
2.00	700	1400		
3.00	600	1800		
4.00	500	2000	Equal to 1	Unitary Elastic
5.00	400	2000		
6.00	300	1800	More than 1	Elastic
7.00	200	1400		
8.00	100	800		

3. **Geometric Method or Point Method**: According to this method, elasticity of demand is measured on different points on a straight line demand curve. The price elasticity of demand at a point on a straight line is equal to the lower segment of the demand curve

divided by upper segment of the demand curve at that point. Thus, at mid point on a straight-line demand curve, elasticity will be equal to unity; at higher points on the same demand curve, but to the left of the mid-point, elasticity will be greater than unity, at lower points on the demand curve, but to the right of the midpoint, elasticity will be less than unity. At a corner point on demand curve where there is no lower segment, elasticity of demand is equal to zero (Ed = ⍰) and where there is no upper segment on demand curve, elasticity of demand is equal to infinity, (Ed = ⍰)

In other words,

**Point Elasticity= Lower segment of demand curve/Upper segment of demand curve**

E=L/U
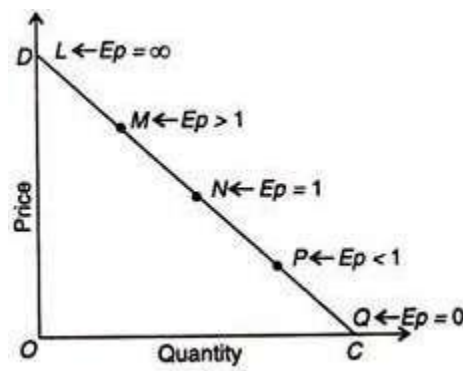
We arrive at the conclusion that at the mid-point on the demand curve, the elasticity of demand is unity. Moving up the demand curve from the mid-point, elasticity becomes greater. When the demand curve touches the Y- axis, elasticity is infinity. Ipso facto, any point below the mid-point towards the A'-axis will show elastic demand. Elasticity becomes zero when the demand curve touches the X -axis.

4. **Arc Method:**

We have studied the measurement of elasticity at a point on a demand curve. But when elasticity is measured between two points on the same demand curve, it is known as arc elasticity. In the words of Prof. Baumol, **"Arc elasticity is a measure of the average responsiveness to price change exhibited by a demand curve over some finite stretch of the curve."**
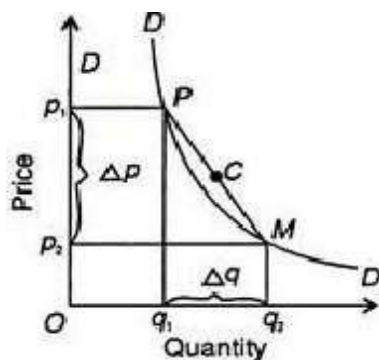
$$E_p = \frac{\dfrac{\Delta q}{(q_1 + q_2)^{1/2}}}{\dfrac{\Delta p}{(p_1 + p_2)^{1/2}}} = \frac{\Delta q}{(q_1 + q_2)^{1/2}} \times \frac{(p_1 + p_2)^{1/2}}{\Delta p} = \frac{\Delta q}{\Delta p} \times \frac{p_1 + p_2}{q_1 + q_2}$$

On the basis of this formula, we can measure arc elasticity of demand when there is a movement either from point P to M or from M to P. Thus whether we move from M to P or P to M on the arc PM of the DD curve, the formula for arc elasticity of demand gives the same numerical value. The closer the two points P and M are, the more accurate is the measure of elasticity on the basis of this formula.

If the two points which form the arc on the demand curve are so close that they almost merge into each other, the numerical value of arc elasticity equals the numerical value of point elasticity.

Significance of Elasticity of Demand:

1. **In the Determination of Output Level:** For making production profitable, it is essential that the quantity of goods and services should be produced corresponding to the demand for that product. Since the changes in demand are due to the change in price, the knowledge of elasticity of demand is necessary for determining the output level.

2. **In the Determination of Price:** The elasticity of demand for a product is the basis of its price determination. The ratio in which the demand for a product will fall with the rise in its price and vice versa can be known with the knowledge of elasticity of demand. The elasticity of demand for a product is the basis of its price determination. The ratio in which the demand for a product will fall with the rise in its price and vice versa can be known with the knowledge of elasticity of demand.

3. **In Price Discrimination by Monopolist:** Under monopoly discrimination the problem of pricing the same commodity in two different markets also depends on the elasticity of demand in each market. In the market with elastic demand for his commodity, the discriminating monopolist fixes a low price and in the market with less elastic demand, he charges a high price.

4. **In Price Determination of Factors of Production:** The concept of elasticity for demand is of great importance for determining prices of various factors of production. Factors of production are paid according to their elasticity of demand. In other words, if the demand of a factor is inelastic, its price will be high and if it is elastic, its price will be low.

5. **In Demand Forecasting:** The elasticity of demand is the basis of demand forecasting. The knowledge of income elasticity is essential for demand forecasting of producible goods in future. Long- term production planning and management depend more on the income elasticity because management can know the effect of changing income levels on the demand for his product.

6. **In the Determination of Government Policies:** The knowledge of elasticity of demand is also helpful for the government in determining its policies. Before imposing statutory price control on a product, the government must consider the elasticity of demand for that product. The government decision to declare public utilities those industries whose products have inelastic demand and are in danger of being controlled by monopolist interests depends upon the elasticity of demand for their products.

Factors affecting elasticity of demand

Some of the major factors affecting the elasticity of demand of a commodity are as follows:

A change in price does not always lead to the same proportionate change in demand. For example, a small change in price of AC may affect its demand to a considerable extent/whereas, large change in price of salt may not affect its demand. So, elasticity of demand is different for different goods

1. Nature of commodity:

Elasticity of demand of a commodity is influenced by its nature. A commodity for a person may be a necessity, a comfort, or a luxury.

    a. When a commodity is a necessity like food grains, vegetables, medicines, etc., its demand is generally inelastic as it is required for human survival and its demand does not fluctuate much with change in price.

    b. When a commodity is a comfort like fan, refrigerator, etc., its demand is generally elastic as consumer can postpone its consumption.

    c. When a commodity is a luxury like AC, DVD player, etc., its demand is generally more elastic as compared to demand for comforts.

    d. The term 'luxury' is a relative term as any item (like AC), may be a luxury for a poor person but a necessity for a rich person.

2. Availability of substitutes:

Demand for a commodity with large number of substitutes will be more elastic. The reason is that even a small rise in its prices will induce the buyers to go for its substitutes. For example, a rise in the price of Pepsi encourages buyers to buy Coke and vice-versa. Thus, availability of close substitutes makes the demand sensitive to change in the prices. On the other hand, commodities with few or no substitutes like wheat and salt have less price elasticity of demand.

3. Income Level:

Elasticity of demand for any commodity is generally less for higher income level groups in comparison to people with low incomes. It happens because rich people are not influenced much by changes in the price of goods. But, poor people are highly affected by increase or decrease in the price of goods. As a result, demand for lower income group is highly elastic.

4. Level of price:

Level of price also affects the price elasticity of demand. Costly goods like laptop, Plasma TV, etc. have highly elastic demand as their demand is very sensitive to changes in their prices. However, demand for inexpensive goods like needle, match box, etc. is inelastic as change in prices of such goods do not change their demand by a considerable amount.

5. Postponement of Consumption:

Commodities like biscuits, soft drinks, etc. whose demand is not urgent, have highly elastic demand as their consumption can be postponed in case of an increase in their prices. However, commodities with urgent demand like life saving drugs, have inelastic demand because of their immediate requirement.

6. Number of Uses:

If the commodity under consideration has several uses, then its demand will be elastic. When price of such a commodity increases, then it is generally put to only more urgent uses and, as a result, its demand falls. When the prices fall, then it is used for satisfying even less urgent needs and demand rises. For example, electricity is a multiple-use commodity. Fall in its price will result in substantial increase in its demand, particularly in those uses (like AC, Heat convector, etc.), where it was not employed formerly due to its high price. On the other hand, a commodity with no or few alternative uses has less elastic demand.

7. Share in Total Expenditure:

Proportion of consumer's income that is spent on a particular commodity also influences the elasticity of demand for it. Greater the proportion of income spent on the commodity, more is the elasticity of demand for it and vice-versa. Demand for goods like salt, needle, soap, match box, etc. tends to be inelastic as consumers spend a small proportion of their income on such goods. When prices of such goods change, consumers continue to purchase almost the same quantity of these goods. However, if the proportion of income spent on a commodity is large, and then demand for such a commodity will be elastic.

8. Time Period:

Price elasticity of demand is always related to a period of time. It can be a day, a week, a month, a year, or a period of several years. Elasticity of demand varies directly with the time period. Demand is generally inelastic in the short period. It happens because consumers find it difficult to change their habits, in the short period, in order to respond to a change in the price of the given commodity. However, demand is more elastic in long rim as it is comparatively easier to shift to other substitutes, if the price of the given commodity rises.

9. Habits:

Commodities, which have become habitual necessities for the consumers, have less elastic demand. It happens because such a commodity becomes a necessity for the consumer and he continues to purchase it even if its price rises. Alcohol, tobacco, cigarettes, etc. are some examples of habit forming commodities. Finally it can be concluded that elasticity of demand for a commodity is affected by number of factors. However, it is difficult to say, which particular factor or combination of factors determines the elasticity. It all depends upon circumstances of each case.

Elasticity of Demand in decision making

For taking decisions on a pricing policy, the businessman has to know the likely effects of price changes on the demand for his product in the market. He can calculate if the demand will increase by lowering of the price and to what extent, and whether it will result in substantial increase in revenue and profits. Some businessmen do not pay any attention to the aspect of elasticity of demand, and suffer heavy losses by wrong decisions. In scientific management decision making, on has to have as precise an idea as possible of the degree of elasticity of demand. By knowing the type of elasticity, it is possible to fix the precise price of the product in a very profitable way. Unitary elastic demand will not bring in more revenue. Demand elasticity being more than unity, a price cut would lead to increase in revenue. If the product has inelastic demand, raising price will fetch better revenue and profits.

Let's say that the cost of vanilla flavoring increases as a result of short market supply. As profits equal revenue minus costs, this would lower the ice cream shop's profits. If costs were close to the price of vanilla ice cream, profits would be almost zero. As vanilla ice cream is elastic, the shop manager would be unable to increase the price without damaging demand. Some businesses, therefore, sell some goods that have little to no profit margin. Their main profits come from products in higher demand. In this case, the ice cream shop would increase the price of the more inelastic good, chocolate ice cream, in order to compensate for the loss in profits.

Demand Forecasting

All organizations operate in an atmosphere of uncertainty but decisions must be made today that affect the future of the organization. There are various ways of making forecasts that rely on logical methods of manipulating the data that have been generated by historical events. A forecast is a prediction or estimation of a future situation, under given conditions. Demand forecast will help the manager to take the following decisions effectively.

The major short run decisions are:	The major long run decisions are:
Purchase of inputs	Expansion of existing capacity
Maintaining of economic level of inventory	Diversification of the product mix
Setting up sales targets	Growth of acquisition
Distribution network	Change of location of plant
Management of working capital	Capital issues
Price policy	Long run borrowings
Promotion policy	Manpower planning

The following are needed for demand forecasting:
- Appropriate production scheduling
- Suitable purchase policy
- Appropriate price policy
- Setting realistic sales targets for salesmen
- Forecasting financial requirements
- Business planning
- Financial planning
- Planning man-power requirements

Characteristics of good demand forecasting

A forecast is said to be successful when the excepted demand is equal to the actual demand.

This can only be possible if the right method of demand forecasting is selected.

i. Accuracy: Accuracy implies that an organization should make forecasts close to real figures, so that the real picture of demand can be determined. For example, there would be an increase in sales in the coming years is an inaccurate forecast. On the other hand, there would be an increase in sales by 30% in the next year is an accurate forecast.

ii. Durability: Implies that forecasts should be done in such a way that they can be used for long periods as forecasts involves a lot of time, money, and efforts.

iii. Flexibility: Flexibility implies that the forecasts should be adjustable and adaptable to changes. In today's uncertain business environment, there is a rapid change in the tastes and preferences of consumers, which affect the demand for products. Therefore, the

demand forecasts made by an organization should reflect those changes. Apart from this, an organization, while making forecasts, should consider various business risks that may take place in the future.
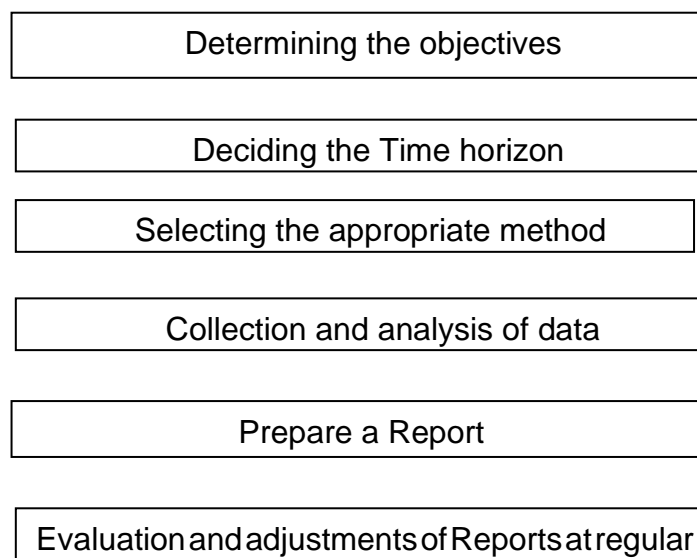
iv. Acceptability: Acceptability Refers to one of the most important criterion of demand forecasting. An organization should forecast its demand by using simple and easy methods. In addition, the methods should be such that organizations do not face any complexities. However, organizations generally prefer advanced statistical methods, which may prove difficult and complex.

v. Availability: Availability implies that adequate and up-to-date data should be available for forecasts. The forecasts should be done in timely manner so that necessary arrangements should be made related to the market demand.

vi. Plausibility: Plausibility implies that the demand forecasts should be reasonable, so that they are easily understood by individuals who are using it.

vii. Economy: Economy implies demand forecasting should be economically effective. The forecasting should be done in such a manner that the costs should be minimized and benefits should be maximized.

Steps in Demand Forecasting

Determining the objectives

Deciding the Time horizon

Selecting the appropriate method

Collection and analysis of data

Prepare a Report

Evaluation and adjustments of Reports at regular

Methods of Demand Forecasting

Broadly speaking, there are two approaches to demand forecasting– one is to obtain information about the likely purchase behavior of the buyer through collecting expert's opinion or by conducting interviews with consumers, the other is to use past experience as a guide through a set of statistical techniques. Both these techniques of demand forecasting rely on varying degrees of judgment. The first method is usually found suitable for short-term forecasting, the latter for long-term forecasting. There are specific techniques which fall under each of these broad methods.

Choice of specific technique would depend on

   a) Imminent objectives of forecast, whether it is for a new product, or to gauge impact of a new advertisement etc

b) Cost involved, i.e., cost of forecasting should not be more than its benefits, here opportunity cost of resources will also be important

c) Time perspective, i.e., whether the forecast is meant for the short run or long run

d) Complexity of the technique, vis-à-vis availability of expertise; this would determine whether the firm would look for experts "in house" or outsource it

e) Nature and quality of available data. i.e., does the time series show a clear trend or is it highly unstable.

For the sake of convenience, we can categorize various techniques under two broad heads

1) **Subjective Methods**
2) **Quantitative Methods**

Subjective Methods of Demand Forecasting

By their nature, judgment-based forecasts use subjective and qualitative data to forecast future outcomes. They inherently rely on expert opinion, experience, judgment, intuition, conjecture, and other "soft" data. Such techniques are often used when historical data are not available, as is the case with the introduction of a new product or service, and in forecasting the impact of fundamental changes such as new technologies, environmental changes, cultural changes, legal changes, and so forth.

1. **Consumer's Opinion Survey:** Under this, the forecaster undertakes a complete survey of all consumers whose demand he intends to forecast, Once this information is collected, the sales forecasts are obtained by simply adding the probable demands of all consumers. The principle merit of this method is that the forecaster does not introduce any bias or value judgment of his own. This is called as Census Method He simply records the data and aggregates. But it is a very tedious and cumbersome process; it is not feasible where a large number of consumers are involved. Moreover if the data are wrongly recorded, this method will be totally useless. We have another method called Sample Method, Under this method, the forecaster selects a few consuming units out of the relevant population and then collects data on their probable demands for the product during the forecast period. The total demand of sample units is finally blown up to generate the total demand forecast.

2. **Experts Opinion Method:** In this method, the experts on the particular product whose demand is under study are requested to give their 'opinion' or 'feel' about the product. These experts, dealing in the same or similar product, are able to predict the likely sales of a given product in future periods under different conditions based on their experience.

    a) **Group Discussion:** Experts meet as group to find out future demand level. Decisions may be taken with the help of brainstorming sessions or by structured discussions. The firm may also encourage negative brainstorming in case it wants to explore the possible fallouts of a particular situation.

    b) **Delphi Technique:** This is a variant of the opinion poll method. Here is an attempt to arrive at a consensus in an uncertain area by questioning a group of experts repeatedly until the responses appear to converge along a single line. The participants are supplied with responses to previous questions (including seasonings from others in the group by a coordinator or a leader or operator of some sort). Such feedback may result in an expert revising his earlier opinion. This may lead to a narrowing down of the divergent views (of the experts) expressed earlier. The Delphi Techniques, followed by the Greeks earlier, thus

generates "reasoned opinion" in place of "unstructured opinion"; but this is still a poor proxy for market behavior of economic variables.

3. **Sales Force Composite:** It is a forecasting method used to forecast the sales by adding up individual sales agents forecasts for sales in their respective sales territories. It is a bottom-up approach which companies use to forecast more accurately. Sales agents have the most direct interaction with the customers and provide many valuable insights which help the companies boost their sales. Using the sales force composite forecast the company not only forecasts for the market as a whole but it also has numbers for individual areas and territories. Flipside of using this technique is that the company forecast will only rely on sales agents who may use too optimistic or too pessimistic approach based on their latest experience. Thus the company can end up forecasting taking only microeconomic factors and neglect the macroeconomic environment. Hence the companies usually combine the sales force composite forecast with the top-down forecast and then finalize the actual forecast.

4. **Market Simulation:** The demand for the market is predicted on the basis of responses of this group of consumers carried out by an experiment. In this method of demand forecasting the group of consumers are provided with certain amount of money and are requested to shop in a store which is a simulated one. The consumers are asked about the quantity of purchases they would make of the products that are kept in the store. The purchases made by consumers in the simulated store are recorded. During the experiment changes may be made in prices, promotional measure, and packaging of the products to see the responses of the consumers to such changes and these also are recorded for the purpose of the forecast. This method can be regarded as one step ahead of the survey method because here the consumers are requested to buy the product thereby generating more precise results. For new product launches this method would also prove to be useful.

5. **Test Marketing:** Test Marketing is often employed after new product development but prior to a full-scale national launch of a new brand or product. The idea is to choose a relatively small, reasonably isolated, yet somehow demographically "typical" market area. The total marketing plan for the item, including advertising, promotions, and distribution tactics, is "rolled out" and implemented in the test market, and measurements of product awareness, market penetration, and market share are made. While these data are used to estimate potential sales to a larger national market, the emphasis here is usually on "fine-tuning" the total marketing plan and insuring that no problems or potential embarrassments have been overlooked. For example, Proctor and Gamble extensively test-marketed its Pringles potato chip product made with the fat substitute Olestra to assure that the product would be broadly acceptable to the market.

Quantitative Methods of Demand Forecasting

We shall now move from simple to complex set of methods of demand forecasting. Such methods are taken usually from statistics. As such, you may be quite familiar with some the statistical tools and techniques, as a part of quantitative methods for business decisions.

I. **Time Series / Trend Projection:** Under this method, the time series data on the under forecast are used to fit a trend line or curve either graphically or through statistical method of Least Squares. The trend line is worked out by fitting a trend equation to time

series data with the aid of an estimation method. The trend equation could take either a linear or any kind of non-linear form. The trend method outlined above often yields a dependable forecast. The advantage in this method is that it does not require the formal knowledge of economic theory and the market; it only needs the time series data.

Components of Trend Projection method:

a) **Trend or time series:** This refers to change occurring consistently over a long time and is relatively smooth in its path.

b) **Seasonal Variations:** This refers to seasonal variations of the data within a year, e.g., Demand for woolens, ice cream; raincoats are dependent upon weather and would vary during a period of one year.

c) **Cyclical Trends:** This refers to a cyclical movement in the demand for a product that may have a tendency to recur in a few years.

d) **Irregular Events:** Typical examples of random events may be natural calamities, social unrest, foreign aggression creating war like situation etc., these events have no trend of occurrence hence they create random variation in the series.

1. **Trend series fitting line by observation:** This is the simplest method of studying trend of a time series. The original data are first plotted on a graph paper. The direction of the plotted data is carefully observed. A smooth line is drawn through the plotted points. While fitting a trend line by the freehand method, an attempt should be made that the fitted curve conforms to these conditions.

2. **Least Squares Method:** The straight-line trend is represented by the equation: $Yt = a + bX$, where Yt are the trend vales, a is the Y intercept or the value of Y when $X = 0$, b represents the slope of line or the amount by which Y variable will change if X is increased or decreased by one unit, and X variable is the time period. In order to determine the value of the constants 'a' and 'b', following two equations, called normal equations, are to be solved.

$$\sum X = Na + b\sum X$$
$$\sum XY = a\sum X + b\sum X2 \,,$$

where N is the number of time periods.

3. **Smoothing Techniques:** When data collected over time displays random variation, smoothing techniques can be used to reduce or cancel the effect of these variations. When properly applied, these techniques smooth out the random variation in the time series data to reveal underlying trends.

a) **Moving Average Smoothing:** In Moving Average Smoothing, each observation is assigned an equal weight, and each observation is forecasted by using the average of the previous observation(s). Using the time series $X_1, X_2, X_3, ..., X_t$, this smoothing technique predicts X_{t+k} as follows :

b) **Exponential Smoothing:** Exponential Smoothing is one of the more popular smoothing techniques due to its flexibility, ease in calculation, and good performance. Exponential Smoothing uses a simple average calculation to assign exponentially decreasing weights starting with the most recent observations. New observations are given relatively more weight in the average calculation than older observations.

4. **ARIMA Method:** The Auto Regressive Integrated Moving Average method has been given by Box and Jenkins, therefore the method is also known as Box Jenkins Method. It is considered to be the most sophisticated technique of forecasting as it combines moving average and auto regressive techniques.

II.   **Barometric Techniques or Lead-Lag Indicators Method:** This consists in discovering a set of series of some variables which exhibit a close association in their movement over a period of time. In barometric forecasting, we construct an index of relevant economic indicators and forecast future trends on the basis of these indicators. These indicators can be grouped into three types on the basis of their timings with respect to the happening of the events.

Following are the types of indicators:
- Leading indicators
- Coincident indicators
- Lagging indicators

Leading indicators: These indicators as the name suggest move ahead of the happening. In other words when an even that has already happened is used to predict the future event, then the already happened even would act as a leading indicator. For instance the data relating to working women would act as a leading indicator for the demand of working women hostels. Though such leading indicators provide a way to understand the future demand, their major drawback is that they may not be always precise. What are the prominent examples of leading economic indicators? They would be data related to mean week hours of work put in by the workers, producers' fresh orders for consumer goods, consumer expectations index, producers' fresh orders of capital goods etc.

Coincident indicators: These are those indicators that take place simultaneously to the happening. These coincident indicators would include data relating to people employed in non-agricultural sectors, production of the industrial sector, personal income etc. These indicators too depict the state of the economy. For instance if the data related to industrial production show strong numbers, then it shows that the economy is performing well. On the other hand disappointing industrial production numbers would reflect poor state of the economy.

Lagging indicators: These indicators are those which take place after the happening. These indicators are essential to understand how the economy would shape up in the future because these follow the economic cycle. In other words these indicators show the way to the future. Hence lagging indicators are those which are the most important ones and are extremely useful in predicting the future economic events. Inflation and data relating to unemployment levels are the top indicators that help in understanding or analysing the performance of the economy.

III.   **Statistical Methods:** Under this method, statistical, mathematical models, equations etc are extensively used in order to estimate future demand of a particular product.

a)   **Naïve Method:** This method is only appropriate for time series data. All forecasts are simply set to be the value of the last observation. That is, the forecasts of all future values are set to be same, where it is the last observed value. This method works remarkably well for many economic and financial time series.

b)   **Correlation Analysis**: Refers to studying the relationship between two variables where one is independent variable and the other is dependent variable.

c)   **Regression Analysis:** It attempts to assess the relationship between at least two variables (one or more independent and one dependent), the purpose being to predict the value of the dependent variable from the specific value of the independent variable. The basis of this prediction generally is historical data. This method starts from the assumption that a basic relationship exists between two

variables. An interactive statistical analysis computer package is used to formulate the mathematical relationship which exists.

IV.   **Econometric Methods:** The Econometric Methods make use of statistical tools and economic theories in combination to estimate the economic variables and to forecast the intended variables. The econometric model can either be a single-equation regression model or may consists a system of simultaneous equations. In most commodities, the single-equation regression model serves the purpose. But, however, in the case where the explanatory economic variables are so interdependent or interrelated to each other that unless one is defined the other variable cannot be determined, a single-equation regression model does not serve the purpose. And, therefore in such situation, the system of simultaneous equations is used to forecast the variable.

Supply Analysis

Supply represents how much the market can offer. The quantity supplied refers to the amount of a good producers are willing to supply when receiving a certain price. The supply of a good or service refers to the quantities of that good or service that producers are prepared to offer for sale at a set of prices over a period of time.

According to Watson, Supply means a schedule of possible prices and amounts that would be sold at each price. The supply is not the same concept as the stock of something in existence, for example, the stock of commodity X in Delhi means the total quantity of Commodity X in existence at a point of time; whereas, the supply of commodity X in Delhi means the quantity actually being offered for sale, in the market, over a specified period of time.

Determinants of Supply

It is relevant to know the factors which determine supply of a product.

1.   **Price of the commodity:** If the prices are high, the sellers are willing to supply more goods to increase total revenue ultimately increasing their profit.
2.   **Cost of Production:** Cost depends on the price of factors. Increase in factor cost increases the cost of production, and reduces supply.
3.   **State of Technology:** Use of advanced technology increases productivity of the organization and increases its supply.
4.   **Number of Firms:** With the increase in number of producers of a particular product, the supply of the product in the market will increase. If entry is unrestricted, new firms will continue to enter the market, thus increasing supply and degree of competition. It results in decrease in supply of product by an individual firm.
5.   **Government Policies:** Government policies related to taxes and subsidies on certain products also have an effect on supply.

Supply Function

A supply function of an individual supplier is an algebraic form of expressing his behavior with regard to what he offers in market at the prevailing prices. In it, the quantity supplied per period of time is expressed as a function of several variables. General form of the supply function is $S_x = f(P_x, C_x, T_x, G, N)$

Law of Supply

The law of supply states that a firm will produce and offer to sell greater quantity of a product or service as the price of that product or services rises, other things being equal. There is direct relationship between price and quantity supplied. In this statement, change

in price is the cause and change in supply is the effect. Thus, the price rise leads to supply rise and not otherwise. It may be noted that at higher prices, there is greater incentive to the producers or firms to produce and sell more. Other things include cost of production, change of technology, price of related goods (substitutes and complements), prices of inputs, level of competition and size of industry, government policy, and non-economic factors.

Thus '*Ceteris Paribus'*;

  a. With an increase in the price of the good, the producer is willing to offer more of goods in the market for sale.
  b. The quantity supplied must be related to the specified time interval over which it is offered.