Segment: Basics of Managerial Economics

Topic: Elasticity of Demand

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Introduction

In the previous topic, we discussed the law of demand and its determinants. It tells us only the direction of change in price and quantity demanded. But it does not specify how much more is purchased when price falls or how much less is bought when price rises. In order to understand the quantitative changes or rate of changes in price and demand, we have to study the concept of elasticity of demand.

In this section, we will discuss the elasticity of demand.

Learning Objectives

At the end of this topic, you will be able to:

- categorise the various factors which influence the demand for goods and services
- apply the concept of elasticity of demand and different kinds of elasticity of demand.

1. Elasticity of Demand

Meaning and definition

The term elasticity is borrowed from physics. It shows the reaction of one variable with respect to a change in other variables on which it is dependent. Elasticity is an index of reaction. In economics, the term elasticity refers to a ratio of the relative changes in two quantities. It measures the responsiveness of one variable to the changes in another variable.

The elasticity of demand is generally defined as the responsiveness or sensitiveness of demand to a given change in the price or non-price determinant of a commodity. It refers to the capacity of demand either to stretch or shrink to a given change in price or non-price determinant. For E.g., demand for good/service changes by some percentage due to change in consumer income by some percentage, Measurement of these changes can lead to the calculation of elasticity of demand. The elasticity of demand indicates a ratio of relative changes in two quantities, i.e., price and demand. According to professor Boulding, the elasticity of demand measures the responsiveness of demand to changes in price. In the words of Marshall, "The elasticity (or responsiveness) of demand in a market is great or small, according to the amount demanded much or little for a given fall in price and diminishes much or little for a given rise in price".

Kinds of elasticity of demand: Broadly speaking, there are five kinds of elasticity of demand. They are price elasticity, income elasticity, cross elasticity, promotional elasticity, and substitution elasticity. We shall discuss each one of them in some detail.

Price elasticity of demand: In the words of Prof. Stonier and Hague, price elasticity of demand is a technical term used by economists to explain the degree of responsiveness of the demand for a product to a change in its price.

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

Where Ep is the price elasticity

Demand rises by 80%, i.e. $\frac{+80}{-20} = -4$ Prices falls by 20%, i.e

Demand falls by 80%, i.e. $\frac{-80}{+20} = -4$ price rises by 20%, i.e.

It implies that at the present level with every change in price, there will be a change in demand four times inversely. Generally, the coefficient of price elasticity of demand always holds a negative sign because there is an inverse relationship between the price and quantity demanded.

$$\text{Symbolically, } Ep = \frac{\Delta D}{\Delta P} \times \frac{P}{D} \quad \frac{40}{-2} \times \frac{6}{20} = -6$$

Original demand = 20 units original price = 6 – 00

New demand = 60 units New price = 4 – 00

In the above example, price elasticity is – 6.

The rate of change in demand may not always be proportional to the change in price. A small change in price may lead to a very great change in demand or a big change in price may not lead to a great change in demand.

Based on the numerical values of the coefficient of elasticity, we can have the following five degrees of price elasticity of demand:

1. **Perfectly elastic demand** – In this case, a very small change in price leads to an infinite change in demand. The demand curve is a horizontal line and parallel to the OX axis. The numerical co-efficient of perfectly elastic demand is infinity (ED= ∞). Figure 1 depicts the perfectly elastic demand curve.

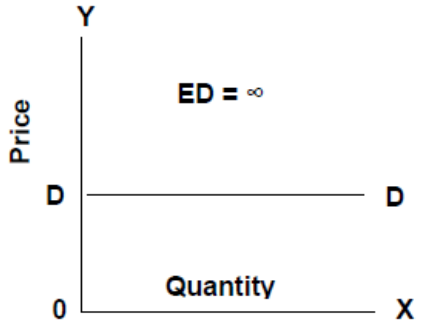

Fig.1: Perfectly Elastic Demand

2. **Perfectly inelastic demand** – In case of any change in price, the quantity demanded will be perfectly constant. The demand curve is a vertical straight line and parallel to the OY axis. The quantity demanded would be 10 units, irrespective of price changes from Rs. 10.00 to Rs. 2.00. Hence, the numerical co-efficient of perfectly inelastic demand is zero. ED = 0. Figure 2 depicts a perfectly inelastic demand curve.

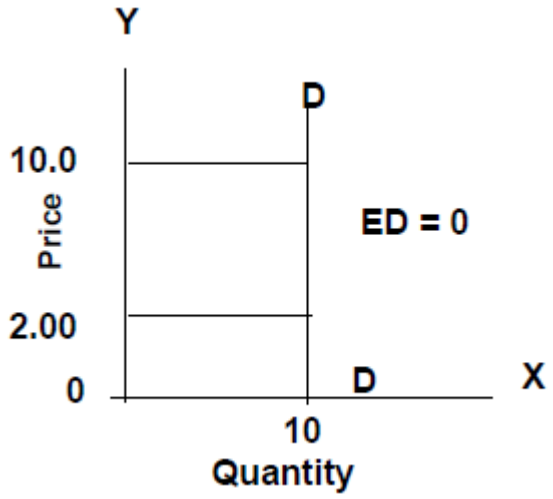

Fig. 2: Perfectly Inelastic Demand

3. **Relatively elastic demand** – Here, if there is a small change in price, then it leads to a proportional change in demand. Figure 3 depicts a relatively elastic demand. In figure 3 you can see that change in demand is more than that of change in price. Hence, the elasticity is greater than one. For E.g., demand rises by 9 % and price falls by 3%. Hence, the numerical co-efficient of demand is greater than one.

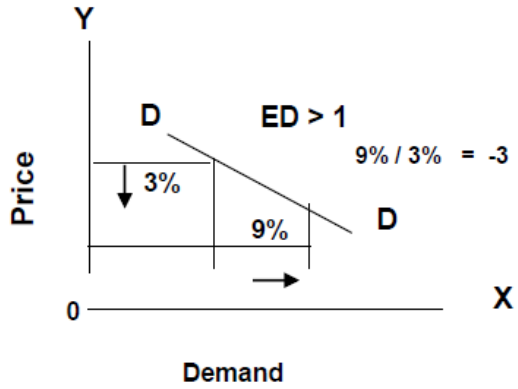

Fig. 3: Relatively Elastic Demand

4. **Relatively inelastic demand –** Here a huge change in price, say 8 % fall price, leads to less than proportional change in demand, say 4 % rise in demand. One can notice here that the change in demand is less than that of change in price. This can be represented by a steeper demand curve. Hence, elasticity is less than one. Figure 4 depicts the relatively inelastic demand curve.

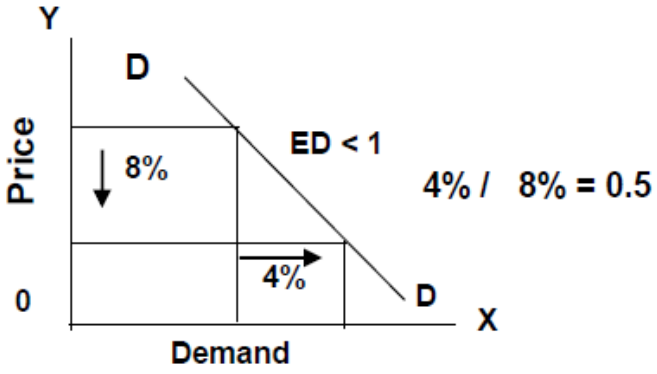

Fig. 4: Relatively Inelastic Demand

In all economic discussion, relatively elastic demand is generally called as 'elastic demand' or 'more elastic' demand, while relatively inelastic demand is popularly known as 'inelastic demand' or 'less elastic demand'.

5. **Unitary elastic demand** – Here, there is a proportionate change in price which leads to an equal proportional change in demand. For E.g., a 5 % fall in price leads to an exactly 5 % increase in demand. Hence, elasticity is equal to unity. It is possible to come across unitary elastic demand, but it is a rare phenomenon. Figure 5 depicts the unitary elastic demand curve.

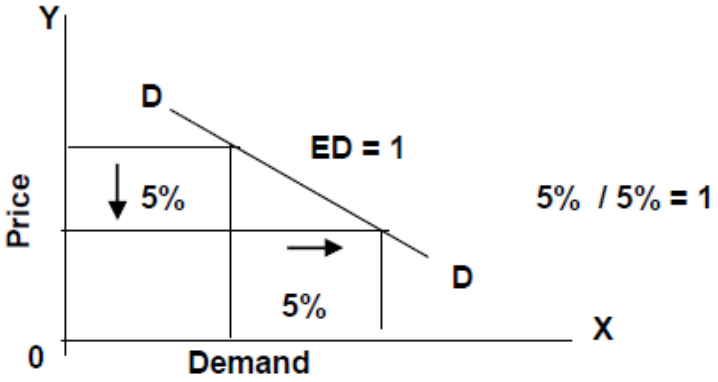

Fig. 5: Unitary Elastic Demand

Out of five different degrees, the first two are theoretical and the last one is a rare possibility. Hence, in all our general discussions, we refer only to two terms: relatively elastic demand and relatively inelastic demand.

Determinants of price elasticity of demand: You may observe that the elasticity of demand depends on several factors of which the following are some of the important ones:

1. **Nature of the commodity –** Commodities coming under the category of necessaries and essentials tend to be inelastic, because people buy them whatever may be the price. For

example, rice, wheat, sugar, milk, vegetables, etc.; on the other hand, for comforts and luxuries, demand tends to be elastic, e.g., TV sets, refrigerators, etc.

2. **Existence of substitutes –** Substitute goods are those that are considered to be economically interchangeable by buyers. If a commodity has no substitutes in the market, demand tends to be inelastic because people have to pay higher price for such articles. For example, salt, onions, garlic, ginger, etc. In case of commodities having different substitutes, demand tends to be elastic. For example, blades, tooth pastes, soaps, etc.

3. **Number of uses for the commodity –** Single-use goods are those, which can be used for only one purpose and multiple-use goods can be used for a variety of purposes. If a commodity has only one use (singe use product), demand tends to be inelastic because people have to pay more prices if they have to use that product for only one use, for example, all kinds of eatables, seeds, fertilizers, pesticides, etc. On the contrary, for commodities having several uses, [multiple- use-products] demand tends to be elastic, for example, coal, electricity, steel, etc.

4. **Durability and reparability of a commodity –** Durable goods are those, which can be used for a long period of time. Demand tends to be elastic in case of durable and repairable goods, because people do not buy them frequently, e.g., table, chair, vessels etc. On the other hand, for perishable and non-repairable goods, demand tends to be inelastic e.g., milk, vegetables, electronic watches, etc.

5. **Possibility of postponing the use of a commodity –** In case there is no possibility to postpone the use of a commodity, demand tends to be inelastic because people have to buy them irrespective of their prices, e.g., medicines. If there is a possibility to postpone the use of a commodity, demand tends to be elastic, e.g., buying TV set, motor cycle, washing machine, car, etc.

6. **Level of income of the people –** Generally speaking, demand will be relatively inelastic in case of rich people, because any change in market price will not alter and affect their purchase plans. On the contrary, demand tends to be elastic in case of poor.

7. **Range of prices –** There are certain goods or products like imported cars, computers, refrigerators, TV, etc, which are costly. Similarly, a few other goods like nails, needles, etc. are low priced goods. In all these cases, a small fall or rise in prices will have insignificant effect on their demand. Hence, demand for them is inelastic. However, commodities having normal prices are elastic.

8. **Proportion of the expenditure on a commodity –** When the amount of money spent on buying a product is either too small or too big, demand tends to be inelastic. For example, salt, newspaper or a site or house. On the other hand, if the amount of money spent is moderate, demand tends to be elastic. For example, vegetables and fruits, cloths, provision items etc.

9. **Habits –** When people are habituated to the use of a commodity, they do not care for price changes over a certain range e.g., in case of smoking, drinking, use of tobacco, etc. In that case, demand tends to be inelastic. If people are not habituated to the use of any product, then demand generally tends to be elastic.

10. **Period of time –** Price elasticity of demand varies with the length of the time period. Generally speaking, in the short period, demand is inelastic because consumption habits of the people, customs and traditions, etc. do not change. On the contrary, demand tends to be elastic in the long period where there is possibility of all kinds of changes.

11. **Level of knowledge –** Demand in case of enlightened customers would be elastic and in case of ignorant customers, it would be inelastic.

12. **Existence of complementary goods –** Goods or services whose demands are interrelated such that an increase in the price of one of the products results in a fall in the demand for the other are known as complementary goods. Goods that are jointly demanded are inelastic. For example, pen and ink, vehicles and petrol, shoes and socks, etc. have inelastic demand for this reason. If a product does not have complements, in that case demand tends to be elastic. For example, biscuits, chocolates, ice creams, etc. In this case, the use of a product is not linked to any other product.

13. **Purchase frequency of a product –** If the frequency of purchase is very high, the demand tends to be inelastic, e.g., coffee, tea, milk, matchbox, etc. On the other hand, if people buy a product occasionally, demand tends to be elastic, e.g., durable goods like radio, tape recorders, refrigerators, etc.

Thus, the demand for a product being elastic or inelastic will depend on several factors.

Measurement of price elasticity of demand: There are different methods to measure the price elasticity of demand and among them, the three most important methods are: total expenditure method, point method and arc method.

Let us discuss these methods in detail.

Total expenditure method: Under this method, the price elasticity is measured by comparing the total expenditure of the consumers (or total revenue i.e., total sales values from the point of view of the seller) before and after variations in price. Table 1 shows the total expenditure of consumers with variations in price and quantity demanded. We measure price elasticity by examining the change in total expenditure as a result of change in the price and quantity demanded for a commodity.

Total expenditure = Price per unit x Total quantity purchased

Table 1: Total Expenditure of Consumers

	Price in (Rs.)	Qty. Demanded	Total Expenditure	Nature of PED
I Case	5.00	2000	10000	> 1
	4.00	3000	12000	
	2.00	7000	14000	
II Case	5.00	2000	10000	= 1
	4.00	2500	10000	
	2.00	5000	10000	
III Case	5.00	2000	10000	< 1
	4.00	2200	8000	
	2.00	4200	8400	

Note:

Variation in the value of ED can be summarised as:

1. When new outlay is greater than the original outlay, then ED > 1.
2. When new outlay is equal to the original outlay then ED = 1.
3. When new outlay is less than the original outlay then ED < 1.

Graphical representation

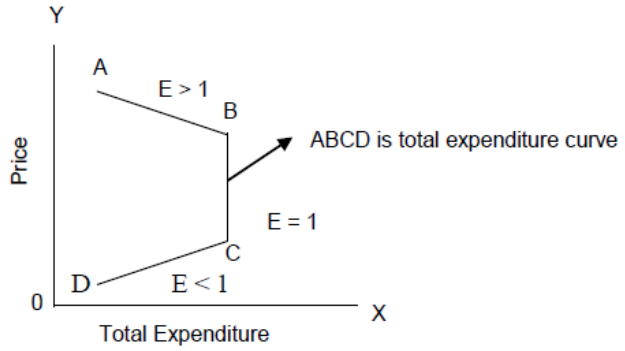

Fig. 6: Graphical Representation of Total Expenditure Method

From the diagram it is clear that:

1. From A to B, price elasticity is greater than one.

2. From B to C, price elasticity is equal to one.

3. From C to D, price elasticity is less than one.

Note:

Following points should be noted from the total expenditure method:

- When total expenditure increases with the fall in price and decreases with a rise in price, then the PED is greater than one.
- When the total expenditure remains the same either due to a rise or fall in price, the PED is equal to one.
- When total expenditure, decreases with a fall in price and increases with a rise in price, PED is less than one.

Point method: Prof. Marshall advocated this method. The point method measures price elasticity of demand at different points on a demand curve. Hence, in this case, an attempt is made to measure small changes in both price and demand. It can be explained either with the help of mathematical calculation or with the help of a diagram or graphical representation. Table 2 shows the relation between the price and the demand at two points: A and B.

Mathematical illustrations

Table 2: Price-Demand in Point Method

Points	Price in Rs.	Demand in units
A	10 - 00	40
B	09 - 00	46

To measure price elasticity at two points, A and B, the following formula is to be adopted.

$$PED = \frac{\text{Percentage change in demand}}{\text{Percentage change in price}}$$

To find out percentage change in demand, the formula is –

$$\frac{\text{Change in demand}}{\text{Original demand}} \times 100$$

To find out percentage change in price, the following formula is employed

$$\frac{\text{Change in price}}{\text{Original price}} \times 100$$

$$\text{At Point A, Ep} = \frac{\text{change in demand}}{\text{original demand}} \quad \frac{6}{40} \times 100 = \frac{600}{40} = 15\%$$

$$\frac{\text{Change in price}}{\text{Original price}} \times 100 = \frac{-1}{10} \times 100 = \frac{-100}{10} = -10\%$$

$$Ep = \frac{15}{-10} = -1.5$$

$$\text{At point B, ED} = \frac{\text{Change in demand}}{\text{Original demand}} \quad \frac{-6}{46} \times 100 = \frac{-600}{46} = -13.04\%$$

$$\frac{\text{Change in price}}{\text{Original price}} \quad \frac{1}{9} \times 100 = \frac{100}{9} = 11.11\%$$

$$Ep = \frac{-13.04}{11.11} = -1.17$$

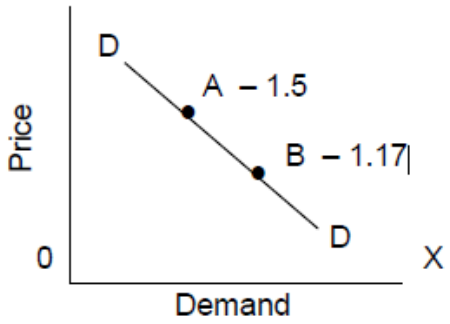

Fig. 7: Demand Curve

Figure 7 depicts the demand curve for the considered case. It is clear that on any straight-line demand curve, price elasticity will be different at different points since the demand curve represents the demand schedule and the demand schedule has different elasticity at various alternative prices.

Graphical representation: The simplest way of explaining the point method is to consider a linear or straight-line demand curve. Let the straight-line demand curve be extended to meet the two axis X and Y when a point is plotted on the demand curve, it divides the curve into two segments. The point elasticity is measured by the ratio of lower segment of the demand curve below the given point to the upper segment of the curve above the point. Hence,

$$\text{Price elasticity} = \frac{\text{Lower segment of the demand curve below the point}}{\text{Upper segment of the demand curve above the point}}$$

In short, e = L / U where 'e' stands for Point elasticity, 'L' for lower segment and 'U' for upper segment.

In the figure 8(a), AB is the straight-line demand curve and P is a given point. PB is the lower segment and PA is the upper segment.

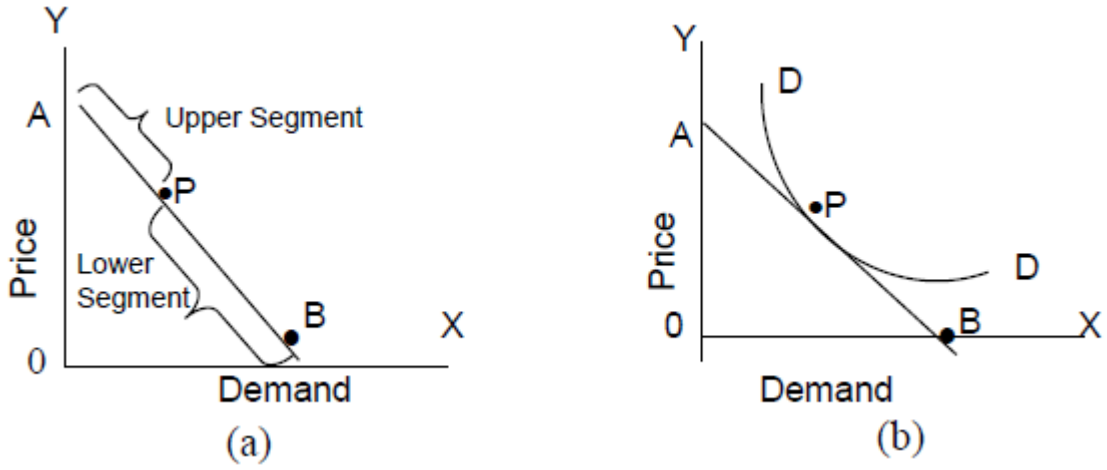

Fig. 8: Demand Curve

In the figure 8(b), AB is the straight-line demand curve and P is a given point. PB is the lower segment and PA is the upper segment.

E = L / U = PB / PA

If after the actual measurement of the two parts of the demand curve, we find that

PB = 3 cm and PA = 2 cm then elasticity at Point P is 3 / 2 = 1.5

If the demand curve is nonlinear then we have to draw a tangent at the given point extending it to intersect both axes. Point elasticity is measured by the ratio of the lower part of the tangent below that given point to the upper part of the tangent above the point. Then, elasticity at point P can be measured as PB / PA.

In the case of point method, the demand function is continuous and hence, only marginal changes can be measured. In short, Ep is measured only when changes in price and quantity demanded are small.

Arc method: This method is suggested to measure large changes in both price and demand. When elasticity is measured over an interval of a demand curve, the elasticity is called as an interval or arc elasticity. It is the average elasticity over a segment or range of the demand curve. Hence, it is also called average elasticity of demand.

The following formula is used to measure arc elasticity.

$$\text{Arc elasticity} = \frac{Q2-Q1}{Q2+Q1} \times \frac{P2+P1}{P2-P1}$$

Illustration

P1 = original price 10 – 00. Q1 = original quantity = 200 units
P2 = New price 05 – 00 Q2 = New quantity = 300units

By substituting the values in to the equation, we can find out Arc elasticity of demand.

$$\frac{300-200}{300+200}\times\frac{5+10}{5-10}=\frac{100}{500}\times\frac{15}{-5}=\frac{1}{5}\times\frac{3}{-1}=\frac{3}{-5}=-0.6$$

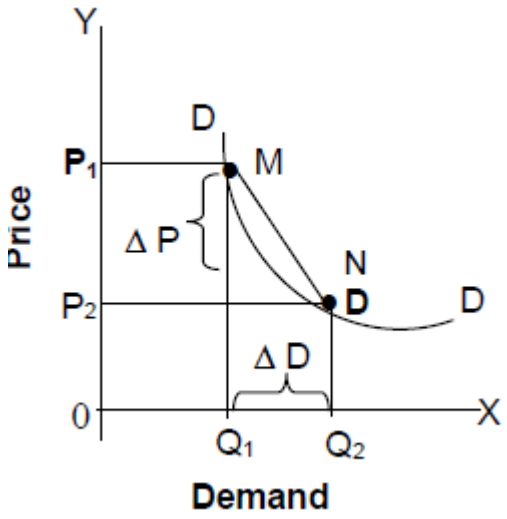

Fig.9: Demand Curve

Figure 9 depicts the demand curve for the arc method. In the diagram, to measure arc elasticity between two points M & N on the demand curve, we have to take the average of prices OP1 and OP2 and also the average quantities of Q1 & Q2.

Practical application of price elasticity of demand

Few examples on the practical application of price elasticity of demand are as follows:

1. ***Production planning –*** It helps a producer to decide about the volume of production. If the demand for his products is inelastic, specific quantities can be produced while he has to produce different quantities, if the demand is elastic.

2. Helps in fixing the prices of different goods – It helps a producer to fix the price of his product. If the demand for his product is inelastic, he can fix a higher price and if the demand is elastic, he has to charge a lower price. Thus, price-increase policy is to be followed if the demand is inelastic in the market and price-decrease policy is to be followed if the demand is elastic.

Similarly, it helps a monopolist to practise price discrimination based on elasticity of demand.

3. Helps in fixing the rewards for factor inputs – Factor rewards refer to the price paid for their services in the production process. It helps the producer to determine the rewards for factors of production. If the demand for any factor unit is inelastic, the producer has to pay higher reward for it and vice-versa.

4. Helps in determining the foreign exchange rates – Exchange rate refers to the rate at which currency of one country is converted in to the currency of another country. It helps in the determination of the rate of exchange between the currencies of two different nations. For E.g. if the demand for US dollar to an Indian rupee is inelastic, in that case, an Indian has to pay more Indian currency to get one unit of US dollar and vice-versa.

5. Helps in determining the terms of trade – t is the basis for deciding the 'terms of trade' between two nations. The terms of trade implies the rate at which the domestic goods are exchanged for foreign goods. For E.g. if the demand for Japan's products in India is inelastic, we have to pay more in terms of our commodities to get one unit of a commodity from Japan and vice-versa.

6. Helps in fixing the rate of taxes – Taxes refer to the compulsory payment made by a citizen to the government periodically without expecting any direct return benefit from it. It helps the Finance Minister to formulate sound taxation policy of the country. He can impose more taxes on those goods for which the demand is inelastic and lower taxes if the demand is elastic in the market.

7. Helps in declaration of public utilities – Public utilities are those institutions which provide certain essential goods to the general public at economical prices. The government may declare a particular industry as 'public utility' or nationalise it, if the demand for its products is inelastic.

Poverty in the midst of plenty – The concept explains the paradox of poverty in the midst of plenty. A bumper crop of rice or wheat, instead of bringing prosperity to farmers, may bring poverty to them because the demand for rice and wheat is inelastic.

Thus, the concept of price elasticity of demand has great practical application in economic theory.

Income elasticity of demand: Income elasticity of demand may be defined as the ratio or percentage change in the quantity demanded of a commodity to a given percentage change in

the income. In short, it indicates the extent to which demand changes with a variation in consumer's income. The following formula helps to measure Ey.

$$Ey = \frac{\text{Percentage change in demand}}{\text{Percentage change in income}}$$

$$\text{Symbolically} \quad Ey = \frac{\Delta D}{\Delta Y} \times \frac{Y}{D} \qquad \frac{300}{2000} \times \frac{4000}{400} = 1.5$$

Original demand = 400 units Original Income = 4000-00
New demand = 700 units New Income = 6000-00

Generally speaking, Ey is positive. This is because there is a direct relationship between income and demand, i.e. higher the income; higher would be the demand and vice-versa. Based on the numerical value of the co-efficient, Ey is classified as greater than one, less than one, equal to one, equal to zero, and negative. The concept of Ey helps us in classifying commodities into different categories. Based on value of Ey, the commodities can be classified as:

1. When Ey is positive, the commodity is normal [used in day-to-day life]
2. When Ey is negative, the commodity is inferior, e.g., Jowar, beedi, etc.
3. When Ey is positive and greater than one, the commodity is luxury.
4. When Ey is positive, but less than one, the commodity is essential.
5. When Ey is zero, the commodity is neutral, e.g. salt, match-box, etc.

Practical application of income elasticity of demand: Few examples on the practical application of income elasticity of demand are as follows:

*1.***Helps in determining the rate of growth of the firm –** If the growth rate of the economy and income growth of the people is reasonably forecasted, in that case, it is possible to predict expected increase in the sales of a firm and vice-versa.

2. **Helps in the demand forecasting of a firm –** It can be used in estimating future demand provided that the rate of increase in income and the Ey for the products are known. Thus, it helps in demand forecasting activities of a firm.

3. **Helps in production planning and marketing –** The knowledge of Ey is essential for production planning, formulating marketing strategy, deciding advertising expenditure and nature of distribution channel, etc. in the long run.

4. **Helps in ensuring stability in production –** Proper estimation of different degrees of income elasticity of demand for different types of products helps in avoiding over-production or under

production of a firm. One should also know whether rise or fall in income is permanent or temporary.

5. **Helps in estimating construction of houses –** The rate of growth in incomes of the people also helps in housing programmes in a country. Thus, it helps a lot in managerial decisions of a firm.

Cross elasticity of demand: Cross elasticity demand may be defined as the percentage change in the quantity demanded of a particular commodity in response to a change in the price of another related commodity. In the words of Prof. Watson cross elasticity of demand is the percentage change in quantity associated with a percentage change in the price of related goods. Generally speaking, it arises in case of substitutes and complements. The formula for calculating cross elasticity of demand is as follows:

$$Ec = \frac{\text{Percentage change in quantity demanded of commodity X}}{\text{Percentage change in the price of Y}}$$

$$\text{Symbolically, } Ec = \frac{\Delta Dx}{\Delta Py} \times \frac{Py}{Dx} \qquad \frac{40}{2} \times \frac{4}{50} = 1.6$$

Price of tea rises from Rs. 4-00 to 6-00 per cup

Demand for coffee rises from 50 cups to 90 cups.

Cross elasticity of coffee in this case is 1.6.

It should be noted that:

1. Cross elasticity of demand is positive in case of good substitutes, e.g. coffee and tea.

2. High cross elasticity of demand exists for those commodities which are close substitutes. In other words, if commodities are perfect substitutes, for e.g., Bata or Corona shoes, Close-up or Pepsodent tooth paste, beans and ladies finger, Pepsi and Coca-Cola, etc.

3. The cross elasticity is zero when commodities are independent of each other, for e.g., stainless steel, aluminium vessels, etc.

4. Cross elasticity between two goods is negative when they are complements. In these cases, rise in the price of one will lead to fall in the quantity demanded of another commodity for example, car and petrol, pen and ink, etc.

Practical application of cross elasticity of demand: Few examples on the practical application of cross elasticity of demand are as follows:

1. **Helps at the firm level** – Knowledge of cross elasticity of demand is essential to study the impact of change in the price of a commodity which possesses either substitutes or

complements. If accurate measures of cross elasticity are available, a firm can forecast the demand for its product and it can adopt necessary safeguards against fluctuating prices of substitutes and complements. The pricing and marketing strategy of a firm would depend on the extent of cross elasticity between different alternative goods.

2. **Helps at the industry level** – Knowledge of cross elasticity would help the industry to know whether an industry has any substitutes or complements in the market. This helps in formulating various alternative business strategies to promote different items in the market.

Advertising or promotional elasticity of demand

Most of the firms, in the present marketing conditions, spend considerable amounts of money on advertisement and other such sales promotional activities with the object of promoting its sales. Advertising elasticity refers to the responsiveness of demand or sales to change in advertising or other promotional expenses. The formula to calculate the advertising elasticity is as follows:

$$Ea = \frac{\text{Percentage change in demand or sales}}{\text{Percentage change in Advertisem ent exp enditure}}$$

Symbolically,

$$Ea = \frac{\Delta D \text{ or Sales}}{\Delta A} \times \frac{A}{\text{Demand or sales}} \quad \frac{40{,}000}{1200} \times \frac{800}{10{,}000} = 2.67$$

Original sales = 10,000 units Original advertisement expenditure = 800-00

New sales = 50,000 units New advertisement expenditure = 2000-00

In the above example, advertising elasticity of demand is 1.67. It implies that for everyone time increase in advertising expenditure, the sales would go up 1.67 times. Thus, Ea is more than one.

Practical application of advertising elasticity of demand: The study of advertising elasticity of demand is of paramount importance to a firm in recent years because of fierce competition. Few examples on the practical application of advertising elasticity of demand are as follows:

1. **Helps in determining the level of prices –** The level of prices fixed by one firm for its product would depend on the amount of advertisement expenditure incurred by it in the market.

2. **Helps in formulating appropriate sales promotional strategy –** The volume of advertisement expenditure also throw light on the sales promotional strategies adopted by a firm to increase its total sales in the market. Thus, it helps a firm to stimulate its total sales in the market.

3. **Helps in manipulating the sales –** It is useful in determining the optimum level of sales in the market. This is because the sales made by one firm would also depend on the total amount of money spent on sales promotion of other firms in the market.

Substitution elasticity of demand: Substitution elasticity demand measures the effects of the substitution of one commodity for another. It may be defined as the percentage change in the demand ratios of two substitute goods X and Y to the percentage change in the price ratio of two goods X and Y. The following formula is used to measure substitution elasticity of demand.

$$Es = \frac{\text{Percentage change in the ratio of 2 goods X and Y}}{\text{Percentage change in the price ratio of 2 goods X and Y}}$$

$$\text{Symbolically } Es = \frac{\Delta[Dx / Dy]}{[Dx / Dy]} \div \frac{\Delta[Px / Py]}{Px / Py}$$

Where, Dx / Dy is ratio of quantity demanded of two goods X & Y.

Delta DX / Dy is the change in the quantity ratio of two goods X & Y.

PX / Py is the price ratio of two goods X & Y.

Delta PX / PY is change in price ratio of two goods X & Y.

The coefficient of substitution elasticity is equal to one when the percentage change in demand ratios of two goods X and Y are exactly equal to the percentage change in price ratios of two goods X and Y. It is greater than one when the changes in the demand ratios of X and Y is more than proportionate to change in their price ratios.

Practical application of substitution elasticity of demand: The concept of substitution elasticity is of great importance to a firm in the context of availability of various kinds of substitutes for one factor inputs to another. For example, let us assume one computer can do the job of 10 labourers and if the cost of computer becomes cheaper than employing workers, in that case, a firm would certainly go for substituting workers for computers. An employer would always compare the cost of different alternative inputs and employ those inputs which are much cheaper than others to cut down his cost of operations. Thus, the concept of substitution elasticity of demand has great theoretical as well as practical application in economic theory.

Activity:

From a local grocery shop find out the price changes during the last two months on a set of ten products of common consumption and enquire about the changes in quantity demanded for the products. On this basis, find out the elasticity of demand.

Hint: Use the theoretical concept and apply the same in the given scenario

2. Summary

Here is a quick recap of what we have learnt so far:

- Elasticity of demand is generally defined as the responsiveness or sensitiveness of demand to a given change in the price or non-price determinant of a commodity.
- It refers to the capacity of demand either to stretch or shrink to a given change in price or non-price determinant. For e.g., demand for a good/service changes by some percentage due to change in consumer income by some percentage, Measurement of these changes can lead to calculation of elasticity of demand.
- Broadly speaking, there are five kinds of elasticity of demand. They are price elasticity, income elasticity, cross elasticity, promotional elasticity and substitution elasticity.

3. Glossary

Demand	It is the total or given quantity of a commodity or a service that is purchased by the consumer in the market at a particular price and at a particular time.
Demand curve	A locus of points showing various alternative price-quantity combinations.
Demand function	A comprehensive formulation which specifies the factors that influence the demand for a product.
Elasticity of demand	Responsiveness or sensitiveness of demand to a given change in the price or non-price determinant of a commodity.
Law of Demand	Keeping other factors that affect demand constant, a fall in price of a product leads to increase in quantity demanded and a rise in price leads to decrease in quantity demanded for the product.
Necessaries	Items which are purchased by consumers whatever may be the price.
Speculation	Purchase or sale of an asset with the hope that its price may rise or fall and make speculative profit.
Veblen's effect	Demand for status symbol goods would go up with a rise in price and vice-versa.