BUSINESS ECONOMICS

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BUSINESS ECONOMICS

C U R R I C U L U M

Introduction to Business Economics: Economics and Business Decision Making; Economics: Scope of economics; economics as a tool for decision making; Business Economics: Definition and scope; distinction between economics and Business Economics; Economic Indicators and Business Cycles

Demand and Supply Analysis: Demand, Generalized Demand Function, The law of demand, Shift and movement along demand curve, Elasticity of demand: Price, Income and Cross Price elasticity of demand, Demand Estimation: Basic concepts , Supply, Generalized supply function, Supply functions, Shifts and movement in the supply curve, Supply elasticity, Market equilibrium, Changes in the market equilibrium, Changes in demand (supply constant), Changes in supply (demand constant).

Cost & Production Analysis: Production in the short run, Total product, Average and marginal products, Law of diminishing marginal product, Production in the long run, Production isoquants, Characteristics of isoquants, Marginal rate of technical substitution, Isocost curves, Finding the optimal combination of inputs, Short run costs of production, Fixed and variable cost, Short run total costs, Average and marginal cost, Marginal cost curves, Long run costs, Derivation of cost schedule from a production function, Economies and diseconomies of scale, Economies of scope

Managerial Decisions in Competitive Markets: Features of perfect competition, Profit maximization in the short run, Profit maximization in the long run, Managerial decisions for firms with market power, Measurement of market power: The Lerner Index, Determinants of the market power: Economies of scale, Barriers created by government, Profit maximization under monopoly: output and pricing decisions, Monopolistic competition: short run and long run equilibrium, Pricing decision in an oligopoly: The Kinked Demand curve model

Market Failures and Price Regulations: Market failures and need for regulation, Regulations and market structure, Firm behavior, Price regulation

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CHAPTER

INTRODUCTION TO BUSINESS ECONOMICS

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RECOVERY OF INDIA'S ECONOMY

In 2013, India was facing an economic crisis due to slow economic growth and high levels of inflation. There was a current account deficit in the country as the rupee was at its all-time low. On August 28, 2013, the value of the Indian rupee against the US dollar was recorded ₹ 68.80, which was the lowest till date.

During the first quarter (April-June) of the fiscal year 2013-14, the economy of India experienced a slow growth rate of 4.4%, the lowest in the previous four years. The revised forecast of economic growth rate of India by the World Bank for the year 2014 was 4.7% against the earlier estimate of 6.1%. In the opinion of economic experts, Indian economy was going through the worst economic crisis since 1991.

India's financial condition was going down as a result of the crisis. On September 04, 2013, Raghuram Rajan was appointed as the 23rd governor of the RBI for a period of three years. His major challenge was to help the Indian economy rise above the economic crisis and bring it back on the path of growth.

After his appointment as the RBI governor, the value of rupee strengthened in the international market. Raghuram Rajan was appreciated by economists and analysts who continued to keep a strict watch on economic strategies adopted by Rajan.

NOTES

LEARNING OBJECTIVES

After completing this chapter, you will be able to:

- Define the meaning of economics
- Discuss the concept of business economics
- Identify the differences between economics and business economics
- Describe microeconomics and macroeconomics
- Explain the laws of economics
- Discuss economic static and dynamics
- Describe the role of economics in decision making
- Define the concept of social accounting
- Estimate GNP
- Describe business cycles
- Explain inflation

1.1 INTRODUCTION

In simple terms, economics can be defined as a discipline that studies the behaviour patterns of human beings. The main aim of economics is to analyse how individuals, households, organisations, and nations use their scarce resources to achieve maximum profit. Economics is broadly classified into two parts, namely microeconomics and macroeconomics. Microeconomics is a branch of economics that studies the behaviour of individual consumers and organisations in the market. It focuses on the demand and supply, pricing, and output of individual organisations. On the other hand, macroeconomics examines the economy as a whole and deals with issues related to national income, employment pattern, inflation, recession, and economic growth.

With the advent of globalisation and rise in competition, it is of paramount importance for managers to make rational decisions. For this, managers should have a clear understanding of different economic concepts, theories, and tools. **Business economics** or **managerial economics** is a specialised discipline of economics that undertakes a study of various economic theories, logics, and tools used in business decision making. It applies various economic concepts, such as demand and supply, competition, allocation of resources, and economic trade-offs, to help managers in making better decisions.

In this unit, you will study the concept of economics, its nature, and scope. After that, you will study the concept and importance of business economics in detail.

1.2 MEANING OF ECONOMICS

In simple terms, **economics** can be defined as the study of how individuals, households, organisations, and nations make optimum utilisation of scarce resources to satisfy their wants and needs. The word economics has originated from a Greek word *oikonomikos*, which can be divided into two parts: *oikos* means **home** and *nomos* means **management**. Thus, in earlier times, **economics** was referred to as home management where the head of a family managed the needs of family members from his limited income. However,over the years, the scope of economics has broadened to **society** (that is referred to as home) and how it satisfies the needs of people by using limited resources.

Defining economics has always been a controversial issue since time immemorial. Different economists have different viewpoints on economics. Some economists had a viewpoint that economics is a study of money, while others believed that economics deals with problems, such as inflation and unemployment. Therefore, to simplify the concept, economics is defined by taking four viewpoints, which are listed in Figure 1.1:

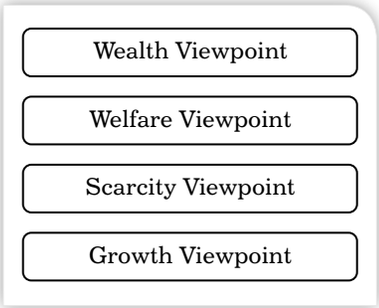

Figure 1.1: Different Viewpoints on Economics

Let us study these viewpoints in detail.

- **Wealth viewpoint:** This is a classical viewpoint on economics that was given by Adam Smith, who is also considered as the father of modern economics. According to him, Economics is *"the study of the nature and causes of nations' wealth or simply as the study of wealth."* He stated that the main purpose of all economic activities is to gain maximum wealth as possible. In Smith's view, the citizens of wealthy nations are happy; thus, economics shows nations to be wealthy.
- **Welfare viewpoint:** It is a neo-classical viewpoint on economics that was given by **Alfred Marshall**. According to Alfred Marshall, "*Economics is a study of man in the ordinary business of life. It enquires how he gets his income and how he uses it. Thus, it is on the one side, the study of wealth and on the other and more important side, a part of the study of man."* He associated economics with the welfare of men, who are responsible for generating wealth.

NOTES

- **Scarcity viewpoint:** It is a pre-Keynesian thought of economics that was given by **Lionel Robins** in his book 'Essays on the Nature and Significance of the Economic Science' (1932). According to Robins, "*Economics is a science which studies human behaviour as a relationship between ends and scarce means which have alternative uses*". The definition focused on human behaviour in the optimum utilisation of scarce resources. It provides three basic features of human existence, which are unlimited wants, limited resources, and alternative uses of limited resources
- **Growth viewpoint:** This is the modern perspective of economics mainly given by **Paul Samuelson**. He provided the growth-oriented definition of economics. According to him, "Economics is a study of how men and society choose with or without the use of money, to employ scarce productive uses resource which could have alternative uses, to produce various commodities over time and distribute them for consumption, now and in the future among the various people and groups of society." The definition outlines three main aspects, namely human behaviour, allocation of resources, and alternative uses of resources. Some other important growth-centred definitions are:

According to **J.M. Keynes**, Economics is defined as "*the study of the administration of scarce resources and of the determinants of income and employment.*"

In **Benham's** words, economics is "*a study of the factors affecting the size, distribution, and stability of a country's national income.*"

1.2.1 SCOPE OF ECONOMICS

Earlier, the scope of economics was limited to the utilisation of scarce resources to meet needs and wants of people and society. However, over the years, the scope of economics has been broadened to many areas, which are shown in Figure 1.2:

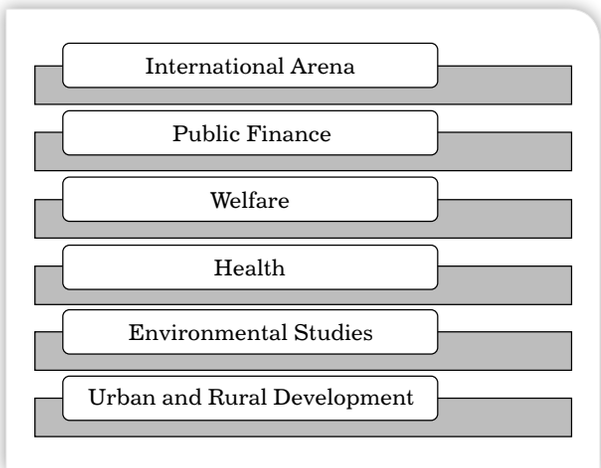

Figure 1.2: Scope of Economics

Let us study about the scope in detail.

- **International arena:** With the advent of globalisation and cross-border integration, economic concepts are applied in order to conduct successful business dealings between countries. Economic concepts can be used in areas, such as foreign trade (exports and imports), foreign exchange (trading currency), balance of payments, and balance of trade.
- **Public finance:** Economic concepts are also applied to assess the government's collection of taxes from the users of public goods as well as expenditure on production and distribution of these goods to the general public.
- **Welfare:** Economic theories and concepts are used to analyse the growth and development of low-income countries. This helps in improving the living standard of people in less developed and developing societies by understanding their needs for various facilities and utilities, such as health and education facilities and good working conditions.
- **Health:** Economic concepts are also applicable in assessing the problems faced in promoting health in different countries. These concepts help the government in making decisions for defining appropriate health packages and programs for the general public.
- **Environmental studies**: Economic concepts are used to analyse the utilisation and depletion of natural resources. Moreover, they are applied to study the impact of increasing ecological imbalance on society.
- **Urban and rural development:** In urban development, the scope of economics covers the analysis of different urban issues such as crime, education, public transit, housing, and local government finance. On the other hand, in rural development, economics can be used to analyse the shortage of natural resources, obtain the best price for production, study constraints of productivity, adapt to climate change, etc.

1.2.2 NATURE OF ECONOMICS

Similar to definitions of economics, there are a number of controversial issues related to its nature. Some economists believe economics as a science, while others have a notion that economics is a social science. Let us now understand the true nature of economics.

- **Economics as a science**: Science is a branch of knowledge that defines the relationship between cause and effect. As results observed in science are measurable and based on facts, economics also endeavours to find a relationship between cause and effect and provides measurable results. Similar to science, in economics, emphasis is laid on collecting relevant information, which is categorised and analysed to reach conclusions.

- **Economics as a social science:** Economics is also considered as social science as it deals with studying the behaviour of human beings and their relationships in a society. This is because the exchange of goods takes place within the society and among different societies to satisfy the needs and wants of people.
- **Economics is an art:** Art is a branch of study that deals with expressing or applying the creative skills and imagination of humans to perform a certain activity. Similarly, economics also requires human imagination for the practical application of scientific laws, principles, and theories to perform a particular activity.

1.2.3 ASSUMPTIONS IN ECONOMICS

In economics, there are certain assumptions about an economic situation to be happened in the future. Nations often make certain assumptions about how the economic environment would be at a certain time period.Economists use assumptions to break down complex economic processes and advocate different theories to understand economic variables. There are three important assumptions in economics, which are discussed as follows:

- **Consumers have rational preferences**: This assumption states that consumers act in a rational manner and focus on satisfying their needs. It is also assumed that the tastes of consumers remain constant for a long period. For instance, a consumer who is vegetarian may not change his/her preferences in the near future.
- **Existence of perfect competition**: According to this assumption, there is perfect competition in an economy, wherein there are numerous buyers and sellers. It is assumed that homogenous products exist in the market and both buyers and sellers cannot affect prices.
- **Existence of equilibrium:** As per this assumption, equilibrium exists wherein both consumers and entrepreneurs achieve maximum satisfaction. In a market, there can be two types of equilibrium: industry equilibrium and firm's equilibrium. An industry is at equilibrium if profits achieved are normal. On the other hand, a firm is at the state of equilibrium if its profits are maximum.

SELF ASSESSMENT QUESTIONS

1. Which one of the following does not fall under the scope of economics?

   a. Public Finance
   b. Welfare
   c. Health
   d. Poverty

2. Economics is considered as social science defines the relationship between cause and effect. (True/False)

ACTIVITY

Using the Internet, find the role of economics in the transportation sector.

1.3 DEFINING BUSINESS ECONOMICS

Organisations face many problems on a day to day basis. These problems require careful analysis and thoughtful consideration. For example, organisationsare always concerned with producing maximum output in the most economical way. To solve problems of such nature, managers are required to apply various economic concepts and theories. The application of economic concepts, theories, and tools in business decision making is called business economics or managerial economics.

Different philosophers have defined business economics or managerial economics differently. The following are some popular definitions of business economics:

According to Mansfield, "*Managerial economics is concerned with the application of economic concepts and economics to the problems of formulating rational decision making*"

In the words of **Spencer and Seigelman,** "*Managerial Economics is the integration of economic theory with business practice for the purpose of facilitating decision making and forward planning by management.*"

According to **Douglas**, "*Managerial economics is concerned with the application of economic principles and methodologies to the decision making process within the firm or organization. It seeks to establish rules and principles to facilitate the attainment of the desired economic goals of management*".

According to **Davis and Chang**, "*Managerial economics applies the principles and methods of economics to analyze problems faced by management of a business, or other types of organizations and to help find solutions that advance the best interests of such organization.*"

From the aforementioned definitions, it can be concluded that managerial economics is a link between two disciplines, which are management and economics. The management discipline focuses on a number of principles that aid the decision-making process of organisations. On the other hand, economics is related to an optimum allocation of limited resources for attaining the set objectives of organisations. Therefore, it can be said that managerial economics is a special discipline of economics that can be applied in business decision making of organisations.

N O T E S

1.3.1 SCOPE OF BUSINESS ECONOMICS

Business economics involves the application of various economic tools, theories, and methodologies for analysingand solving different business problems. These business problems can be related to demand and supply prospects of an organisation, level of production, pricing, market structure, and degree of competition. Figure 1.3 shows the scope of business economics:

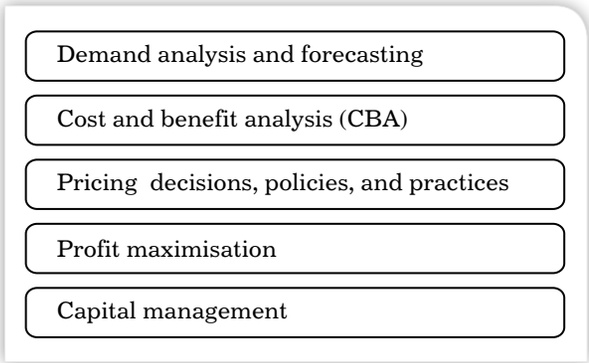

Figure 1.3: Scope of Business Economics

Let us discuss the scope of business economics in detail.

- **Demand analysis and forecasting**: Demand refers to the willingness or capability of individuals to buy a product at a specific price. Demand analysis is a process of identifying potential consumers, the amount of goods they want to purchase, and the price they are willing to pay for it. This process is important for an organisation to analyse the demand for its products and produce accordingly. In business economics, demand forecasting occupies an important place by helping organisations in business planning and deciding on strategic issues.
- **Cost and benefit analysis (CBA):** By analysing costs, management can estimate costs required for running the organisation successfully. Cost analysis helps firms in determining hidden and uncontrollable costs and taking measures for effective cost control. It further enables the organisation to determine the return on investment (ROI). In a nutshell, CBA is a process of comparing the costs and benefits of a particular project or activity. Business economics involves various aspects of cost and benefit analysis, such as cost-output relationships and cost control.
- **Pricing decisions, policies, and practices**: Pricing is one of the key areas of business economics. It is a process of finding the value of a product or service that an organisation receives in exchange for its product/service. The profit of an organisation depends a great deal on its pricing strategies and policies. Business economics includes various pricing-related concepts, such as pricing methods, product-line pricing, and price forecasting.

- **Profit maximisation:** Profit generation and maximisation is the main aim of every organisation (except for non-profit organisations). In order to maximise profit, organisations need to have complete knowledge about various economic concepts, such as profit policies and techniques, and break-even analysis.
- **Capital management**: Organisations often find it difficult to make decisions related to capital investment. These decisions require sound knowledge and expertise on various economic aspects. To make sound capital investment decisions, an organisation needs to determine various aspects, such as cost of capital and rate of return.

1.3.2 SIGNIFICANCE OF BUSINESS ECONOMICS

As discussed earlier, business economics plays an important role in decision making in an organisation. Decision making is a process of selecting the best course of action from the available alternatives. In order to make sound decisions; managers must have in-depth knowledge of economic concepts, theories, and tools. The following points explain the importance of business economics:

- Business economics covers various important concepts, such as demand and supply analysis; short and long-run costs; and marginal utility. These concepts support managers in identifying and analysing problems and finding solutions.
- It helps managers to identify and analyse various internal and external business factors and their impact on the functioning of the organisation.
- Business economics helps managers in framing various policies, such as pricing policies and cost policies, on the basis of economic study and findings.
- By studying various economic variables, such as cost production and business capital, organisations can predict the future.
- Business economics helps in establishing relationships between different economic factors, such as income, profits, losses, and market structure. This helps in guiding managers in effective decision making and running the organisation.

SELF ASSESSMENT QUESTIONS

3. _____ is a process of identifying potential consumers, the amount of goods they want to purchase, and the price they are willing to pay for it
4. By studying various economic variables, such as cost production and business capital, organisations can predict the future. (True/False)

ACTIVITY

Using the Internet, prepare a report on the cost and benefit analysis (CBA) performed by Tata Motors for its product Tata Nano.

1.4 DISTINCTION BETWEEN ECONOMICS AND BUSINESS ECONOMICS

Economics and business economics are different from each other in various aspects. As discussed earlier, economics is a study of human behaviour in making decisions related to the allocation of resources. Business economics, on the other hand, deals with managerial decision making in organisations. The following points distinguish between economics and business economics:

- Economics is a traditional subject that has prevailed from a long time, while business economics is a modern concept and is still developing.
- Economics mainly covers theoretical aspects, whereas business economics covers practical aspects.
- In economics, the problems of individuals and societies are studied. On the other hand, in business economics, the main area of study is the problems of organisations.
- In economics, only economic factors are considered, whereas both economic and no-economic factors are considered in business economics.
- Both microeconomics and macroeconomics fall under the scope of economics. On the other hand, only microeconomics falls under the scope of business economics.
- Economics has a wider scope and covers the economic issues of nations, whereas business economics is a part of economics and is limited to the economic problems of organisations.

Thus, it can be stated that economics is a wide concept that can be applied to various fields, whereas business economics is a narrow approach that can be applied in selected areas.

SELF ASSESSMENT QUESTIONS

5. Both microeconomics and macroeconomics fall under the scope of economics. (True/False)

ACTIVITY

Considering the differences between economics and business economics mentioned above, distinguish between economists and managers.

1.5 MICROECONOMICS AND MACROECONOMICS

As mentioned earlier, economics has a wide scope and involves several concepts, which cannot be studied under a single discipline. Therefore, it is classified into two branches, namely, microeconomics and macroeconomics. Microeconomics deals with the economic problems of a single industry or organisation, while macroeconomics deals with the problems of an economy as a whole. Both of these branches contribute a major part in business analysis and decision-making directly or indirectly. Let us discuss two branches of economics in detail as follows:

- **Microeconomics:** It is a branch of economics that deals with the study of economic behaviour of individual organisations or consumers in an economy. Moreover, microeconomics focuses on the supply and demand patterns and price and output determination of individual markets.

  Microeconomics lays emphasis on decisions related to the selection of resources, the amount of output to be produced, and the price of products of an organisation. Thus, it can be said that the focus of microeconomics is always at individual level. The importance of studying microeconomics is explained as follows:

  - Microeconomics helps in understanding the mechanism of individual markets.
  - It suggests ways for making full utilisation of resources.
  - It facilitates the formation of economic models that can be further be used to understand the real economic phenomenon.

- **Macroeconomics:** It is a branch of economics that mainly deals with the economic behaviour of various units combined together. Macroeconomics focuses on the growth of an economy as a whole by undertaking the study of various economic aggregates, such as aggregate supply and demand, changes in employment, gross domestic product (GDP), overall price levels, and inflation. The following points explain the importance of macroeconomics:

  - Macroeconomics helps in understanding the functioning of an economic system and provides a better view of world's economy.
  - It enables nations to formulate various economic policies.
  - It helps economists in finding solutions to economic problems by providing various economic theories.
  - It helps in bringing stability in prices by supporting detailed analysis of fluctuations in business activities.
  - It helps in identifying the causes of the shortage in the balance of payment and determining remedial measures.

SELF ASSESSMENT QUESTIONS

6. Which one of the following shows the importance of microeconomics?

   a. It enables nations to formulate various economic policies.

   b. It helps in understanding the mechanism of individual markets.

   c. It helps economists in finding solutions to economic problems by providing various economic theories.

   d. It helps in bringing stability in prices by supporting detailed analysis of fluctuations in business activities.

ACTIVITY

Using the Internet, books, or magazines, find out the relationship between microeconomics and macroeconomics.

1.6 LAWS OF ECONOMICS

In the words of **Marshall**, "Economic laws or statements of economic tendencies, are those social laws, which relate to branches of conduct in which the strength of the motives chiefly concerned can be measured by money price."Laws of economics are based on a set of generalisations assumed to govern an economic activity. In economics, there are two basic laws, which are shown in Figure 1.4:

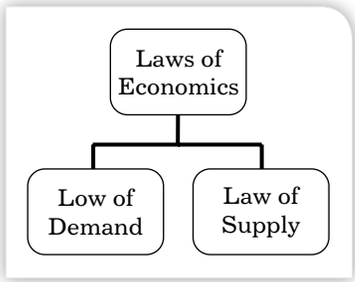

Figure 1.4: Laws of Economics

Let us discuss these two laws in detail.

- **Law of demand**: This is one of the basic economic laws according to which demand rises in response to a fall in prices while other factors remain constant, such as consumer preferences and level of income of consumers. In other words, customers buy a high quantity of products at lower prices and vice versa.
- **Law of supply**: This law states that supply diminishes when there is fall in prices and increases with the rise in prices while other

factors are unchanged. This means that if the price of a product X rises, there will be more products to offer to customers by sellers and vice versa.

1.6.1 NATURE OF ECONOMIC LAWS

In order to understand the significance of economic laws and their utility in daily business practices, it is required to comprehend the nature of these laws. While studying economic laws, it is important to note that all economic laws are based on certain assumptions. The following points describe the nature of economic laws:

- **Lack of exactness**: In comparison to the laws of natural sciences, economic laws are not exact. An economist can only state the events that are likely to happen in the future but cannot be assured of their occurrence. There are three reasons for the lack of exactness in economic laws. **Firstly**, these laws are concerned with human behaviour which is dynamic. The uncertainty of human behaviour makes it difficult to predict the actual course of action for the future. **Secondly**, due to changes in human attitudes, perceptions, and preferences, factual data is difficult to be collected, which is the base of economic laws. **Thirdly**, the business environment is so dynamic that any change in it will simply falsify the economic prediction.
- **Hypothetical:** Economic laws are always based on the fulfilment of specific conditions, which means these laws are subject to hypothesis. For example, the rise in demand for a product is subject to a condition, i.e. reduction in price and other factors are constant. Moreover, the supply must not reduce during that period. However, in reality, it may not be the case as market conditions keep changing with changes in different factors.
- **Statement of propensity:** As discussed, economic laws require certain conditions to be fulfilled to be true. However, these conditions cannot be exactly predicted. For example, an increase in demand for a product tends to increase in its rice. However, the price may not rise as it is dependent on supply too.

1.6.2 APPLICATION OF ECONOMIC LAWS

As mentioned earlier, economic concepts have scope in various sectors. Let us now study the application of economic laws:

- **Formulation of economic policies of countries**: The economic climate changes from one country to the other depending on various factors, such as standard of living of people, level of national income, and composition of population. Every country requires certain policies to run its economy successfully. Economic laws provide a strong base for the formation of economic policies of different countries.

- **Formulation of economic policies of organisations**: In micro environment, organisations differ from each other. To run successfully, organizations apply economic laws to form their policies. Economic laws help organisations to plan their business strategies related to production, costs, and pricing.

SELF ASSESSMENT QUESTIONS

7. Name the law that states supply diminishes when there is fall in prices and increases with the rise in prices while other factors are unchanged.

ACTIVITY

Find out some other applications of economic laws apart from the mentioned above.

1.7 ECONOMIC STATICS AND DYNAMICS

The laws and phenomena of economics are studied under two conditions, which are static and dynamic. Let us study about these two economic conditions in detail as follows:

- **Economic statics:** According to **Prof. Kuznets**, "*Static economics deals with relations and processes on the assumption of uniformity and persistence of either the absolute or relative economic quantities involved.*" Thus, static economics is a study of factors that are not subject to change. Thus, it can be said that there is a state of equilibrium in static economics. According to Clark, the following are static factors:
  - Population size and its composition
  - Quantity of capital remains constant
  - Production techniques
  - Working of business firms
  - Habits, tastes and fashions of people
- Static economics is characterised by the absence of uncertainty. According to Prof. **Samuelson**, "*Economic static concerns itself with the simultaneous and instantaneous or timeless determination of economic variables by mutually interdependent relations.*" Economic statics are based on assumptions, such as existence of perfect competition, perfect knowledge, and perfect mobility of resources. The following points explain the importance of static economics:
  - **Helps in understanding various economic conditions**: Static economics is easy to understand as it is based on variables that do not change in the short run. This means that static econom-

ics assumes a state of equilibrium, which helps in understanding different economic conditions, such as the pricing mechanism in an economy.

- **Formation of economic theories and principles:** Most economic theories and principles are formed on the basis of static economics. For example, doctrine of international trade, Joan Robinson's economics of imperfect competition, Chamberlin's monopolistic competition etc. are all based on statistical analysis in static economics.

- **Economic dynamics:** In the words of **Prof. Harrods**, "*Economic dynamic is the study of an economy in which rates of output are changing.*" Economic dynamics is a study of changes in the economic system. The features of dynamic economy as provided by Prof. Clark are described as follows:
  - There is growth in the population size
  - There is growth in the capital quantity
  - There is improvement in modes of production
  - Many changes occur in organisations. Efficient organisations take over inefficient ones.
  - Wants of people increase leading to changes in the habits of people, fashion trends, and customs.

In economic dynamics, an economic system adjusts itself to the various changes over a period of time. The following points discuss the importance of dynamic economics:

As dynamic economics is based on the study of changes in variables, therefore, it provides a better understanding of the actual functioning of an economy.

Problems of economic growth that deals with time lag, rate of growth, etc. require dynamic analysis, which help in understanding the economic development process.

The study of economic dynamics helpsin developing new techniques of economic analysis. For example, the technique of macro dynamics developed to study the rate of change in aggregate variables is based on dynamic economics.

SELF ASSESSMENT QUESTIONS

8. According to Clark, which one of the following is a dynamic factor?
   a. Production techniques
   b. Population size and its composition
   c. Working of business firms
   d. Growth in the capital quantity

ACTIVITY

Pricing falls under economic dynamics. Comment.

1.8 ECONOMICS AND BUSINESS DECISION MAKING

In organisations, managers deal with various situations that require quick decision making. Decisions taken by managers are subject to various risks and uncertainties due to changes in market forces, business environment, business policies, level of competition, etc. All these factors are dynamic in nature. If these factors are not properly understood by managers before taking decisions, the business of an organisation may lead to failure. Therefore, managers make use of various economic models, tools, and techniques to analyse the complexities of various factors before taking any decisions. These economic models provide a base for effective business decision making to managers. The following points explain the importance of economics in business decision making:

- In economics, there are various analytical models that can help managers in identifying and understanding various organisational problems and solving them. In addition, these models help in identifying and eliminating hindrance in effective decision making.
- Economic theories and concepts used by managers not only help them in solving organisational problems but also enhance the analytical capabilities of managers.
- By studying economic theories, managers can take internal organisational decisions in tandem with the external economic environment of the country.

SELF ASSESSMENT QUESTIONS

9. In economics, _____ helps in these models help managers in identifying and eliminating hindrance in effective decision making.

ACTIVITY

What economic concepts managers may use for business decision making?

1.9 SOCIAL ACCOUNTING

Social accounting can be defined as process of identifying how successfully an organisation is performing with respect to social, econom-

ic and environmental objectives. It measures the impact of business activities of an organisation on community or its stakeholders. It also helps organisations in identifying the areas of improvements and rectifying those areas. Social accounting is also known as social auditing and social responsibility accounting.

In modern times, the concept of social accounting is widely used by organisations in attracting investors. This is because investors always like to invest in organisations that are socially responsible. Some of the important benefits of social accounting are as follows:

- It provides a complete record of an organisation's initiatives towards the well-being of community.
- It spots the areas of success and improvements of the organisation.
- The information of social accounting is used by the organisation to promote its business activities.

SELF ASSESSMENT QUESTIONS

10. _____ is the process of identifying how successfully an organisation is performing with respect to social, economic and environmental objectives

ACTIVITY

Using the Internet, find out the social accounting report of an organisation of your choice. Determine the strengths and weaknesses of the social initiatives taken by the organisation.

1.10 GROSS NATIONAL PRODUCT-CONCEPT AND COMPONENTS

The growth of an economy is characterised by its national income. Alfred Marshall in his book 'Principle of Economics' (1949) defines national income as"The labour and capital of a country, acting on its natural resources, produce annually a certain net aggregate of commodities, material and immaterial, including services of all kindsand net income due on account of foreign investments must be added in. This is the true net National income or Revenue of the country or the national dividend."In other words, national income can be defined as combined factor income arising from the current production of goods and services in a country.It reflects the overall performance of an economy; represents the standard of living of people in the economy; helps in determining the contribution of different sectors in the economy; and so on.

NOTES

There are a number of measures used for the estimation of national income of an economy. However, the most important measure of national income is Gross National Product (GNP). Let us understand the concept of GNP in detail.

GNPcan be defined as the market value of all products and services that are produced in a particular year by a country. In other words, it is a measure of a country's economic performance. It estimates the output generated by a country's organisations located domestically or abroad. Therefore, it can be said that national income is the measure of the current output of economic activity of the country. In GNP, the word gross indicates total national product including depreciation. Depreciation indicates a decrease in the value of an asset with time. It is also called consumption of fixed capital.

GNP is calculated as:

GDP + Net factor from abroad = GNP,

Where, GDP is Gross Domestic Product.

In the calculation of GNP, the following aspects are included:

- Consumer goods and services
- Gross private domestic income
- Goods and services produced by the government
- Net income from abroad

To calculate GNP accurately, complete knowledge of its components is required. Figure 1.5 shows the components of GNP:

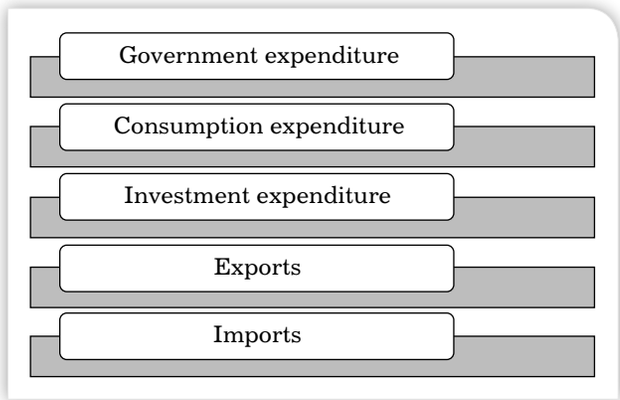

Figure 1.5: Components of GNP

Let us discuss these components in detail.

- **Government expenditure:** It can be defined as the amount spent by a government. Here, expenditure incurred at levels, (from local levels to federal levels) is taken into consideration. Government in-

dulge in various types of expenditures, such as purchase of goods and services, money transfers, and investments.

- **Consumption expenditure**: It can be defined as the amount spent by households for consuming goods and services. Consumption expenditure is incurred to satisfy needs and wants.
- **Investment expenditure**: It can be defined as the amount spent by the business sector on final goods and services. Investment expenditure mainly includes purchase of productive capital goods.
- **Exports:** These can be defined as the amount produced by a country for other nations. Exports include goods and services
- **Imports:** These are opposite of exports. Imports can be referred to the amount of goods and services received from other nations.

SELF ASSESSMENT QUESTIONS

11. GDP + Net factor from abroad = _____

ACTIVITY

Prepare a report on the estimation of GNP in India using the Internet.

1.11 BUSINESS CYCLES

No era can stay forever. Economy too, does not enjoy same periods all the time. Due to its dynamic nature, it moves through various phases. The change in business activities due to fluctuations in economic activities over a period of time is known as a business cycle. The economic activities of a country include total output, income level, prices of products and services, employment, and rate of consumption. All these activities are interrelated; if one activity changes, rest of them also change. Business cycles are also called trade cycles or economic cycles. According to **Arthur F. Burns and Wesley C. Mitchel**, "*Business cycles are a type of fluctuation found in the aggregate economic activity of nations that organize their work mainly in business enterprises: a cycle consists of expansions occurring at about the same time in many economic activities, followed by similarly general recessions, contractions, and revivals which merge into the expansion phase of the next cycle; in duration, business cycles vary from more than one year to ten or twelve years; they are not divisible into shorter cycles of similar characteristics with amplitudes approximating their own.*"

NOTES

A business cycle comprises four phases, which are shown in Figure 1.6:

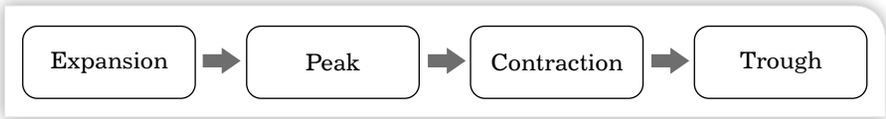

Figure 1.6: Phases of Business Cycles

Let us discuss these phases in detail.

1. **Expansion:** This is the first phase of a business cycle. It is often referred to as the growth phase. In the expansion phase, there is an increase in various economic factors, such as production, employment, output, wages, profits, demand and supply of products, and sales. During this phase, the focus of organisations remains on increasing the demand for their products/services in the market. The expansion phase is characterised by:

   - Increase in demand
   - Growth in income
   - Rise in competition
   - Rise in advertising
   - Creation of new policies
   - Development of brand loyalty

   In this phase, debtors are generally in a good financial condition to repay their debts; therefore, creditors lend money at higher interest rates. This leads to an increase in the flow of money. In the expansion phase, due to increase in investment opportunities, idle funds of organisations or individuals are utilised for various investment purposes. The expansion phase continues till economic conditions are favourable.

2. **Peak:** This is the next phase after expansion. In this phase, a business reaches at the highest level and the profits are stable. Moreover, organisations make plans for further expansion. This phase is marked by the following features:

   - High demand and supply
   - High revenue and market share
   - Reduced advertising
   - Strong brand image

   In peak phase, the economic factors, such as production, profit, sales, and employment, are higher, but do not increase further.

3. **Contraction:** An organisation after being at the peak for a period of time begins to decline and enters the phase of contraction. This phase is also known as recession. An organisation can be in

this phase due to various reasons, such as change in government policies, rise in the level of competition, unfavourable economic conditions, and labour problems. Due to these problems, the organisation begins to experience loss of market share. The important features of this phase are:

- Reduced demand
- Loss in sales and revenue
- Reduced market share
- Increased competition

4. **Trough:** In this phase, an organisation suffers heavy losses and falls at the lowest point. At this stage, both profits and demand reduce. The organisation also loses its competitive position. The main features of this phase are:
   - Lowest income
   - Loss of customers
   - Adoption of measures for cost cutting and reduction
   - Heavy fall in market share

In this phase, the growth rate of an economy becomes negative. In addition, in trough phase, there is a rapid decline in national income and expenditure.

1.11.1 NATURE OF BUSINESS CYCLES

After studying the business cycle, it is important to study its nature. The nature of business cycle helps the organisation to be prepared for facing uncertainties of the business environment. Figure 1.7depicts the nature of a business cycle:

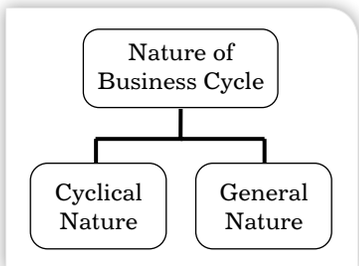

Figure 1.7: Nature of Business Cycle

Let us discuss the nature of a business cycle in detail.

- **Cyclical nature:** This is the periodic nature a business cycle. Periodicity signifies the occurrence of business cycles at regular intervals of time. However, periods of intervals are different for different business cycles. There is a general consensus that a normal business cycle can take 7 to 10 years to complete.

- **General nature:** The general nature of a business cycle states that any change in an organisation affects all other organisations too in the industry. Thus, the general nature regards the business world as a single economic unit. For example, depression moves from one organisation to the other and spread throughout the industry. The general nature is also known as **synchronism**.

SELF ASSESSMENT QUESTIONS

12. Arrange the phases of business cycles.
    1. Peak
    2. Trough
    3. Expansion
    4. Contraction
    a. 1, 2, 3, 4
    b. 4, 3, 2, 1
    c. 3, 1, 4, 2
    d. 2, 3, 1, 4
13. Which nature of business cycle states that any change in an organisation affects all other organisations too in the industry?

ACTIVITY

Find out information on different business cycles that have taken place in the Indian economy in the past few years.

1.12 DEFINITION OF INFLATION

Inflation can be defined as the persistent increase in the price level of goods and services in an economy over a period of time. Some of the important definitions of inflation are:

In the words of **Samuleson-Nordhaus**, "I*nflation is a rise in the general level of prices.*"

According to **Coulborn**, inflation can be defined as, "*too much money chasing too few goods.*"

According to **Parkin and Bade**, "*Inflation is an upward movement in the average level of prices. Its opposite is deflation, a downward movement in the average level of prices. The boundary between inflation and deflation is price stability.*"

In the words of **Peterson**, "The word inflation in the broadest possible sense refers to any increase in the general price-level which is sustained and non-seasonal in character."

According to **Johnson**, "Inflation is an increase in the quantity of money faster than real national output is expanding."

By studying the above definitions, it is clearly understood that if the rise in prices exceeds the rise in output, the situation is called inflationary situation. Inflation can take place due to varoious reasons. One of the major reason is a rapid increase in money supply which leads to a decrease in interest rate. A detailed explanation on how money supply and interest rate leads to inflation is given in the subsequent sections. Apart from this, the following are some other causes of inflation:

- Increase in demand because of rise in individual and aggregate disposable income on consumption and investment goods, rise in exports, and rise in population.
- No rise in output in response to increase in demand due to lack of capital equipment, factors of production, decrease in imports due to restrictive policies, and emergence of drought , famine or any other natural calamity.

1.12.1 CHARACTERISTICS AND TYPES OF INFLATION

Inflation is desirable in a country at moderate levels. However, there is no universally acceptable limit of inflation. Depending on the contribution, a country decides the acceptable limit of inflation. The concept of inflation can be understood by studying its characteristics, which are given as follows:

- Inflation is followed by price rise.
- The cause behind inflation is increase in money supply. Thus, it is a monetary phenomenon.
- Due to interaction among various economic forces, inflation is also an economic phenomenon.
- Inflation occurs in a dynamic environment over a period of time.
- Inflation is always scarcity oriented and occurs in disequilibrium state of economy.
- The rise in prices in inflation cannot be reversed.
- Inflation is persistent in nature.

Generally, inflation is categorised on the basis of its rate. Figure 1.8 shows three types of inflation:

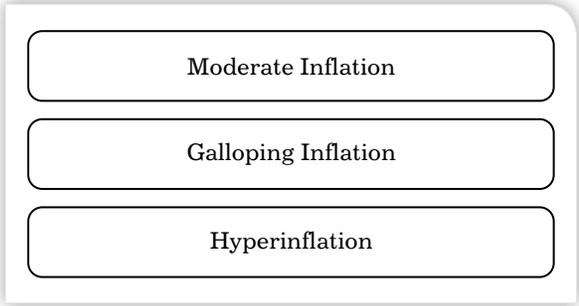

Figure 1.8: Types of Inflation

Let us discuss these three types of inflation in detail.

- **Moderate inflation:** This type of inflation takes place when there is a rise in the prices of goods and services at a single rate annually. Moderate inflation is also known as creeping inflation. At the time of moderate inflation in an economy, the prices of goods and services increase only at a moderate rate. However, the rate of increase in prices differs in different countries. It is easy to anticipate moderate inflation; therefore, individuals hold money as a store of value.
- **Galloping inflation:** This type of inflation takes place at the time of the rise in the prices of goods and services at two-digit or three-digit rate per annum. Another name for galloping inflation is as jumping inflation. In the words of **Baumol and Blinder**, "Galloping inflation refers to an inflation that proceeds at an exceptionally high." The worst sufferers of galloping information are middle and lower class individuals. Due to this, people are unable to save money for the future. This kind of situation requires strict measures to control inflation.
- **Hyperinflation:** This type of inflation takes place when the rate of increase in prices is extremely high or out of control. In other words, hyperinflation occurs when the increase in prices is more than three-digit rate annually. The cause behind hyperinflation is the unrestricted increase in the supply of money in the market. This results in a situation of imbalance in the supply and demand for money. Consequently, money loses its real worth at a rapid speed.

1.12.2 CONCEPT OF MONEY SUPPLY

Money supply is referred to as a stock of money in the market at a specific period of time. In other words, it is an accumulated amount of money in an economy. There have been various views held for defining the term money supply. The term generally defined based on two parameters, namely currency in circulation (In India, it is rupee) and demand deposits (these are the accounts held by individuals in different banks and financial institutions from where the individuals

can withdraw money anytime based on their demand; for example, savings account is a demand deposit). The money supply is classified into four categories, namely M_1, M_2, M_3, and M_4.

- M_1 is the money stock that is inclusive of coins, currency notes, and demand deposits.
- M_2 is the money stock that includes coins, currency notes, demand deposits, and time deposits.
- M_3 is the money stock that includes coins, currency notes, demand deposits, time deposits, and post office deposits.
- M_4 is the money stock that includes coins, currency notes, demand deposits, time deposits, post office deposits, savings bank, and term deposits. The credit control policies imposed by the banking system of a country help in determining the total supply.

The following points explain the link between money supply and inflation:

- Under normal economic conditions, if the money supply rises faster as compared to the real output, it will lead to inflation. However, this relation does not stand true in case of depressed economy because of a fall in circulation of currency.
- When an economy recovers and circulation of currency increases, money supply also rises which leads to inflation.

1.12.3 INTEREST RATE

In the words of Samuelson, "The market rate of interest is that percentage return per year which has to be paid on any safe loan of money, which has to be yielded by any safe bond or other type of security, and which has to be earned on the value of any capital asset (such as a machine, a hotel building, a patent right) in any competitive market where there are no risks or where all risk factors have already been taken care of by special premium payments to protect against risk."

Thus, by studying the above definition, an **interest rate** can be defined as the proportion of a loan that is paid by the borrower as interest for the use of money borrowed from a lender. In simple words, interest rate can be referred to as price of money. For example, a small manufacturing firm borrows capital from a bank to purchase new machines for its plant, and agrees to pay an interest at a predetermined interest rate.

The interest rate is generally determined through negotiation between the borrower and the lender (banks, financial institutions, etc.). However, while deciding the interest rate, various factors are considered, such as size of borrower, credit standing value, access to alternative credit sources , size of loan, maturity period for loan, and relationship with the bank or financial institution. On the lender's side too, some of

the factors that are considered for determining the interest rate are size of the bank or lending financial institution and location of the bank.

Whenever money supply increases in the market, banks and financial institutions willingly offer loans to customers with an aim to earn revenues. For this, banks provide easy loans to customers at minimum interest rates as an abundant amount of money is available in the reserves of banks.

SELF ASSESSMENT QUESTIONS

14. If the rise in prices exceeds the rise in output, the situation is called _____.

ACTIVITY

What type of inflation is currently going on in the Indian economy?

1.13 SUMMARY

- Economics can be defined as the study of optimum utilisation of scarce resources by individuals, households, organisations, and nations to satisfy their wants and needs. Economics is defined by taking four viewpoints, namely wealth viewpoint, scarcity viewpoint, welfare viewpoint, and growth viewpoint.
- The scope of economics includes various fields, such as public finance, health, welfare, environmental studies, and international area.
- The nature of economics cannot be defined in a single term. It can be considered as science, social science and art.
- Business economics can be defined as an application of economic concepts, theories, and tools for effective decision making in organisations.
- The scope of business economics covers various areas, such as demand analysis and forecasting, cost and benefit analysis, pricing decisions, and profit maximisation.
- Both economics and business economics are different from each other. In economics the focus is on the optimum utilisation of scarce resources, whereas business economics emphasises on the managerial decision making in organisations.
- Micro economics is a branch of economics wherein economic behaviour of individual organisations or consumers in an economy is studied.
- The branch of economics that deals with economic behaviour of various units combined together for the growth of an economy. (Message not clear)?

- In economics, there are two basic laws, namely law of demand and law of supply.
- Economic laws are used for formulating economic policies in countries as well as organisations
- In economics, the various laws and phenomena are studied under two conditions, namely static and dynamic. In economic static, the factors which are not subject to change are studied, whereas in economic dynamics changes are studied.
- In economics, numerous concepts, theories and tools are used by managers for solving organisational problems and effective decision making.
- Social accounting helps I measuring the impact of business activities of an organisation on community or its stakeholders. It is also known as social auditing and social responsibility accounting.
- GNP can be defined a measure of country's income which includes market value of all products and services that are produced in a particular year by a country.
- Business cycles can be described as change in business activities due to fluctuations in economic activities over a period of time. It consists of four phases, namely expansion, peak, contraction, and trough.
- Inflation can be defined as the continuous increase in the price level of goods and services in an economy over a period of time.

KEY WORDS

- **Unemployment:** It is an economic condition where individuals constantly seek jobs and do not get full time jobs. It also indicates the health of an economy.
- **Foreign exchange:** It is an international trading system, wherein local currencies are exchanged with foreign currencies.
- **Return on Investment (ROI):** It is a performance measure that helps in evaluating and comparing the efficiency of an investment with other investments.
- **Rate of consumption:** It is the quantity of goods and services that are used by consumers over a period of time and measurable.
- **Disequilibrium state of economy:** It is the state of economy wherein market forces of supply and demand do not reach a balance and there exist a strong possibility of change.

N O T E S

1.14 DESCRIPTIVE QUESTIONS

1. Describe the nature of economics?
2. Discuss the significance of business economics.
3. What is the difference between microeconomics and macroeconomics? Explain.
4. Explain the nature of economic laws.
5. Write a short note on economic dynamics.
6. Discuss the phases of business cycles?
7. Discuss the types of inflation.

1.15 ANSWERS AND HINTS

ANSWERS FOR SELF ASSESSMENT QUESTIONS

Topic	Q. No.	Answers
Meaning of Economics	1.	d. Poverty
	2.	False
Defining Business Economics	3.	Demand Analysis
	4.	True
Distinction between Economics and Business Economics	5.	True
Microeconomics and Macroeconomics	6.	b. It helps in understanding the mechanism of individual markets.
Laws of Economics	7.	Law of Supply
Economic Statics and Dynamics	8.	d. Growth in the capital quantity
Economics and Business Decision Making	9.	Analytical models
Social Accounting	10.	Social Accounting
Gross National Product-Concept and components	11.	GNP
Business Cycles	12.	c. 3, 1, 4, 2
	13.	General nature
Definition of Inflation	14.	Inflationary situation

HINTS FOR DESCRIPTIVE QUESTIONS

1. Economics can be termed as a science as it defines the relationship between cause and effect. Economics can also be considered as a social science as well as an art. Refer to section **1.2 Meaning of Economics**.
2. Business economics helps in making effective decisions in organisations by helping the managers in identifying and analysing the problems and finding solutions. Refer to section **1.3 Defining Business Economics**.
3. Micro economics deals with the study of economic behaviour of individual organisations or consumers in an economy, whereas macroeconomics deals with the economic behaviour of various units combined together. Refer to section **1.5 Microeconomics and Macroeconomics.**
4. Economic laws are not exact in nature. Moreover they are hypothetical and require certain conditions to be fulfilled to be true. Refer to section **1.6 Laws of Economics**.
5. Economic dynamics deals with the study of changes in the economic system and how it adjusts to these changes over a period of time. Refer to section **1.7 Economic Statics and Dynamics**.
6. A business cycles is comprised of mainly four phases, namely expansion, peak, contraction, and trough. Refer to section **1.11 Business Cycles**.
7. There are three types of inflation, namely moderate inflation, galloping inflation, and hyperinflation.

1.16 SUGGESTED READING FOR REFERENCE

SUGGESTED READINGS

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2

CHAPTER

DEMAND ANALYSIS

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	Self Assessment Questions
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NOTES

INTRODUCTORY CASELET

DEMAND OF LOW COST HOUSES IN INDIA

The economic slowdown of 2008-2009 affected the Indian housing industry tremendously. The slowdown resulted in a sharp decline in the demand for luxury houses. Moreover, several retail developers faced competition owing to new entrants. Therefore, a number of retailers shifted their focus from luxury houses to affordable houses in order to generate demand in the housing industry to take advantage of the already existing gap between the demand and supply of low cost houses in India. It is estimated that by the end of 2022, India will have an urban housing shortage of 3.4 crore units.

According to Jaithirth Rao, chairman, Value & Budget Housing Corporation (VBHC), Bangalore, *"The demand in the economically weaker section (households earning up to ₹ 5,000 a month) is 26 million units, whereas the shortage in the low income group (households earning ₹ 5,000-7,500 a month) is three million."*

In order to meet the high level of demand for low cost houses, several developers including Tata Housing, Mahindra Lifespaces, Patel Realty and VBHC are developing low cost houses in India. Smart Value Homes, a Tata Housing subsidiary, plans to develop low cost houses in Maharashtra and Ahmedabad. It has plans to expand across the country by the end of 2015.

LEARNING OBJECTIVES

After completing this chapter, you will be able to:

- Explain the concept of demand
- Discuss different types of demand
- Identify various determinants of demand
- Explain the law of demand
- Discuss the shift and movement along the demand curve

2.1 INTRODUCTION

A market is a place where individuals, households, and businesses are engaged in the buying and selling of products and services through various modes. The working of a market is governed by two forces, which are **demand and supply**. These two forces play a crucial role in determining the price of a product or service and size of the market. In this chapter, a detailed explanation is given on the concept of demand.

In a market, the behaviour of buyers can be analysed by using the concept of demand. Demand is a relationship between various possible prices of a product and the quantities purchased by consumers at each price. In this relationship, price is an independent variable and the quantity demanded is the dependent variable. In simple terms, demand can be defined as the quantity of a product that a buyer desires to purchase at specific price and time. The demand for a product is influenced by a number of factors such as price of the product, change in customers' preferences, and standard of living of people.

The demand for a product in the market is governed by the **law of demand,** which states that the relationship between these two variables can be established if other factors affecting the quantity demanded for a product remain constant (ceteris paribus). As per the law of demand, the demand for a product falls with an increase in its prices and vice versa, while other factors are constant. In this unit, you will study about the concept of demand, factors influencing demand, and law of demand in detail.

NOTE

In this chapter, the three terms products, goods, and commodities are used interchangeably.

2.2 MEANING OF DEMAND

Theoretically, demand can be defined as a quantity of a product an individual is willing to purchase at a specific point of time. In the words

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of **Frederic Charles Courtenay Benham**, "The demand for anything, at a given price, is the amount of it, which will be bought per unit of time, at that price." In this section, let us study about demand in detail.

Demand refers to willingness or effective desire of individuals to buy a product supported by their purchasing power. Here, effective desire is the quantity of a commodity or service that is purchased at a given time period at a given price from the market. The three terms demand, want, and desire are often used interchangeably. However, in economics, each of these terms has a different meaning. Let us understand the difference between these three terms with the help of an example. Suppose an individual is willing to purchase a personal computer for his/her work, it becomes his/her desire. If the individual has purchasing power to buy the computer but is not willing to sacrifice his/her money, it becomes a want. However, if the individual is willing to use the money to purchase the computer, it becomes demand.

Thus, in a nutshell, demand is the quantity of a commodity or service that consumers are willing to buy at a given price at a given time period. The following points should be considered while defining the term **demand**:

- Desire, want, and demand are different from each other as explained earlier.
- The quantity demanded is the amount that a customer is willing to purchase. However, the quantity demanded is not always equal to the actual purchase. This is because the commodity or service may not be available in the required quantity.
- Demand is always referred to in terms of price and bears no meaning if it is not expressed in relation to price. For example, an individual may be willing to purchase a shirt at a price of ₹500 but may not be willing to purchase the same shirt if it is valued at ₹1000. In addition, different quantities of a commodity are demanded at different prices.
- Demand is always referred in terms of a time period and bears no meaning if it is not expressed in relation to a time period. For example, a garment manufacturer has a demand for 200 metres of cloth in a month or 2400 metres of cloth in a year.

Therefore, a statement referring to demand for a commodity or service must include the following three key factors:

- The quantity to be purchased
- The price at which the commodity is to be purchased
- The time period when the commodity is purchased

NOTE

Frederic Charles Courtenay Benham (1900-1962) was an economist who published 'Lectures on the Principles of Money, Banking, and Foreign Exchange', 'London Essays in Economics', and 'The Prosperity of Australia: An Economic Analysis'.

SELF ASSESSMENT QUESTIONS

1. A statement referring to demand for a commodity or service must include the following three key factors, which are:

   a. _____

   b. _____

   c. _____

ACTIVITY

Based on the difference between desire, want and demand, list down 10 things that you desire to have and classify them as your wants or demands.

2.3 TYPES OF DEMAND

Demand is generally classified based on various factors, such as the number of consumers for a given product, the nature of products, utility of products, and interdependence of different demands. The demand for a particular product can be different under different situations. Therefore, it is essential for organisations to be aware of the type of demand that arise for their products under different situations. Figure 2.1 shows different types of demand:

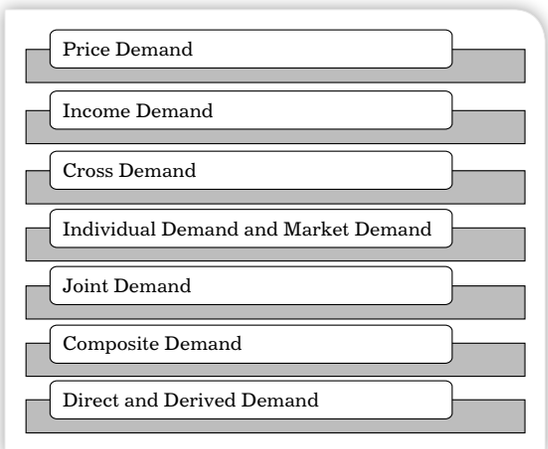


Figure 2.1: Different Types of Demand

NOTES

Let us discuss these different types of demand in detail:

- **Price demand:** It is a demand for different quantities of a commodity or service that consumers intend to purchase at a given price and time period assuming other factors, such as prices of the related goods, level of income of consumers, and consumer preferences, remain unchanged. Price demand is inversely proportional to the price of a commodity or service. As the price of a commodity or service rises, its demand falls and vice versa. Therefore, price demand indicates the functional relationship between the price of a commodity or service and the quantity demanded. It can be mathematically expressed as follows:

  $D_A = f(P_A)$ where,

  D_A = Demand for commodity A

  f = Function

  P_A =Price of commodity A

- **Income demand:** It is a demand for different quantities of a commodity or service that consumers intend to purchase at different levels of income assuming other factors remain the same. Generally, the demand for a commodity or service increases with increase in the level of income of individuals except for inferior goods. Therefore, demand and income are directly proportional to normal goods whereas the demand and income are inversely proportional to inferior goods. The relationship between demand and income can be mathematically expressed as follows:

  $D_A = f(Y_A)$, where,

  D_A = Demand for commodity A

  f = Function

  Y_A = Income of consumer A

- **Cross demand:** It refers to the demand for different quantities of a commodity or service whose demand depends not only on its own price but also the price of other related commodities or services. For example, tea and coffee are considered to be the substitutes of each other. Thus, when the price of coffee increases, people switch to tea. Consequently, the demand for tea increases. Thus, it can be said that tea and coffee have cross demand. Mathematically, this can be expressed as follows:

  $D_A = f(P_B)$, where,

  D_A = Demand for commodity A

  f = Function

  P_B = Price of commodity B

- **Individual demand and market demand:** This is the classification of demand based on the number of consumers in the market. In-

dividual demand refers to the quantity of a commodity or service demanded by an individual consumer at a given price at a given time period. For example, the quantity of sugar that an individual or household purchases in a month is the individual or household demand. The individual demand of a product is influenced by the price of a product, income of customers, and their tastes and preferences. On the other hand, market demand is the aggregate of individual demands of all the consumers of a product over a period of time at a specific price while other factors are constant. For example, there are four consumers of sugar (having a certain price). These four consumers consume 30 kilograms, 40 kilograms, 50 kilograms, and 60 kilograms of sugar respectively in a month. Thus, the market demand for sugar is 180 kilograms in a month.

- **Joint demand:** It is the quantity demanded for two or more commodities or services that are used jointly and are, thus demanded together. For example, car and petrol, bread and butter, pen and refill, etc. are commodities that are used jointly and are demanded together. The demand for such commodities changes proportionately. For example, rise in the demand for cars results in a proportionate rise in the demand for petrol. However, in the case of joint demand, rise in the price of one commodity results in the fall of demand for the other commodity. In the above example, an increase in the price of cars will cause a fall in the demand of not only of cars but also of petrol.
- **Composite demand:** It is the demand for commodities or services that have multiple uses. For example, the demand for steel is a result of its use for various purposes like making utensils, car bodies, pipes, cans, etc. In the case of a commodity or service having composite demand, a change in price results in a large change in the demand. This is because the demand for the commodity or service would change across its various usages. In the above example, if the price of steel increases, the price of other products made of steel also increases. In such a case, people may restrict their consumption of products made of steel.
- **Direct and derived demand:** Direct demand is the demand for commodities or services meant for final consumption. This demand arises out of the natural desire of an individual to consume a particular product. For example, the demand for food, shelter, clothes, and vehicles is direct demand as it arises out of the biological, physical, and other personal needs of consumers. On the other hand, derived demand refers to the demand for a product that arises due to the demand for other products. For example, the demand for cotton to produce cotton fabrics is derived demand. Derived demand is applicable for manufacturers' goods, such as raw materials, intermediate goods, or machines and equipment. Apart from this, the factors of production (land, labour, capital, and enterprise) also have a derived demand. For example, the demand for labour in the construction of buildings is a derived demand.

N O T E S

SELF ASSESSMENT QUESTIONS

2. _____ is a demand for different quantities of a commodity or service that consumers intend to purchase at different levels of income assuming other factors remain the same.

3. Which of the following is the demand for commodities or services meant for final consumption?

   a. Income demand

   b. Derived demand

   c. Direct demand

   d. Composite demand

4. Match the following:

1. Price demand	a. $D_A = f(P_A)$
2. Composite demand	b. Multiple uses
3. Joint demand	c. $D_A = f(P_B)$
4. Cross demand	d. Commodities demanded together

ACTIVITY

List down five pairs of commodities that are substitutes of each other and discuss how changes in the price and demand of one affect those of the others.

2.4 DETERMINANTS OF DEMAND

Determinants of demand are the factors that influence the decision of consumers to purchase a commodity or service. It is essential for organisations to understand the relationship between the demand and its each determinant to analyse and estimate the individual and market demand for a commodity or service. The quantity demanded for a commodity or service is influenced by various factors, such as price, consumers' income and preferences, and growth of population. For example, the demand for apparel changes with changes in fashion and tastes and preferences of consumers. This can be expressed as follows:

$D_A = f(P_A, P_O, \ldots\ldots\ldots I, T)$ where,

D_A = Demand for commodity A

f = Function

P_O = Price of other related products

I= Income of consumers

T= Tastes and preferences of consumers

Here, it should be noted that individual demand and market demand for a commodity is influenced by different factors. However, the extent to which these factors influence demand depends on the nature of the commodity. While analysing the effect of one particular determinant on demand, an organisation needs to assume other determinants to be constant. This is because if all the determinants are allowed to differ simultaneously, it would be difficult to estimate the change in demand. Figure 2.2 lists the determinants of individual and market demand:

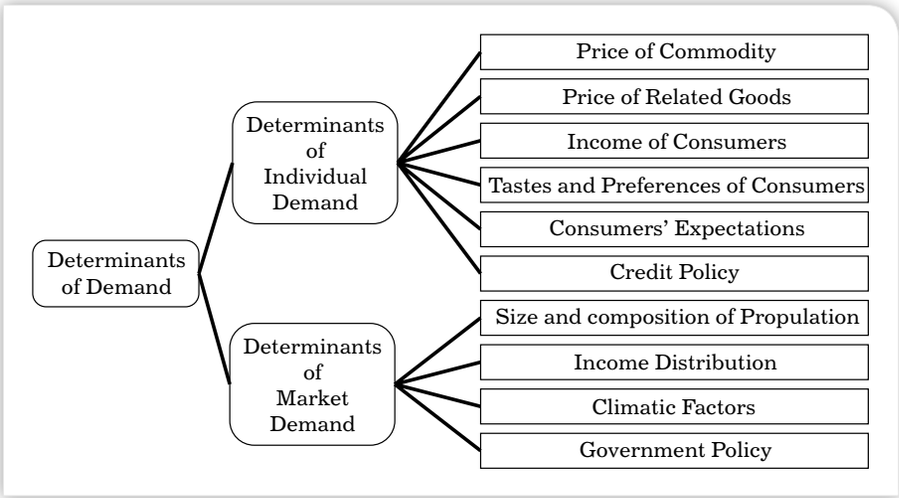


Figure 2.2: Determinants of Individual and Market Demand

Let us discuss these determinants of individual and market demand in detail in the next sections.

2.4.1 FACTORS INFLUENCING INDIVIDUAL DEMAND

When an individual intends to purchase a particular product, he/she may take into consideration various factors, such as the price of the product, the price of substitutes, level of income, tastes and preferences, and the features of the product. These considerations determine the individual demand of the product. Let us now discuss the factors that influence individual demand (as given in Figure 2.2) as follows:

- **Price of a commodity:** The price of a commodity or service is generally inversely proportional to the quantity demanded while other factors are constant. This implies that when the price of the commodity or service rises, its demand falls and vice versa.
- **Price of related goods:** The demand for a good or service not only depends on its own price but also on the price of related goods. Two items are said to be related to each other if the change in price of one item affects the demand for the other item. Related goods can be categorised as follows:

- **Substitute or competitive goods:** These goods can be used interchangeably as they serve the same purpose; thus, are the competitors of each other. For example, tea and coffee, cold drink and juice, etc. The demand for a good or service is directly proportional to the price of its substitute. Consider the two brands of biscuits; Britannia's Good Day and Sunfeast's Cookies. If the price of Good Day increases, consumers will tend to switch to Sunfeast's Cookies. Therefore, the demand for Sunfeast's Cookies is influenced by the rise in the price of Britannia's Good Day. Therefore, these are substitutes or competitors of each other.
- **Complementary goods:** Complementary goods are used jointly; for example, car and petrol. There is an inverse relationship between the demand and price of complementary goods. This implies that an increase in the price of one good will result in fall in the demand of the other good. For example, an increase in the price of mobile phones not only would lead to fall in the quantity demanded but also lower the demand for mobile cover or scratch guards. *The use of SIM cards might confuse students as even if the new mobile is purchased the old SIM card can be inserted and that does not lead to any change in demand.*

- **Income of consumers:** The level of income of individuals determines their purchasing power. Generally, income and demand are directly proportional to each other. This implies that rise in the consumers' income results in rise in the demand for a commodity. However, the relationship depends on the type of commodities, which are listed in Figure 2.3:

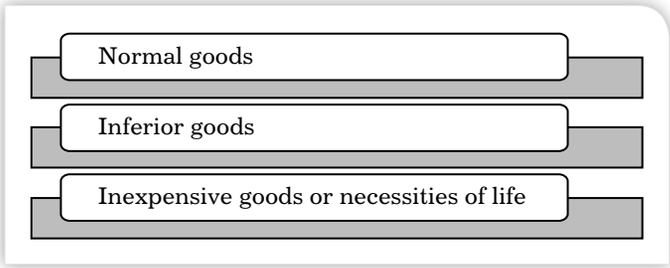


Figure 2.3: Types of Commodities

Let us discuss different types of commodities in detail.

- **Normal goods:** These are goods whose demand rises with an increase in the level of income of consumers. For example, the demand for clothes, furniture, cars, mobiles, etc. rises with an increase in individuals' income.
- **Inferior goods:** These are goods whose demand falls with an increase in consumers' income. For example, the demand for cheaper grains, such as maize and barley, falls when individuals' income increases as they prefer to purchase higher quality grains. These goods are known as Giffen goods in economic parlance.

- **Inexpensive goods or necessities of life:** These are basic necessities in an individual's life, such as salt, matchbox, soap, and detergent. The demand for inexpensive goods rises with increase in consumers' income until a certain level after that it becomes constant.

- **Tastes and preferences of consumers**: The demand for a commodity changes with changes in the tastes and preferences of consumers (which depend on customers' customs, traditions, beliefs, habits, and lifestyles). For example, the demand for *burqas* is high in gulf countries. In such countries, there may be less or no demand for short skirts.

- **Consumers' expectations:** Demand for commodities also depends on the consumers' expectations regarding the future price of a commodity, availability of the commodity, changes in income, etc. Such expectations usually cause rise in demand for a product. For example, if a consumer expects a rise in the price of a commodity in the future, he/she may purchase larger quantities of the commodity in order to stock it. Similarly, if a consumer expects a rise in his/her income, he/she may purchase a commodity that was relatively unaffordable earlier.

- **Credit policy:** It refers to terms and conditions for supplying various commodities on credit. The credit policy of suppliers or banks also affects the demand for a commodity. This is because favourable credit policies generally result in the purchase of commodities that consumers may not have purchased otherwise. Favourable credit policies generally increase the demand for expensive durable goods such as cars and houses. For example, easy home and car loans offered by banks have led to a steep rise in the demand for homes and cars respectively.

2.4.2 FACTORS INFLUENCING MARKET DEMAND

Market demand is the sum total of all household (individual) demands. Therefore, all the factors that affect the individual demand also affect the market demand as well. However, there are certain other factors that affect the market demand, which are as follows:

- **Size and composition of population:** Population size refers to the actual number of individuals in a population. An increase in the size of a population increases the demand for commodities as the number of consumers would increase. Population composition refers to the structure of the population based on characteristics, such as age, sex, and race. The composition of a population affects the demand for commodities as different individuals would have different demands. For example, a population with more youngsters will have higher demand for commodities like t-shirts, jeans, guitars, bikes, etc. compared to the population with more elderly people.

NOTES

- **Income distribution:** Income distribution shows how the national income is divided among groups of individuals, households, social classes, or factors of production. Unequal distribution of income results in differences in the income status of different individuals in a nation. Rich people would have higher purchasing power resulting in a higher demand for commodities required by rich classes. For example, luxury goods will have higher demand. On the other hand, nations having evenly distributed income would have higher demand for essential goods.
- **Climatic factors:** The demand for commodities depends on the climatic conditions of a region such as cold, hot, humid, and dry. For example, the demand for air coolers and air conditioners is higher during summer while the demand for umbrellas tends to rise during monsoon.
- **Government policy:** This includes the actions taken by the government to determine the fiscal policy and monetary policy such as taxation levels, budgets, money supply, and interest rates. Government policies have direct impact on the demand for various commodities. For example, if the government imposes high taxes (sales tax, VAT, etc.) on commodities, their prices would increase, which would lead to a fall in their demand. On the contrary, if the government invests in building of roads, bridges, schools, and hospitals, the demand for bricks, cement, labour, etc., would rise.

SELF ASSESSMENT QUESTIONS

5. The price of a commodity or service is generally directly proportional to the quantity demanded while other factors are constant. (True/False)
6. Which of the following determinants result in a fall in the demand of a commodity?
   a. Increase in income
   b. Fall in the price of substitute goods
   c. Favourable credit policy
   d. Increase in population size
7. The demand for inexpensive goods rises with an increase in consumers' income until a certain level after that it becomes constant. (True/False)
8. A higher demand for burqas in the gulf nations is an outcome of which of these factors?
   a. Climatic factors
   b. Taste and preferences
   c. Income distribution
   d. Size and composition of population

ACTIVITY

Using the Internet, find out how the expectations of investors affect the buying and selling of shares and stocks in the capital market.

2.5 LAW OF DEMAND

Take the example of an individual, who needs to purchase soft drinks. In the market, a pack of three soft drinks is priced at ₹120 and the individual purchases the pack. In the next week, the price of the pack is reduced to ₹105. This time the individual purchases two packs of soft drinks. In the third week, the price of the pack has risen to ₹130. This time the individual does not purchase the pack at all. It is a common observation that consumers purchase a commodity in greater quantities when its price is low and vice versa. This inverse relationship between the demand and price of a commodity is called the **law of demand.** The following are some popular definitions of the law of demand given by experts:

According to **Robertson**, "*Other things being equal, the lower the price at which a thing is offered, the more a man will be prepared to buy it.*"

In the words of **Marshall**, "*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.*"

According to **Ferguson**, "*Law of Demand, the quantity demanded varies inversely with price.*"

The law of demand represents a functional relationship between the price and quantity demanded of a commodity or service. The law states that the quantity demanded of a commodity increases with a fall in the price of the commodity and vice versa while other factors like consumers' preferences, level of income, population size, etc. are constant. Demand is a dependent variable, while price is an independent variable. Therefore, demand is a function of price and can be expressed as follows:

D= f (P)

Where

D= Demand

P= Price

f = Functional Relationship

The law of demand is based on certain assumptions, which are discussed in the next section.

NOTES

2.5.1 ASSUMPTIONS IN THE LAW OF DEMAND

The law of demand follows the assumption of ceteris paribus, which means that the other factors remain unchanged or constant. As mentioned earlier, the demand for a commodity or service not only depends on its price but also on several other factors such as price of related goods, income, and consumer tastes and preferences. In the law of demand, other factors are assumed to remain constant while only the price of the commodity changes. The law of demand is based on the following assumptions:

- The income of the consumer remains constant.
- Consumer tastes and preferences remain constant.
- Price of related goods remains unchanged.
- Population size remains constant.
- Consumer expectations do not change.
- Credit policies remain unchanged.
- Income distribution remains constant.
- Government policies remain unchanged.
- The commodity is a normal commodity.

The law of demand can be understood with the help of certain concepts, such as demand schedule, demand curve, and demand function. Let us discuss these concepts in detail in the upcoming sections.

2.5.2 DEMAND SCHEDULE

A demand schedule is a tabular representation of different quantities of commodities that consumers are willing to purchase at specific price and time while other factors are constant. It can be classified into two categories, which are:

- **Individual demand schedule:** It is a tabular representation of quantities of a commodity demanded by an individual at a particular price and time, provided all other factors remain constant.
- **Market demand schedule:** There is more than one consumer of a commodity in the market. Each consumer has his/her own individual demand schedule. If the quantities of all individual demand schedules are consolidated, it is called market demand schedule.

Let us understand the concept of demand schedule with the help of an example.

Assume that there are two individuals A and B in the market. They have particular individual demand for eggs. The individual demand schedules for A and B and the consequent market demand are shown in Table 2.1:

TABLE 2.1: INDIVIDUAL AND MARKET DEMAND FOR EGGS			
Price per dozen (in ₹ per dozen)	**Quantity demanded by A (in dozens per week)**	**Quantity demanded by B (in dozens per week)**	**Total market demand (A + B) (in dozens per week)**
(1)	(2)	(3)	(4)
80	2	4	2 + 4 = 6
70	4	6	4 + 6 = 10
60	6	10	6 + 10 = 16
50	9	15	9 + 15 = 24
40	14	22	14 + 22 = 36

In Table 2.1, the individual demand schedule of A and B are depicted in the columns (2) and (3) at different price levels shown in column (1). Column (4) depicts the market demand schedule, which is the sum total of the individual demands of A and B. As shown in Table 2.1, at a price level of ₹ 80 per dozen of eggs, individual demand by A and B are 2 dozens per week and 4 dozens per week respectively. The market demand (assuming there are only two individuals in the market) is the sum total of individual demands i.e. 6 dozens a week.

The law of demand can also be represented graphically with the help of a demand curve, which is discussed in the next section.

2.5.3 DEMAND CURVE

A demand curve is a graphical representation of the law of demand. The demand schedule can be converted into a demand curve by graphically plotting the different combinations of price and quantity demanded of a product. Thus, it can be said that demand curve is the pictorial representation of the demand schedule. The demand curve represents different quantities of a commodity demanded at specific price and time while other factors remain constant. Similar to demand schedule, demand curve can also be categorised into the following two types:

- **Individual demand curve:** It is the curve that shows different quantities of a commodity which an individual is willing to purchase at all possible prices in a given time period with an assumption that other factors are constant. In the above example, the individual demand schedules of A and B, when plotted on a graph, will represent the individual demand curves, which are shown in Figure 2.4 and Figure 2.5:

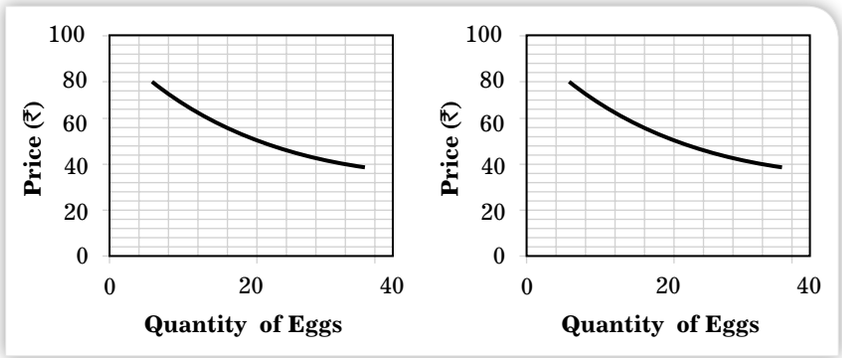


Figure 2.4: Individual Demand Curve of A
Figure 2.5: Individual Demand Curve of B

An individual demand curve slopes downwards to the right, indicating an inverse relationship between the price and quantity demanded of a commodity.

- **Market demand curve:** This curve is the graphical representation of the market demand schedule. A market demand curve shows different quantities of a commodity which all consumers in a market are willing to purchase at different price levels at a given time period, while other factors remaining constant. A market demand curve can be plotted by consolidating individual demand curves. Therefore, market demand curve is the horizontal summation of individual demand curves. In the example given in Table 2.1, plotting the price of eggs (column 1) against the summation of quantities demanded by A and B (column 4) would represent a market demand curve. This is shown in Figure 2.6:

Figure 2.6: Market Demand Curve

A market demand curve, just like the individual demand curves, slopes downwards to the right, indicating an inverse relationship between

the price and quantity demanded of a commodity. The negative slope of a demand curve is a reflection of the law of demand. However, it is important to understand the reasons why the demand curve slopes downwards to the right. These reasons are depicted in 2.7:

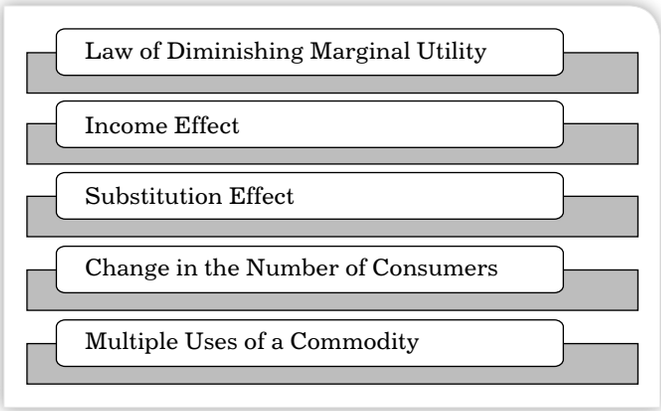


Figure 2.7: Factors Influencing the Law of Demand

Let us discuss these factors in detail.

- **Law of diminishing marginal utility:** Consumers purchase commodities to derive utility out of them. The law of diminishing marginal utility states that as consumption increases, the utility that a consumer derives from the additional units (marginal utility) of a commodity diminishes constantly. Therefore, a consumer would purchase a larger amount of a commodity when it is priced low as the marginal utility of the additional units decreases.
- **Income effect:** A change in the demand arising due to change in the real income of a consumer owing to change in the price of a commodity is called income effect. A change in the price of a commodity affects the purchasing power of a consumer. For example, if an individual buys two dozens of apples at ₹40 per kg, he/she spends ₹80. When the price of apples falls to ₹30 per kg, he/she spends ₹60 for purchasing two kg of apples. This results in a saving of ₹20 for the individual, which implies that the real income of the individual has increased by ₹20. The amount saved may be utilised by the individual in purchasing additional units of apples. Thus, the demand for apples increased due to change in real income.
- **Substitution effect:** The change in demand due to change in the relative price of a commodity is called the substitution effect. The relative price of a commodity refers to its price in relation to the prices of other commodities. Consumers always switch to lower-priced commodities that are substitutes of higher-priced commodities in order to maintain their standard of living. Therefore, demand for relatively cheaper commodities increases. For exam-

ple, if the price of pizzas comes down, while the price of burgers remains the same, pizzas will become relatively (burgers) cheaper. The demand for pizzas will increase as compared to burgers.

- **Change in the number of consumers:** When the price of a commodity decreases, the number of consumers of the commodity increases. This leads to a rise in the demand for the commodity. For example, when the price of apples is ₹120 per kg, only a few people purchase it. However, when the price of apples falls down to ₹60 per kg, more number of people can afford it.
- **Multiple uses of a commodity:** There are certain commodities that can serve more than one purpose. For example, milk, steel, oil, etc. However, some uses are more important over the others. When the price of such a commodity is high, it will be used to serve important purposes. Thus, the demand will be low. On the other hand, when the price of the commodity falls, it will be used for less important purposes as well. Thus, the demand will increase. For example, when the price of electricity is high, it is used only for lighting purposes, whereas when the price of electricity goes down, it is also used for cooking, heating, etc.

2.5.4 DEMAND FUNCTION

Mathematically, a function is a symbolic representation of the relationship between dependent and independent variables. Demand function represents the relationship between the quantity demanded for a commodity (dependent variable) and the price of the commodity (independent variable). Let us assume that the quantity demanded of a commodity X is D_x, which depends only on its price P_x, while other factors are constant. It can be mathematically represented as:

$$D_x = f(P_x)$$

However, the quantitative relationship between D_x and P_x is expressed as:

$$D_x = a - bP_x$$

Where, a (intercept) and b (relationship between D_x and P_x) are constants.

There are mainly two types of demand functions, which are discussed as follows:

- **Linear demand function:** In the linear demand function, the slope of the demand curve remains constant throughout its length. A linear demand equation is mathematically expressed as:

  $$D_x = a - bP_x$$

  In this equation, **a** denotes the total demand at zero price.

  b = slope or the relationship between D_x and P_x

  b can also be denoted by change in D_x for change in P_x

If the values of a and b are known, the demand for a commodity at any given price can be computed using the equation given above. For example, let us assume a = 50, b = 2.5, and P_x= 10:

Demand function is:

$D_x = 50 – 2.5 (P_x)$

Therefore, $D_x = 50 – 2.5 (10)$

or D_x= 25 units

The demand schedule for the above function is given in Table 2.2:

TABLE 2.2: DEMAND SCHEDULE USING THE LINEAR EQUATION $D_x = 50 – 2.5 (P_x)$

Quantity Demanded of Commodity X	Price Levels of Commodity X
5	18
10	16
15	14
20	**12**
25	**10**

When the demand schedule is plotted on a graph, it produces a linear demand curve, which is shown in Figure 2.8:

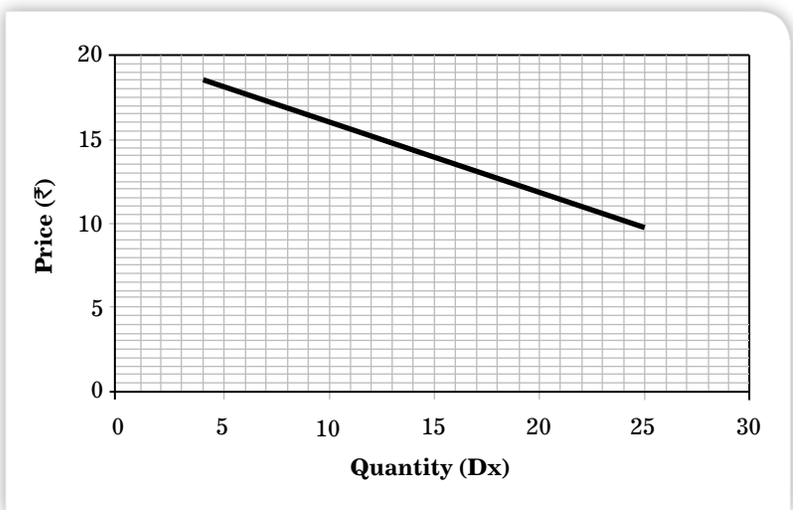


Figure 2.8: Demand Curve in Linear Demand Function

- **Non-linear demand function:** In the non-linear or curvilinear demand function, the slope of the demand curve (ΔP/ΔQ) changes along the demand curve. Instead of a demand line, non-linear demand function yields a demand curve. A non-linear demand equation is mathematically expressed as:

$D_x = a (P_x)^{-b}$

Or of a rectangular hyperbola of the form

$$D_x = \frac{a}{P_x + c} b$$

where a, b, c> 0

Exponent –b of price in the non-linear demand function refers to the coefficient of the price elasticity of demand

Figure 2.9 represents a non-linear demand function:

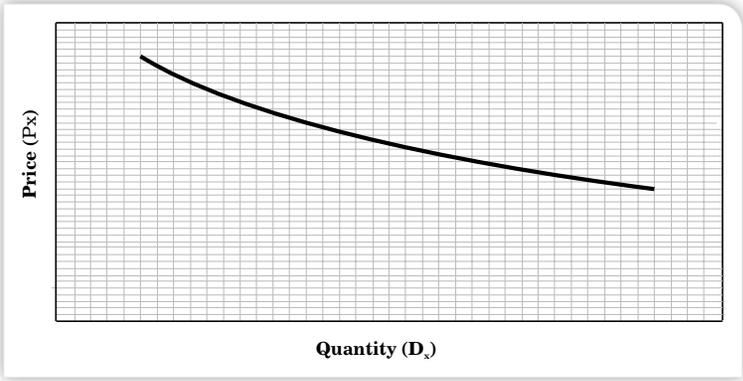


Figure 2.9: Non-linear Demand Function

2.5.5 EXCEPTIONS TO THE LAW OF DEMAND

So far, you have studied that there is an inverse relationship between the demand and price of a product. The universal law of demand states that rise in the price of a product would leadto a fall in the demand for that product and vice versa. However, there are certain exceptions that with a fall in price, the demand also falls and there is an increase in demand with an increase in price. This situation is paradoxical in nature and regarded as exception to the law of demand. In simple words, exception to law of demand refers to conditions where the law of demand is not applicable. In case of exceptions, demand curve shows an upward slope and referred as exceptional demand curve. Figure 2.10 shows an exceptional demand curve:

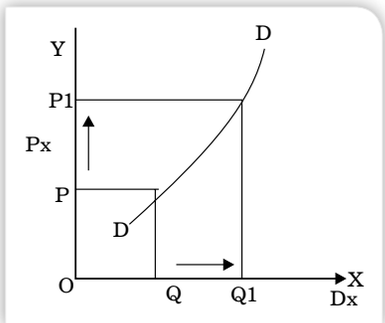


Figure 2.10: Exceptional Demand Curve

A few exceptions to the law of demand are explained as follows:

- **Giffen goods:** Named after the economist, Robert Giffen (1837-1910), Giffen good is a commodity that is unexpectedly consumed more as its price increases. Thus, it is an exception to the law of demand. In case of Giffen goods, the income effect dominates over the substitution effect. After the Irish Famine (1845), the potato crop failed due to a plant disease, *late blight,* which destroys both the leaves and the edible roots, or tubers, of the potato plant. Due to this, the price of potatoes increased tremendously. Despite the fact that the price increase made people to find substitutes of potatoes, they moved away from luxury products so that their overall consumption of potatoes increased.
- **Articles of distinction/Veblen goods:** Named after economist, Thorstein Veblen, these commodities satisfy the desires of the upper class people in the society. Veblen goods include those commodities whose demand is proportional to their price and thus, they are exceptions to the law of demand. These articles are purchased only by a few rich people to feel superior to the rest. For example, diamonds, rare paintings, vintage cars, and antique goods are the examples of Veblen goods.
- **Conspicuous necessities**: There are certain commodities that have turned into necessities of modern life. People purchase these commodities despite their high prices. Thus, conspicuous necessities are exception to the law of demand. For example, the demand for televisions, automobiles, refrigerators, etc. is generally high in spite of their increasing prices.
- **Consumers' ignorance:** Consumers' ignorance is another factor that motivates people to purchase a commodity at a higher price, which violates the law of demand. This results out of the consumers' biases that a high-priced commodity is better in quality than a low-priced commodity.
- **Situations of crisis:** Crisis such as war and famine negate the law of demand. During crisis, consumers tend to purchase in larger quantities with the purpose of stocking, which further accentuates the prices of commodities in the market. They fear that goods would not be available in the future. On the other hand, at the time of depression, a fall in the price of commodities does not induce consumers to demand more.
- **Future price expectations:** When consumers expect a rise in the prices of commodities, they tend to purchase commodities at existing high prices. For example, speculation of market strategists on an increase in gold prices in the future induces consumers to purchase higher quantities in order to stock gold. On the contrary, if consumers expect a fall in the price of a commodity, they postpone the purchase for the future.

SELF ASSESSMENT QUESTIONS

9. _____ represents a functional relationship between the price and quantity demanded of a commodity or service.
10. The formula to calculate linear demand equation is _____.
11. A Veblen good is a commodity that is unexpectedly consumed more as its price increases. True/False)
12. Which of these factors explains an increase in the real income of a consumer due to a fall in the price of a commodity?
    a. Substitution effect
    b. Income effect
    c. Situations of crisis
    d. Law of diminishing marginal utility

ACTIVITY

List down the examples of both Giffen goods and Veblen goods that you use in your daily life.

2.6 SHIFT AND MOVEMENT ALONG DEMAND CURVE

In economics, **change in quantity demanded** and **change in demand**are two different concepts.Change in quantity demanded refers to change in the quantity purchased due to rise or fall in product prices while other factors are constant. On the other hand, change in demand refers to increase or decrease in demand for a product due to various determinants of demand other than price (in this case, price is constant).

Change in quantity demanded can be measured by the movement along the demand curve, while change in demand is measured by shifts in demand curve. The terms, change in quantity demanded refers to **expansion or contraction of demand**, while change in demand means **increase or decrease in demand**.

2.6.1 INCREASE AND DECREASE IN DEMAND

Increase and decrease in demand takes place due to changes in other factors, such as change in income, distribution of income, change in consumer's tastes and preferences, change in the price of related

goods. In this case, the price factor remains unchanged. Increase in demand refers to the rise in demand for a product at a specific price, while a decrease in demand is the fall in demand for a product at a given price.

When other factors change, the demand curve changes its position which is referred to as a shift along the demand curve, which is shown in Figure 2.11:

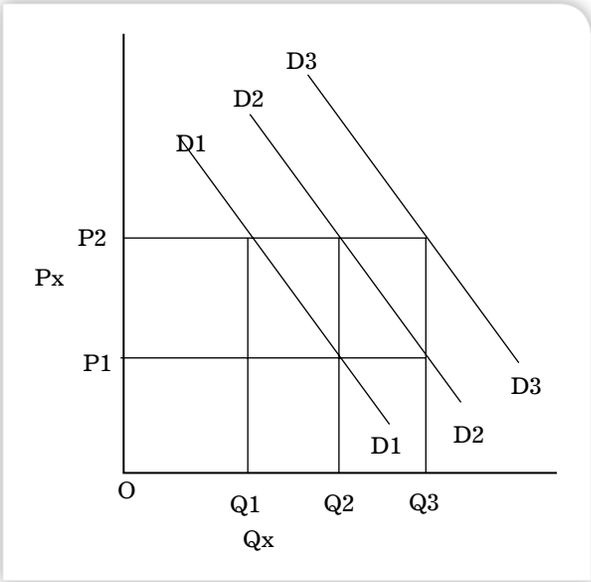


Figure 2.11: Shift in Demand Curve

Demand curve D2 is the original demand curve of commodity X. At price OP_2, the demand is OQ_2 units of commodity X. When the consumer's income decreases owing to high income tax, he/she is able to purchase only OQ_1 unit of commodity X at the same price OP_2. Therefore, the demand curve, D_2 shifts downwards to D_1. Similarly, when the consumer's disposable income increases due to a reduction in taxes, he/she is able to purchase OQ_3 units of commodity X at the price OP_2. Therefore, the demand curve, D_2 shifts upwards to D_3. Such changes in the position of the demand curve from its original position are referred to as a shift in the demand curve. There are several factors that cause a shift in the demand curve. Some of them are given as follows:

- A fall in consumers' income due to which they can purchase fewer units of a commodity (income effect).
- A fall in the price of a related commodity due to which consumers prefer to purchase the substitute commodity (substitution effect).
- Changes in the tastes and preferences of consumers due to which they may replace the original commodity with a new one.
- Increase in the price of complementary goods due to which consumers can afford to buy fewer units of the original commodity.

- Change in fashion, season, technology, or quality due to which consumers may purchase fewer units of the original commodity.

2.6.2 EXPANSION AND CONTRACTION OF DEMAND

The change in the quantity demanded of a product with change in its price, while other factors are at constant, is called expansion or contraction of demand. Expansion and contraction are represented by the movement along the same demand curve. Let us discuss the expansion and contraction of demand as follows:

- **Expansion or extension of demand:** It is an increase in the demand of a commodity due to decrease in its prices, while other factors are constant. For example, in Table 2.1, when the price of eggs falls from ₹60 per dozen to ₹50 per dozen, its quantity demanded rises from 6 dozens to 9 dozens by individual A. Therefore, the demand for eggs is expanded or extended.
- **Contraction of demand**: It is a decrease in the demand of a commodity due to increase in its price, while other factors remain unchanged. For example, in Table 2.1, when the price of eggs rises from ₹60 per dozen to ₹80 per dozen, its quantity demanded falls from 6 dozens to 2 dozens by individual A. Therefore, the demand for eggs is contracted.

Let us consider the graph shown in Figure 2.12:

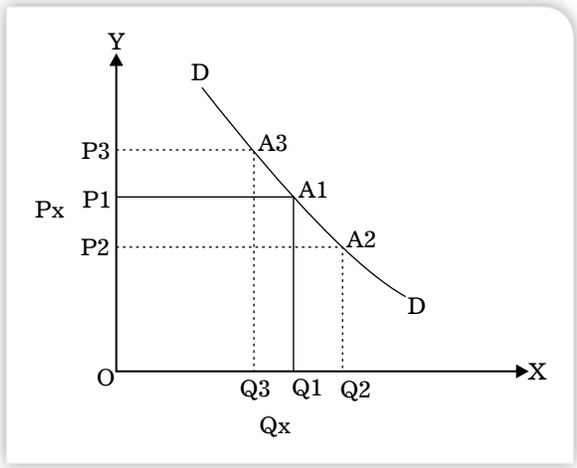


Figure 2.12: Movement along the Demand Curve

In the demand curve, when the price of commodity X is OP_1, quantity demanded is OQ_1. If the price of commodity X decreases to OP_2, the quantity demanded increases to OQ_2. The movement of the demand curve from A_1 to A_2 in the downward direction is called the extension of the demand curve. On the other hand, if the price of the commodity X rises from OP_1 to OP_3, the quantity demanded of commodity X falls from OQ_1 to OQ_3. This movement along the demand curve in the upward direction is called the contraction of demand.

SELF ASSESSMENT QUESTIONS

13. Change in the quantity demanded can be measured by the movement along the demand curve, while change in demand is measured by shifts in demand curve. (True/False)

14. _____ is an increase in the demand of a commodity due to decrease in its prices, while other factors are constant.

ACTIVITY

Using the Internet, find out the change in demand of sugar in India in 2010-2013. Plot it on a graph and depict the shift in the demand curve caused due to changes in other factors.

2.7 SUMMARY

- Demand refers to the willingness or effective desire of individuals to buy a product supported by their purchasing power.
- Demand for a commodity must include details about the quantity to be purchased, the price at which the commodity is to be purchased, and the time period when the commodity is purchased.
- There are different types of demands, such as price demand, income demand, cross demand, individual demand, market demand, joint demand, composite demand, and direct and derived demand.
- Determinants of demand are the factors that influence the decision of consumers to purchase a commodity or service.
- The quantity demanded for a commodity or service is influenced by various factors, such as price, consumers' income and preferences, and growth of population.
- Determinants of individual demand are price of a commodity, price of related goods, income of consumers, tastes and preferences of consumers, consumers' expectations, credit policy, etc.
- Determinants of market demand are size and composition of population, income distribution, climatic factors, and government policy.
- An inverse relationship between the demand and price of a commodity is called the law of demand.
- The law of demand represents a functional relationship between the price and quantity demanded of a commodity or service.
- A demand schedule is a tabular representation of different quantities of commodities that consumers are willing to purchase at specific price and time while other factors are constant. It is of two types, individual demand schedule and marker demand schedule.

NOTES

- A demand curve is a graphical representation of the law of demand. The demand schedule can be converted into a demand curve by graphically plotting the different combinations of price and quantity demanded of a product.
- An individual demand curve shows different quantities of a commodity which an individual is willing to purchase at all possible prices in a given time period with an assumption that other factors are constant.
- Market demand curve shows different quantities of a commodity that all consumers in a market are willing to purchase at different price levels at a given time period while other factors remain constant.
- Demand function represents the relationship between the quantity demanded for a commodity (dependent variable) and the price of the commodity (independent variable).
- There a few exceptions to the law of demand, such as Giffen goods, Veblen goods, conspicuous necessities, consumers' ignorance, situations of crisis, and future price expectations.
- Change in quantity demanded can be measured by the movement along the demand curve, while change in demand is measured by shifts in demand curve.
- A shift in demand curve takes place due to changes in other factors, such as change in income, distribution of income, change in consumer's tastes and preferences, change in the price of related goods, while the price of a commodity remains unchanged.
- The change in the quantity demanded of a product with change in its price, while other factors are at constant is called a movement in demand curve.

KEY WORDS

- **Manufacturers' goods:** These goods are used for the production of other complex products, such as leather (which is used in the manufacturing of shoes and handbags).
- **Factors of production:** These are inputs used in the production of goods or services in an attempt to earn an economic profit. These factors are land, labour, capital, and enterprise.
- **Dependent variable:** It refers to the output or effect of an experiment or modelling test. A dependent variable relies on other factors and corresponds to the changes in other factors.
- **Independent variable:** It refers to the inputs or causes in an experiment or modelling test. An independent variable does not depend on any other factor.
- **Inferior goods:** These are goods whose demand declines when an individual's income increases.

2.8 DESCRIPTIVE QUESTIONS

1. Differentiate between the three terms; desire, want, and demand.
2. Discuss different types of demands.
3. Identify various determinants of demand.
4. Discuss a few exceptions to the law of demand.
5. The demand function for ball pens is given as $D_X = 1000 - 25P_X$
   a. Create a demand schedule for ball pens with the prices of ₹10, ₹15, ₹20, ₹25, ₹30
   b. Create a demand curve for ball pens, plotting the points from the demand schedule.
6. The price in ₹ per kg and market demand in kg per month of wheat for a population is as shown in the table:

Price (in ₹ per kg)	Market demand (kg per month)
20	12
40	7
60	4
80	2

Plot the price of wheat against the market demand to depict the contraction of demand in wheat due to increase in prices.

2.9 ANSWERS AND HINTS

ANSWERS FOR SELF ASSESSMENT QUESTIONS

Topic	Q. No.	Answers
Meaning of Demand	1.	a. The quantity to be purchased
		b. The price at which the commodity is to be purchased
		c. The time period when the commodity is purchased
Types of Demand	2.	Price demand
	3.	Direct demand
	4.	1(a), 2(b), 3(d), 4(c)
Determinants of Demand	5.	False
	6.	b. Fall in the price of substitute goods
	7.	True
	8.	Taste and preferences

Topic	Q. No.	Answers
Law of Demand	9.	Law of demand
	10.	Dx = a – bPx
	11.	False
	12.	Income effect
Shift and Movement along Demand Curve	13.	True
	14.	Extension or expansion

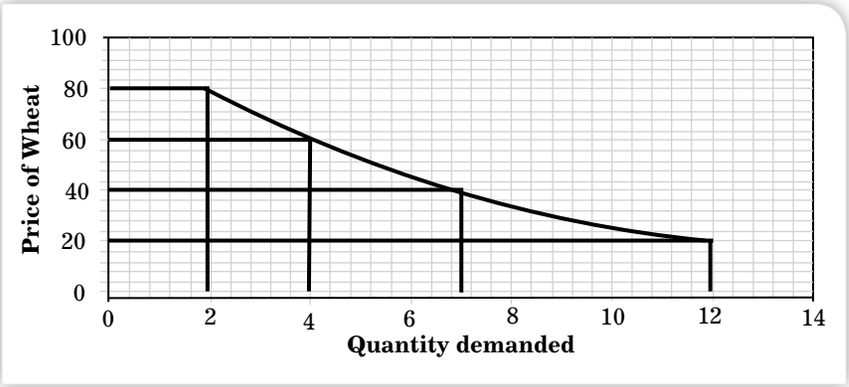
HINTS FOR DESCRIPTIVE QUESTIONS

1. The willingness to purchase a commodity is called desire. Willingness to purchase the commodity but lacking the will to sacrifice money is a want. However, willingness to purchase the commodity coupled with the willingness to spend money is called a demand. Refer to section **2.2 Meaning of Demand**.
2. The different types of demands include price demand, income demand, cross demand, individual demand, market demand, joint demand, composite demand, direct and derived demand. Refer to section **2.3 Types of Demand**.
3. Determinants of individual demand are price of a commodity, price of related goods, income of consumers, tastes and preferences of consumers, consumers' expectations, and credit policy. Determinants of market demand are size and composition of population, income distribution, climatic factors, and government policy. Refer to section **2.4 Determinants of Demand**.
4. There are certain exceptions to the law of demand, such as **Giffen goods, articles of distinction, and conspicuous necessities**. Refer to section **2.5 Law of Demand**.
5. Demand function = $D_X = 1000 – 25P_X$, demand schedule will be:

Price of ball pens	Quantity demanded of ball pens
10	1000 – 25 (10) = 750
15	1000 – 25 (15) = 625
20	1000 – 25 (20) = 500
25	1000 – 25 (25) = 375
30	1000 – 25 (30) = 250

In the demand curve, price will be plotted on Y-axis and the quantity demanded on X-axis.

6. Plot the different prices on Y-axis and the quantity demanded on X-axis as follows:



When the price of wheat rises from ₹ 20 per kg to ₹40 per kg, the quantity demanded of wheat falls from 12 kg to 7 kg. Similarly, as the price keeps increasing from ₹40 per kg to ₹ 80 per kg, the quantity demanded continues to fall. This movement along the demand curve in the upward direction is called the contraction of demand. Refer to section **2.6 Shift and Movement along Demand Curve**.

2.10 SUGGESTED READING FOR REFERENCE

SUGGESTED READINGS

- Kishtainy, N., & Abbot, G. (2012). The economics book (1st ed.). New York [N.Y.]: DK Pub.
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3

CHAPTER

SUPPLY ANALYSIS

CONTENTS

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NOTES

INTRODUCTORY CASELET

SHORTAGE OF SUPPLY OF OLIVE OIL IN 2012-13

Over the years, olive oil has gained rapid popularity due to its health factor. It has been considered as one of the healthiest cooking oil due to the presence of monosaturated fats in high quantities. In addition, olive oil is great for skin too. However, the only problem with the oil is its ever-growing prices across the world. Since mid-2012, the prices of olive oil have risen to 75 per cent.

The cause behind the high prices is the low supply of olives in the market. Spain, the world's largest supplier of olives, had a bad year due to adverse climatic conditions and was not able to produce as expected. As the trees were blossoming in the spring, the unexpected frost nearly damaged all production. In addition, with summer came drought that existed for a long time. By end of the year, the total production of olives in Spain was reduced to 44 percent.

The harvest of olives in other countries was better. However, as Spain was the biggest contributor of olives, other countries were not able to make up the loss. Even in this scenario, the demand remained unchanged. In international markets, the wholesale prices of olive oil at end of 2013 was $3,613/tonne which rose to $4,300/tonne at end of 2014, an increase of 19.01%.

LEARNING OBJECTIVES

After completing this chapter, you will be able to:

- Explain the concept of supply
- List the determinants of supply
- State the law of supply
- Explain the shift and movement along supply curve
- Discuss the concept of market equilibrium

3.1 INTRODUCTION

In the previous unit, you have studied that a market is a place where buyers and sellers are engaged in exchanging products at certain prices. The behaviour of buyers is understood with the help of the concept of demand. On the other hand, the behaviour of sellers is analysed using the **concept of supply**.

Supply can be defined as the quantity of a product that a seller is willing to offer in the market at a particular price within specific time. The supply of a product is influenced by various determinants, such as price, cost of production, government policies, and technology. It is governed by the **law of supply**, which states a direct relationship between the supply and price of a product, while other factors remaining the same. In simple words, the law of supply states that the supply of a product increases with an increase in its price, while other factors at constant and vice versa.

In a market, the two forces **demand and supply** play a major role in influencing the decisions of consumers and producers. The interaction between demand and supply helps in determining the market equilibrium price of a product. Equilibrium price is a price where the quantity demanded of a product by buyers is equal to the quantity supplied by sellers. In simple terms, equilibrium price is a price when there is a balance between market demand and supply. The equilibrium price of a product can change due to various reasons, such as reduction in cost of production, fall in the price of substitutes, and unfavourable climatic conditions. In this chapter, you will study the concept of supply in detail. Moreover, you will study about market equilibrium price at length.

NOTE

In this chapter, the three terms products, goods, and commodities are used interchangeably.

3.2 CONCEPT OF SUPPLY

In economics, supply refers to the quantity of a product available in the market for sale at a specified price and time. In other words, supply can be defined as the willingness of a seller to sell the specified quantity of a product within a particular price and time period. Here, it should be noted that demand is the willingness of a buyer, while supply is the willingness of a supplier. Different experts have defined the term supply differently. The following are some popular definitions of supply:

According to **Meyers**, *"Supply may be defined as a schedule of the amount of a product that would be offered for sale at all possible prices at any one instant of time, or during any one period of time, for example, a day, a week, a month, a year and so on, in which the conditions of supply remain the same."*

In the words of **McConnell**, "*Supply may be defined as a schedule which shows the various amounts of a product which a particular seller is willing and able to produce and make available for sale in the market at each specific price in a set of possible prices during a given period.*"

According to **Anatol Murad**, *"Supply refers to the quantity of a commodity offered for sale at a given price, in a given market, at given time."*

From the aforementioned definitions, it can be said that supply has three important aspects, which are as follows:

- Supply is always referred in terms of price. The price at which quantities are supplied differs from one location to the other. For example, fast moving consumer goods (FMCG) are usually supplied at different prices in different prices.
- Supply is referred in terms of time. This means that supply is the amount that suppliers are willing to offer during a specific period of time (per day, per week, per month, bi-annually, etc.)
- Supply considers the stock and market price of the product. The stock of a product refers to the quantity of the product available in the market for sale within a specified point of time. Both stock and market price of a product affect its supply to a greater extent. If the market price of a product is more than its cost price, the seller would increase the supply of the product in the market. However, a decrease in the market price as compared to the cost price would reduce the supply of product in the market.

Let us understand the concept of supply with an example. For example, a seller offers a commodity at ₹100 per piece in the market. In this case, only commodity and price are specified; thus, it cannot be considered as supply. However, there is another seller who offers the same

commodity at ₹110 per piece in the market for the next six months from now on. In this case, commodity, price, and time are specified, thus it is supply.

Supply can be classified into two categories, which are individual supply and market supply. Individual supply is the quantity of goods a single producer is willing to supply at a particular price and time in the market. In economics, a single producer is known as a firm. On the other hand, market supply is the quantity of goods supplied by all firms in the market during a specific time period and at a particular price. Market supply is also known as industry supply as firms collectively constitute an industry.

SELF ASSESSMENT QUESTIONS

1. _____ can be defined as the willingness of a seller to sell the specified quantity of a product within a particular price and time period.
2. The price at which quantities are supplied remains the same at all locations. (True/False)
3. Which of the following is a type of supply?
   a. Group Supply
   b. Economic Supply
   c. Market Supply
   d. Domestic Supply

ACTIVITY

Using the Internet, find the supply of cotton in the year 2013 in the Indian market. Prepare a report on individual and market supply of cotton in different states of India.

3.3 DETERMINANTS OF SUPPLY

Supply does not remain constant all the time in the market. There are many factors that influence the supply of a product. Generally, the supply of a product depends on its price and cost of production. Thus, it can be said that supply is the function of price and cost of production. These factors that influence the supply are called the determinants of supply. Figure 3.1 shows the determinants of supply:

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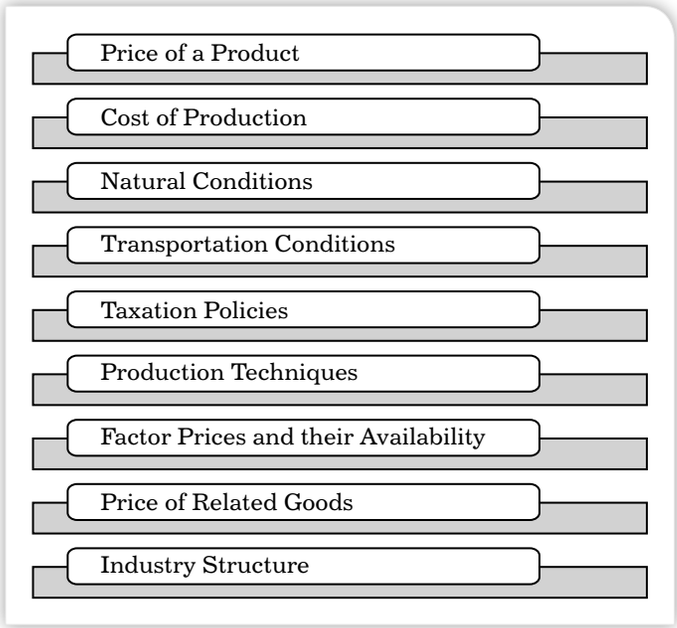

Figure 3.1: Factors Influencing Supply

Let us study these factors in detail.

- **Price of a product:** The major determinant of the supply of a product is its price. An increase in the price of a product increases its supply and vice versa while other factors remain the same. Producers increase the supply of the product at higher prices due to the expectation of receiving increased profits. Thus, price and supply have a direct relationship.
- **Cost of production**: It is the cost incurred on the manufacturing of goods that are to be offered to consumers. Cost of production and supply are inversely proportional to each other. This implies that suppliers do not supply products in the market when the cost of manufacturing is more than their market price. In this case, sellers would wait for a rise in price in the future. The cost of production increases due to several factors, such as loss of fertility of land; high wage rates of labour; and increase in the prices of raw material, transportation cost, and tax rate.
- **Natural conditions**: The supply of certain products is directly influenced by climatic conditions. For instance, the supply of agricultural products increases when the monsoon comes well on time. On the contrary, the supply of these products decreases at the time of drought. Some of the crops are climate specific and their growth purely depends on climatic conditions. For example, Kharif crops are well grown at the time of summer, while Rabi crops are produced well in the winter season.
- **Transportation conditions**: Better transport facilities result in an increase in the supply of goods. Transport is always a constraint

to the supply of goods. This is because goods are not available on time due to poor transport facilities. Therefore, even if the price of a product increases, the supply would not increase.

- **Taxation policies**: Government's tax policies also act as a regulating force in supply. If the rates of taxes levied on goods are high, the supply will decrease. This is because high tax rates increase overall productions costs, which will make it difficult for suppliers to offer products in the market. Similarly, reduction in taxes on goods will lead to an increase in their supply in the market.
- **Production techniques:** The supply of goods also depends on the type of techniques used for production. Obsolete techniques result in low production, which further decreases the supply of goods. Over the years, there has been tremendous improvement in production techniques, which has led to increase in the supply of goods.
- **Factor prices and their availability:** The production of goods is dependent on the factors of production, such as raw material, machines and equipment, and labour. An increase in the prices of the factors of production increases the cost of production. This will make difficult for firms to supply large quantities in the market.
- **Price of related goods:** The prices of substitutes and complementary goods also influence the supply of a product to a large extent. For example, if the price of tea increases, farmers would tend to grow more tea than coffee. This would decrease the supply of tea in the market.
- **Industry structure:** The supply of goods is also dependent on the structure of the industry in which a firm is operating. If there is monopoly in the industry, the manufacturer may restrict the supply of his/her goods with an aim to raise the prices of goods and increase profits. On the other hand, in case of a perfectly competitive market structure, there would be a large of number of sellers in the market. Consequently, the supply of a product would increase.

SELF ASSESSMENT QUESTIONS

4. Cost of production and supply are directly proportional to each other. (True/False)
5. Raw materials, machines and labour are all _____.

ACTIVITY

What can be the determinants that influence the supply of cars in the Indian market? Refer to the Internet, books, magazines, newspapers, etc.

3.4 LAW OF SUPPLY

The law of supply explains the relationship between price and supply of a product. According to the law, the quantity supplied increases with a rise in the price of a product and vice versa while other factors are constant. The other factors may include customer preferences, size of the market, size of population, etc. For example, in the case of rise in a product's price, sellers would prefer to increase the production of the product to earn high profits, which would automatically lead to an increase in supply. Similarly, if the price of the product decreases, the supplier would decrease the supply of the product in the market as he/she would wait for a rise in the price of the product in the future.

Thus, the law of supply states a direct relationship between the price of a product and its supply. Therefore, both price and supply moves in the same direction. To understand the law of supply, it is important to discuss the concepts of demand schedule and demand curve.

3.4.1 SUPPLY SCHEDULE

Supply schedule can be defined as a tabular representation of the law of supply. It represents the quantities of a product supplied by a supplier at different prices and time periods, keeping all other factors constant. There can be two types of supply schedules, namely individual supply schedule and market supply schedule. These two types of supply schedules are explained as follows:

- **Individual supply schedule:** This schedule represents the quantities of a product supplied by an individual firm or supplier at different prices during a specific period of time, assuming other factors remain unchanged. Let us understand the individual supply schedule with the help of an example. Table 3.1 shows the supply schedule of a firm supplying commodity A:

TABLE 3.1: INDIVIDUAL SUPPLY SCHEDULE FOR COMMODITY A

Price of the Product (₹ per Kg)	Quantity Supplied of Commodity A (Kg per Week)
5	3,000
10	8,000
15	12,000
20	15,000

From Table 3.1, it is clear that the firm is supplying 3,000 kg per week of commodity A at the price of ₹5 per kg. As the price rises from ₹5 to ₹10 per kg, the firm also increased the supply to 8,000 per kg. Therefore, the individual supply schedule shown in Table 3.1 indicates that the quantity supplied increases with a rise in price.

- **Market supply schedule:** This schedule represents the quantities of a product supplied by all firms or suppliers in the market at different prices during a specific period of time, while other factors are con-

stant. In other words, market supply schedule can be defined as the summation of all individual supply schedules. Table 3.2 shows the market supply schedule of two firms X and Y for the commodity A:

TABLE 3.2: MARKET SUPPLY SCHEDULE FOR COMMODITY A

Price of Product A (₹ per kg)	Quantity Supplied by Firm X (1000 kg per week)	Quantity Supplied by Firm Y (1000 kg per week)	Market Supply (1000 kg per week)
5	3	7	10
10	8	12	20
15	12	15	27
20	15	17	32

In Table 3.2, market supply is calculated by combining the quantities supplied by firm X and Y. It also shows when the commodity is priced at ₹5 per kg, the market supply of commodity A is 10,000 kg per week. When the price rises to ₹10 per kg, the market supply also increases to 20,000 per kg. So it can be observed, that a rise in price of the commodity A increases the market supply.

3.4.2 SUPPLY CURVE

The graphical representation of supply schedule is called supply curve. In a graph, the price of a product is represented on Y-axis and quantity supplied is represented on X-axis. Supply curve can be of two types, individual supply curve and market supply curve. These two types of curves are explained as follows:

- **Individual supply curve:** It is the graphical representation of individual supply schedule. The individual supply schedule of commodity A represented in Table 3.1, when plotted on a graph will provide the individual supply curve, which is shown in Figure 3.2:

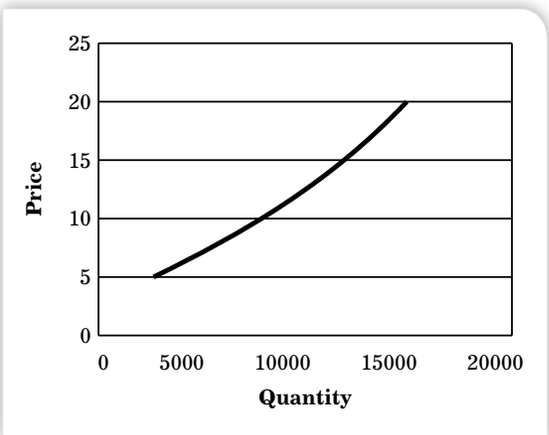

Figure 3.2: Individual Supply Curve

The slope moving upwards to the right in individual supply curve shows the direct relationship between supply and price, i.e. increase in supply along with the rise in prices.

- **Market Supply curve:** It is the graphical representation of market supply schedule. The market supply schedule of commodity A (supplied by Firm X and Firm Y) represented in Table 3.2, when plotted on graph will provide the market supply curve, which is shown in Figure 3.3:

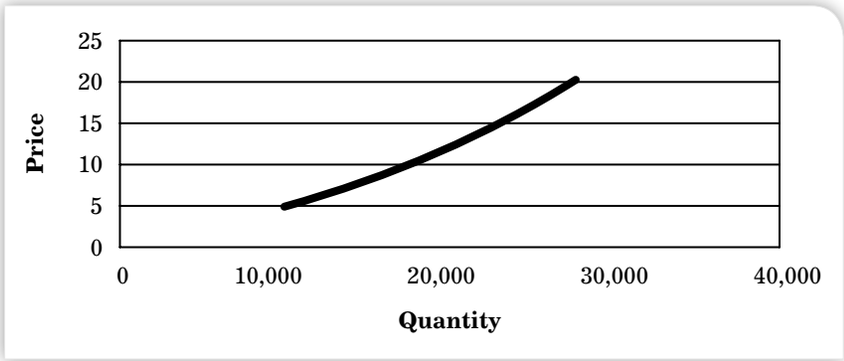

Figure 3.3: Market Supply Curve

3.4.3 SUPPLY FUNCTION

Supply function is the mathematical expression of law of supply. In other words, supply function quantifies the relationship between quantity supplied and price of a product, while keeping the other factors at constant. The law of supply expresses the nature of relationship between quantity supplied and price of a product, while the supply function measures that relationship. The supply function can be expressed as:

$Q_s = f(P_a, P_b, P_c, T, T_p)$

Where,

Q_s = Supply

P_a = Price of the good supplied

P_b = Price of other goods

P_c = Price of factor input

T = Technology

T_p = Time Period

According to supply function, the quantity supplied of a good (Q_s) varies with price of that good (P_a), the price of other goods (P_b), the price of factor input (P_c), technology used for production (T), and time period (T_p)

3.4.4 ASSUMPTIONS IN LAW OF SUPPLY

Like the law of demand, the law of supply also follows the assumption of ceteris paribus, which means that 'other things remain unchanged or constant'. As mentioned earlier, the supply of a commodity is dependent on many factors other than price, such as consumers' income and tastes, price of substitutes, natural factors, etc. All the factors other than the price are assumed to be constant. The law of supply works on certain assumptions which are given as follows:

- Income of buyers and sellers remains unchanged.
- The commodity is measurable and available in small units.
- The tastes and preferences of buyers remain unchanged.
- The cost of all factors of production does not change over a period of time.
- The time period under consideration is short.
- The technology used remains constant.
- The producer is rational.
- Natural factors remain stable.
- Expectations of producers and the government policy do not change over a period of time.

3.4.5 EXCEPTIONS TO LAW OF SUPPLY

According to the law of supply, if the price of a product rises, the supply of the product also rises and vice versa. However, there are certain conditions where the law of supply is not applicable. These conditions are known as exceptions to the law of supply. In such cases, the supply of a product falls with the increase in the price of a product at a particular point of time. For example, there would be a decrease in the supply of labour in an organisation when the rate of wages is high. The exception to the law of supply is represented on the regressive supply curve or backward sloping curve. It is also known as an exceptional supply curve. Some important exceptions to the law of supply are shown in Figure 3.4:

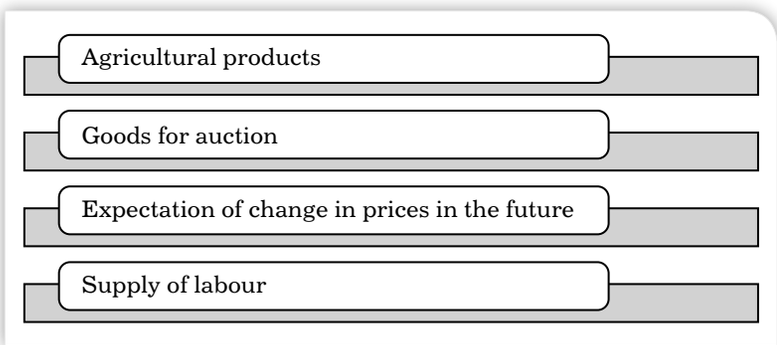

Figure 3.4: Exceptions to the Law of Supply

NOTES

Let us discuss these exceptions in detail.

- **Agricultural products:** The law of exception is not applicable to agricultural products. The production of these products is dependent on so many factors which are uncontrollable, such as climate and availability of fertile land. Thus, the production of agricultural products cannot be increased beyond a limit. Therefore, even a rise in price cannot increase the supply of these products beyond a limit.
- **Goods for auction:** Auctions goods are offered for sale through bidding. Auction can take place due to various reasons, for instance, a bank may auction the assets of a customer in case of his failure in paying off the debts over a period of time. Thus, supply of these goods cannot increase or decrease beyond a limit. In case of these goods, a rise or fall in price does not impact the supply.
- **Expectation of change in prices in the future:** Law of supply is not applicable under the circumstances when there is an expectation of change in the prices of a product in the near future. For instance, if the price of wheat rises and is expected to increase further in the next few months, sellers may not increase supply and store huge quantities in the hope of achieving profits at the time of a price rise.
- **Supply of labour:** The law of supply fails in the case of labour. After a certain point, the rise in wages does not increase the supply of labour. At higher wages, labour prefers to work for lesser hours. This happens due to change in preference of labour for leisure hours.

SELF ASSESSMENT QUESTIONS

6. _____ represents the quantities of a product supplied by an individual firm or supplier at different prices during a specific period of time, assuming other factors remain unchanged.
   a. Supply curve
   b. Individual supply schedule
   c. Market supply schedule
   d. Economic supply schedule
7. The graphical representation of supply schedule is called _____
8. Which of the following is not an assumption of supply?
   a. The time period under consideration is short
   b. The technology used keeps changing
   c. The producer is rational
   d. Natural factors remain stable

ACTIVITY

Draw a supply curve for the following supply schedule showing the quantity of notebooks supplied at different prices:

Quantity (1000 per week)	5	9	16	19	23
Price (₹ per notebook)	7	10	15	20	25

3.5 SHIFTS AND MOVEMENT ALONG SUPPLY CURVE

In economics, like demand, **change in quantity supplied** and **change in supply** are two different concepts. Change in quantity supplied occurs due to rise or fall in product prices while other factors are constant. On the other hand, change in supply refers to increase or decrease in the supply of a product due to various determinants of supply other than price (in this case, price is constant).

Change in quantity supplied can be measured by the movement of the supply curve, while change in supply is measured by shifts in the supply curve. The terms, change in quantity supplied refers to **expansion or contraction of demand**, while change in supply means **increase or decrease in demand**. Let us discuss the expansion and contraction of supply as well as increase and decrease in supply in the next sections.

3.5.1 EXPANSION AND CONTRACTION OF SUPPLY

When there are large quantities of a good supplied at higher prices, it is known as **expansion or extension of supply**. On the other hand, **contraction of supply** occurs when smaller quantities of goods are supplied even at reduced prices. Figure 3.5 shows the movement of the supply curve:

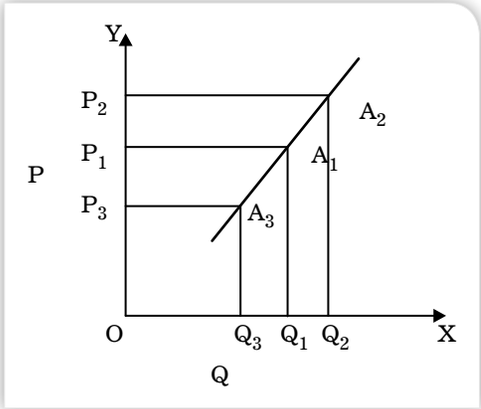

Figure 3.5: Expansion and Contraction of supply

In Figure 3.5, quantity supplied at price OP_1 is OQ_1. When the price rises to OP_2, the quantity supplied also increases to OQ_2, which is shown by the upward movement from A_1 to A_2 (it is pointed by the direction of the arrow between A_1 to A_2). This upward movement is known as the expansion of supply. On the contrary, a fall in price from OP_1 to OP_3 results in a decrease in supply from OQ_1 to OQ_2. This movement from A_1 to A_3 shown by the arrow pointed downwards is known as the **contraction of supply**. Thus, the movement from A_1 to A_3 is the representation of the **expansion and contraction of the quantity supplied.**

3.5.2 INCREASE AND DECREASE IN SUPPLY

An increase in supply takes place when a supplier is willing to offer large quantities of products in the market at the same price due to various reasons, such as improvement in production techniques, fall in prices of factors of production, and reduction in taxes. On the other hand, a decrease in supply occurs when a supplier is willing to offer small quantities of products in the market at the same price due to increase in taxes, low agricultural production, high costs of labour, unfavourable weather conditions, etc. A shift takes place in supply curve due to increase or decrease in supply, which is shown in Figure 3.6:

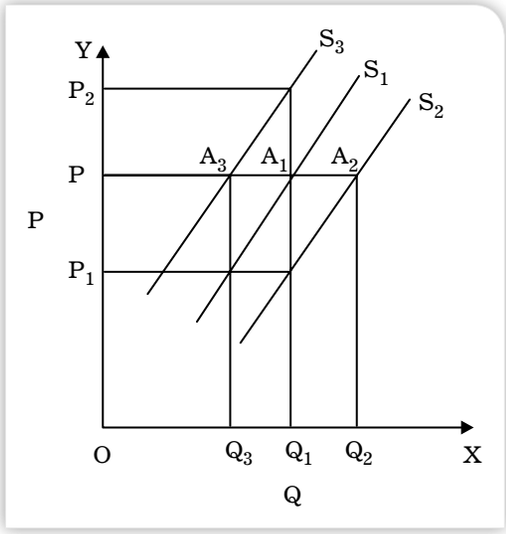

Figure 3.6: Increase and Decrease in Supply

In Figure 3.6, an increase in supply in indicated by the shift of the supply curve from S_1 to S_2. Because of an increase in supply, there is a shift at the given price OP, from A_1 on supply curve S_1 to A_2 on supply curve S_2. At this point, large quantities (i.e. Q_2 instead of Q_1) are offered at the given price OP. On the contrary, there is a shift in the supply curve from S_1 to S_3 when there is a decrease in supply. The amount supplied at OP is decreased from OQ_1 to OQ_3 due to a shift from A_1 on supply curve S_1 to A_3 on supply curve S_3. However, a decrease in supply also

occurs when producers sell the same quantity at a higher price (which is shown in Figure 3.6) as OQ_1 is supplied at a higher price OP_2.

SELF ASSESSMENT QUESTIONS

9. Which of the following change occurs when smaller quantities of goods are supplied even at reduced prices?
   a. Increase in supply
   b. Contraction of supply
   c. Expansion of supply
   d. Decrease in demand
10. Change in quantity supplied can be measured by the movement along the supply curve. (True/False)

ACTIVITY

Using the Internet, find the trend of export of wheat from India to other countries in the last five years. Plot the shift along the supply curve.

3.6 MARKET EQUILIBRIUM: DEMAND AND SUPPLY EQUILIBRIUM

From the discussion so far, it can be concluded that a market system is driven by two forces, which are demand and supply. This is because these two forces play a crucial role in determining the price at which a product is sold in the market. Price is determined by the interaction of demand and supply in a market.

According to the economic theory, the price of a product in a market is determined at a point where the forces of supply and demand meet. The point where the forces of demand and supply meet is called equilibrium point. Conceptually, equilibrium means state of rest. It is a stage where the balance between two opposite functions, demand and supply, is achieved. Mathematically, market equilibrium is expressed as:

$Q^d(P) = Q^s(P)$

Where

$Q^d(P)$ is the quantity demanded at price P

$Q^s(P)$ is the quantity supplied at price P

Let us understand the concept of market equilibrium with the help of an example.

Table 3.3 shows the demand and supply of fans in Delhi at different price levels.

TABLE 3.3: DEMAND AND SUPPLY OF FANS IN DELHI		
Price (₹ per fan)	**Supply ('000 in a month)**	**Demand ('000 in a month)**
600	55	80
650	65	75
700	**70**	**70**
750	75	50

In Table 3.3, it can be observed that at the price of ₹700, the demand and supply of fans is equal i.e. 70,000 fans. Therefore, market equilibrium exists at 70,000 where demand and supply are the same. Figure 3.7 shows the market equilibrium of demand and supply of fans mentioned in Table 3.3:

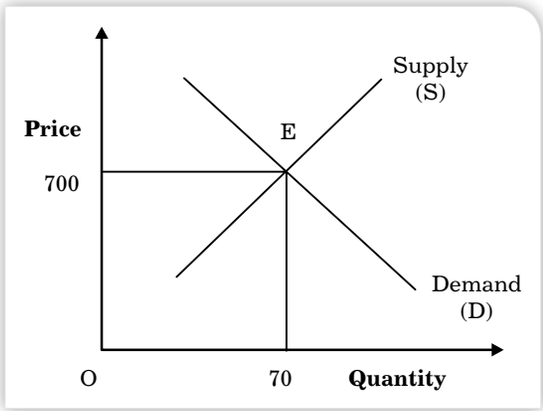

Figure 3.7: Market Equilibrium

In Figure 3.7, E is the point where demand and supply both intersect. Thus, market equilibrium exists at the point E where demand and supply are equal.

3.6.1 DETERMINATION OF MARKET PRICE

As mentioned earlier, the market equilibrium price of a product is determined at the point of intersection of demand and supply. However, it is important to understand how the price is determined. Let us understand the determination market price with the help of an example.

Let us consider the example of fans (as given in Table 3.3). In Table 3.3, it is mentioned that when price is ₹600, the demand for fans is 80,000 units while supply is 55,000 units. This indicates that there is a shortage of 25,000 fans in the market. As a result of this shortage, the seller tries to increase their earnings by raising the price of fans. On the other hand, consumers would be willing to purchase at the price quoted by the seller due to the shortage of fans. This leads to an increase in the profit of the seller, which, in turn, would improve the production of fans. As a result, the supply of fans increases. The process of increase in prices goes on till the price of fans reaches to ₹700.

As shown in Table 3.3, at the price of ₹700, the demand is reduced to 70, 000 fans, while the supply is also increased to 70, 000 fans. Thus, equilibrium is reached. This will lure consumers to buy more due to reduction in the price of fans. As a result of increase in buying, the equilibrium price would be ₹300.

3.6.2 SHIFTS IN MARKET EQUILIBRIUM

A shift in supply or demand curve also shifts the equilibrium point. Let us understand the mechanism of shift in market equilibrium in the case of shift of supply and demand curves respectively.

SHIFT IN DEMAND CURVE

Figure 3.8 shows a shift in the demand curve:

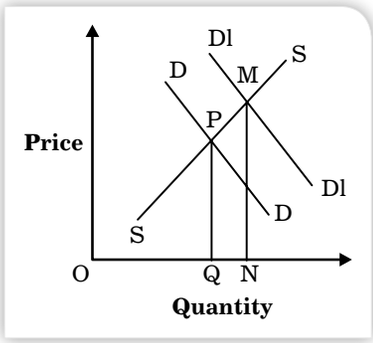

Figure 3.8: Shift in Demand and Equilibrium

In Figure 3.8, the initial equilibrium price is observed at PQ and quantity at OQ. When the demand curve is shifted from initial demand curve DD to D_1D_1, there is a shift in the equilibrium from PQ to MN. Thus, the new equilibrium price is at MN and the quantity is at ON. However, supply remains the same in this case. Thus, it can be said that when the demand curve shifts, an increase in quantity leads to an increase in the equilibrium price.

SHIFT IN SUPPLY CURVE

Figure 3.9 shows a shift in the supply curve:

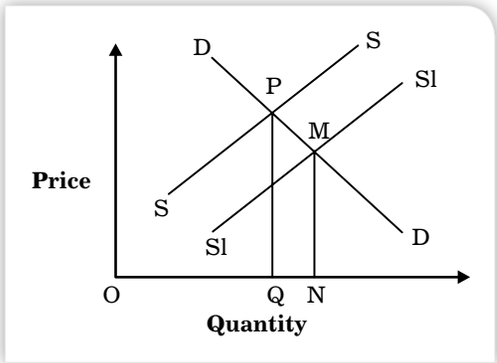

Figure 3.9: Shift in Supply Curve and Equilibrium

In Figure 3.9, the initial equilibrium price is placed at PQ and quantity at OQ. As the supply curve shifts from SS to S_1S_1, the equilibrium point also shifts from PQ to MN. After the shift, the new equilibrium price is at MN and the quantity is at ON. However, demand remains the same in this case. Thus, it can be said that when supply curve shifts, an increase in quantity results in an increase in the equilibrium price too.

3.6.3 COMPLEX CASES OF SHIFT IN EQUILIBRIUM

Now, let us understand what impact simultaneous shifts in the demand and supply curve have on the equilibrium point. The extent of shift in the demand and supply curves determines the impact on the equilibrium point. If the shift in supply curve is greater than the demand curve, equilibrium price falls and output rises. Figure 3.10 shows the impact on equilibrium point when shift in supply curve is more than the shift in demand.

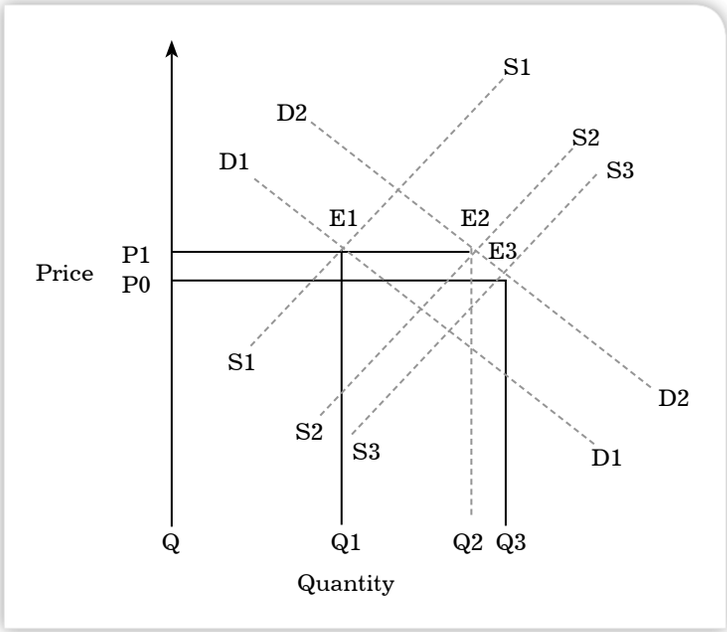

Figure 3.10: Equilibrium Position
(when shift in supply is more than demand)

In Figure 3.10, the initial equilibrium position, E1 is the point where demand curve D1D1 and supply curve S1S1 intersect. At this point, equilibrium price and quantity is P1 and OQ1 respectively. As the demand curve shifts from D1D1 to D2D2 and supply curve shifts from S1S1 to S3S3, there is a shift in equilibrium from E1 to E3. Here, the shift in supply is greater than the demand shift; therefore, equilibrium price falls down to P0 and output rises to OQ3. However, if the shift in demand and supply curve is equal that is D2D2 and S2S2 respectively, there is no change in equilibrium price while output increases to Q2.

In case, shift in demand curve is greater than the shift in supply curve, both equilibrium price and quantity, increase, as shown in Figure 3.11:

Figure 3.11: Equilibrium Position
(when shift in demand is more than supply)

In Figure 3.11, E1 is the initially equilibrium which is obtained by balancing the demand curve, D1D1 and supply curve, S1S1. At E1, equilibrium price is P1 and quantity is OQ1. Now, when the demand curve shifts from D1D1 to D2D2 and supply curve shifts from S1S1 to S2S2, equilibrium also shifts from E1 to E2. As can be seen the Figure 3.11, demand shift is greater than the shift in supply; therefore, equilibrium price is increased to P2 and output is increased to OQ2.

SELF ASSESSMENT QUESTIONS

11. _____ is a stage where the balance between two opposite functions, demand and supply, is achieved.
12. A shift in supply or demand curve also shifts the equilibrium point. (True/False)
13. When the demand curve shifts, an increase in quantity leads to an _____in the equilibrium price
14. If the shift in supply curve is greater than the demand curve, equilibrium price falls and output rises. (True/False)

ACTIVITY

Determine the equilibrium point from the following data of the supply of computers in India?

Prise (₹ per computer)	Supply ('000 in a month)	Demand ('000 in a month)
25,000	55	95
35,000	70	85
45,000	80	80
55,000	95	70

Plot the equilibrium point on the graph.

3.7 SUMMARY

- Supply refers to the willingness of a seller to offer a particular quantity of a product in the market for sale at a specified price and time.
- Supply is always referred in terms of price, time, and quantity. It can be of two types: individual supply and market supply.
- The supply of a product is dependent on many factors such as price of the product, cost of production, natural conditions, transportation conditions, and taxation policies.
- The law of supply states that supply decreases with a fall in price and increases with a rise in price, assuming all other factors remain unchanged. Thus, there is direct relationship between supply and price.
- Law of supply is often represented by supply schedule and supply curve.
- A supply schedule is a tabular representation of the quantity of a product supplied by a supplier at different price and time, keeping all other factors constant.
- A supply curve is a graphical representation of the supply schedule. It is classified into two categories: individual supply curve and market supply curve.
- Supply function states the functional relationship between supply and various determinants of supply.
- The law of supply is based on certain assumptions, such as no change in the income of buyers and sellers, no change in the factors of production, and stability of natural factors.
- The law of supply fails under certain cases such as agricultural products, expectation of change in price in the future, and labour supply.
- Change in quantity supplied occurs as a result of rise or fall in product prices while other factors are constant. It is also expressed in terms of expansion or contraction of demand, while

- Change in supply can be defined as increase or decrease in the supply of a product due to various determinants and is expressed in terms of increase or decrease in demand.
- Market equilibrium is a stage where both the opposite forces, i.e. demand and supply meet. It is expressed as $Q^d(P) = Q^s(P)$.
- The price at which both demand and supply intersect is known equilibrium price.

KEY WORDS

- **Cost Price:** It refers to the price at which the product is bought from a manufacturer by sellers and retailers.
- **Fast Moving Consumer Goods (FMCG):** These are goods that are sold frequently at relatively low prices. Examples are cold drinks, biscuits, etc.
- **Supply curve:** It is a graphical representation of the supply schedule that states the law of supply.
- **Market price:** It refers to the price at which a product is available for sale in the market.
- **Equilibrium:** It is a stage where both opposite forces, i.e. demand and supply meet.

3.8 DESCRIPTIVE QUESTIONS

1. Discuss the concept of supply.
2. What are the determinants of supply?
3. What do you understand by the law of supply?
4. Explain the exceptions to the law of supply.
5. Discuss the concept of change in supply.
6. What do you understand by market equilibrium?
7. Describe the impact of increase in both demand and supply on equilibrium.

3.9 ANSWERS AND HINTS

ANSWERS FOR SELF ASSESSMENT QUESTIONS

Topic	Q. No.	Answers
Concept of Supply	1.	Supply
	2.	False
	3.	c Market Supply

N O T E S

Topic	Q. No.	Answers
Determinants of Supply	4.	False
	5.	Factors of production
Law of Supply	6.	b. Individual supply schedule
	7.	Supply curve
	8.	b. The technology used keeps changing
Shifts and Movement Along Supply Curve	9.	b. Contraction of supply
	10.	True
Market Equilibrium: Demand and Supply Equilibrium	11.	Equilibrium
	12.	True
	13.	Increase
	14.	True

HINTS FOR DESCRIPTIVE QUESTIONS

1. Supply can be defined as the quantities of products offered for sale by suppliers at a price over a period of time, keeping all other factors constant. Refer to section **3.2 Concept of Supply**.
2. Determinants of supply are the factors that influence the supply of a product, such as price of the product, cost of production, natural conditions, and production techniques. Refer to section **3.3 Determinants of Supply**.
3. The law of supply states the relationship between price and supply, whereby a rise in the price of a product leads to an increase in supply and vice versa, assuming other factors constant. Refer to section **3.4 Law of Supply**.
4. Law of supply does not hold true under all circumstances. Some important exceptions to the law are agricultural products, goods for auction, expectation of change in prices in the future, labour supply, etc. Refer to section **3.4 Law of Supply**.
5. Change in supply can be defined as an increase or decrease in the supply of a product as a result of various determinants of supply other than price. Refer to section **3.5 Shifts and Movement Along Supply Curve**.
6. Market equilibrium is a stage where two opposite functions, demand and supply, meet. Refer to section **3.6 Market Equilibrium: Demand and Supply Equilibrium**.

7. An increase in demand and supply results in an increase of equilibrium quantity. However, the change in equilibrium price depends on the size of the change in demand and supply. Refer to section **3.6 Market Equilibrium: Demand and Supply Equilibrium**.

3.10 SUGGESTED READING FOR REFERENCE

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4

CHAPTER

CONSUMER DEMAND ANALYSIS

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INTRODUCTORY CASELET

NOTES

CONSUMER DEMAND FOR BOTTLED WATER

According to a study conducted by IKON Marketing Consultants India, an Ahmedabad-based market research firm, the bottled water market in India is estimated to be ₹ 8,000 crores. The bottled water market is growing at a compound annual growth rate (CAGR) of 19%, which is expected to grow over four-folds by 2020.

According to the report, consumers' increasing awareness for health and safety, scarcity of safe drinking water, and aggressive expansion by market players are the reasons behind the expansion of the bottled water industry during the past decade.

Because of an outburst of waterborne diseases, consumers have become concerned about their health and safety. They do not mind spending on bottled water in spite of its higher per unit cost against tap water. The awareness about the need for safe drinking water has spread even in rural areas and small towns, which has aggravated the sale of bottled water all over the country.

Apart from this, factors, such as increased disposable income of consumers, growth of organised retail, and focus on product extension and quality, may further stimulate the growth of the industry.

LEARNING OBJECTIVES

After completing this chapter, you will be able to:

- Explain the concept of consumer demand
- Discuss utility as a basis for consumer demand
- Elaborate on total utility and marginal utility
- Explain the law of diminishing marginal utility
- Discuss cardinal utility approach
- Shed light on ordinal utility approach
- Explain the concept of budget line
- Discuss consumer equilibrium effects
- Describe the revealed preference theory

4.1 INTRODUCTION

In the previous chapters, you have studied that demand is the willingness of a consumer to purchase a particular quantity of a good at specific price and time. A consumer is willing to buy a particular good to satisfy his/her various needs and wants. Thus, it can be said that the demand for a good is closely related to the level of satisfaction that the consumer derives from that good. For instance, if the level of consumer satisfaction after the consumption of a good is high, the demand for that good rises and vice versa.

The level of satisfaction derived by a consumer after consuming a good or service is called **utility**. In other words, utility can be defined as a measure of consumer satisfaction received on the consumption of a good or service. The utility of a good differs from one consumer to the other at different time periods depending on their tastes and preferences, income level, standard of living, etc. It is important for producers to measure the extent of utility or satisfaction received by a consumer after consuming a good in order to estimate the demand for their goods in the future.

Utility analysis is a systematic process of measuring utility derived by a consumer after the consumption of a good. It involves analysing factors that influence consumer behaviour for a particular good. There are two approaches to the measurement of utility, namely cardinal utility approach and ordinal utility approach. In this chapter, you will study about consumer demand and utility as a basic element of consumer demand in detail.

4.2 CONCEPT OF CONSUMER DEMAND

Consumers consider various factors before making purchases. For example, a particular brand, price range, size, features, etc. These

factors differ from one individual to the other depending on their income level, standard of living, age, sex, customs, socio-economic backgrounds, tastes and preferences, etc. These factors form the basis for consumer buying behaviour.

Manufacturers are always interested to gain insight into consumer buying behaviour. For this, they need to analyse **consumer demand** for their products and services. Consumer demand analysis is a process of assessing consumer behaviour based on the satisfaction of wants and needs generated by a consumer from the consumption of various goods. The satisfaction that consumers gain out of the consumption of a commodity or service is called utility. A detailed explanation on the concept of utility is given in the next section.

The study and analysis of consumer behaviour is based on three main assumptions, which are listed in Figure 4.1:

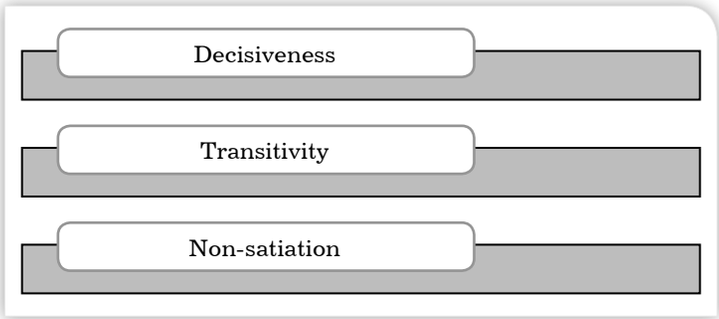

Figure 4.1: Assumptions in Consumer Behaviour Analysis

Let us discuss these assumptions in detail.

- **Decisiveness:** It is assumed that a consumer is able to state his/her own preference or indifference for two different commodities. Therefore, consumers are least ambiguous or confused about deciding between different commodities. This is referred to as decisiveness of consumers. For example, an individual goes to a fast food restaurant and is asked to opt between pizza and burger. According to the assumption of decisiveness, the individual would act in one of the following ways:
  - Opt for pizza
  - Opt for burger
  - Opt for none of the two and walk out
- **Transitivity:** In consumer demand, it is assumed that the preferences of an individual consumer are always consistent. An individual's preference or indifference for one commodity over another can be applied to another related commodity. This is referred to as transitivity. In the above example, if the individual chooses pizza over burger, burger over pasta, then the individual would prefer pizza over pasta too as per the assumption of transitivity.

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- **Non-satiation:** It is assumed that a consumer is never completely satisfied. If a consumer prefers a commodity, he/she would continue to demand it. This is referred to as non-satiation. For example, a larger pizza is preferred over a smaller pizza; two dresses are preferred over one; etc. However, non-satiation is not a fundamental assumption as rational consumers get satiated after a certain limit.

SELF ASSESSMENT QUESTIONS

1. _____ is a process of assessing consumer behaviour based on the satisfaction of wants and needs generated by a consumer from the consumption of various goods.
2. The study and analysis of consumer behaviour is based on three main assumptions, which are:
   a. _____
   b. _____
   c. _____

ACTIVITY

Identify the various factors that affect a consumer's buying behaviour (apart from the above-mentioned factors) and discuss how each of these factors affect the consumer buying behaviour.

4.3 UTILITY AS A BASIS OF CONSUMER DEMAND

Demand is the willingness or ability of a consumer to pay for a particular good. A consumer is willing to purchase a good as he/she derives utility from the consumption of that good. Utility can be defined as a measure of satisfaction received by a consumer on the consumption of a good or service. In this section, let us study about the concept of utility in detail.

The concept of utility may be looked upon from two perspectives: from the product perspective and from the consumer perspective. From the product perspective, utility is the ability of a product to satisfy want. This property is ingrained in the product itself irrespective of whether or not it is consumed by an individual. For example, a pen possesses its own utility whether a consumer purchases it or not. On the other hand, from the consumer perspective, utility is the psychological feeling of satisfaction, happiness, well-being, etc. that a consumer gains from the consumption or possession of a good.

In economics, utility implies that a product has the power to satisfy a want. However, utility is a relative term which means that a product may give satisfaction to one individual while be of no use to the other. For example, a car would be of utility to an office goer but is of no use to a beggar. In addition, the same product may provide an individual with different levels of satisfaction depending on the circumstances. For example, a cup of tea in the morning may provide more satisfaction to the consumer compared to when consumed at noon.

Mathematically, utility can be expressed as a function of the quantities of different commodities consumed by an individual. If an individual consumes quantity m_1 of a commodity M, quantity n_1 of a commodity N, and quantity r_1 of a commodity R, the utility U of the consumer can be measured as follows:

$$U = f(m_{1,} n_{1,} r_1)$$

Let us discuss the quantitative concepts of utility such as total utility and marginal utility in the next sections.

4.3.1 TOTAL UTILITY

Total utility is defined as the sum of the utility derived by a consumer from the different units of a commodity or service consumed at a given period of time. Assume that an individual consumes five units of a commodity X at a given period of time and derives utility out of the consumption of each unit as $U_{1,}$ $U_{2,}$ $U_{3,}$ $U_{4,}$ and U_5. The total utility is measured as follows:

$$TU = U_1 + U_2 + U_3 + U_4 + U_5$$

If the individual consumes n number of commodities, his/her total utility, TU_n, will be the sum of the utility derived from each commodity. For example, an individual consumes commodities X, Y, and Z and their respective utilities are U_x, U_y, and U_z, then total utility is expressed as follows:

$$TU_n = U_x + U_y + U_z$$

4.3.2 MARGINAL UTILITY

Apart from total utility, the concept of marginal utility is equally important for utility analysis. Marginal utility is defined as the utility derived from the marginal or additional unit of a commodity consumed by an individual. It can also be defined as the addition to the total utility of a commodity resulting from the consumption of an additional unit. Therefore, marginal utility, MU of a commodity X, is the change in the total utility, Δ TU, attained from the consumption of an additional unit of commodity X. Mathematically, it can be expressed as:

$$MU_x = \frac{\Delta TUx}{\Delta Qx}$$

Where TU_x = Total utility, ΔQ_x = Change in quantity consumed by one additional unit

When total number of unit consumed is n, marginal utility can also be expressed as:

$$MU \text{ of nth unit} = TU_n - TU_{n-1}$$

SELF ASSESSMENT QUESTIONS

3. The concept of utility may be looked upon from two perspectives, which are:
   a. _____
   b. _____
4. How would you measure the utility U of a consumer who consumes quantity m1 of a commodity M, quantity n1 of a commodity N, and quantity r1 of a commodity R?
5. Total utility is defined as the utility derived from the marginal or additional unit of a commodity consumed by an individual. (True/False)
6. Provide the formula for measuring marginal utility.

ACTIVITY

List down the units of different commodities consumed by you in the previous month. Plot the total utility and marginal utility on graphs.

4.4 LAW OF DIMINISHING MARGINAL UTILITY

The law of diminishing marginal utility is one of the most important laws in economics. It states that as the quantity consumed of a commodity continues to increase, the utility obtained from each successive unit goes on diminishing, assuming that the consumption of all other commodities remains the same. To put simply, when an individual continues to consume more and more units of a commodity per unit of time, the utility that he/she obtains from each successive unit continues to diminish. For example, the utility derived from the first glass of water is high, but with successive glasses of water, the utility would keep diminishing. The law of diminishing marginal utility is applicable to all kinds of goods such as consumer goods, durable goods, and non-durable goods. Let us understand the law of diminishing marginal utility with the help of an example.

An individual consumes only one commodity X and its utility is measured quantitatively. The total utility and marginal utility schedules are as shown in Table 4.1:

TABLE 4.1: NUMBER OF UNITS OF COMMODITY X CONSUMED PER UNIT OF TIME

Units of Commodity X	Total Utility (TU_x)	Marginal Utility (MU_x)
1	30	30
2	50	30
3	60	20
4	65	10
5	60	5
6	45	-5

Table 4.1 shows that as the number of units of commodity X consumed per unit of time increases, TU_x increases but at a diminishing rate while marginal utility MU_x decreases consistently. The rate of increase in TU_x as a result of increase in the number of units consumed has been depicted through the MU_x curve in the graph shown in Figure 4.2:

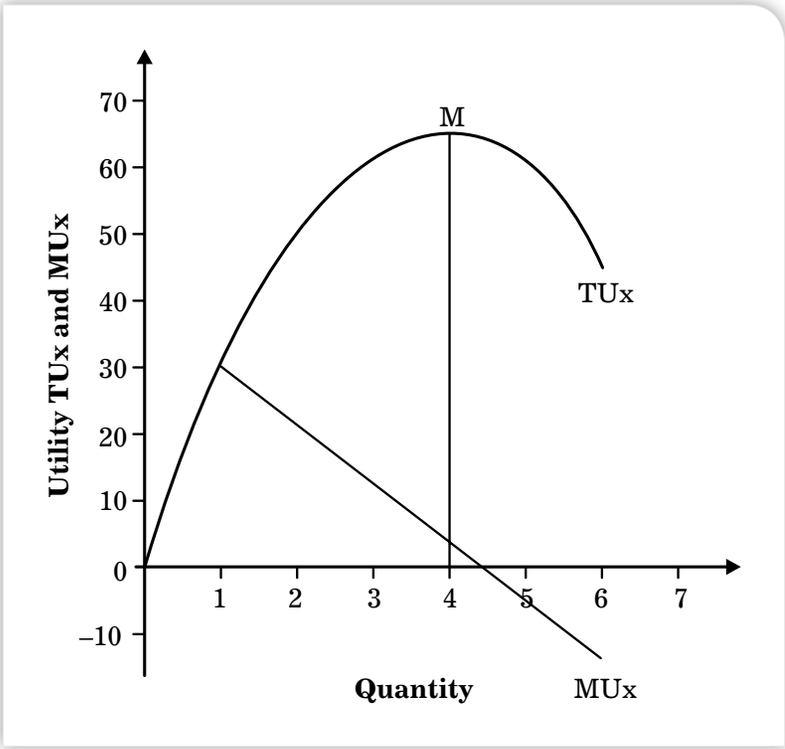

Figure 4.2: Total and Diminishing Marginal Utility of Commodity X

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In Figure 4.2, the downward sloping MU_x curve shows that the marginal utility of a commodity consistently decreases as its consumption increases. When the consumption reaches to 4 units of commodity X, TU_x reaches its maximum level (the point of saturation) marked as M. Beyond the point of saturation, MU_x becomes negative and TU_x begins to decline consistently. The downward slope of MU_x explains the law of diminishing marginal utility. Therefore, according to the law of diminishing marginal utility, the utility gained from a unit of a commodity is dependent on the consumer's desire for the commodity. When an individual continues to consume additional units of a commodity, the satisfaction that he/she derives from the consumption keeps decreasing. This is because his/her need gets satisfied in the process of consumption. Therefore, the utility derived from successive units of the commodity decreases.

The law of diminishing marginal utility is based on certain assumptions, which are as follows:

- **Rationality:** The law of marginal utility assumes that a consumer is a rational being who aims at maximising his/her utility at the given income level and the market price.
- **Measurement of utility:** The utility of a commodity can be measured using quantifiable standards like a cup of tea, a bag of sugar, a pair of socks, etc.
- **Constant marginal utility of money:** The marginal utility of consumer's income is constant.
- **Homogeneity of commodity:** The successive units of a commodity consumed are homogenous or identical in shape, size, colour, taste, quality, etc.
- **Continuity:** The consumption of successive units of a commodity should be continuous without intervals.
- **Ceteris paribus:** Factors, such as the income, tastes and preferences of consumers; price of related goods; etc. remain unchanged.

However, the law of diminishing marginal utility does not hold true in some cases called exceptions to the law of diminishing marginal utility. For example, in cases, such as individuals accumulating wealth, pursuing hobbies (such as collection of stamps, coins, or antiques, songs, rare paintings, etc.), the marginal utility may increase initially rather than decrease. Therefore, they violate the law of diminishing marginal utility. However, eventually the marginal utility may slowly begin to decrease.

The measurement of utility has always been a controversial issue. Different economists have given different viewpoints on the measurement of utility. Neo-classical economists have given **cardinal utili-**

ty concept to measure the utility derived from a good. On the other hand, modern economists have given the concept of **ordinal utility for measuring utility**. Let us discuss these two concepts in detail in the next sections.

NOTE

Cardinal numbers are 1, 2, 3, 4, 5, and so on. On the other hand, ordinal numbers are used for ranking like 1st, 2nd, 3rd, 4th, and so on.

SELF ASSESSMENT QUESTIONS

7. _____ states that as the quantity consumed of a commodity continue to increase, the utility obtained from each successive unit goes on diminishing, assuming that the consumption of all other commodities remains the same.

8. Match the following:

1. Rationality	a. Other factors remain unchanged
2. Measurement of utility	b. Use of quantifiable standards
3. Homogeneity of commodity	c. Successive units are identical
4. Ceteris paribus	d. Consumer tries to maximise utility

ACTIVITY

From the total utility and marginal utility measured in the above activity, discuss whether it follows the law of diminishing marginal utility.

4.5 CARDINAL UTILITY APPROACH - NEO CLASSICAL APPROACH

The cardinal utility theory or approach was proposed by classical economists, Gossen (Germany), William Stanley Jevons (England), Leon Walras (France), and Karl Menger (Austria). Later on a neo-classical economist, Alfred Marshall brought about significant refinement in the cardinal utility theory. Therefore, cardinal utility theory is also known as neo-classical utility theory.

Neo-classical economists believed that utility is cardinal or quantitative like other mathematical variables, such as height, weight, velocity,

NOTES

air pressure, and temperature. They developed a unit of measuring utility called utils. For example, according to the cardinal utility concept, an individual gains 20 utils from a pizza and 10 utils from coffee. In the measurement of utility, neo-classicists assumed that one util equals one unit of money and the utility of money remains constant. The assumptions of the cardinal utility approach are as follows:

- **Utility is measurable:** The basic assumption of the cardinal utility approach is that utilities of commodities can be quantified. According to Marshall, money is used to measure the utilities of commodities. This implies that the amount of money that a customer is willing to pay for a particular commodity is a measure of its utility.
- **Marginal utility of money is constant:** The cardinal utility approach assumes that money must measure the same amount of utility under all circumstances. To put simply, the utility derived from each unit of money remains constant.
- **Utilities are additive:** As per this assumption, the utility derived from various commodities consumed by an individual can be added together to derive the total utility. Suppose an individual consumes X_1, X_2, X_3,....X_n units of commodity X and derives U_1, U_2, U_3,....U_n utils respectively, the total utility that the individual derives from n units of the commodity can be expressed as follows:

  $U_n = U_1(X_1) + U_2(X_2) + \ldots + U_n(X_n)$

  - **Diminishing marginal utility:** The marginal utility of a commodity diminishes as an individual consumes successive units of a commodity. This can be expressed as follows:

    $MU_x = f(Q_x)$

    Where MU_x is the marginal utility of commodity X, f is a function, and Q_x is the quantity of the commodity consumed.

  - **Rationality:** Consumers are rational beings and aim to maximise their utility at the given income level and market price.

According to the cardinal utility approach, a consumer reaches his/her equilibrium when the last unit of his/her money spent on each unit of the commodity yield the same utility. Therefore, the consumer would spend his/her money income on commodity X so long as:

$MU_x > P_x (MU_m)$

Where P_x is the price of the commodity, MU_x is the marginal utility of the commodity and MU_m is the marginal utility of money.

A utility maximising consumer reaches the equilibrium when:

$MU_x = P_x (MU_m)$ or $= 1$

This equilibrium condition derives the consumer demand curve for commodity X, which is shown in Figure 4.3:

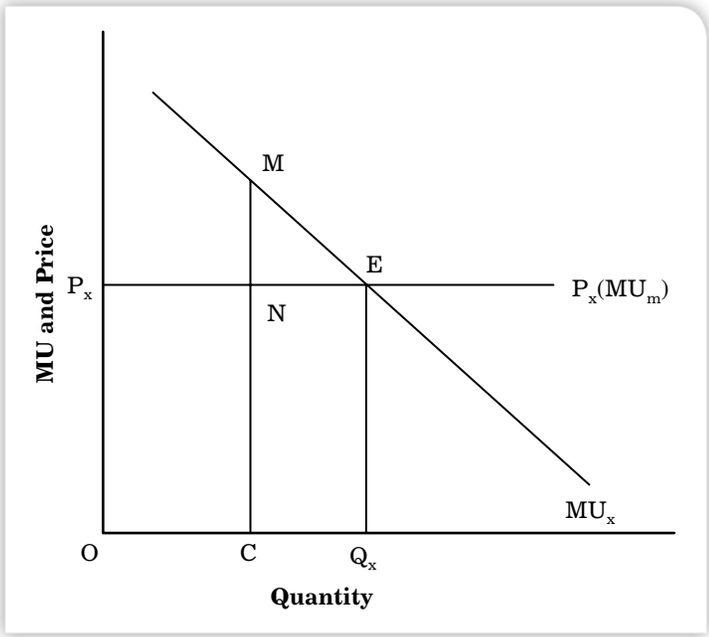

Figure 4.3: Consumer Equilibrium

The line parallel to the X-axis, $P_x(MU_m)$ depicts the constant utility of money weighed by the price of commodity X. MU_x curve represents the diminishing marginal utility of commodity X. Both the lines intersect at point E, which means the consumer reaches equilibrium at point E. The effects of consumer equilibrium on the consumer demand are discussed later in the chapter.

SELF ASSESSMENT QUESTIONS

9. Which of these economists brought about significant refinement in the cardinal utility theory?
   a. Alfred Marshall
   b. William Stanley Jevons
   c. Karl Menger
10. The unit for measuring utility is referred to as _____.
11. According to the cardinal utility approach, a consumer reaches equilibrium when the last unit of his/her money spent on each unit of the commodity yields the same utility. (True/False)

ACTIVITY

With the help of the Internet, books, magazines, and newspapers, find data on the criticism of the cardinal utility approach that led to the development of the ordinal utility approach.

4.6 ORDINAL UTILITY APPROACH – INDIFFERENCE CURVE ANALYSIS

In the 1930s, two English economists, John Hicks and R.J. Allen argued that the theory of consumer behaviour should be developed on the basis of ordinal utility. According to the ordinal theory, utility is a psychological phenomenon like happiness, satisfaction, etc. It is highly subjective in nature and varies across individuals. Therefore, it cannot be measured in quantifiable terms.

As per the ordinal utility approach, utility can be measured in relative terms such as less than and greater than. The approach advocates that consumer behaviour can be explained in terms of preferences or rankings. For example, a consumer may prefer ice-cream over soft drink. In such a case, ice-cream would have 1st rank, while 2nd rank would be given to soft drink.

Therefore, as per the ordinal utility approach, a consumer identifies several pairs of two commodities which would provide him/her the same level of satisfaction. Among these pairs, he/she may prefer one commodity over the other based on how he/she ranks them in order of utility. This implies that utility can be ranked qualitatively and not quantitatively. To better understand the ordinal utility approach, there are certain concepts that need to be discussed. Figure 4.4 shows these concepts:

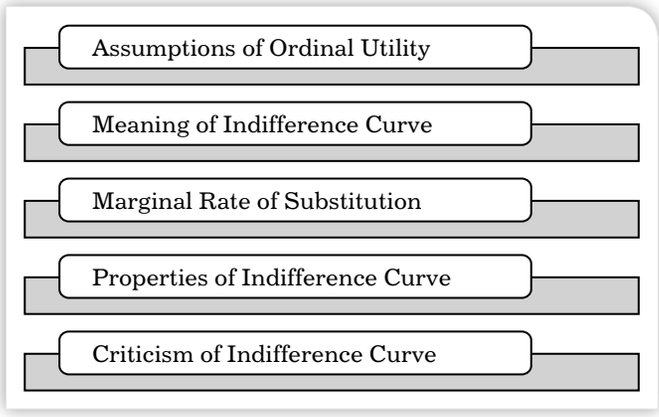

Figure 4.4: Ordinal Utility Approach

4.6.1 ASSUMPTIONS OF ORDINAL UTILITY

The ordinal utility approach is based on certain assumptions, which are as follows:

- **Rationality:** Consumers are rational beings and aim to maximise their utility at the given income level and market price of commodities that they consume.
- **Ordinal utility:** Utility cannot be measured in quantitative terms but in qualitative terms. This is because a consumer expresses his/her preference for a commodity out of a collection of similar goods.

- **Transitivity and uniformity of choice:** It is assumed that a consumer's choice is always transitive. This implies that if a consumer prefers A to B and B to C, the consumer would prefer A to C as well. On the other hand, if the consumer considers A=B and B=C, he must consider A=C. On the other hand, uniformity of choice implies that if a consumer prefers A to B at one time period, he/she does not prefer B to A in another time period or even does not consider A and B as equal.
- **Non-satiety:** The theory also assumes that a consumer is never oversupplied with commodities. This means that a consumer does not reach a state of saturation in case of any commodity. Thus, a consumer tends to prefer larger quantities of a commodity over smaller.
- **Diminishing marginal rate of substitution:** The marginal rate of substitution refers to the rate at which a consumer is willing to substitute one good (X) for another good (Y) in order to maintain the level of satisfaction. The marginal rate of substitution is represented as dY/dX. According to the ordinal utility approach, the marginal rate of substitution goes on decreasing when a consumer continues to substitute X for Y. The marginal rate of substitution has been discussed in the later sections of the chapter.

4.6.2 MEANING OF INDIFFERENCE CURVE

An indifference curve can be defined as the locus of points each representing a different combination of two substitutes, which yield the same level of utility to a consumer. Therefore, the consumer is indifferent to any combination of two commodities if he/she has to make a choice between them. This is because an individual consumes a variety of goods over time and realises that one good can be substituted with another without compromising on the satisfaction level. When these combinations are plotted on the graph, the resulting curve is called indifference curve. This curve is also called the iso-utility curve or equal utility curve.

Let us learn the indifference curve through a schedule. Assume that a consumer consumes two commodities X and Y and makes five combinations for the two commodities a, b, c, d, and e, which is shown in Table 4.2:

TABLE 4.2: INDIFFERENCE SCHEDULE F OR SUBSTITUTES X AND Y

Combination	Units of Commodity Y	Units of Commodity X	Total Utility
a	25	3	U
b	15	5	U
c	8	9	U

Combination	Units of Commodity Y	Units of Commodity X	Total Utility
d	4	17	U
e	2	30	U

When the indifference schedule for X and Y is plotted on a graph, a curve is obtained, which is shown in Figure 4.5:

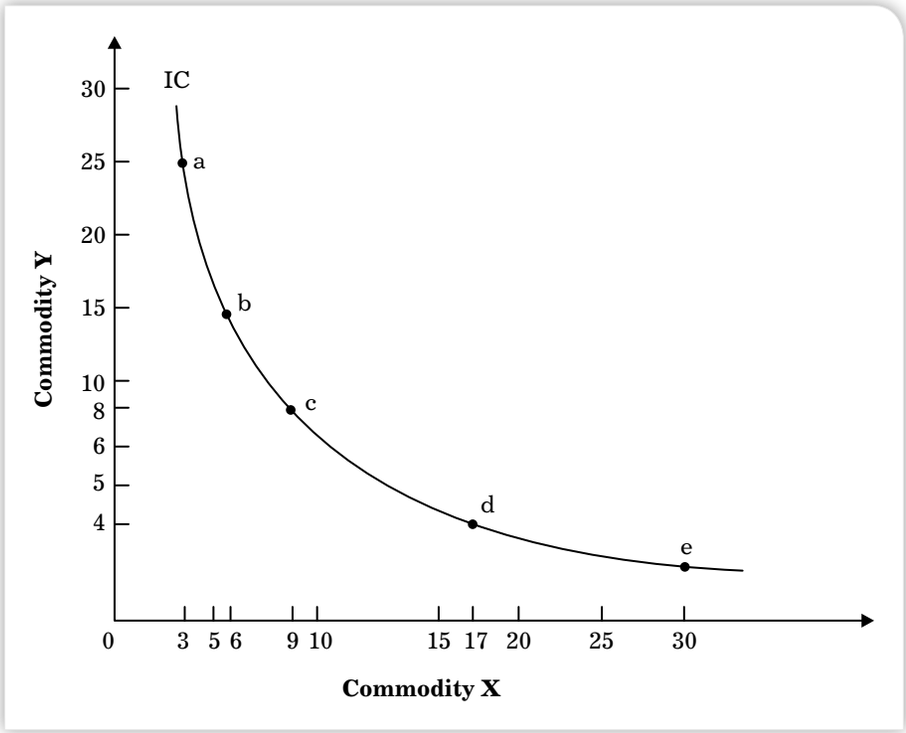

Figure 4.5: Indifference Curve for Substitutes X and Y

On the indifference curve (IC), there can be several other points in between the points a, b, c, d, and e, which would yield the same level of satisfaction to the consumer. Therefore, the consumer remains indifferent towards any combinations of two substitutes yielding the same level of satisfaction.

NOTE

When more than one indifference curve is plotted on the same graph, the family of curves is called an indifference map.

4.6.3 MARGINAL RATE OF SUBSTITUTION

Marginal rate of substitution (MRS) refers to the rate at which one commodity can be substituted for another commodity maintaining the same level of satisfaction. The MRS for two substitute goods X and Y

may be defined as the quantity of commodity X required to replace one unit of commodity Y (or quantity of commodity Y required to replace one unit of X) such that the utility derived from either combinations remains the same. This implies that the utility of X (or Y) is equal to the utility of additional units of Y (or X) added to a combination. MRS of X and Y is denoted as $\Delta Y/ \Delta X$ as it continues to diminish as the consumer continues to substitute X for Y or vice versa. According to the ordinal utility approach, $MRS_{y, x}$ (or $MRS_{x, y}$) decreases which means that the quantity of a commodity an individual is willing to give up for an additional unit of the other commodity continues to decrease with each substitution. $MRS_{y,x}$ derived from different combinations of commodities X and Y are given in Table 4.3:

TABLE 4.3: DIMINISHING MRS BETWEEN X AND Y

Indifference points	Combinations Y+X	Change in Y (ΔY)	Change in X (ΔX)	$MRS_{y,x}$ ($\Delta Y/ \Delta X$)
a	25 + 3	-	-	-
b	15 + 5	-10	2	-5.00
c	8 + 9	-7	4	-1.75
d	4 + 17	-4	8	-0.50
e	2 + 30	-2	13	-0.15

As the consumer moves from combination a to b on IC, he/she sacrifices 10 units of commodity Y and gets 2 units of commodity X. Therefore,

$$MRS_{y, x} = -5$$

Similarly when the consumer moves from combination b to c, he/she sacrifices 7 units of Y and gets 4 units of X. Therefore,

$$MRS_{y, x} = -1.75$$

This shows that as the consumer moves down the IC from point a to b to c, MRS diminishes from -5 to -1.75.

4.6.4 PROPERTIES OF INDIFFERENCE CURVE

The indifference curve (IC) has certain definite properties or characteristics, which are as follows:

- **ICs are negatively sloped:** The indifference curves are sloped downwards to the right. The reason for the negative slope is that as a consumer increases the consumption of commodity X, he/she sacrifices some units of commodity Y in order to maintain the same level of satisfaction.
- **Higher IC represents higher satisfaction level:** A higher IC lying above and to the right of another IC implies a higher level of satisfaction and vice versa. In simple words, the combination of

commodities on the higher IC is preferred by a consumer to the combination that lies on a lower IC.

- **ICs are convex to the origin:** ICs are curved inwards; thus they are convex to the origin. This implies that as the consumer continues to substitute commodity X for commodity Y, MRS of X for Y diminishes along the IC.
- **ICs do not intersect:** This can be explained by considering a hypothetical situation where two indifference curves intersect. The point of intersection would then imply that a combination of commodities on the higher curve would offer the same level of satisfaction as that on the lower indifference curve, which violates the basic assumption of ICs.

4.6.5 CRITICISM OF INDIFFERENCE CURVE

Although the concept of IC is vital to explain the ordinal approach, it is criticised on various grounds. The main points of criticism against IC are given in Figure 4.6:

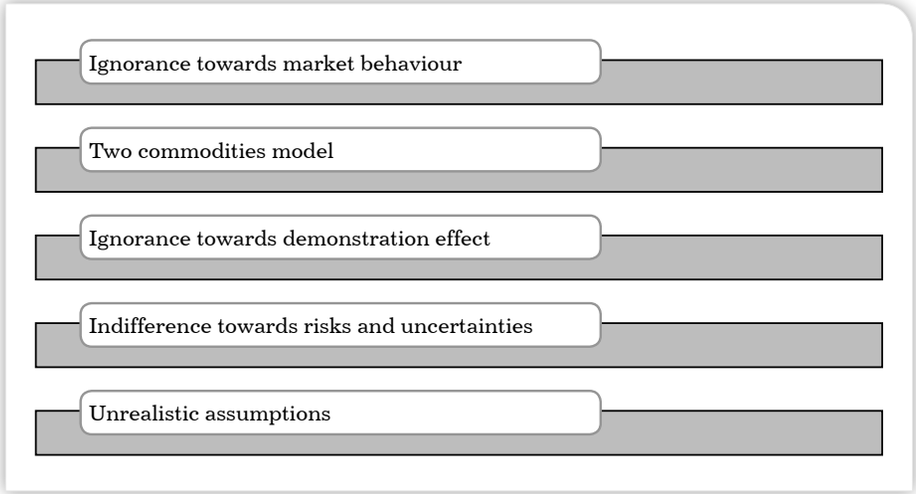

Figure 4.6: Points of Criticism against Indifference Curve

Let us discuss these points of criticism in detail:

- **Ignorance towards market behaviour:** IC analysis considers only two commodities in the market. However, the market is full of a large number of commodities. Thus, it does not consider market behaviour in the analysis of consumer behaviour. For example, a change in the price of other commodities in the market may affect the purchase of the commodities being considered.
- **Two commodities model:** IC analysis is based on the combinations of two commodities. Considering more than two commodities in IC analysis makes the calculations more complex. This may further make it difficult to predict consumer behaviour.

- **Ignorance towards demonstration effect:** James Stemble Duesenberry (July 18, 1918- October 5, 2009), an American economist, proposed the concept of demonstration effect. The demonstration effect states that an individual's consumption pattern is affected by the level of consumption of other individuals. This is ignored by IC analysis limiting its use to understand consumer behaviour.
- **Indifference towards risks and uncertainties:** Risks and uncertainties in the market and individual's life are inevitable. John Von Neumann and Oskar Morgenstern, authors of The Theory of Games and Economic Behaviour point out that IC analysis has no ability to analyse consumer behaviour in the midst of several risks and uncertainties that prevail in the market and real life.
- **Unrealistic assumptions:** IC is based on an assumption that a consumer is fully aware of his/her preference for various commodities. However, this is an unrealistic assumption as humans have their limitations. A human brain cannot take quick decisions by analysing different combinations of several commodities available in the market.

SELF ASSESSMENT QUESTIONS

12. According to the ordinal theory, utility can be measured quantitatively. (True/False)
13. According to the ordinal utility approach, the _____ goes on decreasing when a consumer continues to substitute one commodity for another.
14. The indifference curve is concave to the origin. (True/False)
15. _____ for two substitute goods may be defined as the quantity of one commodity required to replace the other such that the utility derived from either combinations remains the same.

ACTIVITY

Tea and coffee are substitutes of each other. Calculate the MRS of coffee for tea if an individual replaces coffee for tea every third day in a month.

4.7 CONCEPT OF BUDGET LINE

A budget line, also called price line, represents various combinations of two commodities, which can be purchased by a consumer at the given income level and market price. The budget line is an important element of consumer behaviour analysis. In this section, let us study about the concept and importance of the budget line in detail.

NOTES

The indifference curve represents consumers' preferences for a combination of two goods that are substitutes of each other. However, actual choices made by consumers depend on their income. A budget line is the locus of all commodity combinations that a consumer can purchase by spending all his/her income. Let us assume that there are only two commodities X and Y. The price of X is P_x and that of Y is P_y. Let Q_x be the quantity of commodity X and Q_y be the quantity of commodity Y, purchased by the consumer with income M.

Then, the budget equation is represented as follows:

$$M = P_x Q_x + P_y Q_y$$

The budget equation states that the total expenditure of a consumer on various combinations of commodities X and Y cannot exceed his/her money income M. The different quantities that the consumer can purchase using his/her income can be obtained using the following formula:

$$Q_x = \frac{M}{Px} - \left(\frac{Py}{Px} Qy\right) \text{ and}$$

$$Q_y = \frac{M}{Py} - \left(\frac{Px}{Py} Qx\right)$$

When different numerical values of Q_x and Q_y are plotted on a graph, a straight line with a negative slope is derived. This is called the budget line or price line, which has been depicted in Figure 4.7:

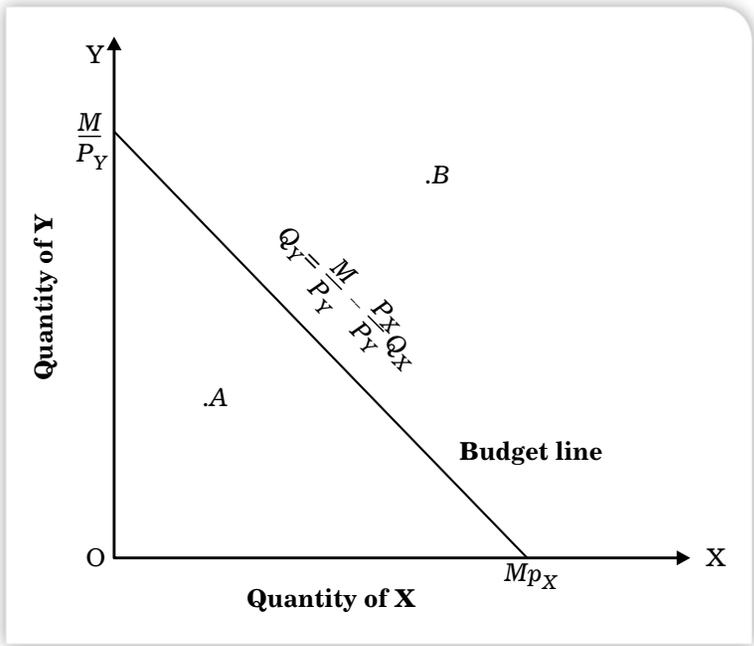

Figure 4.7: Budget Line

The budget line that shows an individual's consumption combinations, resembles a different line that separates the combinations that are attainable from those that are not, referred to as the production-possibilities frontier. Let us understand the concept of budget line with the help of a popular example from the Second World War. During World War II, the United States concluded that it needed to produce more quantities of armaments (guns) and decided to shift butter producing factories to those producing guns. This tradeoff can be represented as a move from a point **a** to a point **b** in Figure 4.8:

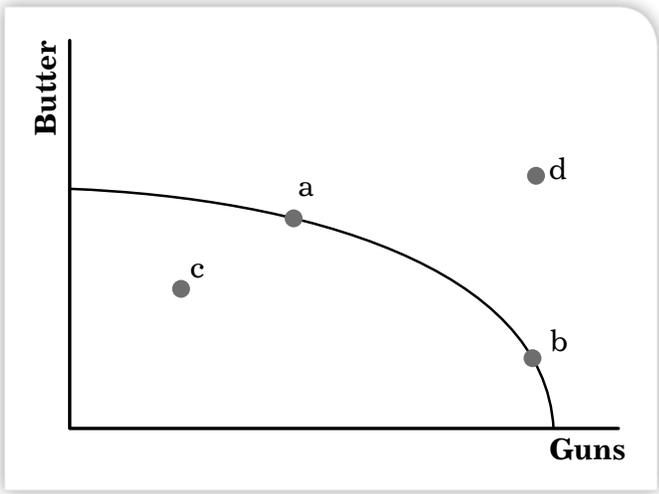

Figure 4.8: Guns vs. Butter in World War II
(**Source:** http://ingrimayne.com/econ/LogicOfChoice/BudgetLine.)

At the beginning of the War, there was a high level of unemployment owing to the recessions of 1929-33 and 1937-38, called Great Depression. Therefore, the United States was at a point **c**, which indicates that more of all goods could have been produced given the amount of resources and technology. However, compared to point **a** or **b**, point **d** was a more desirable position although it was unattainable given the available technology and resources. During World War II, the cost of producing thousands of guns reduced the production of butter for the use of civilians. The basic idea behind a budget line is that all economic activities take place within limitations or constraints. Owing to constraints, individuals and organisations need to prioritise certain needs and sacrifice the rest.

4.7.1 SHIFTS IN BUDGET LINE

The budget line is derived on the basis of the income of a consumer and the prices of commodities in the market. Any change in the consumer's income or the prices of commodities would result in a change in the budget line. This phenomenon of change is called a shift in the budget line. Let us discuss the effect of change in income M and price

P_x (commodity X) and P_y (commodity Y) on the budget line with the help of Figure 4.9:

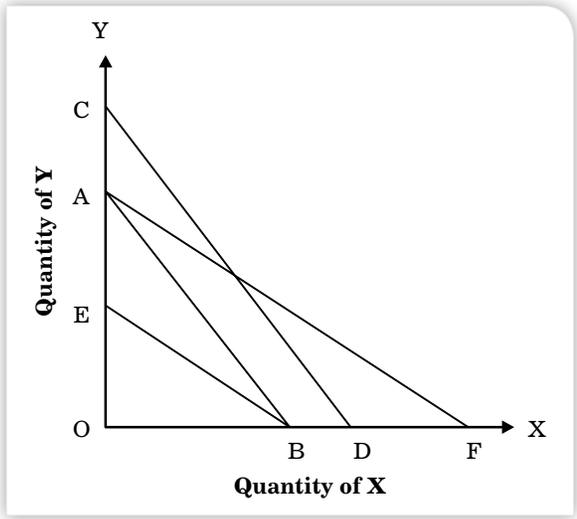

Figure 4.9: Shift in Budget Line

As it can be seen in Figure 4.9, a shift in the budget line takes place due to change in income of a consumer and the price of commodities. Let us understand this as follows:

- **Change in income M:** A rise in the consumer's income results in an upward shift in the budget line with an assumption that the prices of commodities remain the same. In Figure 4.9, the original budget line AB shifts upwards to CD. On the other hand, a fall in the level of income results in a downward shift in the budget line, assuming that product prices remain constant. In Figure 4.9, the original budget line AB shifts back to its original position when M decreases.
- **Change in the price of commodities:** When the prices of commodities change, the budget line shifts from its original position while income remains unchanged. In Figure 4.9, when M and P_y remain unchanged but P_x decreases to half its original value, the budget line shifts from AB to AF. Similarly, when M and P_x remain unchanged, and P_y increases, the budget line shifts from AB to EB.

4.7.2 SLOPE OF BUDGET LINE

The slope of the budget line is an important aspect in determining consumer equilibrium. The slope of the budget line indicates how many units of commodity Y a consumer would give up to buy an additional unit of commodity X or vice versa. The slope of budget line (AB) (depicted in Figure 4.9) is expressed as follows:

$$\frac{\Delta Q_Y}{\Delta Q_X} = \frac{OA}{OB}$$

As OA = M/P_y (when X=0) and OB = M/P_x (when Y=0), the slope AB can be rewritten as follows:

$$\frac{OA}{OB} = \frac{M/P_Y}{M/P_X} = \frac{P_X}{P_Y}$$

Therefore, it can be inferred that the slope of the budget line is equal to the price ratio of commodities X and Y.

SELF ASSESSMENT QUESTIONS

16. _____ represents various combinations of two commodities, which can be purchased by a consumer at the given income level and market price.

17. A change in the consumer's income or the prices of commodities does not affect the budget line. (True/False)

ACTIVITY

Plot the budget line of total money you spent on stationery in the last two months. How would the budget line shift if you had more money to spend?

4.8 CONSUMER EQUILIBRIUM EFFECTS

Now that you have studied about the indifference curve and budget line, let us analyse consumer equilibrium further. A consumer reaches a state of equilibrium when he/she attains maximum total utility at the given income level and market price of commodities. The ordinal utility approach (which follows the two-commodity model explanation) provides two conditions with respect to consumer equilibrium:

- First order condition
- Second order condition

The first order condition for consumer equilibrium in ordinal utility is the same as that specified through cardinal utility. Therefore,

$$\frac{MUx}{MUy} = \frac{Px}{Py}$$

As $MU_x/MU_y = MRS_{x,y}$, the first order condition in ordinal utility is given as follows:

$$MRS\ x,y = \frac{MUx}{MUy} = \frac{Px}{Py}$$

The second order condition states that the first order condition must be satisfied at the highest IC as shown in Figure 4.10:

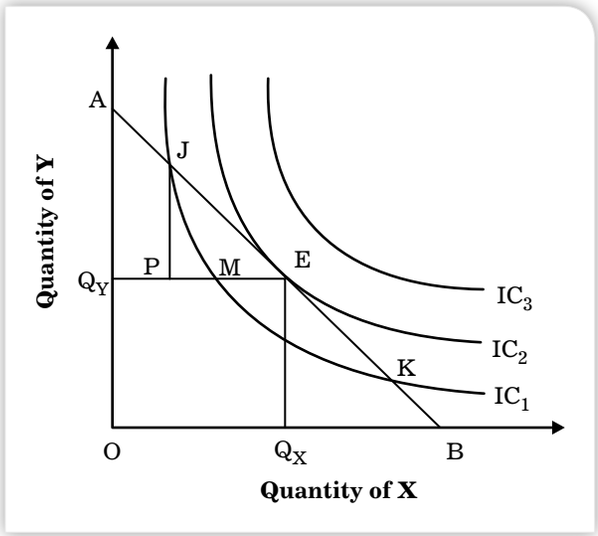

Figure 4.10: Consumer Equilibrium

In Figure 4.10, IC_1, IC_2, and IC_3 represent the hypothetical indifference map of a consumer. AB is the budget line that intersects IC_2 at point E. This implies that the slope of IC_2 and AB are equal. This satisfies both the first order condition and the second order condition. In Figure 4.10, between any two points on an indifference curve, IC_1:

$$\Delta Y.\ MUy = \Delta X.\ MUx$$

Therefore, the slope of the curve would be:

$$\frac{\Delta Y}{\Delta X} = \frac{MUx}{MUy} = MRSy,\ x$$

The slope of budget line is given as:

$$\frac{OA}{OB} = \frac{Px}{Py}$$

At point E where $MRS\,y,x = Px / Py$

Therefore, the consumer is at equilibrium at point E. As the IC_2 curve is tangent to the budget line AB, IC_2 is the highest indifference curve that a consumer can attain at the given income level and market price of commodities. At point E, the consumer consumes quantities OQ_x of X and OQ_y of Y to yield maximum satisfaction. In Figure 4.10, when the consumer is at point J and moves to point M, there is no difference in the satisfaction level at both points that lie on the same curve IC_1. However, as point E is the point of equilibrium, a consumer would tend to reach point E from J or M. The other point to note here is that the indifference curve IC_3 is impossible to reach for the consumer due to budgetary constraints. His/her income does not permit the consumer to purchase any combination of commodities X and Y on indifference curve IC_3.

The above explanation of the consumer equilibrium is based on an assumption that the income of the consumer and the market price of commodities remain unchanged. However, this is not always the case as both income and market price may vary at different time periods. The change in these variables results in an upward or downward shift in the consumer's budget line. The effects of these changes are shown in Figure 4.11:

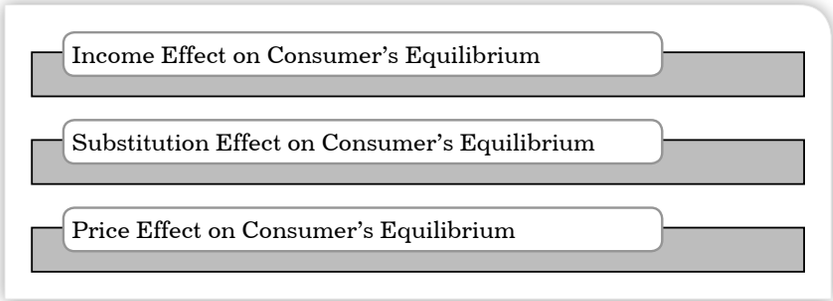

Figure 4.11 Effects on Consumer Equilibrium

Let us discuss these effects in detail in the next sections.

4.8.1 INCOME EFFECT ON CONSUMER EQUILIBRIUM

Income effect on consumer's equilibrium can be defined as the effect caused by changes in consumer's income on his/her purchases while the prices of commodities remain unchanged. Figure 4.12 illustrates the effect of change in the consumer's income on his/her equilibrium:

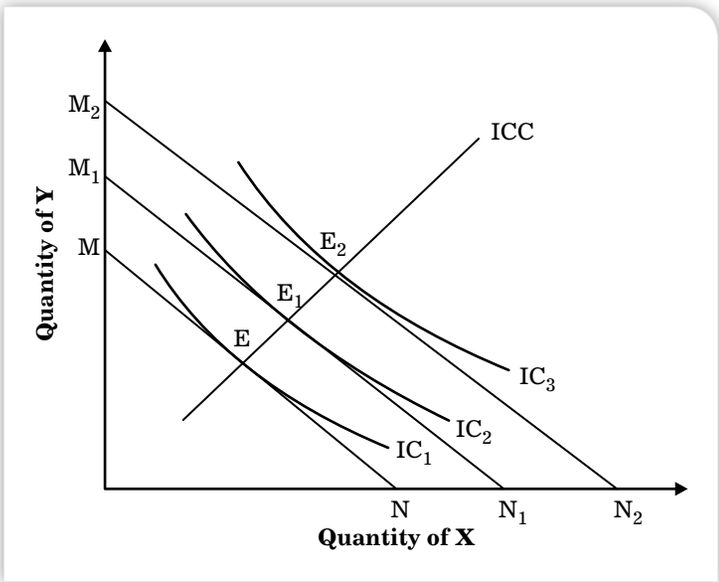

Figure 4.12: Effect of Change in Income on Consumer's Equilibrium

Point E is the original point of consumer's equilibrium. At point E, the indifference curve IC_1 is tangent to the budget line MN. In case the consumer's income increases, the budget line would shift from MN to M_1N_1 and then to M_2N_2. As a result, the point of equilibrium shifts from E to E_1 and then to E_2. The ICC line on the graph represents the **Income Consumption Curve**. The ICC can be obtained by joining all the points of consumer's equilibrium E, E_1 and E_2.

4.8.2 SUBSTITUTION EFFECT ON CONSUMER EQUILIBRIUM

Suppose a consumer's money income is ₹15000. He/she needs to purchase two commodities X and Y. Assume that the price of commodity Y increases and the price of commodity X decreases. In such a case, the consumer would tend to purchase more units of commodity X and fewer units of commodity Y, which implies that the consumer substitutes commodity X for Y. This is known as the substitution effect. The substitution effect occurs because of the following:

The relative prices of commodities change. In such a case, one commodity becomes more affordable than the other.

The income of the consumer remains unchanged. In this case, the consumer needs to substitute commodities in order to satisfy his/her needs.

Let us understand this with the help of Figure 4.13:

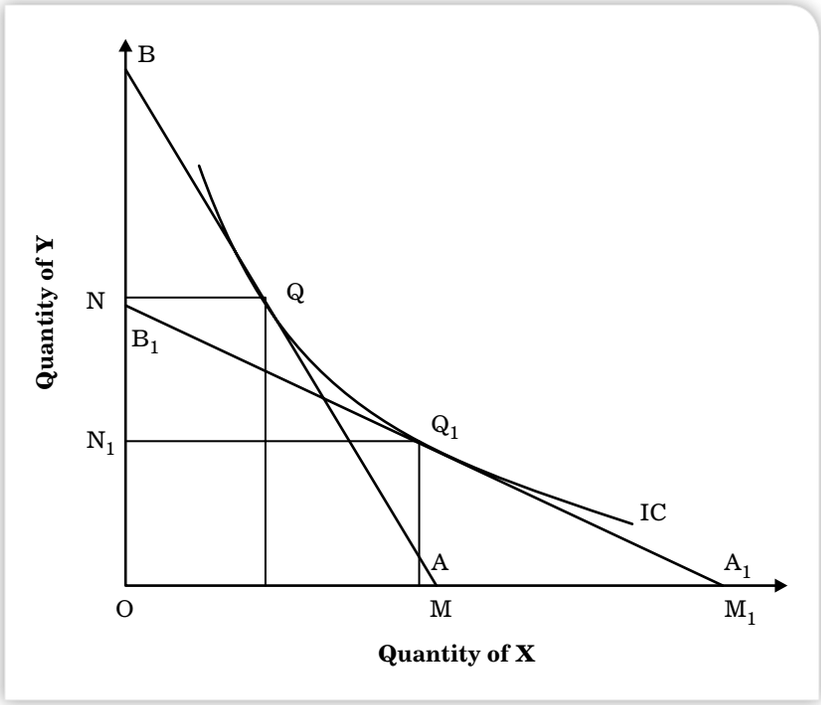

Figure 4.13: Effect of Substitution on Consumer's Equilibrium

Line AB represents the original budget line. Q is the original point of consumer's equilibrium, where AB is tangent to IC. At Q, the consumer purchases OM quantity of commodity X and ON quantity of commodity Y. If the price of commodity Y increases and the price of commodity X decreases, the new budget line would shift to B_1A_1. This new budget line is tangent to IC at Q1. Therefore, the new equilibrium position of the consumer changes to Q_1 from Q when the price of a commodity changes. At Q_1, the consumer cuts down the units of commodity Y from ON to ON_1 and purchases more units of X, OM to OM_1. However, the indifference curve remains the same. This movement along the indifference curve from Q to Q_1 is known as the substitution effect.

4.8.3 PRICE EFFECT ON CONSUMER EQUILIBRIUM

As discussed in the substitution effect, the prices of both the commodities change (P_y increases and P_x decreases). However, while considering the effect of price on consumer equilibrium, the price of only one commodity changes. Therefore, the price effect is the change in the price of any one of the commodities due to which the quantity of commodities or services purchased changes. Assume that the consumer purchases two commodities, X and Y. The price of commodity X decreases while the price of commodity Y and consumer's money income remain constant. Let us understand this with the help of Figure 4.14:

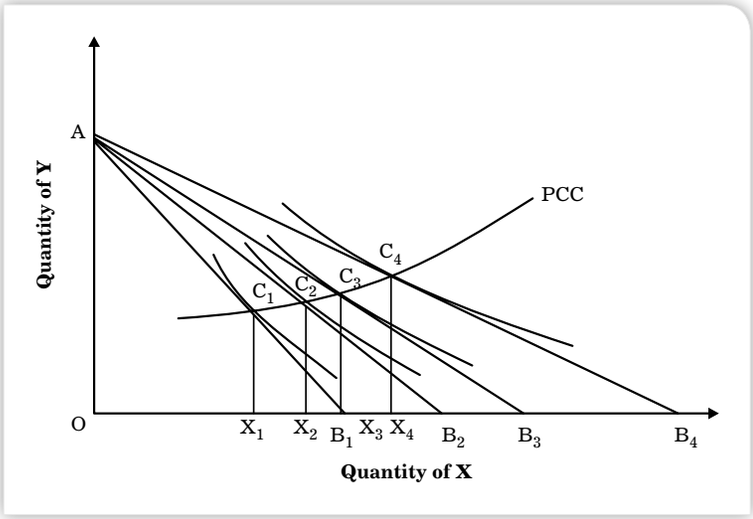

Figure 4.14: Effect of Price on Consumer's Equilibrium

In Figure 4.14, the drop in the price of commodity X is denoted by the corresponding shifts of budget line from AB_1 to AB_2, AB_2 to AB_3 and AB_3 to AB_4. C_1, C_2, C_3, and C_4 represent a shift in consumer's equilibrium. As the price of commodity X decreases, the consumer's real income increases. As a result, the consumer is able to purchase more units of both commodities X and Y. The curve PCC represents the **Price Consumption Curve**, which can be obtained by joining all equilibrium points C_1, C_2, C_3, and C_4.

SELF ASSESSMENT QUESTIONS

18. A consumer reaches a state of equilibrium when he/she attains maximum total utility at the given income level and market price of commodities. (True/False)

19. Which of the following explains the situation where a consumer would tend to purchase more units of commodity X and fewer units of commodity Y?
    a. Price effect on consumer's equilibrium
    b. Substitution effect on consumer's equilibrium
    c. Income effect on consumer's equilibrium

ACTIVITY

Search the Internet to outline the scope of consumer equilibrium.

4.9 REVEALED PREFERENCE THEORY

The revealed preference theory was proposed by an American economist Paul Samuelson in his article 'Consumption Theory in Terms of Revealed Preference' in 1948. The theory states that consumers' preferences can be revealed by the purchases they make under different income and price circumstances. The revealed preference theory gives a more realistic assessment of consumer's behaviour. This theory does not take into account utility approaches or indifference curve to explain consumer behaviour. According to the revealed preference theory, the demand for a commodity by a consumer can be determined by observing the actual behaviour of the consumer with the varied levels of income and market price of commodities. The basic hypothesis of the revealed preference theory is that **'choice reveals preference'**. The theory explains the demand curve on the basis of consumer's behaviour. Let us understand the theory with the help of Figure 4.15:

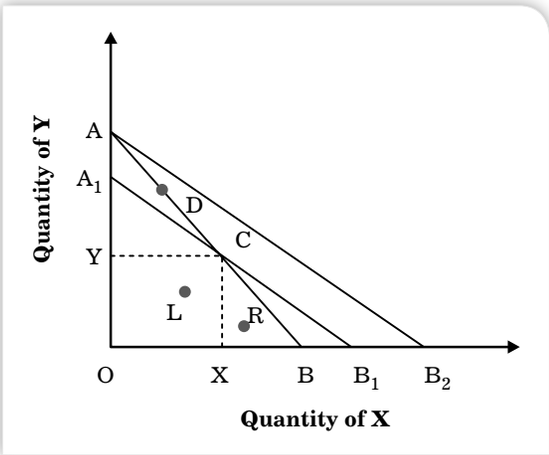

Figure 4.15: Demand Curve by Revealed Preference

In Figure 4.15, AB is the budget line. Therefore, OAB is the feasible set where all points on or below AB can be attained by the consumer with the given income and market price of commodities. Suppose the consumer chooses C of all the possible combinations of commodities X and Y. This implies that the consumer has revealed his/her preference for combination C over all other combinations, which are D, L, and R. There are three main axioms proposed under the revealed preference theory which are listed in Figure 4.16:

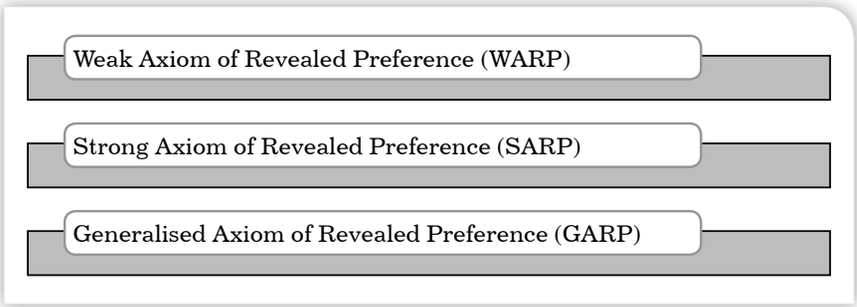

Figure 4.16: Axioms of Revealed Preference Theory

Let us discuss these axioms in detail:

- **Weak Axiom of Revealed Preference (WARP):** As per this axiom, a consumer always makes the same choice while purchasing one commodity instead of the other at the given price and income. The consumer makes a different choice if the other commodity provides more benefit in terms of more affordability or better quality.
- **Strong Axiom of Revealed Preference (SARP):** The SARP applies the concept of transitivity to revealed preferences. This implies that if a consumer chooses commodity A over commodity B and commodity B over commodity C, the consumer would prefer commodity A to commodity C.
- **Generalised Axiom of Revealed Preference (GARP):** This axiom states that more than one combination of two commodities provides the same level of satisfaction to a consumer at a given market price and income level. As per GARP, there is no unique combination of two commodities that provides maximum utility to the consumer.

SELF ASSESSMENT QUESTIONS

20. _____ theory states that consumers' preferences can be revealed by the purchases they make under different income and price circumstances.
21. Give the expanded forms for the following:
    a. WARP: _____
    b. SARP: _____
    c. GARP: _____

NOTES

ACTIVITY

Search the Internet to find basic assumptions on which the theory of revealed preference is based.

4.10 SUMMARY

- Utility can be defined as a measure of satisfaction received by a consumer on the consumption of a good or service.
- Total utility is defined as the sum of the utility derived by a consumer from different units of a commodity or service consumed at a given period of time.
- Marginal utility is defined as the utility derived from the marginal or additional unit of a commodity consumed by an individual.
- The law of diminishing marginal utility states that as the quantity consumed of a commodity continues to increase, the utility obtained from each successive unit goes on diminishing, assuming that the consumption of all other commodities remains the same.
- According to the ordinal utility approach, utility can be measured in relative terms.
- An indifference curve can be defined as the locus of points each representing a different combination of two substitutes, which yield the same level of utility to a consumer.
- Marginal rate of substitution (MRS) refers to the rate at which one commodity can be substituted for another commodity maintaining the same level of satisfaction.
- A budget line represents various combinations of two commodities, which can be purchased by a consumer at the given income level and market price.
- A change in the consumer's income or the prices of commodities would result in a shift in the budget line.
- A consumer reaches a state of equilibrium when he/she attains maximum total utility at the given income level and market price of commodities.
- Income effect on consumer's equilibrium can be defined as the effect caused by changes in consumer's income on his/her purchases while the prices of commodities remain unchanged.
- When a consumer tends to purchase more units of commodity X and fewer units of commodity Y, it is called substitution effect on consumer's equilibrium.
- The revealed preference theory states that consumers' preferences can be revealed by the purchases they make under different income and price circumstances.

KEY WORDS

- **Utility:** It refers to the ability of a good or service to satisfy consumers' needs or wants.
- **Transitivity:** It refers to the property through which preferences are transferred logically. According to this property, if a product A is preferred to product B, and product B is preferred to product C, then product A is also preferred to product C.
- **Homogeneity:** It refers to a state or quality of substances of being similar in composition, characteristics, and state, etc.
- **Consumer equilibrium:** It refers to the point at which a consumer attains optimum utility from goods and services purchased with the given income and market price.
- **Demonstration effect:** It refers to the tendency of people to purchase influence of other people.

4.11 DESCRIPTIVE QUESTIONS

1. Discuss utility as a basis of consumer demand.
2. Describe total utility and marginal utility.
3. Explain the law of diminishing marginal utility.
4. Differentiate between cardinal utility approach and ordinal utility approach.
5. Explain the meaning of indifference curve and list its properties.
6. Explain a shift in budget line due to changes in income and market price.
7. Discuss the effects on consumer equilibrium due to income, price, and substitution effects.
8. Explain the substitution effect on consumer equilibrium.
9. Write a short note on the revealed preference theory.

4.12 ANSWERS AND HINTS

ANSWERS FOR SELF ASSESSMENT QUESTIONS

Topic	Q.No.	Answers
Concept of Consumer Demand	1.	Consumer demand analysis
	2.	a. Decisiveness
		b. Transitivity
		c. Non-satiation

N O T E S

Topic	Q.No.	Answers
Utility as a Basis of Consumer Demand	3.	a. Consumer perspective
		b. Product perspective
	4.	U = f (m1, n1, r1)
	5.	False
	6.	MUx = $(\Delta TU_x)/(\Delta Q_x)$ or MU of nth unit = $TU_n - TU_{n-1}$
Law of Diminishing Marginal Utility	7.	Law of diminishing marginal utility
	8.	1 (d), 2(b), 3(c), 4(a)
Cardinal Utility Approach- Neo Classical Approach	9.	a. Alfred Marshall
	10.	Util
	11.	True
Ordinal Utility Approach – Indifference Curve Analysis	12.	False
	13.	Marginal rate of substitution (MRS)
	14.	False
	15.	Marginal rate of substitution (MRS)
Concept of Budget Line	16.	Budget line
	17.	False
Consumer Equilibrium Effects	18.	True
	19.	b. Substitution effect on consumer's equilibrium
Revealed Preference Theory	20.	Revealed Preference theory
	21.	a. Weak Axiom of Revealed Preference
		b. Strong Axiom of Revealed Preference
		c. Generalised Axiom of Revealed Preference

HINTS FOR DESCRIPTIVE QUESTIONS

1. Utility can be defined as a measure of satisfaction received by a consumer on the consumption of a good or service. Utility is the psychological feeling of satisfaction, happiness, well-being,

etc. that a consumer gains from the consumption or possession of a good. Refer to section **4.3 Utility as a Basis of Consumer Demand**.

2. Total utility is defined as the sum of the utility derived by a consumer from the different units of a commodity or service consumed at a given period of time. Marginal utility is defined as the utility derived from the marginal or additional unit of a commodity consumed by an individual. Refer to section **4.3 Utility as a Basis of Consumer Demand.**

3. The law of diminishing marginal utility states that as the quantity consumed of a commodity continues to increase, the utility obtained from each successive unit goes on diminishing, assuming that the consumption of all other commodities remains the same. Refer to section **4.4 Law of Diminishing Marginal Utility.**

4. According to cardinal utility, utility can be measured in quantitative terms whereas according to the ordinal utility approach, utility can be measured in qualitative or relative terms. Refer to sections **4.5 Cardinal Utility Approach- Neo Classical Approach** and **4.6 Ordinal Utility Approach –Indifference Curve Analysis.**

5. An indifference curve can be defined as the locus of points each representing a different combination of two substitutes, which yield the same level of utility to a consumer. Properties of indifference curve are that ICs are negatively sloped, higher IC represents higher satisfaction level, ICs are convex to the origin, and ICs do not intersect. Refer to section **4.6 Ordinal Utility Approach –Indifference Curve Analysis.**

6. A change in the consumer's income or the prices of commodities results in a change in the budget line. A rise in the consumer's income results in an upward shift in the budget line with an assumption that the prices of commodities remain the same. When the prices of commodities change, the budget line shifts from its original position while income remains unchanged. Refer to section **4.7 Concept of Budget Line.**

7. Income effect on consumer's equilibrium can be defined as the effect caused by changes in consumer's income on his/her purchases while the prices of commodities remain unchanged. When a consumer would tend to purchase more units of commodity X and fewer units of commodity Y, it is called substitution effect on consumer's equilibrium. Price effect is the change in the price of any one of the commodities due to which the quantity of commodities or services purchased changes. Refer to section **4.8 Consumer Equilibrium Effects.**

8. When an individual substitutes one good (good 1) for the other good (good 2) in case of price rise in good 2, it is called substitution

effect on consumer equilibrium. Refer to section **4.8 Consumer Equilibrium Effects**.

9. The Revealed Preference theory states that consumers' preferences can be revealed by the purchases they make under different income and price circumstances. Refer to section **4.9 Revealed Preference Theory.**

4.13 SUGGESTED READING FOR REFERENCE

SUGGESTED READINGS

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5

CHAPTER

ELASTICITY OF DEMAND AND SUPPLY

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INTRODUCTORY CASELET

PRICE ELASTICITY OF MOBILE PHONES IN INDIA

On August 23rd, 1995, the Chief Minister of West Bengal, Jyoti Basu, made India's first call using a mobile phone from Kolkata. Initially, the Indian government charged a high license fee from mobile operators for providing mobile services. For recovering the high license fee, mobile operators charged higher tariff rates from mobile customers. This resulted in a slow growth of the mobile phone industry in India. Moreover, the higher price of handsets further slowed down the growth of the industry.

The cost of an average handset was around ₹ 15,000, while the outgoing and incoming call charges were ₹16/minute and ₹ 8/minute, respectively. Owing to these reasons, a limited number of customers were willing to make use of mobile phones. About 3,000 people possessed mobile phones in 1995–96. In 1999, the Indian government introduced a new telecom policy for revenue sharing in the industry. The government reduced the license fee that resulted in the reduction of call rates by 60%. Moreover, incoming calls ceased to be charged. This led to an increase in the number of mobile subscribers in the successive years. The number of mobile subscribers in India rose from 2 million to 90 million in 1999–2006. Currently, India's telecom industry has more than 1 billion subscribers owing to the reduction in call rates and mobile phones.

LEARNING OBJECTIVES

After completing this chapter, you will be able to:

- Define the concept of elasticity of demand
- State different types of price elasticity
- Measure the price elasticity of demand
- Discuss factors influencing the price elasticity of demand
- Explain the significance of the price elasticity of demand
- Describe the concept of income elasticity of demand
- Elaborate on the concept of cross elasticity of demand
- Discuss the concept of advertisement elasticity of demand
- Explain the concept of elasticity of supply

5.1 INTRODUCTION

In the previous units, you have studied that the demand and supply of a product is affected by many factors. For example, the demand for a product is influenced by changes in the price, changes in related goods, changes in the income level of customers, and so on. On the other hand, the supply of a product is determined by the price of the product, prices of factors of production, technology, etc. However, it is not sufficient for organisations to only be aware of the factors that influence the demand and supply of a product. Organisations need to measure the extent to which these factors affect the demand and supply. **Elasticity** is a measure of how much the quantity demanded or supplied would be affected by a proportionate change in its determinants.

The demand for a product can be elastic or inelastic. Demand is said to be elastic when the quantity demanded for a product changes with a change in any of its determinant. On the other hand, inelastic demand does not change or remains constant with a change in its determinants. The concept of elasticity of demand is of paramount importance for the government of a country to formulate various taxation policies. Moreover, an organisation always considers the elasticity of demand before determining the prices of different products.

Elasticity of supply is a responsiveness of quantity supplied with respect to a change in the price of a product. To put simply, elasticity of supply is a measurement of change in quantity supplied with a certain change in the price of a product. The elasticity of supply is influenced by a number of factors, such as nature of a good, production technology, scale of production, and time period. In this unit, you will study about the concepts of elasticity of demand and supply in detail.

5.2 ELASTICITY OF DEMAND

The concept of elasticity was first introduced by **Dr. Alfred Marshall**, who is regarded as the major contributor of the theory of demand, in his book "Principles of Economics." According to him, "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, and diminishes much or little for a given rise in price." In economics, elasticity can be defined as the responsiveness of a variable (demand or supply) with respect to its various determinants.

The elasticity of demand is a degree of change in the quantity demanded of a product in response to its determinants, such as the price of the product, price of substitutes, and income of consumers. The following are some popular definitions of elasticity of demand:

In the words of **Lipsey,** "Elasticity of demand may be defined as the ratio of percentage change in demand to the percentage change in the price".

According to **Mrs. Jone Robinson,** "The elasticity of demand is the proportionate change of amount purchased in response to a small change in price, divided by the proportionate change in price."

In the words of **Prof. Boulding,** "The elasticity of demand may be defined as the percentage change in the quantity demanded which would result from one percent change in price".

From the above definitions, it can be noted that the elasticity of demand is referred to as a change in quantity demanded of a product with change in its price. However, in a logical sense, the elasticity of demand measures the receptiveness of demand of a product with a change in any of its determinants, such as the price, income of consumers, and availability of substitutes. Therefore, economists have divided the elasticity of demand in three main categories, which are shown in Figure 5.1:

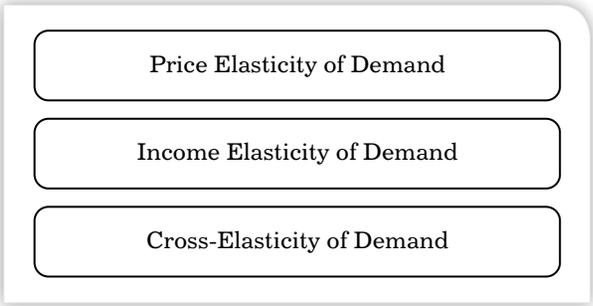

Figure 5.1: Types of Elasticity of Demand

These three types of elasticity of demand are explained in detail in the upcoming sections of the chapter.

SELF ASSESSMENT QUESTIONS

1. "Elasticity of demand may be defined as the ratio of percentage change in demand to the percentage change in the price." – **Identify the speaker of these words**.

   a. Lipsey

   b. Prof. Boulding

   c. Alfred Marshall

   d. Mrs. Jone Robinson

ACTIVITY

Determine the elasticity of demand for cotton in the year 2012-13 in India.

5.3 PRICE ELASTICITY OF DEMAND

Price elasticity of demand is a measure of a change in the quantity demanded of a product due to change in the price of the product in the market. In other words, it can be defined as the ratio of the percentage change in quantity demanded to the percentage change in price. It can be mathematically expressed as:

$$\text{Price elasticity of demand} = \frac{\textit{Proportionate Change in the Quantity Demanded}}{\textit{Proportionate Change in Price}}$$

A percentage change in demand and price is denoted with a symbol Δ.

Thus, the formula for calculating the price elasticity of demand is as follows:

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

Where,

e_p = Price elasticity of demand

P = Initial price

ΔP = Change in price

Q = Initial quantity demanded

ΔQ = Change in quantity demanded

Let us understand the concept of price elasticity of demand with the help of an example.

Example 1: Assume that a business firm sells a product at the price of ₹ 450. The firm has decided to reduce the price of the product to ₹ 350. Consequently, the demand for the product is raised from 25,000 units to 35,000 units. In this case the price elasticity of demand is calculated as follows:

Here,

P = ₹ 450

ΔP = ₹ 100 (a fall in price; ₹ 450 – ₹ 350 = 100)

Q = 25,000 units

ΔQ = 10,000 (35,000 – 25,000)

By substituting these values in the above formula, we get:

$$e_p = \frac{10,000}{100} X \frac{450}{25,000}$$

$$e_p = \frac{45,00,000}{25,00,000}$$

$$e_p = \frac{9}{5}$$

$$e_p = 1.8$$

Thus, elasticity of demand is greater than 1.

SELF ASSESSMENT QUESTIONS

2. _____ is a measure of a change in the quantity demanded for a product due to a change in the price of the product in the market.

ACTIVITY

Using the Internet, find out the demand schedule of petrol in the year 2010-11 in India. Also, calculate the price elasticity of demand of petrol.

5.4 DIFFERENT TYPES OF PRICE ELASTICITY

The extent of responsiveness of demand with change in the price does not remain the same under every situation. The demand for a product can be elastic or inelastic, depending on the rate of change in the de-

mand with respect to change in price of a product. Based on the rate of change, the price elasticity of demand is grouped into five main categories, which are shown in Figure 5.2:

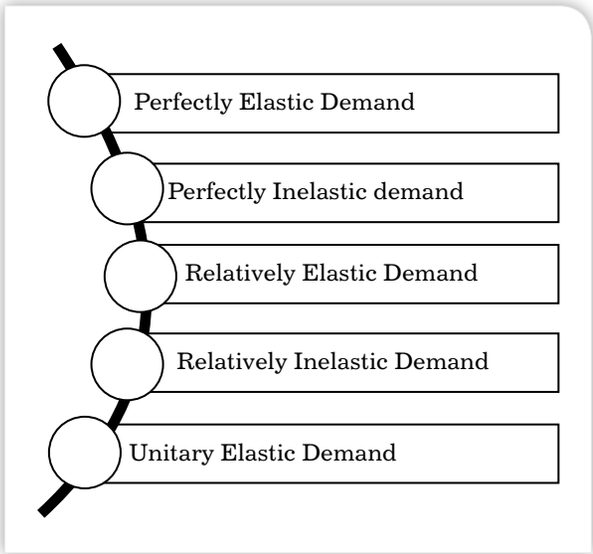

Figure 5.2: Types of Price Elasticity

Let us study about these different types of price elasticity of demand in the next sections.

5.4.1 PERFECTLY ELASTIC DEMAND

When a small change (rise or fall) in the price results in a large change (fall or rise) in the quantity demanded, it is known as **perfectly elastic demand**. Under such type of elasticity of demand, a small rise in price results in a fall in demand to zero, while a small fall in price causes an increase in demand to infinity. In such a case, the demand is perfectly elastic or $=\infty$. Suppose product X is manufactured by a large number of sellers in the market. If a person wants to buy the product X, he could choose among different firms for the purchase. Let's say, firm A increased the price of product X, above market equilibrium. As a result, the demand for the product X for the firm would decrease to a great extent as the same product is available with other sellers too at cheaper prices. Thus, the demand for product X of the firm A is perfectly elastic.

The extent or degree of elasticity of demand defines the shape and slope of the demand curve. Therefore, the elasticity of demand can be determined by the slope of the demand curve. Flatter the slope of the demand curve, higher the elasticity of demand. In perfectly elastic demand, the demand curve is represented as a horizontal straight line (in parallel to X-axis), which is shown in Figure 5.3:

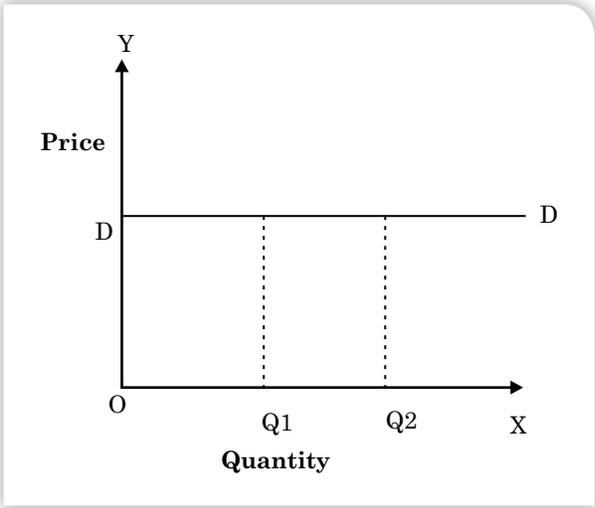

Figure 5.3: Perfectly Elastic Demand

In Figure 5.3, DD is the demand curve. Thus, demand rises from OQ to OQ_1 and so on, if the price remains at OD. A slight fall in price will increase the demand to OX, whereas a slight rise in price will bring demand to zero.

Let us understand perfectly elastic demand with the help of an example.

Example 2: The demand schedule for bread is given below

Price of Bread (₹ per packet)	Quantity Demanded (per month)
23	100
23.04	70

Calculate the price elasticity of demand and determine the type of price elasticity.

Solution:

$P = 23$

$Q = 100$

$P_1 = 23.04$

$Q_1 = 70$

Therefore, change in the price of milk is:

$\Delta P = P_1 - P$

$\Delta P = 23.04 - 23$

$\Delta P = 0.04$

A change of ₹ 0.04 is a negligible change; thus, can be considered as zero.

Similarly, change in quantity demanded of bread is:

$\Delta Q = Q_1 - Q$

$\Delta Q = 70 - 100$

$\Delta Q = -30$

In the above calculation, a change in demand shows a negative sign, which is ignored. This is because price and demand are inversely related which can yield a negative value of demand (or price).

Price elasticity of demand for bread is:

$e_p = \Delta Q / \Delta P \times P / Q$

$e_p = 30/0 \times 23/100$

$e_p = \infty$

The price elasticity of demand for bread is ∞. Therefore, in such a case, the demand for bread is perfectly elastic.

5.4.2 PERFECTLY INELASTIC DEMAND

When a change (rise or fall) in the price of a product does not bring any change (fall or rise) in the quantity demanded, the demand is called perfectly inelastic demand. In this case, the elasticity of demand is zero and represented as $e_p = 0$. Graphically, perfectly inelastic demand curve is represented as a vertical straight line (parallel to Y-axis). Figure 5.4 shows the perfectly inelastic demand curve:

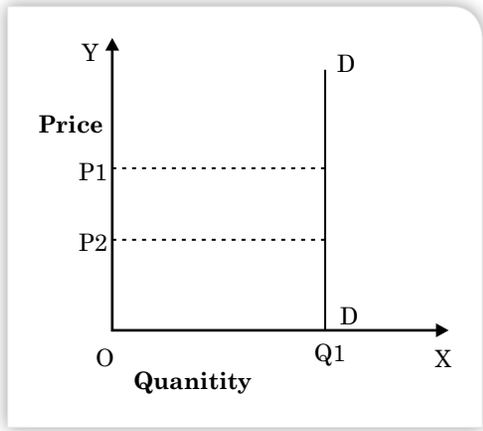

Figure 5.4: Perfectly Inelastic Demand

In Figure 5.4, DD is the demand curve. Thus, it can be observed that even when there is a change in the price from OP_1 to OP_2, quantity demanded remains the same at OQ_1.

Let us understand perfectly inelastic demand with the help of an example.

Example 3: The demand schedule for notebooks is given below

Price of Notebook (₹ per notebook)	Quantity Demanded
40	100
30	100

Calculate the price elasticity of demand and determine the type of price elasticity.

Solution:

$P = 40$

$Q = 100$

$P_1 = 30$

$Q_1 = 100$

Therefore, a change in the price of notebooks is:

$\Delta P = P_1 - P$

$\Delta P = 30 - 40$

$\Delta P = -10$

In the above calculation, the change in price shows a negative sign, which is ignored. This is because price and demand are inversely related which can yield a negative value of price (or demand).

Similarly, a change in quantity demanded of notebooks is:

$\Delta Q = Q_1 - Q$

$\Delta Q = 100 - 100$

$\Delta Q = 0$

Price elasticity of demand for notebook is:

$e_p = \Delta Q / \Delta P \times P / Q$

$e_p = 0/10 \times 40/100$

$e_p = 0$

The price elasticity of demand for notebook is 0. Therefore, in such a case, the demand for notebook is perfectly inelastic.

5.4.3 RELATIVELY ELASTIC DEMAND

When a proportionate or percentage change (fall or rise) in price results in greater than the proportionate or percentage change (rise or fall) in quantity demanded, the demand is said to be **relatively elastic demand**. In other words, a change in demand is greater than

the change in price. Therefore, in this case, elasticity of demand is greater than 1 and represented as $e_p > 1$. The demand curve of relatively elastic demand is gradually sloping, which is shown in Figure 5.5:

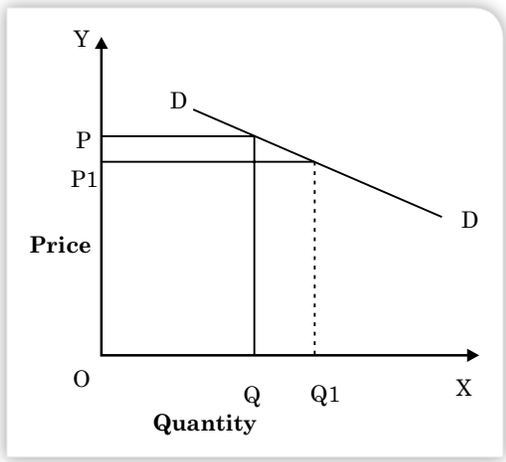

Figure 5.5: Relatively Elastic Demand

In Figure 5.5, DD is the demand curve that slopes gradually down with a fall in price. When price falls from OP to OP_1, demand rises from OQ to OQ_1. However, the rise in demand QQ_1 is greater than the fall in price PP_1.

Let us understand relatively elastic demand with the help of an example.

Example 4: The demand schedule for pens is given below

Price of Pen (₹ per pen)	Quantity Demanded
25	50
20	100

Calculate the price elasticity of demand and determine the type of price elasticity.

Solution:

$P = 25$

$Q = 50$

$P_1 = 20$

$Q_1 = 100$

Therefore, a change in the price of pens is:

$\Delta P = P_1 - P$

$\Delta P = 20 - 25$

$\Delta P = -5$

In the above calculation, a change in price shows a negative sign, which is ignored. This is because price and demand are inversely related which can yield a negative value of price (or demand).

Similarly, a change in quantity demanded of pens is:

$\Delta Q = Q_1 – Q$

$\Delta Q = 100 – 50$

$\Delta Q = 50$

Price elasticity of demand for pens is:

$e_p = \Delta Q / \Delta P * P / Q$

$e_p = 50/5 * 25/50$

$e_p = 5$

The price elasticity of demand for bread is 5, which is greater than one. Therefore, in such a case, the demand for pens is relatively elastic.

5.4.4 RELATIVELY INELASTIC DEMAND

When a percentage or proportionate change (fall or rise) in price results in less than the percentage or proportionate change (rise or fall) in demand, the demand is said to be relatively inelastic demand. In other words, a change in demand is less than the change in price. Therefore, the elasticity of demand is less than 1 and represented as $e_p < 1$. The demand curve of relatively inelastic demand is rapidly sloping, which is shown in Figure 5.6:

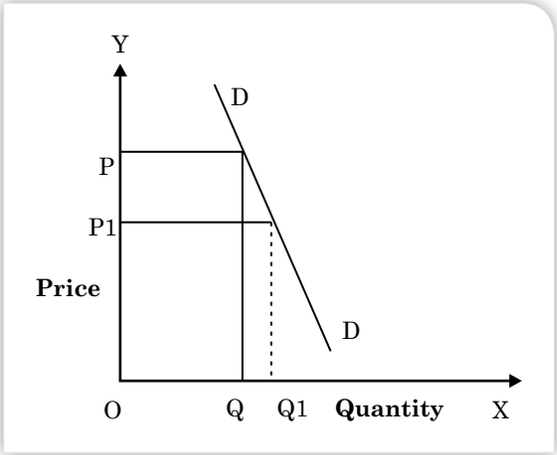

Figure 5.6: Relatively Inelastic Demand

In Figure 5.6, DD is the demand curve that slopes steeply with a fall in price. When price falls from OP to OP_1, the demand rises from OQ to OQ_1. However, the rise in demand QQ_1 is less than the fall in price PP_1.

Let us understand relatively inelastic demand with the help of an example.

Example 5: The demand schedule for milk is given below

Price of Milk(₹ per litre)	Quantity Demanded (litres)
15	90
20	85

Calculate the price elasticity of demand and determine the type of price elasticity.

Solution: P= 15

$Q = 90$

$P_1 = 20$

$Q_1 = 85$

Therefore, a change in the price of milk is:

$\Delta P = P_1 - P$

$\Delta P = 20 - 15$

$\Delta P = 5$

Similarly, a change in quantity demanded of milk is:

$\Delta Q = Q_1 - Q$

$\Delta Q = 85 - 90$

$\Delta Q = -5$

In the above calculation, a change in demand shows a negative sign, which is ignored. This is because price and demand are inversely related which can yield a negative value of demand (or price).

Price elasticity of demand for milk is:

$e_p = \Delta Q/\Delta P \times P/Q$

$e_p = 5/5 \times 15/90$

$e_p = 0.2$

The price elasticity of demand for milk is 0.2, which is less than one. Therefore, in such a case, the demand for milk is relatively inelastic.

5.4.5 UNITARY ELASTIC DEMAND

Unitary elastic demand occurs when a change (rise or fall) in price results in equivalent change (fall or rise) in demand. The numerical value for unitary elastic demand is equal to one, i.e., $e_p = 1$. The demand

curve for unitary elastic demand is a rectangular hyperbola, which is shown in Figure 5.7:

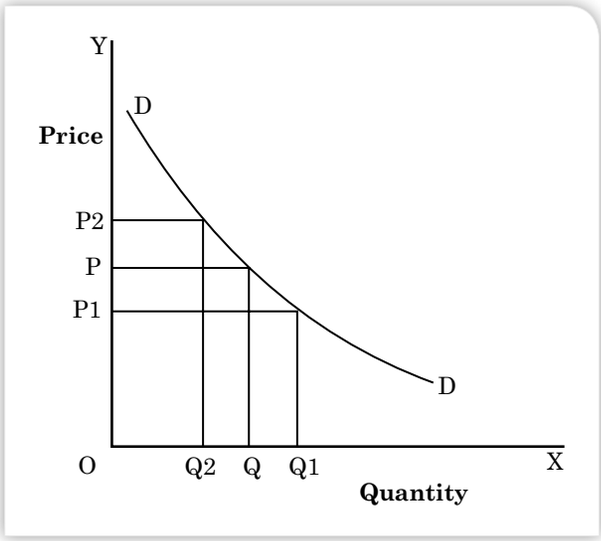

Figure 5.7: Unitary Elastic Demand

In Figure 5.7, DD is the unitary elastic demand curve sloping uniformly from left to the right. Here, the demand falls from OQ to OQ_2 when the price rises from OP to OP_2. On the contrary, when price falls from OP to OP_1, demand rises from OQ to OQ_1.

Let us understand unitary elastic demand with the help of an example

Example 6: The demand schedule for cloth is given as follows:

Price of cloth(₹ per metre)	Quantity Demanded (in metres)
30	100
15	150

Calculate the price elasticity of demand and determine the type of price elasticity.

Solution:

$P = 30$

$Q = 100$

$P_1 = 15$

$Q_1 = 150$

Therefore, change in the price of cloth is:

$\Delta P = P_1 - P$

$\Delta P = 15 - 30$

$\Delta P = -15$

In the above calculation, a change in price shows a negative sign, which is ignored. This is because price and demand are inversely related which can yield a negative value of price (or demand).

Similarly, change in quantity demanded of cloth is:

$\Delta Q = Q_1 - Q$

$\Delta Q = 150 - 100$

$\Delta Q = 50$

Price elasticity of demand for cloth is:

$e_p = \Delta Q / \Delta P \times P / Q$

$e_p = 50/15 \times 30/100$

$e_p = 1$

The price elasticity of demand for cloth is 1. Therefore, in such a case, the demand for milk is unitary elastic.

The different types of price elasticity (mentioned above) are summarised in Table 5.1:

TABLE 5.1: TYPES OF PRICE ELASTICITY OF DEMAND

Numerical Value	Type of Price Elasticity of Demand	Condition
$=\infty$	Perfectly elastic demand	Greater change in demand in response to percentage or smaller change in the price.
$=0$	Perfectly inelastic demand	No change in demand in response to percentage or smaller change in the price.
>1	Relatively elastic demand	A change in demand is greater than the change in price.
<1	Relatively inelastic demand	A change in demand is less than the change in price.
$=1$	Unitary elastic demand	A change in demand is equivalent to change in price.

SELF ASSESSMENT QUESTIONS

3. The extent of responsiveness of demand with a change in the price remains same under every situation. (True/False)
4. When a small change (rise or fall) in the price results in a large change (fall or rise) in the quantity demanded, it is known as _____.
5. In relatively inelastic demand, e_p is _____ than one.
6. Unitary elastic demand occurs when a change (rise or fall) in price results in equivalent change (fall or rise) in demand. (True/False)

ACTIVITY

Consider the following products:

- Tires, tobacco, LPG, home theatres, and antique guns

Determine the price elasticity of demand for these products. In addition, mention the type of elasticity for each of these products.

5.5 MEASUREMENT OF PRICE ELASTICITY

In practical applications, it is not sufficient to determine whether the demand is elastic or inelastic. An organisation needs to estimate the numerical value of change in demand with respect to change in the given price for making various business decisions. The numerical value of elasticity of demand can only be estimated by its measurement. Organisations use various methods for measuring price elasticity of demand. Figure 5.8 shows some commonly used methods of measuring price elasticity of demand:

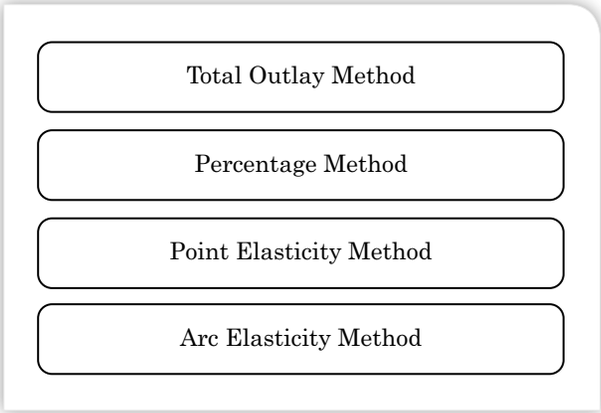

Figure 5.8: Methods for Measuring Price Elasticity

Let us discuss study these methods in detail.

- **Total outlay method:** This method was introduced by Dr. Alfred Marshall. According to this method, the price elasticity of a product is measured on the basis of the total amount of money spent (total expenditure) by consumers on the consumption of that product. Using this method, price elasticity is determined by comparing consumers' expenditure or outlay before change in the price with that of after change in the price. By comparing so, the. In the total outlay method, three cases are considered, which are:
  - If the total outlay remains unchanged after there is a change in the price of the good, the price elasticity equals one ($e_p = 1$).

- When a fall in the price of the good results in a small increase in the quantity demanded leading to a decline in total outlay, the elasticity of demand is less than one ($e_p < 1$).
- When a fall in the price of the good brings a large increase in the quantity demanded resulting in the rise of total expenditure, elasticity of demand is greater than one ($e_p > 1$).

Let us understand the estimation of price elasticity using the total outlay method with the help of an example.

Example 7: The quantity demanded for notebooks at the original price and changed price are given as follows:

Price	15	9	15	9	15	9
Quantity Demanded	30	50	20	25	40	70

Calculate the price elasticity using the total outlay method.

Solution: Table 5.2 shows the calculation of price elasticity of demand using the total outlay method:

TABLE 5.2: ESTIMATION OF PRICE ELASTICITY USING THE TOTAL OUTLAY METHOD

Price (in ₹)		**Quantity Demanded (Q)**		**Total Outlay (P × Q) (in ₹)**		**Price Elasticity of Demand**
Original Price	**New Price**	**Original Quantity**	**New Quantity**	**Original**	**New**	
15	9	30	50	450	450	Here, outlay is equal in both cases; therefore, $e_p = 1$
15	9	20	25	300	225	Here, a change in outlay is less than the original outlay; therefore, $e_p < 1$
15	9	40	70	600	630	Here, a change in outlay is greater than the original outlay; therefore, $e_p > 1$

- **Percentage method**: It is also known as the ratio method. Using this method, a ratio of proportionate change in quantity demanded to the price of the product is calculated to determine the price elasticity. Thus,

$$e_p = \frac{Q_2 - Q_1/Q_1}{P_2 - P_1/P_1}$$

Where,

Q_1 = Original quantity demanded

Q_2 = New quantity demanded

P_1 = Original price

P_2 = New price

Let us understand the calculation of price elasticity of demand through the percentage method.

Example 8: Suppose there is a change in demand of plastic bottles from 700 units to 1000 units as a result of fall of price from ₹ 15 to ₹ 10. Calculate the price elasticity of demand of plastic bottles.

Solution: As per the formula,

$$e_p = \frac{Q_2 - Q_1/Q_1}{P_2 - P_1/P_1}$$

Substituting the values in the formula:

$$e_p = \frac{1000 - 700/700}{10 - 15/15}$$

$$e_p = \frac{60}{-466} = 1.28 = 1.28$$

In this example, the value of the denominator is negative. However, price and demand are inversely related and move in opposing directions. Therefore, the negative sign is ignored. Thus, the elasticity is greater than one ($e_p > 1$).

- **Point elasticity method:** This method is used to measure the elasticity at a specific point on a demand curve. The point elasticity method is also known as geometric method or slope method. In this method, different points are taken on the demand curve to find the price elasticity of demand at different prices. The points at which elasticity is measured are lower and upper segments of the curve.

  Thus, $e_p = \frac{L}{U}$

  Where L is lower segment of the demand curve

U is the upper segment of the demand curve.

The point price elasticity of demand is measured on linear curves and non-linear curves. Let us discuss these two curves:

- **Linear demand curve**: It is a curve where demand is represented as a straight line. Let us understand how to calculate price elasticity using the linear demand curve with the help of an example.

  Example 9: Consider the curve in Figure 5.9:

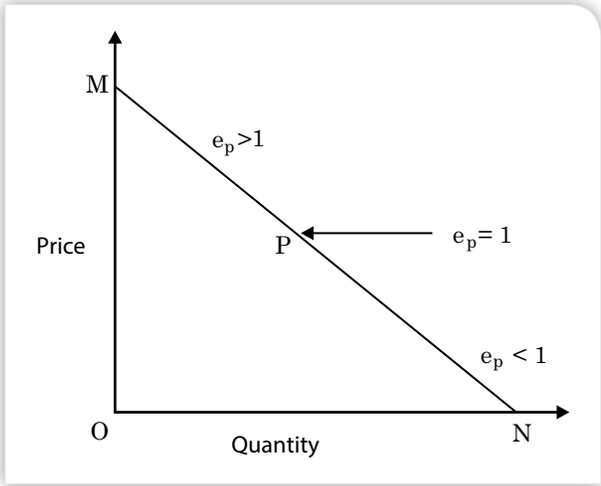

Figure 5.9: Linear Demand Curve

Assume that Figure 5.9 is drawn to scale if MP is greater than NP i.e. MP = 10 cms and NP = 8 cms. Calculate the point elasticity at the point P.

Solution: In Figure 5.9, MN is the demand curve. The elasticity at the point P can be measured as:

$$e_p = \frac{L}{U},$$

Here L= NP = 8 cms,

U= MP = 10 cms,

Substituting the values in the formula

$e_p = 8/10$

$e_p = 0.8$

Thus, e is 0.8 which is less than one ($e_p < 1$).

- **Non-linear demand curve:** In this curve, a tangent is drawn that touches point P (price elasticity) at the demand curve. By drawing the tangent, the curve is separated into two parts, namely the upper segment and the lower segment. Let us understand the calculation of price elasticity on a non-linear demand curve.

  Example 10: Consider the curve in Figure 5.10:

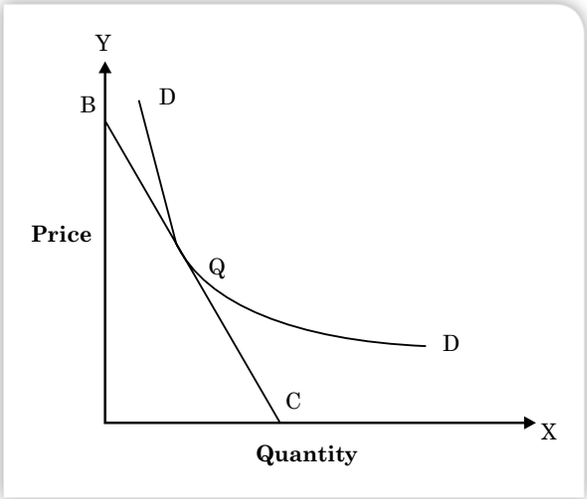

Figure 5.10: Non-Linear Demand Curve

In Figure 5.10, DD is a demand curve, and tangent BC meets DD at the point Q dividing into two parts AQ and QB. Assume, QC = 15 and QB = 10.

As per the formula,

$e_p = \frac{L}{U}$,

$e_{p =}$ QC/BQ

Substituting the values in the formula we get,

$e_p = 15/10 = 1.5$

Here, e is 1.5, thus greater than one ($e_p > 1$).

- **Arc elasticity method:** This method is used to calculate the elasticity of demand at the midpoint of an arc on the demand curve. In this method, the average of prices and quantities are calculated for finding elasticity. It is assumed that the elasticity would be same over a range of values of variables considered. The formula of the arc elasticity method is:

$$e_p = \frac{\Delta Q}{\Delta P} \times \frac{P + P_1}{Q + Q_1}$$

Where,

ΔQ is change in quantity ($Q_1 - Q$)

ΔP is change in price ($P_1 - P$)

Q is original quantity demanded

Q_1 is new quantity demanded

P is original price

P_1 is the new price

NOTES

Let us understand how to calculate price elasticity using the non-linear demand curve with the help of an example.

Example 11: Assume that at the price of ₹50, the demand for the product is 200 units. If the price of the product increases to ₹80, the demand decreases to 150 units. Calculate the price elasticity.

Solution: Given that

$P = ₹50$

$P_1 = ₹80$

$Q = 200$

$Q_1 = 150$

$$e_p = \frac{\Delta Q}{\Delta P} \times \frac{P + P_1}{Q + Q_1}$$

$$e_p = \frac{80 - 50}{150 - 200} \times \frac{80 + 50}{200 + 150}$$

Substituting the values in the formula, we get:

$$e_p = \frac{30}{-50} \times \frac{130}{350} = 0.6$$

As price and demand are inversely related and move in opposing directions. Therefore, the negative sign is ignored. Thus, the price elasticity of demand is less than one ($e_p < 1$).

SELF ASSESSMENT QUESTIONS

7. Which of the following method is not used for measuring the price elasticity of demand?
   a. Total outlay method
   b. Point method
   c. Arc method
   d. Division method
8. In the total outlay method, if the total outlay remains unchanged after there is a change in the price of the good, the price elasticity equals one ($e_p > 1$). (True/False)
9. Name the method that is used to measure the elasticity at a specific point on a demand curve.
10. The arc elasticity method is used to calculate the elasticity of demand at the _____ of an arc on the demand curve.

ACTIVITY

Suppose there is a change in the demand of toothpicks from 2000 units to 3000 units as a result of fall of price from ₹ 20 to ₹ 15. Calculate the price elasticity of demand of toothpicks using the ratio method.

5.6 FACTORS INFLUENCING PRICE ELASTICITY OF DEMAND

As discussed earlier, the price elasticity of demand of a product reflects the change in the quantity demanded as a result of a change in price. However, the price elasticity differs for different products as it depends on various factors. Some of these factors are listed in Figure 5.11:

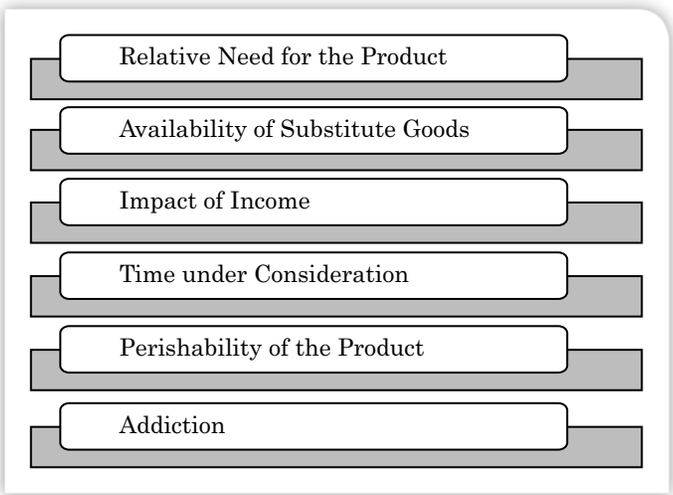

Figure 5.11: Factors Influencing Price Elasticity of Demand

Let us study about these factors in detail.

- **Relative need for the product**: The need of every individual is not the same for the same product. A product that is luxury for an individual may be a necessity for another person. For example, a laptop may be a luxury product for an ordinary individual, while a necessity for a computer engineer. Thus, price elasticity differs across people due to their different needs.
- **Availability of substitute goods**: As discussed in the previous chapters, the availability of substitutes has major impact on the demand for a product. If substitutes are easily available at relatively low prices, the demand for the product would be more elastic and vice versa. For example, if the price of tea rises, people may opt for coffee.

NOTES

- **Impact of income**: The amount of income that consumers spend on purchasing a particular product also influences the price elasticity of demand. If consumers spend a large sum on a product, the demand for the product would be elastic. For example, if the price of salt is raised by 50%, the demand would still be inelastic as consumers would keep on purchasing. Conversely, if the price of a home theatre system is raised by 25%, the demand for the system would be more elastic.
- **Time under consideration**: It majorly influences the price elasticity of demand. Demand for a product remains inelastic in the short run due to failure to postpone demand. For example, if the price of electricity goes up, people may find it difficult to cut its consumption; thus, the demand would remain less elastic. However, in case of a continuous increase in the price, people would gradually reduce the consumption of electricity by finding various ways, such as using CFL bulbs. In such a case, the demand would be more elastic.
- **Perishability of the product**: If products are perishable in nature, the demand for such products would be inelastic as their consumption cannot be postponed. For example, if the prices of vegetables that are used regularly are raised, the consumption would not decrease. Thus, the demand would be inelastic. Similarly, if products such as medicines are to be used in an emergency, the demand for them would not decrease.
- **Addiction:** Some products, such as cigarettes and other tobacco-based products, have inelastic demand. For instance, smokers may be willing to pay extra for cigarettes even in case of a price rise. Thus, the demand would remain the same.

SELF ASSESSMENT QUESTIONS

11. The need of every individual is same for the same product. (True/False)
12. If consumers spend a large sum on a product, the demand for the product would be _____.

ACTIVITY

Make a group of four friends and discuss how the addiction of coffee would impact the price elasticity of demand for coffee.

5.7 SIGNIFICANCE OF PRICE ELASTICITY OF DEMAND

The concept of price elasticity of demand plays a vital role in the functioning economies by having a significant contribution in the field of

industry, trade, and commerce. Not only this, it helps organisations in analysing economic problems and making appropriate business decisions. Figure 5.12 shows the significance of price elasticity of demand:

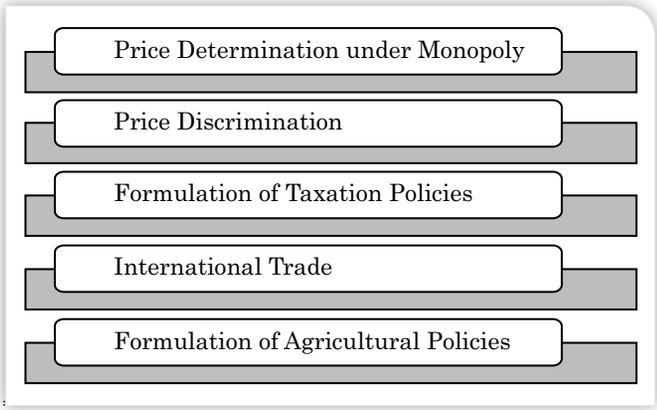

Figure 5.12: Significance of Price Elasticity of Demand

Let us discuss the importance of price elasticity of demand in detail.

- **Price determination**: The concept of price elasticity of demand is used by organisations in determining prices under various situations. For instance, under monopolistic market conditions, an organisation sets a low price per unit of the product in case of elastic demand. As a result, the demand for the product rises. On the other hand, when the demand for the product is inelastic, the price is set very high. This helps in generating large revenues for organisations due to the high price of a product while demand remains constant.
- **Price discrimination**: This is another area where price elasticity of demand plays an important role. Price discrimination refers to charging different prices from various customers for the same product. The common example of price variation is petrol. Its demand is inelastic as the change in the price does not affect the consumption. Thus, the price of petrol is charged differently in different states of India.
- **Formulation of taxation policies:** Government takes under consideration the price elasticity of demand before formulating taxation policies. Generally, government levies high taxes on products (for producers) whose demand is elastic. On the contrary, it levies high taxes on products (for customers) having inelastic demand as the consumption remains unaffected.
- **International trade:** The concept of price elasticity has a significant role in international trade. This is because successful trade transactions between two countries are dependent on the price elasticity of demand. This is because price elasticity of demand is used in deciding the level of imports and exports. For instance, if

the demand for the product is inelastic in the international market, the seller country will have an upper hand in exports.

- **Formulation of agricultural policies**: The price elasticity of demand also helps the government in formulating agricultural policies by providing insight into the paradox of poverty. The prices of farm products whose demand is inelastic fall due to large supplies as a result of bumper crops. This results in a fall in prices, which leads to low income for farmers. Consequently, poverty among farmers increases. Thus, government sets a minimum suitable price for inelastic farm products so that farmers can generate adequate revenues.

SELF ASSESSMENT QUESTIONS

13. Under _____ market conditions, an organisation sets a low price per unit of the product in the case of elastic demand.
    a. Monopolistic
    b. Duopolistic
    c. Oligopolistic
    d. Perfectly competitive
14. _____ refers to charging different prices from various customers for the same product.
15. Government levies high taxes on products (for producers) whose demand is elastic. (True/False)

ACTIVITY

Using the Internet, find out how the concept of price elasticity of demand helps the government in deciding the export level of sugarcane in India.

5.8 INCOME ELASTICITY OF DEMAND

Similar to the price, the income of consumers is also an important determinant of the demand for the product. An increase in the income of consumers increases the demand for the product even if the price remains constant. The responsiveness of quantity demanded with respect to the income of consumers is called the income elasticity of demand. The following are some important popular definitions of income elasticity of demand:

In the words of **Watson**, "Income elasticity of demand means the ratio of the percentage change in the quantity demanded to the percentage in income."

According to **Richard G. Lipsey**, "*The responsiveness of demand to change in income is termed as income elasticity of demand.*"

Mathematically, the income elasticity of demand can be stated as:

$$e_{y=} \frac{\text{Percentage change in quantity demanded}}{\text{Percentage change in income}}$$

Where,

Percentage change in quantity demanded =

$$\frac{New\ quantity\ demanded - \text{Original Quantitiy demanded}(\Delta Q)}{Original\ quantity\ demanded(Q)}$$

Percentage change in income =

$$\frac{New\ income - Original\ income(\Delta Y)}{Original\ income(Y)}$$

Thus, the formula for calculating the price elasticity of demand is as follows:

$$e_y = \frac{\Delta Q}{\Delta Y} \times \frac{Y}{Q}$$

Where

Q is original quantity demanded

Q_1 is new quantity demanded

$\Delta Q = Q_1 - Q$

Y is original income

Y_1 is new income

$\Delta Y = Y_1 - Y$

Let us understand the concept of income elasticity of demand with the help of an example.

Example 12: Suppose the monthly income of an individual increases from ₹ 5,000 to ₹ 15,000. Now, his demand for clothes increases from 35 units to 70 units. Calculate the income elasticity of demand.

Solution: Given that:

$Y = ₹\ 5{,}000$

$Y_1 = ₹\ 15{,}000$

$\Delta Y = 15{,}000\text{-}5{,}000 = 10{,}000$

$Q = 35$ units

$Q_1 = 70$ units

$\Delta Q = 70 - 35 = 35$

The formula for calculating the income elasticity of demand is:

$$e_y = \frac{\Delta Q}{\Delta Y} \times \frac{Y}{Q}$$

Substituting the values,

$$e_y = \frac{35}{10,000} \times \frac{5000}{35} = 0.5 \ (< 1)$$

5.8.1 TYPES OF INCOME ELASTICITY OF DEMAND

Similar to the price elasticity of demand, the degree of responsiveness of demand with change in consumer's income is not always the same. The income elasticity of demand varies for different products and under different situations. On the basis of numerical value, income elasticity of demand is classified into three groups, which are explained as follows:

- **Positive income elasticity of demand:** When a proportionate change in the income of a consumer increases the demand for a product and vice versa, income elasticity of demand is said to be positive. In case of normal goods, the income elasticity of demand is generally found positive, which is shown in Figure 5.13:

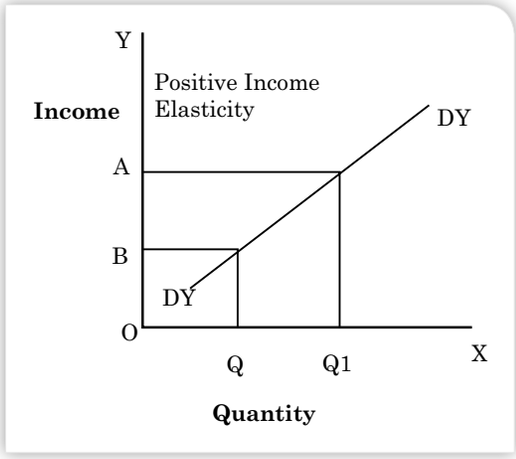

Figure 5.13: Positive Income Elasticity of Demand

- In Figure 5.13, DYDY is the curve representing positive income elasticity of demand. The curve is sloping upwards from left to the right, which shows an increase in demand (OQ to OQ_1) as a result of rise in income (OB to OA).
- There are three types of positive income elasticity of demand, namely unitary income elasticity of demand, less than unitary income elasticity of demand, and more than income elasticity of demand. Let us discuss them as follows:
  - **Unitary income elasticity of demand**: The income elasticity of demand is said to be unitary when a proportionate change in a

consumer's income results in an equal change in the demand (increase) for a product. For example, if there is 25% increase in the income of a consumer, the demand for milk consumption would also be increased by 25%. Thus $e_y = 25/25 = 1$.

- **Less than unitary income elasticity of demand:** The income elasticity of demand is said to be less than unitary when a proportionate change in a consumer's income causes comparatively less increase in the demand for a product. For example, if there is an increase of 25% in consumer's income, the demand for milk is increased by only 10%. Thus $e_y = 10/100 = 0.1 < 1$
- **More than unitary income elasticity of demand:** The income elasticity of demand is said to be more than unitary when a proportionate change in a consumer's income causes a comparatively large increase in the demand for a product. For example, if there is an increase of 25% in consumer's income, the demand for milk is increased by only 35%. Thus $e_y = 35/25 = 1.4 > 1$.

- **Negative income elasticity of demand:** When a proportionate change in the income of a consumer results in a fall in the demand for a product and vice versa, the income elasticity of demand is said to be positive. It generally happens in case of inferior goods. For example, consumers may prefer small cars with a limited income. However, with a rise in income, they may prefer using luxury cars.

NOTE

Goods are not inferior or superior rather the inferiority or superiority of goods is decided by consumers based on their income level, perceptions, and preferences.

Figure 5.14 shows the negative income elasticity of demand:

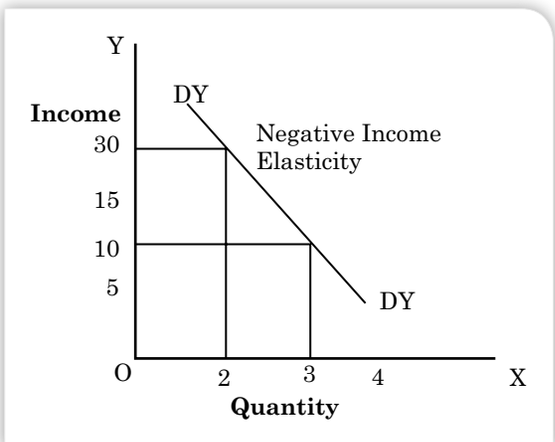

Figure 5.14: Negative Income Elasticity of Demand

In Figure 5.14, DYDY is the curve representing negative income elasticity of demand. The curve is sloping downwards from left to the right, which shows a decrease in the demand as a result of a rise in income. As shown in Figure 5.14, with a rise of income from 10 to 30, the demand falls from 3 to 2.

- **Zero income elasticity of demand**: When a proportionate change in the income of a consumer does not bring any change in the demand for a product, income elasticity of demand is said to be zero. It generally occurs for utility goods such as salt, kerosene, electricity. Figure 5.15 shows the zero income elasticity of demand:

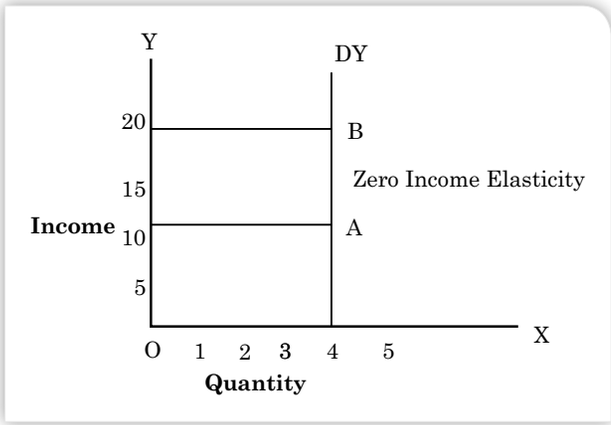

Figure 5.15: Zero Income Elasticity

In Figure 5.15, DYDY is the curve representing zero income elasticity of demand. The curve is parallel to Y-axis that shows no change in the demand as a result of a rise in income. As shown in Figure 5.14, with a rise of income from 10 to 20, the demand remains the same i.e. 4.

5.8.2 FACTORS INFLUENCING INCOME ELASTICITY OF DEMAND

As discussed earlier, the income elasticity of demand for a product reflects the change in the quantity demanded as a result of change in consumer's income. However, the income elasticity differs for different products as it depends on various factors. Some of these factors are listed in Figure 5.16:

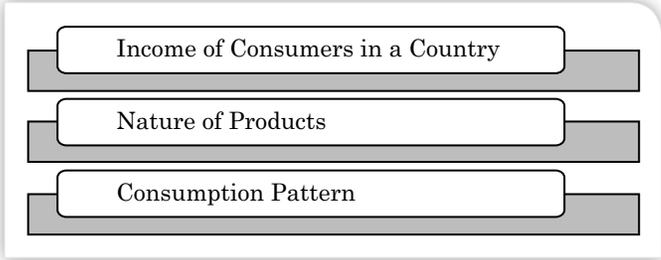

Figure 5.16: Factors Influencing Income Elasticity of Demand

Let us discuss these factors in detail.

- **Income of consumers in a country**: In any country, the income level of consumers is not the same. Therefore, consumers spend on the basis of not only on their need but also their purchasing capacity. The purchasing capacity of consumers increases with a rise in their income. For example, a consumer with a low income may prefer using public transport for commuting. However, with a rise in income, he/she may buy a two wheeler for the same purpose.
- **Nature of products**: The nature of products being consumed by consumers also has an important influence on income elasticity. For example, basic goods used on a day to day basis, such as salt, sugar, and cooking oil, is elastic. Even with a rise in the income of a consumer, the demand for such products does not change and remain inelastic.
- **Consumption pattern**: With a rise in income, people quickly change their consumption patterns. For example, people may start buying high priced products with an increase in their income. This leads to an increase in the demand for the products in the market. However, once the consumption pattern is established, it becomes difficult to lower the demand in case of decrease in income. For example, a consumer may buy a two wheeler that runs on petrol as a result of rise in his/her income. However, over a period of time, in case his/her income falls, it will be difficult for him to reduce the consumption of petrol.

Moreover, the concept of income elasticity of demand helps sellers to make investment decisions. Generally, sellers prefer to invest in industries where the demand for products is more with respect to a proportionate change in the income or where the income elasticity of demand is greater than zero (>1). For example, the demand for durable goods, such as vehicles, furniture, and electrical appliances, increases in response to increase in income. In such industries, sellers earn high profits when there is an increase in national income. In addition, by calculating the income elasticity of demand, organisations can anticipate the demand for goods in the future. If a change in income is certain, there would be a major change in the demand for goods. Apart from this, the income elasticity of demand also helps sellers to decide the income group of customers to whom the goods should target.

SELF ASSESSMENT QUESTIONS

16. An increase in the income of consumers increases the demand for the product even if the price remains constant. (True/False)

17. $\frac{\text{Percentage change in quantity demanded}}{\text{Percentage change in income}} = ?$

18. When a proportionate change in the income of a consumer increases the demand for a product and vice versa, the income elasticity of demand is said to be _____
19. Which of the following is not a type of positive income elasticity of demand?
    a. Unitary
    b. Less than unitary
    c. More than unitary
    d. Zero
20. Even with a rise in the income of a consumer, the demand for basic products does not change and remain inelastic. (True/False)

ACTIVITY

Using various sources, find out the consumption pattern of Amul butter in India in the year 2011.

5.9 CROSS ELASTICITY OF DEMAND

The cross elasticity of demand can be defined as a measure of a proportionate change in the demand for goods as a result of change in the price of related goods. In the words of **Ferguson**, "*The cross elasticity of demand is the proportional change in the quantity demanded of good X divided by the proportional change in the price of the related good Y.*" The cross elasticity of demand can be measured as:

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

Where,

Percentage change in quantity demanded of X=

$$\frac{Change\ in\ demand\ for\ X}{Original\ demand\ for\ X} = \frac{\Delta Q_X}{Q_X}$$

Percentage change in price of Y=

$$\frac{Change\ in\ price\ for\ Y}{Original\ price\ for\ Y} = \frac{\Delta P_Y}{P_Y}$$

Thus, mathematically, the cross elasticity of demand is stated as:

$$e_c = \frac{\Delta Q_X}{\Delta P_Y} \times \frac{P_Y}{Q_X}$$

Here,

e_c is the cross elasticity of demand

Q_X = Original quantity demanded of product X

ΔQ_X = Change in quantity demanded of product X

P_Y = Original price of product Y

ΔP_Y = Change in the price of product Y

Let us understand the concept of cross elasticity of demand with the help of an example.

Example 13: Assume that the quantity demanded for detergent cakes has increased from 500 units to 600 units with an increase in the price of detergent powder from ₹150 to ₹200. Calculate the cross elasticity of demand between two products.

Solution: Given that

X = Detergent cakes

Y = Detergent powders

$Q_X = 500$

$\Delta Q_X = 100(600\text{-}500)$

$P_Y = 150$

$\Delta P_Y = 50$

The formula for calculating the cross elasticity of demand is:

$$e_c = \frac{\Delta Q_X}{\Delta P_Y} \times \frac{P_Y}{Q_X}$$

By substituting the given values in the formula, we get

$$e_c = \frac{100}{50} \times \frac{150}{500} = 0.6$$

Cross elasticity of demand can be categorised into three types, which are as follows:

- **Positive cross elasticity of demand**: When an increase in the price of a related product results in an increase in the demand for the main product and vice versa, the cross elasticity of demand is said to be positive. Cross-elasticity of demand is positive in case of substitute goods. For example, the quantity demanded for tea has increased from 200 units to 300 units with an increase in the price of coffee from ₹ 25 to ₹ 30. In this case, the cross elasticity would be:

  $e_c = \Delta Q_X / \Delta P_Y \times P_Y / Q_X$

  Where

  P_Y = ₹ 25

  $Q_X = 200$

  $\Delta Q_X = Q_{X1} - Q_X = 300 - 200 = 100$ units

  Similarly, $\Delta P_Y = P_{Y1} - P_Y$ = ₹ 30 – ₹ 25 = ₹ 5.

NOTES

Substituting the values in the formula:

$e_c = 100/5 \times 25/200 = 2.5 > 1.$

Here, the cross elasticity is positive.

- **Negative cross elasticity of demand:** When an increase in the price of a related product results in the decrease of the demand of the main product and vice versa, the negative elasticity of demand is said to be negative. In complementary goods, cross elasticity of goods is negative. For example, if the price of butter is increased from ₹ 20 to ₹ 25, the demand for bread is decreased from 200 units to 125 units. In such a case, cross elasticity will be calculated as:

  $e_c = \Delta Q_X / \Delta P_Y \times P_Y / Q_X$

  Where,

  $P_Y = ₹ 20$

  $Q_X = 200$ units

  $\Delta Q_X = Q_{X1} - Q_X = 125 - 200 = -75$ units

  Similarly, $\Delta P_Y = P_{Y1} - P_Y = ₹25 - ₹20 = ₹ 5$

  Substituting the values in the formula,

  $e_c = -75/5 \times 20/200 = -1.5 < 1$

  Thus, cross elasticity is negative.

- **Zero cross elasticity of demand:** When a proportionate change in the price of a related product does not bring any change in the demand for the main product, the negative elasticity of demand is said to be negative. In simple words, cross elasticity is zero in case of independent goods. In this case, e_c becomes zero.

By studying the concept of cross elasticity of demand, organisations can forecast the effect of change in the price of a good on the demand for its substitutes and complementary goods. Thus, it helps organisations in making pricing decisions by determining the expected change in the demand for its substitutes and complementary goods. Moreover, it helps an organisation to anticipate the degree of competition in the market.

SELF ASSESSMENT QUESTIONS

21. _____ can be defined as a measure of a proportionate change in the demand for goods as a result of change in the price of related goods.
22. The cross-elasticity of demand is positive in case of complementary goods. (True/False)
23. Cross elasticity helps organisations in making _____ by determining the expected change in the demand for its substitutes and complementary goods

ACTIVITY

Find the type of cross elasticity of demand for the following products:

- Computer hardware and computer software
- DVD players and DVDs
- Diesel and petrol
- Mobile and apparel

5.10 ADVERTISEMENT ELASTICITY OF DEMAND

Every organisation spends a certain amount on advertisement and other promotional activities with an aim to create awareness among customers and boost sales. The effectiveness of elasticity of demand decides the sales of an organisation. Thus, is it important for the organisation to determine how advertisements affect its sales. The advertisement elasticity of demand is a degree of responsiveness of a change in the sales of a product with respect to a proportionate change in advertisement expenditure.

By measuring the advertisement elasticity of demand, an organisation can determine optimum level of advertisement expenditure under various situations, such as government's restrictions on the cost of advertisement and high competition. The advertisement elasticity (e_A) can be calculated using the following formula:

$$e_A = \frac{Percentage\ \ Change\ \ in\ \ quantity\ \ demanded}{Percentage\ \ Change\ \ in\ \ advertisement\ \ cost}$$

Mathematically, advertisement elasticity (e_A) can be expressed as:

$$e_A = \frac{\Delta Q}{\Delta A} \times \frac{Q}{A}$$

Where

$\Delta Q = Q_1 - Q$

$\Delta A = A_1 - A$

Q is the original quantity demanded

Q_1 is the new quantity demanded

A is the original advertisement cost

A_1 is the new advertisement cost

Example 14: Suppose the advertisement expenditure of an organisation increases from ₹ 25,000 to ₹ 60,000. Consequently, the demand of

the organisation's products increases from 40,000 units to 70,000 units. Calculate the advertisement elasticity of demand.

Solution: Here,

$\Delta D = 70000 - 40000 = 30000$ units

$\Delta A = ₹\ 60{,}000 - ₹\ 25{,}000 = ₹\ 35{,}000$

The formula for calculating the advertisement elasticity of demand is:

$$e_A = \frac{\Delta D}{\Delta A} \times \frac{D}{A}$$

Substituting the values in the formula

$$e_A = \frac{30000}{35000} \times \frac{40000}{25000} = 1.2 \ (\text{greater than one})$$

The advertisement elasticity of demand ranges from $e_A = 0$ and $e_A = \infty$, which is shown in Table 5.3:

TABLE 5.3: CONDITIONS OF ADVERTISEMENT ELASTICITY OF DEMAND

Numerical Value of Advertisement Elasticity of demand	Description
$e_A = 0$	When a proportionate change in advertisement expenditure does not result in any proportionate change in the demand of an organisation.
$e_A > 0$ but < 1	When a proportionate change in advertisement expenditure results in a comparatively less proportionate change in the total demand for products.
$e_A = 1$	When a proportionate change in advertisement expenditure results in an equal proportionate change in total demand for products.
$e_A > 1$	When a proportionate change in advertisement expenditure results in a comparatively higher proportionate change in the total demand for products.

The concept of advertisement elasticity of demand is an important aspect especially while making decisions related to promotional activities. The advertisement elasticity of demand is influenced by a number of factors. Some of these factors are explained as follows:

- **Product launch**: Generally, at the time of a new product launch in the market, the advertisement elasticity of demand is greater than unity. This is because at that time the aim of the advertisement is to create awareness of the product among customers. After the sales goes up, the advertisement elasticity of demand decreases. On the contrary, once the product is well-established in the market, the aim behind advertising is to attract new customers and create additional demand. In this case, the advertisement expenditure increases while an increase in demand is less.

- **Advertisement by competitors**: Advertisement elasticity of demand is influenced by advertisements being produced in the market by competitors. In a highly competitive market structure, the effectiveness of the advertisement of an organisation is determined by the amount spent and effectiveness of advertisements of its competitors.

SELF ASSESSMENT QUESTIONS

24. The advertisement elasticity of demand is a degree of responsiveness of a change in the sales of a product with respect to a proportionate change in _____.
25. At the time of a new product launch in the market, the advertisement elasticity of demand is greater than _____.
26. When a proportionate change in advertisement expenditure results in an equal proportionate change in the total sales of an organisation,
    a. $e_A = 0$
    b. $e_A = 1$
    c. $e_A > 1$
    d. $e_A > 0$ but < 1

ACTIVITY

Recall the products whose advertisements prompted you to buy those products. Find out the advertisement elasticity of demand for those products.

5.11 ELASTICITY OF SUPPLY

As discussed in the previous chapters, the law of supply states that the quantity supplied of a product increases with a rise in the price of the product and vice versa, while keeping all other factors constant. However, an organisation needs to determine the impact of change in price of a product on its supply in numerical terms. The concept of elasticity of supply helps organisations to estimate the impact of change in the supply of a product with respect to its price.

According to **Prof. Thomas**, "*The supply of a commodity is said to be elastic when as a result of a change in price, the supply changes sufficiently as a quick response. Contrarily, if there is no change or negligible change in supply or supply pays no response, it is elastic.*" Thus, the elasticity of supply is a measure of the degree of change in the quantity supplied of a product in response to a change in its price. Mathematically, the elasticity of supply is expressed as:

$$e_s = \frac{Percentage\ \ change\ \ in\ \ quantity\ \ supplied\ \ of\ \ commodity\ \ X}{Percentage\ \ change\ \ in\ \ price\ \ of\ \ commodity\ \ X}$$

Percentage change in quantity supplied =

$$\frac{change\,in\,quantity\,(\Delta S)}{Original\ \ quantity\ \ supplied\,(S)}$$

The elasticity of supply can be calculated with the help of the following formula:

$$e_s = \frac{\Delta S}{S} \times \frac{P}{\Delta P}$$

$$e_s = \frac{\Delta S}{\Delta P} \times \frac{P}{S}$$

Where,

$\Delta S = S_1 - S$

$\Delta P = P_1 - P$

Let us understand how to calculate the elasticity of supply with the help of an example.

Example 15: Assume that a business firm supplied 450 units at the price of ₹ 4500. The firm has decided to increase the price of the product to ₹ 5500. Consequently, the supply of the product is increased to 600 units. Calculate the elasticity of supply.

Solution: Here,

P = ₹ 4500

ΔP = ₹ 1000 (a fall in price; ₹ 5500– ₹ 4500 = 1000)

S = 450 units

ΔS = 150 (600 – 450)

By substituting these values in the above formula, we get:

$$e_s = \frac{150}{1000} \times \frac{4500}{450} = 1.5$$

5.11.1 TYPES OF ELASTICITY OF SUPPLY

Similar to elasticity of demand, elasticity of supply also does not remain same. The degree of change in the quantity supplied of a product with respect to a change in its price varies under different situations.

Based on the rate of change, the price elasticity of supply is grouped into five main categories, which are explained as follows:

- **Perfectly elastic supply**: When a proportionate change (increase/decrease) in the price of a product results in an increase/decrease of quantity supplied, it is called perfectly elastic supply. In such a case, the numerical value of elasticity of supply would be infinite ($e_s = \infty$). This situation is imaginary as there is no as such product whose supply is perfectly elastic. Therefore, this situation does not have any practical implication. Let us understand the concept of perfectly elastic supply with the help of an example.
- **Example 16:** The supply schedule of product X is given as follows:

Price (₹ Per Kg.)	Quantity Supplied (Kgs. in thousands)
100	40
100	60
100	80

Draw a supply curve for the supply schedule and find the type of elasticity of supply using the curve.

Solution: The supply curve for product X is shown in Figure 5.17:

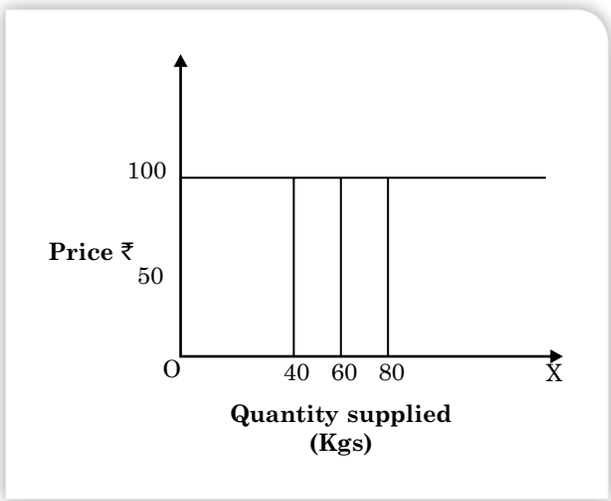

Figure 5.17: Perfectly elastic supply curve

Figure 5.17 shows that the price of product X remains constant at ₹100 per kg. However, the quantity supplied changes from 40,000 kgs to 80,000 kgs at the same price. Therefore, the supply of product X is perfectly elastic ($e_s = \infty$).

- **Perfectly inelastic supply:** In this situation, the quantity supplied does not change with respect to a proportionate change in the price of a product. In other words, the quantity supplied remains constant at the change in price when supply is perfectly inelastic. Thus, the elasticity of supply is equal to zero (=0). However, this situation is imaginary as there can be no product whose supply could be perfectly inelastic. Let us understand the concept of perfectly inelastic supply with the help of an example.

Example 17: The quantity supplied and the price of product A are given as follows:

Price (₹ Per Kg.)	Quantity Supplied (Kgs. in thousands)
45	50
55	50
65	50

Draw a supply curve for the supply schedule and find the type of elasticity of supply using the curve.

Solution: The supply curve for product A is shown in Figure 5.18:

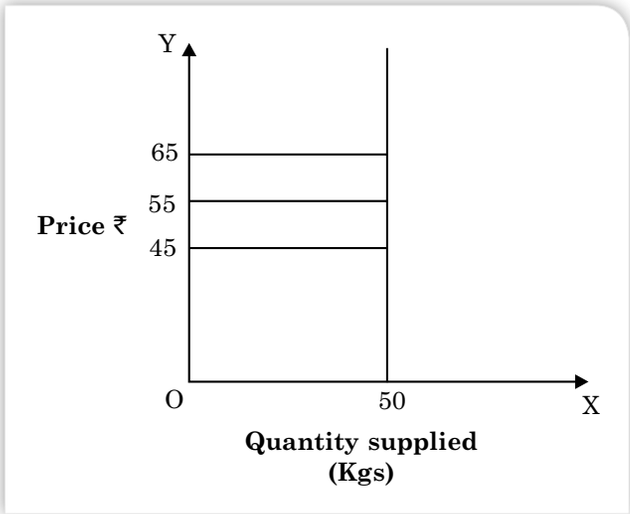

Figure 5.18: Perfectly Inelastic Supply Curve

Figure 5.18 shows that the supply of product A remains constant at 50,000 kgs. However, the price changes from ₹45 to ₹65 at the same supply rate. Therefore, the supply of product X is perfectly inelastic (e = 0).

- **Relatively elastic supply**: When a percentage change in the quantity supplied is more than a percentage change in the price of a product, it is called relatively elastic supply. In this case, the elasticity of supply is less than 1, i.e. e < 1. Let us under-

stand the concept of relatively elastic supply with the help of an example.

- **Example 18:** The quantity supplied and the price of product P are given as follows:

Price (₹ Per Kg.)	Quantity Supplied (Kgs. in thousands)
50	35
53	40
55	45

Draw a supply curve for the supply schedule of product P and find the type of the elasticity of supply using the curve.

Solution: The supply curve for product P is shown in Figure 5.19:

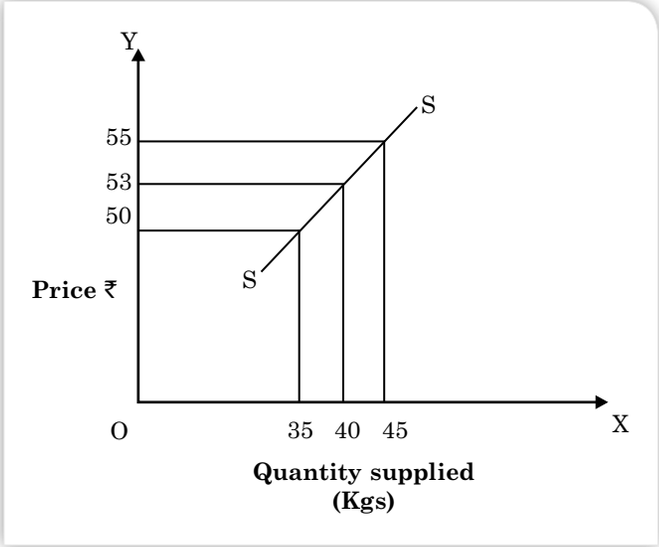

Figure 5.19: Relatively Elastic supply

In Figure 5.19, SS is the supply curve. When the price of product P is ₹50, the quantity supplied is 35,000 kgs. However, when the price increases to ₹53, supply reaches to 40,000 kgs. Similarly, when the price further increases to ₹55, the supply increases to 45,000 kgs. This shows that the change in price is only ₹2 while the change in supply is 5,000 kgs. In other words, the proportionate change in quantity supplied is more than the proportionate change in the price of product P. Therefore, the supply of product P is highly elastic ($e_s > 1$).

- **Relatively inelastic supply:** When a percentage change in the quantity supplied is less than the percentage change in the price of a product, it is called relatively inelastic supply. In this case, the elasticity of supply is greater than 1, i.e. $e < 1$. Let us understand the concept of relatively inelastic supply with the help of an example.

Example 19: The quantity supplied and the price of product B are given as follows:

Price (₹Per Kg.)	Quantity Supplied (Kgs. in thousands)
45	50
55	51
65	52

Draw a supply curve for the supply schedule of product B and find the type of elasticity of supply using the curve.

Solution: The supply curve for product B is given in Figure 5.20:

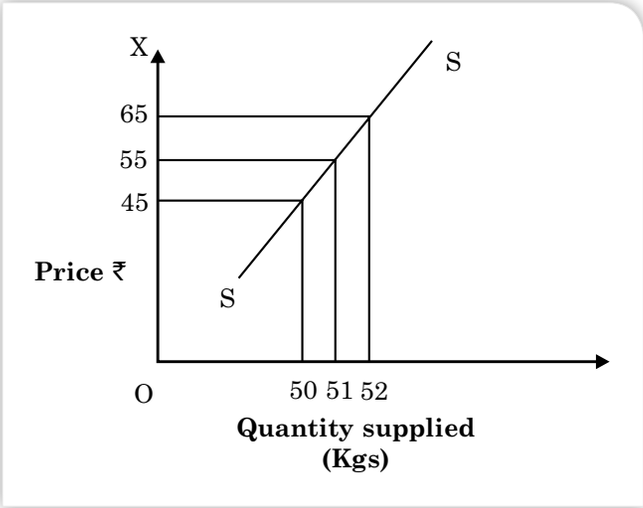

Figure 5.20: Relatively Inelastic Supply

In Figure 5.20, when the price of product B is ₹45, the quantity supplied is 50,000 kgs. When price increases to ₹55, supply reaches to 51,000 kgs. Similarly, as the price of product B increases to ₹65, the supply increases to 52,000 kgs, which clearly shows that a change in price is ₹10 while the change in supply is 1,000 kgs. In other words, the proportionate change in quantity supplied is less than the change in the price of product B. Thus, the supply of product B is relatively inelastic ($e_s < 1$).

- **Unitary elastic supply:** When the proportionate change in the quantity supplied is equal to the proportionate change in the price of a product, the supply is unitary elastic. In this case, elastic supply is equal to one ($e_s = 1$). Let us understand the concept of relatively elastic supply with the help of an example.

Example 20: The quantity supplied and the price of product Z are given below:

Price (₹ Per Kg.)	Quantity Supplied (Kgs. in thousands)
50	30
55	35

Draw a supply curve for the supply schedule of product B and find the type of elasticity of supply using the curve.

Solution: The supply curve for product Z is shown in Figure 5.21:

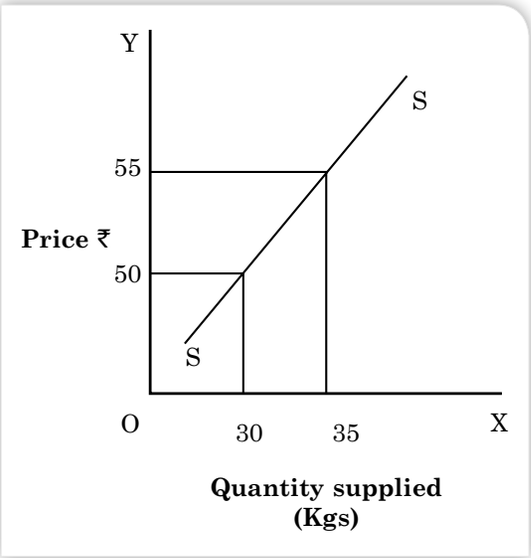

Figure 5.21: Unitary Elastic Supply

In Figure 5.21, when the price of product Z is ₹50, the quantity supplied is 30,000 kgs. When price increases to ₹55, supply reaches to 35,000 kgs. This shows that the proportionate change in quantity supplied is equal to the change in the price of product Y. Therefore, the supply of product B is unit elastic (e_s=1).

5.11.2 MEASUREMENT OF ELASTICITY OF SUPPLY

An organisation is required to estimate the elasticity of supply for making various business decisions under different situations, such as deciding the supply of products. Apart from this, the concept of elasticity of supply is helpful for the government in deciding taxation policies. For instance, high taxes are levied on goods whose supply is inelastic to generate large revenues. Thus, a numerical value is required to measure the elasticity of supply. There are two most commonly used methods for measuring the elasticity of supply, which are explained as follows:

- **Proportionate method**: It is an important method of measuring the elasticity of supply. In this method, the elasticity of supply is

calculated by dividing the percentage change in quantity supplied with the percentage change in the price of a product. Thus, the elasticity of supply is calculated as follows:

$$e_s = \frac{\text{Percentage change in quantity supplied}}{\text{Percentage change in price}}$$

Percentage change in quantity supplied =

$$\frac{\text{Change in quantity supplied } (\Delta S)}{\text{Original quantity supplied } (S)}$$

$$\text{Percentage change in price} = \frac{\text{Change in price} (\Delta S)}{\text{Original price } (P)}$$

Thus,

$$e_S = \frac{\Delta S}{S} \times \frac{P}{\Delta P}$$

$$e_S = \frac{\Delta S}{\Delta P} \times \frac{P}{S}$$

Where

$$\Delta S = S_1 - S$$

$$\Delta P = P_1 - P$$

For example, the quantity supplied of a product increases from 1000 units to 2000 units as the price changes from ₹ 50 to ₹ 60 per unit. In such a case, the elasticity of supply would be calculated as follows:

P1= ₹ 60, P= ₹ 50, S_1=2000 units, S=1000 units

Therefore, $\Delta S = S_1 - S$= 2000-1000= 1000 units and $\Delta P = P_1 - P$= ₹60 - ₹50 = ₹10

$$e_S = \frac{\Delta S}{\Delta P} \times \frac{P}{S}$$

$$e_{S=} \frac{1000}{10} \times \frac{50}{1000} = 5 > 1$$

Thus, e_s represents relatively elastic supply.

- **Point method:** In this method, the elasticity of supply is measured at a particular point on the supply curve. For that, a tangent needs to be drawn along with the demand curve. Let us understand the estimation of elasticity of supply on the demand curve using the point method.

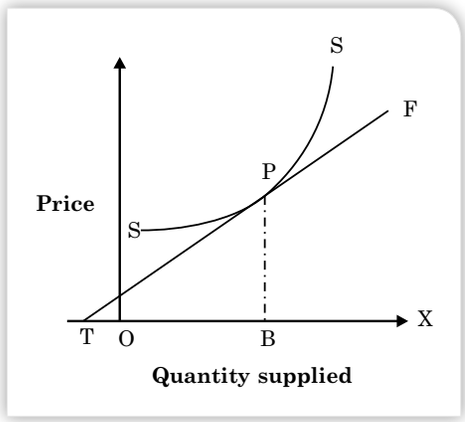

Figure 5.22: Point Elasticity of Supply

In Figure 5.22, TF is a tangent drawn from point P to measure the elasticity of supply. This tangent intersects X-axis at point T. Another vertical line from P is intersecting X-axis at point B. Thus, the elasticity of supply at point P is calculated as:

e_s = TB/OB

Thus, it presents three conditions. If

TB > OB, $e_s > 1$

TB < OB, $e_s < 1$

TB = OB, $e_s = 1$

Let us understand these three conditions with the help of the following diagrams:

1. **When TB < OB**

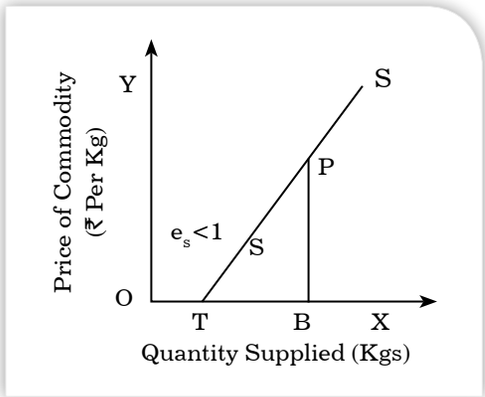

Figure 5.23: Condition 1: TB < OB

In the Figure 5.23, SS is the suply curve and at point P the elalsticity of thesupply is measured. When SS curve is extended, it intertsects OX axis at point T. Now es is represented as

$$\frac{TB}{OB}$$

By seeing the Figure 5.23, it is apparent that TB < OB. Therefore, $e_s < 1$, representative that the supply is less inelastic:

2. **When TB = OB**

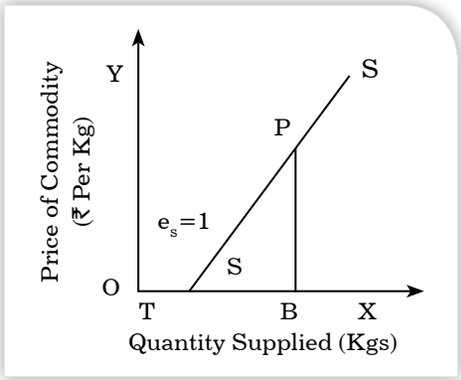

Figure 5.24: Condition 2: TB = OB

In the Figure 5.24, SS is the supply curve and at point P the elasticity of the supply is measured. As SS curve is extended, passes through the point of origin. Now es is represented as

$$e_s = \frac{TB}{OB}.$$

By seeing the Figure 5.24, it is apparent that TB = OB. Therefore, $e_s = 1$, implying that the supply is elastic:

3. **When TB > OB**

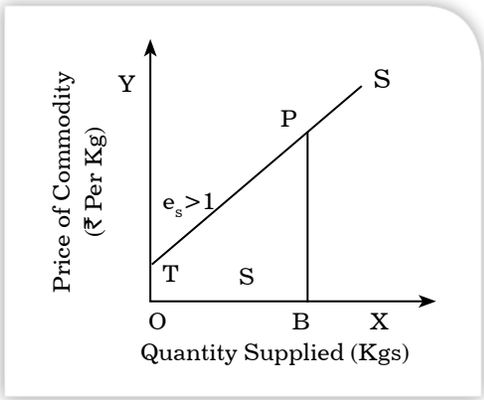

Figure 5.25: Condition 3: TB > OB

In the Figure 5.25, SS is the supply curve and at point P the elasticity of the supply is measured. As SS curve is extended, it it meets OY axis at point T. Now es is represented as

$$e_s = \frac{TB}{OB}.$$

By seeing the Figure 5.25, it is apparent that TB>OB. Therefore, $e_s > 1$, implying that the supply is highly elastic.

5.11.3 FACTORS DETERMINING ELASTICITY OF SUPPLY

As discussed earlier, the elasticity of supply cannot be same under all circumstances. This is because it is influenced by a number of factors. Some of the important factors that influence the elasticity of supply are explained as follows:

- **Nature of a product:** The product's nature is an important factor that influences the elasticity of supply. For instance, products that are perishable in nature have inelastic supply as their supply cannot be increased or decreased in a short span of time. On the other hand, products, such as antiques and old wines, which cannot be reproduced in the same form, have a constant supply.
- **Production techniques**: Production techniques used by organisations also have great influence on the supply of their products. If organisations use the latest techniques of production, the supply can be faster with respect to the change in the price of products.
- **Time period**: It affects the elasticity of supply to a great extent. For instance, in the short run, elasticity of supply is low due to various factors, such as obsolete production techniques. Therefore, changes in prices do not affect the supply of products immediately. If the price remains high for a longer period, the supply of products is increased.
- **Agriculture products:** The production of agriculture products cannot be increased or decreased easily as they depend on natural factors, including rain, humidity, and sunlight. This affects the supply of such products to a great extent; thereby making the supply relatively inelastic.

SELF ASSESSMENT QUESTIONS

27. When a proportionate change (increase/decrease) in the price of a product results in an increase/decrease of quantity supplied, it is called as _____.
28. Supply is said to be _____ when e < 1.

ACTIVITY

The quantity supplied of bathing soaps of a particular brand increases from 5000 units to 7000 units as the price changes from ₹ 50 to ₹ 80per unit. Calculate the elasticity of supply using the proportionate method.

5.12 SUMMARY

- The elasticity of demand is a measure a change in the quantity demanded of a product in response to its determinants, such as price of products.

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- There are three types of elasticity of demand, namely price elasticity of demand, income elasticity of demand, and cross elasticity of demand]
- Price elasticity of demand can be defined as a measure of a change in the quantity demanded of a product as a result of a change in the price of the product in the market.
- Price elasticity is classified into five types, namely perfectly elastic demand, perfectly inelastic demand, relatively elastic demand, relatively inelastic demand, unitary elastic demand.
- In order to measure price elasticity, four methods are used namely total outlay method, percentage method, point elasticity method, and arc elasticity method.
- The price elasticity of demand is influenced by various factors, such as relative need for the product, availability of substitute goods, impact of income, and time under consideration.
- Income elasticity of demand can be defined as measure of quantity demanded with respect to the income of consumers.
- The income elasticity of demand is classified into three groups; namely positive income elasticity of demand, negative income elasticity of demand, and zero income elasticity of demand.
- The cross elasticity of demand can be defined as measure of change in the demand for a good as a result of change in the price of related goods.
- Cross elasticity of demand is classified into three groups; namely positive cross elasticity of demand, negative cross elasticity of demand, and zero cross elasticity of demand.
- The advertisement elasticity of demand is a measure of change in the sales of a product with respect to a proportionate change in advertisement expenditure.
- The elasticity of supply is a measure of change in the quantity supplied of a product in response to a change in its price.
- The elasticity of supply is categorised into five types, namely perfectly elastic supply, perfectly inelastic supply, relatively elastic supply, relatively inelastic supply, and unitary elastic supply.
- The elasticity of supply is measured using two methods namely proportionate method and point method

KEY WORDS

- **Elasticity of demand**: It is a measure of responsiveness of the quantity demanded for a product with respect to a change in its price.

- **Elasticity of supply**: It is a measure of responsiveness of the quantity supplied for a product with respect to a change in its price.
- **Consumption:** It is a process of using the goods and services by the public.
- **Forecasting:** It is a process of predicting the future trends based on the analysis of past and present trends in the market.

5.13 DESCRIPTIVE QUESTIONS

1. Discuss the concept of elasticity of demand.
2. Explain the concept of price elasticity of demand.
3. Calculate the price elasticity of demand for cups (given below) and determine the type of price elasticity.

Price of Bread (₹ per packet)	25	27	29
Quantity Demanded (per month	100	80	65

4. Explain the total outlay method for measuring the price elasticity of demand with the help of an example.
5. Assume that at the price of ₹ 100, the demand for the product is 1000 units. If the price of the product increases to ₹120, the demand decreases to 700 units. Calculate the price elasticity using the arc elasticity method.
6. What are the factors the influence the price elasticity of demand?
7. Discuss the significance of the price elasticity of demand.
8. Suppose the monthly income of an individual decreases from ₹15,000 to ₹ 10,000. Now, his demand for clothes decreases from 70 units to 40 units. Calculate the income elasticity of demand.
9. Discuss the types of income elasticity of demand.
10. Discuss the concept of cross elasticity of demand.
11. Given that the advertisement expenditure of an organisation increases from ₹ 35,000 to ₹ 60,000. Consequently, the demand for products increases from 45,000 units to 80,000 units. Calculate the advertisement elasticity of demand.
12. Explain the methods that can be used to measure the elasticity of supply.

N O T E S

5.14 ANSWERS AND HINTS

ANSWERS FOR SELF ASSESSMENT QUESTIONS

Topic	Q. No.	Answers
Elasticity of Demand	1.	a. Lipsey
Price Elasticity of Demand	2.	Price elasticity of demand
Different Types of Price Elasticity	3.	False
	4.	d. Perfectly elastic demand
	5.	Less
	6.	True
Measurement of Price Elasticity	7.	d. Division method
	8.	False
	9.	Point elasticity method
	10.	Midpoint
Factors Influencing Price Elasticity of Demand	11.	False
	12.	Elastic
Significance of Elasticity of Demand	13.	a. Monopolistic
	14.	Price Discrimination
	15.	True
Income Elasticity of Demand	16.	True
	17.	Income elasticity of demand
	18.	Positive
	19.	d. Zero
	20.	True
Cross Elasticity of Demand	21.	Cross elasticity of demand
	22.	False
	23.	Pricing
Advertisement Elasticity of Sale	24.	Advertisement expenditure
	25.	Unity
	26.	b. $e_A = 1$
Elasticity of Supply	27.	Perfectly elastic supply
	28.	Relatively inelastic supply

HINTS FOR DESCRIPTIVE QUESTIONS

1. The elasticity of demand is a degree of change in the quantity demanded of a product in response to its various determinants, such as price of substitutes, and income of consumers. Refer to section **5.2 Elasticity of Demand**.
2. The price elasticity of demand is a measure of a change in the quantity demanded of a product as a result of change in the price of the product in the market. Refer to section **5.3 Price Elasticity of Demand**.
3. The price elasticity of demand is estimated by using the formula $e_p = \Delta Q/\Delta P \times P/Q$. Refer to section **5.3 Price Elasticity of Demand.**
4. In the total outlay method, the price elasticity of a product is measured on the basis of the total amount of money spent (total expenditure) by consumers on the consumption of that product. Refer to section **5.5 Measurement of Price Elasticity**.
5. The arc elasticity method is used to calculate the elasticity of demand at the midpoint of an arc on the demand curve. The formula for calculating the price elasticity is $e_p = \frac{\Delta Q}{\Delta P} \times \frac{P+P1}{Q+Q1}$. Refer to section **5.5 Measurement of Price Elasticity**.
6. There are numerous factors that influence the price elasticity of demand, such as need for the product, availability of substitute goods, income effects, and time period. Refer to section **5.6 Factors Influencing Price Elasticity of Demand**.
7. The price elasticity of demand helps in various ways, such as determining price, formulating taxation policies, successful international transactions. Refer to section **5.7 Significance of Price Elasticity of Demand**.
8. Income elasticity of demand is a measure of change in demand due to a change in the consumers' income. It can be calculated using the formula $e_y = \Delta Q/\Delta Y \times Y/Q$. Refer to section **5.8 Income Elasticity Of Demand**.
9. The income elasticity of demand is classified into three types, namely unitary income elasticity of demand, less than unitary income elasticity of demand, and more than income elasticity of demand. Refer to section **5.8 Income Elasticity of Demand**.
10. The cross elasticity of demand is a measure of a proportionate change in the demand for goods with respect to a change in the price of related goods. Refer to section **5.9 Cross Elasticity of Demand**.

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11. The advertisement elasticity of demand is measured to determine the optimum level of advertisement expenditure under different situations. It can be estimated by using the formula $e_A = \Delta S/\Delta A \times S/A$. Refer to section **5.10 Advertisement Elasticity of Demand**.
12. The elasticity of supply is a measure of change in the quantity supplied of a product with respect to its price. The elasticity of supply is measured by using two methods, namely proportionate method and point method. Refer to section **5.11 Elasticity of Supply**.

5.15 SUGGESTED READING FOR REFERENCE

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6

CHAPTER

DEMAND FORECASTING

CONTENTS

6.1		Introduction
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	6.2.1	Need for Demand Forecasting
	6.2.2	Factors Influencing Demand Forecasting
	6.2.3	Steps in Demand Forecasting
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NOTES

INTRODUCTORY CASELET

NEW COKE-BLIND TASTE TEST

The Coca-Cola Company is an American corporation that is engaged in the business of manufacturing, retailing and marketing of non-alcoholic beverages, concentrates and syrups. The company is headquartered in Atlanta, Georgia.

In the 1970s, the company conducted a ***blind taste test*** on about 200,000 consumers where the consumers were not informed of what they were about to taste. The company made the consumers taste three different compositions, the original Coke, the new Coke composition, and Pepsi (its competitor's drink). Of the 200,000 consumers, only about 30,000 consumers tasted the compositions. Apart from this, the company also surveyed the consumers randomly to gauge their reactions towards the change in the taste of Coke's new composition. Based on the analysis, it decided to change its drink formula to a sweeter one. After the ***blind taste test***, the new Coke was launched with a new packaging. However, the new Coke was met with a negative response to the extent that the customers revolted against the change in the traditional American product. Owing to the conditions, the company had to quickly react and change back to its original formula, the original Coke.

This is a classic example of how the wrong selection of demand forecasting technique led to the company's loss of resources and revenues.

LEARNING OBJECTIVES

After completing this chapter, you will be able to:

- Explain the concept of demand forecasting
- Discuss various techniques of demand forecasting
- Describe the limitations of demand forecasting
- Identify the criteria for good demand forecasting

6.1 INTRODUCTION

Every business involves certain risks and uncertainties especially in today's dynamic world. If these risks are not mitigated on time, it may lead to huge losses for organisations. Organisations can cope with these risks by determining the future demand or sales prospects for its products or services. Demand forecasting is a process of predicting the demand for an organisation's products or services in a specified time period in the future.

Demand forecasting is helpful for both new as well as existing organisations in the market. For instance, a new organisation needs to anticipate demand to expand its scale of production. On the other hand, an existing organisation requires demand forecasts to avoid problems, such as overproduction and underproduction. Demand forecasting enables an organisation to arrange for the required inputs as per the predicted demand, without any wastage of materials and time.

Organisations forecast demand in short term or long term depending on their requirements. Short-term forecasting is done for coordinating routine activities, such as scheduling production activities, formulating pricing policy, and developing an appropriate sales strategy. On the contrary, long-term forecasting is performed for planning a new project, expansion, and upgradation of production plant, etc. There are a number of techniques for forecasting demand. Some of the popular techniques of demand forecasting are survey methods and statistical methods. In this chapter, you will study about demand forecasting and its various methods in detail.

6.2 CONCEPT OF DEMAND FORECASTING

A market is characterised by various risks and uncertainties that affect the demand, sales, and prices of goods and services in the market. These risks and uncertainties involve failure of technology, natural disasters (famines, floods, earthquakes, etc.), restrictions by the government, economic fluctuations (like recession), and so on. Thus, in order to mitigate such risks, it is of paramount importance for organisations to determine the future prospects of their products and services in the

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market. This knowledge of the future demand for a product or service in the market is gained through the process of **demand forecasting**.

Demand forecasting can be defined as a process of predicting the future demand for an organisation's goods or services. It is also referred to as sales forecasting as it involves anticipating the future sales figures of an organisation. Some of the popular definitions of demand forecasting are as follows:

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

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

Demand forecasting helps an organisation to take various business decisions, such as planning the production process, purchasing raw materials, managing funds, and deciding the price of its products. Demand can be forecasted by organisations either internally by making estimates called guess estimate or externally through specialised consultants or market research agencies.

There are three bases for performing demand forecasting, which are shown in Figure 6.1:

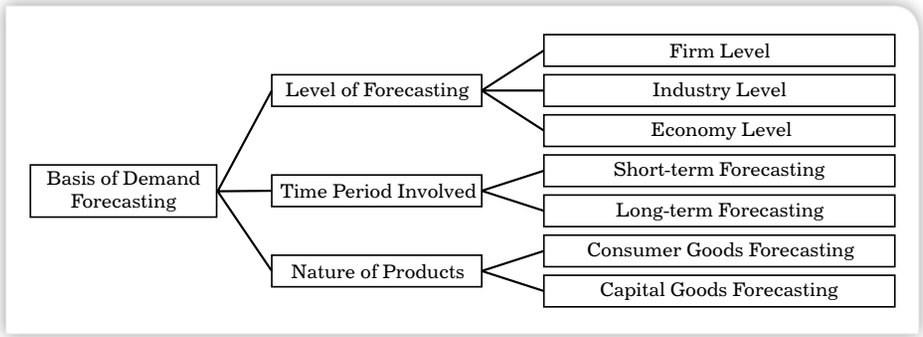

Figure 6.1: Basis of Demand Forecasting

Let us discuss the basis of demand forecasting in detail.

- **Level of forecasting:** Demand forecasting can be done at the firm level, industry level, or economy level. At the firm level, the demand is forecasted for the products and services of an individual organisation in the future. At the industry level, the collective demand for the products and services of all organisations in a particular industry is forecasted. On the other hand, at the economy level, the aggregate demand for products and services in the economy as a whole is anticipated.

- **Time period involved:** On the basis of the duration, demand is forecasted in the short run and long term, which is explained as follows:
  - **Short-term forecasting:** It involves anticipating demand for a period not exceeding one year. It is focused on the short-term decisions (for example, arranging finance, formulating production policy, making promotional strategies, etc.) of an organisation.
  - **Long-term forecasting:** It involves predicting demand for a period of 5-7 years and may extend for a period of 10 to 20 years. It is focused on the long-term decisions (for example, deciding the production capacity, replacing machinery, etc.) of an organisation.
- **Nature of products:** Products can be categorised into consumer goods or capital goods on the basis of their nature. Demand forecasting differs for these two types of products, which is discussed as follows:
  - **Consumer goods:** The goods that are meant for final consumption by end users are called consumer goods. These goods have a direct demand. Generally, demand forecasting for these goods is done while introducing a new product or replacing the existing product with an improved one.
  - **Capital goods:** These goods are required to produce consumer goods; for example, raw material. Thus, these goods have a derived demand. The demand forecasting of capital goods depends on the demand for consumer goods. For example, prediction of higher demand for consumer goods would result in the anticipation of higher demand for capital goods too.

6.2.1 NEED FOR DEMAND FORECASTING

Demand forecasting is vital to the management of every business. It enables an organisation to mitigate business risks and make effective business decisions. Moreover, demand forecasting provides insight into the organisation's capital investment and expansion decisions. The following points explain the need for demand forecasting:

- **Producing the desired output:** Demand forecasting enables an organisation to produce the pre-determined output. It also helps the organisation to arrange for the various factors of production (land, labour, capital, and enterprise) beforehand so that the desired quantity can be produced without any hindrance.
- **Assessing the probable demand:** Demand forecasting enables an organisation to assess the possible demand for its products and services in a given period and plan production accordingly. In this way, demand forecasting avoids dependence on merely making assumptions for demand.

- **Forecasting sales figures:** Sales forecasting refers to the estimation of sales figures of an organisation for a given period. Demand forecasting helps in predicting the sales figures by considering historical sales data and current trends in the market.
- **Better control:** In order to have better control on business activities, it is important to have a proper understanding of cost budgets, profit analysis, which can be achieved through demand forecasting.
- **Controlling inventory:** As discussed earlier, demand forecasting helps in estimating the future demand for an organisation's products or services. This in turn helps the organisation to accurately assess its requirement for raw material, semi-finished goods, spare parts, etc.
- **Assessing manpower requirement:** Demand forecasting helps in accurate estimation of the manpower required to produce the desired output, thereby avoiding the situations of under-employment or over-employment.
- **Ensuring stability:** Demand forecasting helps an organisation to stabilise their operations by initiating the development of suitable business policies to meet cyclical and seasonal fluctuations of an economy.
- **Planning import and export policies:** At the macro level, demand forecasting serves as an effective tool for the government in determining the import and export policies for the nation. It helps in assessing whether import is required to meet the possible deficit in domestic supply. It also helps in developing effective export promotion policies in the case of a surplus in domestic supply.

6.2.2 FACTORS INFLUENCING DEMAND FORECASTING

There are a number of factors that affect the process of demand forecasting. Figure 6.2 lists down various factors influencing demand forecasting:

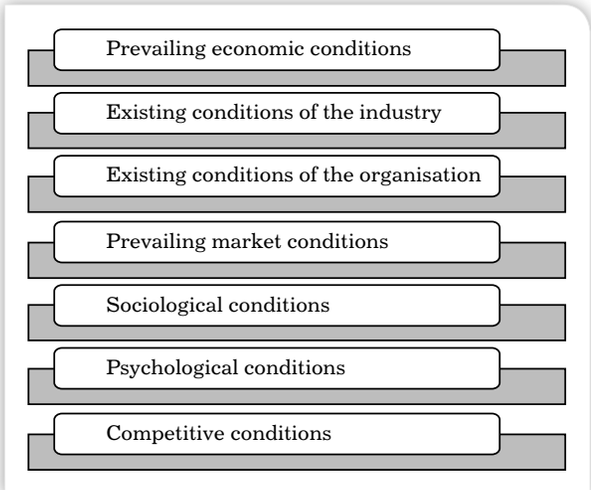

Figure 6.2: Factors Affecting Demand Forecasting

Let us discuss these factors in detail.

- **Prevailing economic conditions:** Demand forecasting can be affected by the changing price levels, national and per capita income, consumption pattern of consumers, saving and investment practices, employment level, etc. of an economy. Thus, it is important that existing economic conditions should be assessed in order to align demand forecasting with current economic trends.
- **Existing conditions of the industry:** The assessment of demand for an organisation's products and services is also affected by the overall conditions of the industry in which the organisation operates. For example, concentration of an industry increases the level of competition, which directly affects the demand for products and services of different organisations in the industry. In such a case, demand forecasted by organisations may falter.
- **Existing condition of an organisation:** Apart from industry conditions, the internal state of an organisation also affects demand forecasting. Within the organisation, demand forecasting is affected by various factors, such as plant capacity, product quality, product price, advertising and distribution policies, financial policies, etc.
- **Prevailing market conditions:** Changes in market conditions, such as change in the prices of goods; change in consumers' expectations, tastes and preferences; change in the prices of related goods; and change in the income level of consumers also influence the demand for an organisation's products and services.
- **Sociological conditions:** Sociological factors, such as size and density of population, age group, size of family, family life cycle, education level, family income, social awareness, etc. largely impact demand forecasts of an organisation. For example, markets having a large population of youngsters would have a higher demand for lifestyle products, electronic gadgets, etc.
- **Psychological conditions:** Psychological factors, such as changes in consumer attitude, habits, fashion, lifestyle, perception, cultural and religious beliefs, etc. affect demand forecast of an organisation to a large extent.
- **Competitive conditions:** A market consists of several organisations offering similar products. This gives rise to competition in the market, which affects demand forecasted by organisations. For example, reduction in trade barriers increases the number of new entrants in a market, which affects the demand for products and services of existing organisations.
- **Import-export policies:** The demand for export-import goods gets directly affected by changes in factors, such as import and export control, terms and conditions of import and export, import/export policies, import/export conditions, etc.

6.2.3 STEPS IN DEMAND FORECASTING

To achieve the desired results, it is important that demand forecasting is done systematically. Demand forecasting involves a number of steps, which are shown in Figure 6.3:

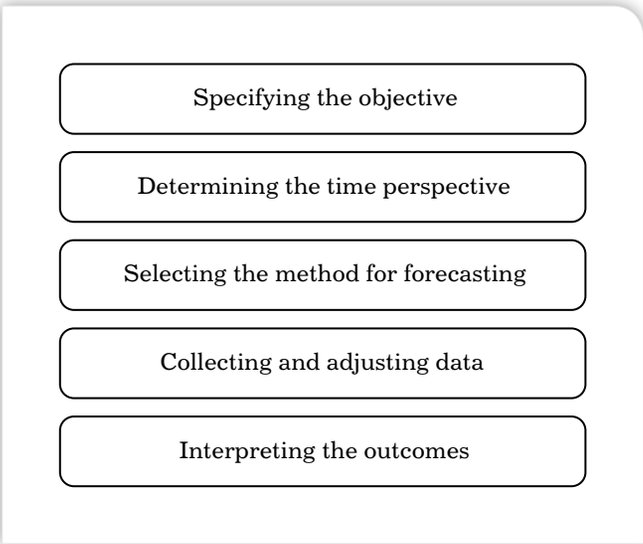

Figure 6.3: Steps Involved in **Demand Forecasting**

Let us discuss these steps in detail.

- **Specifying the objective:** The purpose of demand forecasting needs to be specified before starting the process. The objective can be specified on the following basis:
  - Short-term or long-term demand for a product
  - Industry demand or demand specific to an organisation
  - Whole market demand or demand specific to a market segment
- **Determining the time perspective:** Depending on the objective, the demand can be forecasted for a short period (2-3 years) or long period (beyond 10 years). If an organisation performs long-term demand forecasting, it needs to take into consideration constant changes in the market as well the economy.
- **Selecting the method for forecasting:** There are various methods of demand forecasting, which have been discussed later in the chapter. However, not all methods are suitable for all types of demand forecasting. Depending on the objective, time period, and availability of data, the organisation needs to select the most suitable forecasting method. The selection of demand forecasting method also depends on the experience and expertise of the demand forecaster.

- **Collecting and analysing data:** After selecting the demand forecasting method, the data needs to be collected. Data can be gathered either from primary sources or secondary sources or both. As data is collected in the raw form, it needs to be analysed in order to derive meaningful information out of it.
- **Interpreting outcomes:** After the data is analysed, it is used to estimate demand for the predetermined years. Generally, the results obtained are in the form of equations, which need to be presented in a comprehensible format.

EXHIBIT

Data Collection

Demand forecasting requires the collection of correct data. Without accurate data, exact demand for an organisation's products and services cannot be predicted. Thus, it can be said that effectiveness of demand forecasting depends on the accuracy of data. In this section, let us study about data collection and its importance.

Data collection is a process of accumulating facts and figures about the variables of interest in a systematic manner. Data can be collected from primary sources (such as surveys, observations, interviews, questionnaires) or secondary sources (for example, the Internet, newspapers, magazines, company accounting records, company reports, journals, books etc.).

Data collection is a systematic process and involves a number of steps. The steps involved in data collection are as follows:

1. **Identify the purpose of data collection:** In this step, an examiner (the one who is responsible for data collection) identifies all possible issues in the concerned company/system after a thorough assessment of internal and external factors. These issues serve as an opportunity for data collection. After all possible issues are identified; the examiner is able to ascertain the purpose of data collection.
2. **Select issues and/or opportunities and set goals:** Out of all the issues that have been identified in the previous step, the examiner should choose one or more priority issues and/or opportunities for collecting data. After that, the examiner should set individual goals and objectives for each issue.
3. **Plan:** Now, the examiner has to decide on certain aspects such as:
   - Type of data to be used which may either be primary data or secondary data
   - Factors to be considered while collecting data.

- Locations from where the primary data has to be gathered.
- Methods of data collection to be used which may either be qualitative or quantitative.
- Data sources that can be used to collect secondary data. The examiner may choose from pre-existing or official data; survey data; interviews and focus groups; observed data, etc.
- Scope and time of data collection.

4. **Collect data:** In this step, the examiner now actually collects the data. For example, he/she may gather primary data from the field using various methods chosen; for example, questionnaires or interviews.
5. **Analyse and interpret data:** The data that has been collected must be organised in a structured manner in order to derive meaningful results.

SELF ASSESSMENT QUESTIONS

1. The knowledge of the future demand for a product or service in the market is gained through the process of _____.
2. The bases for performing demand forecasting are:
   a. _____
   b. _____
   c. _____
3. Which of these steps of demand forecasting is performed immediately after determination of the time perspective?
   a. Interpreting outcomes
   b. Selecting the method for forecasting
   c. Collecting and analysing data

ACTIVITY

Using the Internet, find the demand forecasting techniques used by Tata Motors before launching Tata Nano.

6.3 TECHNIQUES OF DEMAND FORECASTING

Different organisations rely on different techniques to forecast demand for their products or services for a future time period depending on their requirements and budget. Demand forecasting methods are broadly categorised into two types, which are listed in Figure 6.4:

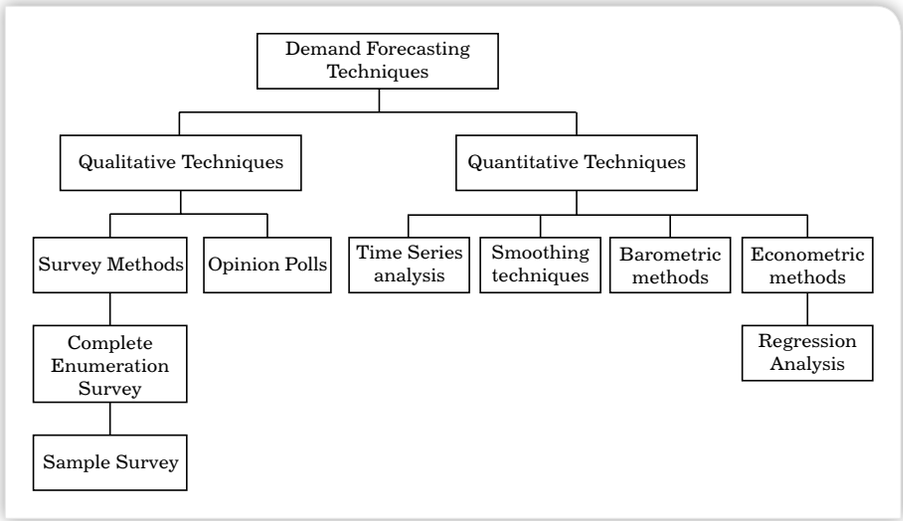

Figure 6.4: Demand Forecasting Techniques

Let us discuss these two demand forecasting techniques in detail.

6.3.1 QUALITATIVE TECHNIQUES

Qualitative techniques rely on collecting data on the buying behaviour of consumers from experts or through conducting surveys in order to forecast demand. These techniques are generally used to make short-term forecasts of demand. Qualitative techniques are especially useful in situations when historical data is not available; for example, introduction of a new product or service. These techniques are based on experience, judgment, intuition, conjecture, etc. Let us discuss different types of qualitative techniques in the next sections.

SURVEY METHODS

Survey methods are the most commonly used methods of forecasting demand in the short run. This method relies on the future purchase plans of consumers and their intentions to anticipate demand. Thus, in this method, an organization conducts surveys with consumers to determine the demand for their existing products and services and anticipate the future demand accordingly. As consumers generally plan their purchases in advance, their opinions and intentions may be sought to analyse trends in market demand. The two types of survey methods (as shown in Figure 6.4) are explained as follows:

- **Complete enumeration survey:** This method is also referred to as the census method of demand forecasting. In this method, almost all potential users of the product are contacted and surveyed about their purchasing plans. Based on these surveys, demand forecasts are made. The aggregate demand forecasts are attained by totalling the probable demands of all individual consumers in the mar-

ket. This implies that the probable demand of the consumers are added together to obtain the probable demand for the product. For example, if a number of consumers is n, their demand for a commodity X is D_1, D_2, D_3....D_n, the total probable demand (D_p) is calculated as follows:

$$D_p = D_1, + D_2, + D_3 + ...D_n$$

- **Sample survey:** In this method, only a few potential consumers (called sample) are selected from the market and surveyed. In this method, the average demand is calculated based on the information gathered from the sample. The average demand is then multiplied by the total number of consumers in the market, which gives the aggregate demand for the product (for which demand is to be forecasted). Let us understand this with the help of an example.

  Example 1: Given that,

  The number of consumers ($\mathbf{C_n}$) **=10, 000**

  Sample size: 500

  Demand of consumers = D_1, D_2, D_3 .... D_{500}

Therefore average demand (A_x) = $\dfrac{D_1 + D_2 + D_3 + \cdots .D_{500}}{500}$

Aggregate demand (D_x) = $C_n \times A_x$

$= 10{,}000 \times A_x$

NOTE

A portion of the total population is known as a sample. The method of selecting samples from a population is known as sampling.

OPINION POLLS

Opinion poll methods involve taking the opinion of those who possess knowledge of market trends, such as sales representatives, marketing experts, and consultants. The most commonly used opinion polls methods are explained as follows:

- **Expert opinion method:** In this method, sales representatives of different organisations get in touch with consumers in specific areas. They gather information related to consumers' buying behaviour, their reactions and responses to market changes, their opinion about new products, etc. In this way, the sales representatives provide an estimate of the probable demand for their organisation's product.
- **Delphi method:** In this method, market experts are provided with the estimates and assumptions of forecasts made by other experts in the industry. Experts may reconsider and revise their own estimates and assumptions based on the information provided by

other experts. The consensus of all experts on demand forecasts constitutes the final demand forecast.

- **Market studies and experiments:** This method is also referred to as market experiment method. In this method, organisations initially select certain aspects of a market such as population, income levels, cultural and social background, occupational distribution, and consumers' tastes and preferences. Among all these aspects, one aspect is selected and its effect on demand is determined while keeping all other aspects constant. The controlled variable (the selected aspect) is changed over time and subsequent changes in the demand over a period of time are recorded. Based on the data collected, the demand for a product in the future is assessed.

6.3.2 QUANTITATIVE TECHNIQUES

Quantitative techniques for demand forecasting usually make use of statistical tools. In these techniques, demand is forecasted based on historical data. These methods are generally used to make long-term forecasts of demand. Unlike survey methods, statistical methods are cost effective and reliable as the element of subjectivity is minimum in these methods. Let us discuss different types of quantitative methods in the next sections.

TIME SERIES ANALYSIS

Time series analysis or trend projection method is one of the most popular methods used by organisations for the prediction of demand in the long run. The term **time series** refers to a sequential order of values of a variable (called trend) at equal time intervals. Using trends, an organisation can predict the demand for its products and services for the projected time. There are four main components of time series analysis that an organisation must take into consideration while forecasting the demand for its products and services. These components are:

- **Trend component:** The trend component in time series analysis accounts for the gradual shift in the time series to a relatively higher or lower value over a long period of time.
- **Cyclical component:** The cyclical component in time series analysis accounts for the regular pattern of sequences of values above and below the trend line lasting more than one year.
- **Seasonal component:** The seasonal component in time series analysis accounts for regular patterns of variability within certain time periods, such as a year.
- **Irregular component:** The irregular component in time series analysis accounts for a short term, unanticipated and non-recurring factors that affect the values of the time series.

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SMOOTHING TECHNIQUES

In cases where the time series lacks significant trends, smoothing techniques can be used for demand forecasting. Smoothing techniques are used to eliminate a random variation from the historical demand. This helps in identifying demand patterns and demand levels that can be used to estimate future demand. The most common methods used in smoothing techniques of demand forecasting are simple moving average method and weighted moving average method.

The simple moving average method is used to calculate the mean of average prices over a period of time and plot these mean prices on a graph which acts as a scale. For example, a five-day simple moving average is the sum of values of all five days divided by five. The weighted moving average method uses a predefined number of time periods to calculate the average, all of which have the same importance. For example, in a four-month moving average, each month represents 25% of the moving average.

BAROMETRIC METHODS

Barometric methods are used to speculate the future trends based on current developments. Barometric methods make use of economic and statistical indicators, which serve as barometers of economic change. Thus, these methods are also referred to as the leading indicators approach to demand forecasting. Many economists use barometric methods to forecast trends in business activities. The basic approach followed in barometric methods of demand analysis is to prepare an index of relevant economic indicators and forecast future trends based on the movements shown in the index. The barometric methods make use of the following indicators:

- **Leading indicators:** When an event that has already occurred is considered to predict the future event, the past event would act as a leading indicator. For example, the data relating to working women would act as a leading indicator for the demand of working women hostels.
- **Coincident indicators:** These indicators move simultaneously with the current event. For example, a number of employees in the non-agricultural sector, rate of unemployment, per capita income, etc., act as indicators for the current state of a nation's economy.
- **Lagging indicators:** These indicators include events that follow a change. Lagging indicators are critical to interpret how the economy would shape up in the future. These indicators are useful in predicting the future economic events. For example, inflation, unemployment levels, etc. are the indicators of the performance of a country's economy.

ECONOMETRIC METHODS

Econometric methods make use of statistical tools combined with economic theories to assess various economic variables (for example, price change, income level of consumers, changes in economic policies, and

so on) for forecasting demand. The forecasts made using econometric methods are much more reliable than any other demand forecasting method. An econometric model for demand forecasting could be single equation regression analysis or a system of simultaneous equations. A detailed explanation of regression analysis is given in the next section.

6.3.3 REGRESSION ANALYSIS

The regression analysis method for demand forecasting measures the relationship between two variables. Using regression analysis a relationship is established between the dependent (quantity demanded) and independent variable (income of the consumer, price of related goods, advertisements, etc.). For example, regression analysis may be used to establish a relationship between the income of consumers and their demand for a luxury product. In other words, regression analysis is a statistical tool to estimate the unknown value of a variable when the value of the other variable is known.

After establishing the relationship, the regression equation is derived assuming the relationship between variables is linear. The formula for a simple linear regression is as follows:

$$Y=a + bX$$

Where Y is the dependent variable for which the demand needs to be forecasted; b is the slope of the regression curve; X is the independent variable; and a is the Y-intercept. The intercept a will be equal to Y if the value of X is zero.

Determination of linear regression equation involves the following steps:

1. Identifying the dependent (Y) and independent (X) variables.
2. Computing the value for the slope (b) of the regression curve using the following formula:

$$b = \frac{\sum XY - n\overline{X}\overline{Y}}{\sum X^2 - n\overline{X}^2}$$

3. Computing the value for the Y-intercept using the following formula:

$$a = \overline{Y} - b\overline{X}$$

4. Developing a linear regression equation for the trend line using the following formula:

$$Y=a + bX$$

Let us understand the concept of regression analysis with the help of an example.

Example 2: A manufacturer of shirts has traced the relationship between the sales of shirts and the corresponding advertising and promotion. Calculate the linear regression to forecast sales figures if the

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manufacturer has invested ₹53, 00,000 on advertising in 2014. The figures for sales and advertising expenses in the past are given below:

Year	Advertising Expenses (in lakhs) (X)	Sales (in lakhs) (Y)	XY	X^2	Y^2
2010	32	130	4160	1024	16,900
2011	52	151	7852	2704	22,801
2012	50	150	7500	2500	22,500
2013	55	158	8690	3025	24964
Total	**189**	**589**	**28202**	**9253**	**87165**
Average	**47.25**	**147.25**			

$$b = \frac{\sum XY - n\overline{X}\overline{Y}}{\sum X^2 - n\overline{X}^2}$$

Therefore, $= \frac{28202 - 4(47.25)(147.25)}{9253 - 4(47.25)(47.25)} = 1.15$

$$a = \overline{Y} - b\overline{X}$$

Therefore, a = 147.25 – 1.15(47.25) = 92.9

Y=a + bX

Therefore, regression equation = Y = 92.9 + 1.15 X

Y= 92.9 + 1.15 (53) = 153.85

Therefore, with an expense of ₹ 53, 00,000 on advertising, the sales figures are estimated to be ₹ 153, 85,000.

SELF ASSESSMENT QUESTIONS

4. Which of the following methods of demand forecasting is based on the consensus of demand forecasts made by all experts in the industry?
   a. Expert opinion method
   b. Delphi method
   c. Market studies and experiments
5. Match the following:

1. Leading indicators	a. events that follow a change
2. Coincident indicators	b. events that have already occurred
3. Lagging indicators	c. events that move simultaneously with current event

ACTIVITY

Give a few examples of the effect of seasonal components and cyclical components on time series.

6.4 LIMITATIONS OF DEMAND FORECASTING

Although demand forecasting has wide applicability in an organisation, there are certain limitations associated with demand forecasting. This is because demand forecasting is based on the analysis of past and present events for determining the future course of action. The events or occurrences in the past may not always be reliable to base the future predictions on them. Apart from this, there are some other limitations of demand forecasting, which are explained as follows:

- **Lack of historical sales data:** Past sales figures may not always be available with an organisation. For example, in case of a new commodity, there is unavailability of historical sales data. In such cases, new data is required to be collected for demand forecasting, which can be cumbersome and challenging for an organisation.
- **Unrealistic assumptions:** Demand forecasting is based on various assumptions, which may not always be consistent with the present market conditions. In such a case, relying on these assumptions may produce incorrect forecasts for the future.
- **Cost incurred:** Demand forecasting incurs different costs for an organisation, such as implementation cost, labour cost, and administrative cost. These costs may be very high depending on the complexity of the forecasting method selected and the resources utilised. Owing to limited means, it becomes difficult for new start-ups and small-scale organisations to perform demand forecasting.
- **Change in fashion:** Consumers' tastes and preferences continue to change with a change in fashion. This limits the use of demand forecasting as it is generally based on historical trend analysis.
- **Lack of expertise:** Demand forecasting requires effective skills, knowledge and experience of personnel making forecasts. In the absence of trained experts, demand forecasting becomes a challenge for an organisation. This is because if the responsibility of demand forecasting is assigned to untrained personnel, it could bring huge losses to the organisation.
- **Psychological factors:** Consumers usually prefer a particular type of product over others. However, factors, such as fear of war and changes in economic policy, could affect consumers' psychology. In such cases, the outcomes of forecasting may no longer remain relevant for the time period.

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SELF ASSESSMENT QUESTIONS

6. The use of demand forecasting is not affected by the change in consumers' tastes and preferences or psychological factors. (True/False)

ACTIVITY

Discuss whether the complete enumeration survey method is feasible to use in the case of products consumed by a large population.

6.5 CRITERIA FOR GOOD DEMAND FORECASTING

Demand forecasting can be effective if the predicted demand is equal to the actual demand. The effectiveness of demand forecasting depends on the selection of an appropriate forecasting technique. Each technique serves a specific purpose; thus an organisation should be careful while selecting a forecasting technique for a particular problem. The following points explain the criteria for the selection of demand forecasting technique:

- **Accuracy:** Almost all the methods of demand forecasting yield accurate results under different circumstances. However, not all methods are appropriate to be used for all kinds of forecasting. For example, a lack of statistical data limits the use of regression analysis in order to predict demand. Therefore, an appropriate selection of forecasting technique would ensure the accuracy of results.
- **Timeliness:** As discussed earlier, demand forecasting can be short term or long term. The demand forecasting methods used for both the time periods vary. For example, the demand for a new product, which needs to be introduced in a month's time, cannot be assessed using the time series analysis method. This is because this method requires data collected over long periods.
- **Affordability:** The cost for different demand forecasting methods varies based on its implementation, expertise required, the time period involved, etc. Thus, organisations should select a method that suits their budget and requirements without compromising on the outcome. For example, the complete enumeration method of demand forecasting yields accurate results but could prove expensive for small-scale organisations.
- **Ease of interpretation:** Outcomes generated using demand forecasting methods are generally represented in the form of statistical or mathematical equations. Therefore, it should be ensured that personnel carrying out forecasting are trained and efficient to use forecasting methods and interpret the results.

- **Flexibility:** As the market is susceptible to a number of uncontrollable variables, flexibility in using demand forecasting techniques would be a necessary condition for making an effective forecast.
- **Ease in using available data:** Forecasting is made on the basis of the availability of primary or secondary data. Therefore, for an effective forecast, it is important that the required data is easily available to forecasters.
- **Ease of use:** Demand forecasting methods can be complex to use if the forecaster is not trained to apply them. Therefore, depending on the objective of forecasting, the forecaster should use a simple yet effective method of forecasting. For example, not all sales representatives are trained to use regression analysis for demand forecasting. Therefore, in such cases using a simple technique, such as the sample survey method, would yield better results.
- **Ease of implementation:** One of the most important criteria for selecting a demand forecasting method is the ease of implementation. Many organisations lack personnel who are trained or have experience in using demand forecasting methods. In such cases, the outcome of a forecast may remain void due to improper implementation in spite of the availability of adequate data and resources. Therefore, forecasting methods that are easy to implement should be selected to make the required forecast.
- **Reliability:** A time tested method of forecasting is generally assumed to be more effective than the other less used methods. If a certain method has yielded reliable outcomes in the past, the same method could be used for forecasting in the future too.
- **Durability of outcomes:** Forecasts made using a demand forecasting technique should be valid in the long run. For example, in case of a new product, there is a certain time lag between the period when a forecast is made and the period when the product is likely to enter the market. In such a case, the results of the forecast should remain valid in the course of time.

SELF ASSESSMENT QUESTIONS

7. Not all methods are appropriate to be used for all kinds of forecasting. A forecaster should therefore focus on which of the following criteria to select a demand forecasting method?

   a. Durability of outcomes b. Reliability

   c. Accuracy d. Ease of use

ACTIVITY

Using the Internet, find out the methods for assessing the accuracy of demand forecasting techniques.

NOTES

6.6 SUMMARY

- Demand forecasting can be defined as a process of predicting the future demand for an organisation's goods or services.
- Demand forecasting helps an organisation to take various business decisions, such as planning the production process, purchasing raw materials, managing funds, and deciding the price of its products.
- Factors affecting demand forecasting are prevailing economic conditions, existing conditions of the industry, existing conditions of the organisation, prevailing market conditions, sociological conditions, psychological conditions, and competitive conditions.
- Demand forecasting methods are broadly categorised into two types qualitative techniques (surveys and opinion polls) and quantitative techniques (time series analysis, smoothing techniques, barometric methods, and econometric methods)
- Regression analysis may be used to establish a relationship between two economic variables.
- The limitations of demand forecasting are a lack of historical sales data, unrealistic assumptions, cost incurred, change in fashion, lack of expertise, and psychological factors.
- The effectiveness of demand forecasting depends on the selection of an appropriate demand forecasting technique.
- The criteria for the selection of demand forecasting technique are accuracy, timeliness, affordability, ease of interpretation, flexibility, ease in using available data, ease of use, and ease of implementation, etc.

KEY WORDS

- **Cost budget:** It refers to the allocation of different costs to individual business activities, such as allocation of administrative cost, financing cost, production cost, etc.
- **Semi-finished goods:** These goods are used as inputs in the production of other goods, such as consumer goods.
- **Under-employment:** It refers to a situation where an individual is employed but not in the desired capacity, whether in terms of compensation, work-hours, or level of skills and experience.
- **Over-employment:** It refers to a situation where individuals are inadequately employed with respect to long working hours and greater output. The situation arises due to the inadequacy of labour compared to the labour demand.
- **Economic variable:** It is a measure to determine the functioning of an economy. Examples of economic variables include population, poverty rate, inflation, etc.

6.7 DESCRIPTIVE QUESTIONS

1. Describe the steps in demand forecasting.
2. The advertisement expenditure and sales figures for a garment manufacturer is given below:

Year	Advertisement expenditure (in lakhs)	Sales figure ('000 units)
2007	8	65
2008	10	78
2009	14	90
2010	16	102
2011	18	114
2012	20	116
2013	25	140

   Calculate the linear regression to forecast the sales figures if the manufacturer plans to invest ₹ 30, 00,000 on advertising in 2014.
3. Explain the criteria for good demand forecasting.

6.8 ANSWERS AND HINTS

ANSWERS FOR SELF ASSESSMENT QUESTIONS

Topic	Q.No.	Answers
Concept of Demand Forecasting	1.	Demand forecasting
	2.	a. Level of forecasting
		b. Time period involved
		c. Nature of products
	3.	b. Selecting the method for forecasting
Techniques of Demand Forecasting	4.	b. Delphi method
	5.	1(b), 2(c), 3(a)
Limitations of Demand Forecasting	6.	False
Criteria for Good Demand Forecasting	7.	c. Accuracy

HINTS FOR DESCRIPTIVE QUESTIONS

1. The various steps of demand forecasting are specifying the objective, determining the time perspective, selecting the method

for forecasting, collecting and adjusting data, and interpreting the outcomes. Refer to section **6.2 Concept of Demand Forecasting**.

2. Calculate b, a, and find the linear regression equation Y=a + bX. A hint has been given below:

Year	Advertisement expenditure (in lakhs) (X)	Sales figure ('000 units) (Y)	XY	X^2	Y^2
2007	8	65	520	64	4225
2008	10	78	780	100	6084
2009	14	90	1260	196	8100
2010	16	102	1632	256	10404
2011	18	114	2052	324	12996
2012	20	116	2320	400	13456
2013	25	140	3500	625	19600
Total	**111**	**705**	**12064**	**1965**	**74865**
Average	**15.85**	**100.71**			

$$b = \frac{12064 - 4(15.85)(100.71)}{1965 - 4(15.85)(100.71)}$$; calculate b

a = 100.71 – b (15.85); calculate a

Y= a + b(X) = 153.85, (the given value of X = 30); calculate Y

Refer to section **6.3 Techniques of Demand Forecasting**.

3. The criteria for the selection of demand forecasting technique are accuracy, timeliness, affordability, ease of interpretation, flexibility, ease in using available data, ease of use, etc. Refer to section **6.5 Criteria for Good Demand Forecasting**.

6.9 SUGGESTED READING FOR REFERENCE

SUGGESTED READINGS

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7

CHAPTER

PRODUCTION THEORY

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INTRODUCTORY CASELET

NOTES

PRODUCTION DILEMMA IN SKY CONSTRUCTIONS

Mr. A, an illiterate businessman, opened a construction business, Sky Constructions that involved building garages for residential homes. He took a loan worth ₹ 10,000,00 for starting his business. Mr. E was hired for all the managerial, accounting and clerical functions. The organisation hired 20 labourers and built around 50 garages in the first year. The capital equipment of organisation included trucks, tools and machines.

At the end of the first year, Mr. E prepared an income statement that showed the loss of ₹ 1,000,00. The reason for the loss was the failure of Mr. A to understand the optimal use of inputs, capital and labour. He did not know anything about the producer's equilibrium. He did not even know what to minimise and what to maximise. To overcome these issues, he hired an economic analyst, Mr. Rajan, for making a thorough economic analysis of the organisation's operations, studying the production details and finding the implications and results.

It was found from Rajan's study that the major costs bore by Sky Constructions included the cost of capital and labour. The main goal of the organisation was to minimise its costs while keeping the maximum output. For this, the organisation tried various combinations of labour and capital, so that the same output could be obtained for every combination. For instance, for producing 150 garages a year, it either could use 3 units of labour and 8 units of capital or 4 units of labour and 6 units of capital. The profit maximising point was identified.

In addition, Cobb-Douglas production function was used to study the relation between the input and the output, in which one input can be substituted by the other, but to a limited extent.

N O T E S

LEARNING OBJECTIVES

After completing this chapter, you will be able to:

- Define the concept of production
- State different factors of production
- Discuss production possibility curve
- Explain the production function
- Describe the production in the short run
- Elaborate on the law of diminishing returns
- Detail upon long-run production
- Identify the iso-cost lines
- Elaborate on the producer's equilibrium
- Discuss the concept of returns to scale
- Explain different types of production function

7.1 INTRODUCTION

Production is a process of transforming tangible and intangible inputs into goods or services. Raw materials, land, labour and capital are the tangible inputs, whereas ideas, information and knowledge are the intangible inputs. These inputs are also known as factors of production. For an organisation, the four major factors of production are land, capital, labour and enterprise. An organisation needs to make an optimum utilisation of these factors to achieve maximum output. The technical relationship between the inputs and the output is expressed by production function. It enables an organisation to achieve maximum output with the given combinations of factors of production in a particular time period.

The production function can be of two types, namely, short-run production function and long-run production function. In the short run, change in production function is brought by changing only one factor of production, while keeping the other factors constant. On the other hand, in the long run, production function changes with changes in only two factors of production, labour and capital, while other factors remain unchanged. The production laws studied under these periods are law of diminishing returns and law of returns to scale. In this unit, you will study about the concepts of production in short run and long run, in detail.

7.2 CONCEPT OF PRODUCTION

According to **James Bates** and **J.R. Parkinson**, "*Production can be defined as an organised activity of transforming physical inputs (re-*

sources) into outputs (finished products), which will satisfy the products' needs of the society."

According to **J.R. Hicks**, "*Production is an activity whether physical or mental, which is directed to the satisfaction of other people's wants through exchange.*"

Production can be defined as the process of converting the inputs into outputs. Inputs include land, labour and capital, whereas output includes finished goods and services. In other words, production is an act of creating value that satisfies the wants of the individuals.

Organisations engage in production for earning maximum profit, which is the difference between the cost and revenue. Therefore, their production decisions depend on the cost and revenue. The main aim of production is to produce maximum output with given inputs.

For attaining the maximum output, inputs are combined in more than one way. The most efficient combination is chosen from the different combinations. The decisions for choosing the combinations depend upon the purchase of inputs, distribution of budget among inputs, allocation of inputs and combination of output.

Production is considered very important by organisations because of the following reasons:

- Helps in creating value by applying labour on land and capital
- Improves welfare as more commodities mean more utility
- Generates employment and income, which develops the economy
- Helps in understanding the relation between cost and output

SELF ASSESSMENT QUESTIONS

1. _____is the process of converting inputs into outputs.
2. Profit is the sum of cost and revenue. (True/ False)

ACTIVITY

Learn about the production operations of any manufacturing organisation of your choice. Note down the details of inputs and output used in the production.

7.3 FACTORS OF PRODUCTION

Factors of production are the inputs that are used for producing the final output with the main aim of earning an economic profit. Land, labour, capital and enterprise are the main factors of production. Each

and every factor is important and plays a distinctive role in the organisation. Let us learn these factors of production in detail:

- **Land:** Land is the gift of nature and includes the dry surface of the earth and the natural resources on or under the earth's surface, such as forests, rivers, sunlight, etc. Land is utilised to produce income called rent. Land is available in fixed quantity; thus, does not have a supply price. This implies that the change in price of land does not affect its supply. The return for land is called rent.
- **Labour**: Labour is the physical and mental efforts of human beings that undertake the production process. It includes unskilled, semi-skilled and highly skilled labour. The supply of labour is affected by the change in its prices. It increases with an increase in wages. The return for labour is called wages and salary.
- **Capital:** Capital is the wealth created by human beings. It is one of the important factors of production of any kind of goods and services, as production cannot take place without the involvement of capital. Capital is an output of a production process that goes into another production process as an input. It is divided into two parts, namely, physical capital and human capital. Physical capital includes tangible resources, such as buildings, machines, tools and equipment, etc. Human capital includes knowledge and skills of human resource, which is gained by education, training and experience. Return for capital is termed as interest.

NOTE

Land cannot be regarded as capital because of the dissimilarities between the characteristics of land and capital. For example, land is natural, permanent, immobile and fixed. On the other hand, capital is man-made, temporary, mobile and differs from time to time.

- **Enterprise:** Collecting, coordinating and utilising the factors of production for achieving economic gains is called an enterprise. An enterprise is an organisation that undertakes commercial purposes or business ventures and focuses on providing goods and services. An enterprise is composed of individuals and physical assets with a common goal of generating profits. An entrepreneur is the person who creates an enterprise. The success or failure depends on the efficiency of the entrepreneur. Profit is the remuneration of the entrepreneur, which is the residual income from business after the payment of rent, wages and interest.

SELF ASSESSMENT QUESTIONS

3. The main factors of production for an organisation are _____, _____, _____ and _____.

ACTIVITY

Visit an organisation in your vicinity and learn about its factors of production.

7.4 PRODUCTION POSSIBILITY CURVE

Production Possibility Curve (PPC) is a curve that shows the alternative combinations of two goods and services by using all the available factor resources, efficiently. PPC provides an overview of the maximum output of a good that can be produced in an economy by using available resources with respect to quantities of other goods produced. It is also known as Production Possibility Frontier (PPF) or transformation curve.

The goods and resources plotted on the production possibility curve are considered as technically efficient, while the goods and resources that are lying beneath the curve are regarded as inefficient. The goods and services that lie beyond the curve are beyond the scope of the economy. In the production possibility curve, only two goods are taken into account as large number of goods cannot be represented on a two-dimensional graph.

Let us learn PPC with the help of an example.

Suppose an organisation decided to produce two goods A and B with its available resources. If all the resources are used in producing A, then 100 lakh units of A can be produced, whereas if all the resources are used in producing B, then 4000 units of B can be produced. If both the goods are produced, then there is possibility of various combinations as shown in Table 7.1:

TABLE7.1: PRODUCTION POSSIBILITIES

A (in lakhs)	B (in thousands)
100	0
90	1
70	2
40	3
0	4

Let us draw the PPC from Table 7.1, as shown in Figure 7.1:

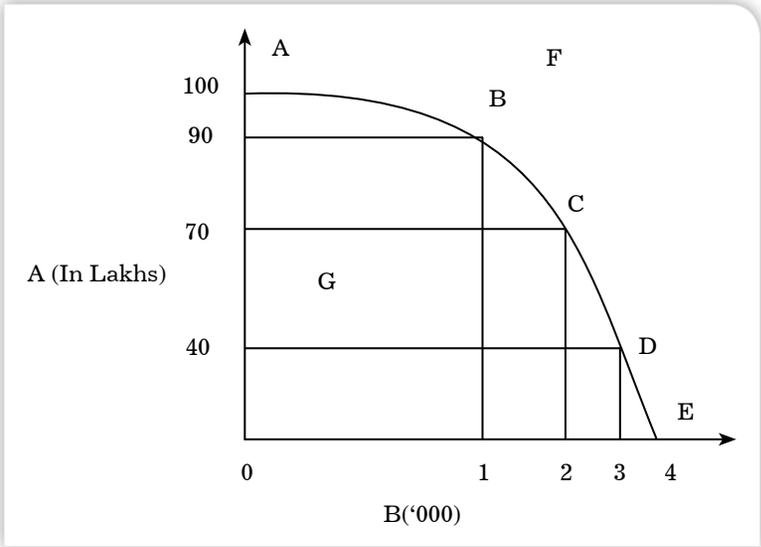


Figure 7.1: Production Possibility Curve

As shown in Figure 7.1, the attainable combinations are A, B, C, D and E from the given resources. A and E are the combinations that produce only one good at a time. The unattainable combination is F as it is outside the PPC. G is the inefficient combination, which is inside the PPC. It implies that the resources are underutilised.

From Figure 7.1, it can be noticed that PPC is concave to origin. It is because the increase in production of one unit of good is accompanied by the sacrifice of units of the other good. The rate at which an amount of product is sacrificed for producing the amount of another product is called Marginal Rate of Transformation (MRT). For example, in case of A and B, the amount of product B that is sacrificed to produce the amount of product A is termed as MRT. The slope of PPC is also MRT. Increasing MRT implies increasing slope of PPC.

Let us discuss some important uses of PPC as follows:

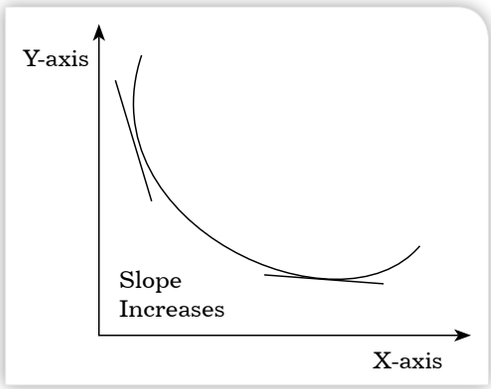
- It enables the planning authority of a developed nation to divert the usage of its resources for the production of necessary goods to the production of luxury goods and from consumer goods to producer's goods, after a certain point of time.
- It helps a democratic nation to focus and shift a major amount of resources in the production of public sector goods instead of private sector goods. The public sector goods are supplied and financed by government, such as public utilities, free education and medical facilities. These goods are free or involve a negligible cost. On the other hand, private sector goods are manufactured by privately owned organisations and are purchased by individuals at a certain price.
- It helps in guiding the movement of resources from producer goods to capital goods, such as machines, which, in turn, increases the productive resources of a country for achieving a high production level.

EXHIBIT

Convex and Concave Curves

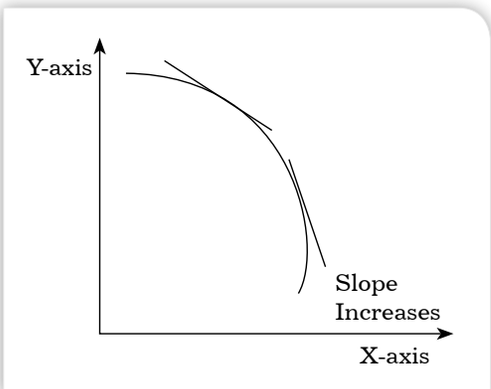
Convex implies a curve that extends outward whereas concave is a curve that extends inward. A convex function can be defined as a real valued function. Graphically, the convex function is represented as a line segment between two points and never lies below the graph. Example, $f(x) = x^2$

The following figure below shows that the slope of the convex curve increases:



Convex Curve

On the other hand, a concave function is the negative of the convex function. The concave function is represented as a line segment between two points on the graph and never lies above the graph. Example, $f(x) = -x^2$. A concave curve is explained with the help of the following figure:



Concave Curve

Figure shows that the slope of concave decreases.

In production, PPC is concave which implies that an increase in output that is generated by one unit increase in input is smaller when output is larger than when it is small.

SELF ASSESSMENT QUESTIONS

4. PPC stands for:
   a. Production Profit Curve
   b. Production Possibility Cart
   c. Profit Possibility Curve
   d. Production Possibility Curve
5. PPC is _____to origin.

ACTIVITY

Suppose an organisation produces two goods, A and B. The following table shows different combinations of A and B produced by the organisation:

Production possibilities	A (thousands)	B (thousands)
P	0	20
Q	2	14
R	4	10
S	5	5
T	6	0

From the above table, draw PPC.

7.5 PRODUCTION FUNCTION

Production function can be defined as a technological relationship between the physical inputs and physical output of the organisation.

According to **Stigler**, "*production function is the name given to the relationship between the rates of input of productive services and the rate of output…*"

According to **Samuelson**, "*Production Function is the technological relationship, which explains the quantity of production that can be produced by a certain group of inputs. It is related with a given state of technological change.*"

In the words of **Watson**, "*The relation between a firm's physical production (output) and the material factors of production (input) is referred to as production function.*"

Inputs include the factors of production, such as land, labour, capital, whereas physical output includes quantities of finished products pro-

duced. The long-run production function (Q) is usually expressed as follows:

Q= f (LB, L, K, M, T, t)

Where, LB= land and building

L = labour

K = capital

M = raw material

T = technology

t = time

Production function is based on the following assumptions:

- Production function is related to a specific time period.
- The state of technology is fixed during this period of time.
- The factors of production are divisible into the most viable units.
- There are only two factors of production, labour and capital.
- Inelastic supply of factors in the short-run period.

The uses of production function are as follows:

- Helps in making short-term decisions, such as optimum level of output.
- Helps in making long-term decisions, such as deciding the production level.
- Helps in calculating the least cost combination of various factor inputs at a given level of output.
- Gives logical reasons for making decisions. For example, if price of one input falls, one can easily shift to other inputs.

Apart from the advantages, production function also suffers from some limitations, which are given as follows:

- Restricts itself to the case of two inputs and one output.
- Assumes smooth and continuous curve, which is not possible in the real world, as there are always discontinuities in production.
- Assumes technology as fixed, which is not possible in the real world.
- Assumes perfectly competitive market, which is rare in the real world.

SELF ASSESSMENT QUESTIONS

6. Production function assumes technology as fixed. (True/ False)

ACTIVITY

Visit any organisation and learn about its production function in detail.

7.6 PRODUCTION IN THE SHORT RUN

The two reference periods while learning the concept of production are short run and long run. Let us learn the concept of short run period in this section.

The short run refers to a time period in which the supply of the inputs, such as plant and machinery is fixed. Only the variable inputs, such as labour and raw materials can be used to increase the production of the goods. In other words, in the short run, change in production is brought by changing only one variable, while other factors remain constant.

The short-run production function is given as:

$$Q = f(L, \overline{K})$$

where L=labour, which is variable

$\overline{K}$ = Capital, which is constant

The law of production studied under short-run production is called the law of variable proportions or the law of diminishing marginal returns. For learning the law of production under short run, it is necessary to study about total product, average product and marginal product.

- **Total Product (TP):** It can be defined as the total quantity of output produced by an organisation for a given quantity of input. It is also known as total physical product.
- **Average Product (AP):** It refers to the ratio of the total product to the variable input used for obtaining the total product. It is the product produced per unit of variable input employed when fixed inputs are held constant. The average product is calculated as:

  Average Product = Total Product/ variable inputs employed
- **Marginal Product (MP):** Marginal product refers to the product obtained by increasing one unit of input. In terms of labour, the change in total quantity of product produced by including one more worker is termed as marginal product of labour. Marginal product of labour (MPL) can be calculated with the help of the following formula:

  $MPL = \Delta Q / \Delta L$

  Where, ΔQ = Change in output

ΔL = Change in labour

ΔQ = new product – old product

ΔL = new labour – old labour

SELF ASSESSMENT QUESTIONS

7. The formula to calculate AP is _____.
8. The law of production studied under short-run production is called the _____.

ACTIVITY

Find the AP and MP from the information provided in the following table:

No. of workers (L)	Total Product (TP)	Marginal Product (MP)	Average Product
1	49		
2	152		
3	303		
4	496		

7.7 LAW OF DIMINISHING RETURNS (LAW OF VARIABLE PROPORTIONS)

According to **G. Stigler**, "*As equal increments of one input are added; the inputs of other productive services being held, constant, beyond a certain point the resulting increments of the product will decrease, i.e., the marginal product will diminish.*"

According to **F. Benham**, "*As the proportion of one factor in a combination of factors is increased, after a point, first the marginal and then the average product of that factor will diminish.*"

In the words of **Alfred Marshall**, "*An increase in the Capital and Labour applied in the cultivation of land causes, in general, less than proportionate increase in the amount of produce raised unless it happens to coincide with an improvement in the art of agriculture.*"

According to **Richard A. Bilas**, "*If the input of one resource to other resources is held constant, total product (output) will increase but beyond some point, the resulting output increases will become smaller and smaller*".

The law of diminishing returns is an important concept of the economic theory. This law examines the production function with one variable keeping the other factors constant. It explains that when more

and more units of a variable input are employed at a given quantity of fixed inputs, the total output may initially increase at an increasing rate and then at a constant rate, and then it will eventually increase at diminishing rates. It implies that the total output initially increases with an increase in variable input at a given quantity of fixed inputs, but it starts decreasing after a point of time.

The main assumptions made under the law of diminishing returns are as follows:

- The state of technology is given and changed.
- The prices of the inputs are given.
- Labour is the variable input and capital is the constant input.
- Let us understand the law of diminishing returns with the help of an example. Suppose an organisation has fixed amount of land (fixed factor) and workers (variable factor) as the labour in the short-run production. For increasing the level of production, it can hire more workers. In such a case, the production function of the organisation would be as follows:

  Q= f (L), K

  Q = Total Production

  L = Labour

  K = Capital (Constant)

Table 7.2 shows the law of diminishing returns:

TABLE 7.2: OUTPUT-LABOUR COMBINATIONS

No. of Workers (L)	Total Product(TP_L)	Marginal Product(MP_L)	Average Product(AP_L)	Stages of Production (on the basis of MP_L)
1	80	80	80	Increasing returns
2	170	90	85	
3	270	100	90	
4	368	98	92	Diminishing returns
5	430	62	86	
6	480	50	80	
7	504	24	72	
8	504	0	63	
9	495	-9	55	Negative returns
10	470	-25	47	

From Table 7.2, we can see that MP of labour rises till 3 units of labour. Beyond this point, the MP of labour starts decreasing. After using the 8 units of labour, the MP of labour starts becoming negative.

In Table7.2, the last column shows the three stages of production, which are explained as follows:

- **Stage I: Increasing returns**: It refers to the stage of production in which the total output increases initially with the increase in the number of labour. Table 7.2 shows the increase in the marginal product till the number of workers increased to 3.
- **Stage II**: **Diminishing returns**: It refers to the stage of production in which the total output increases, but marginal product starts declining with the increase in the number of workers. Table 7.2 shows the declining of marginal product as the number of workers reaches 4.
- **Stage III**: **Negative returns**: It refers to the stage of production in which the total product starts declining with an increase in the number of workers. As shown in Table 7.2, the total output reaches to maximum level at the 8th worker. After that, the total output starts declining. Marginal product becomes negative at this stage.

Figure 7.2 shows the graphical representation of the three stages of production:

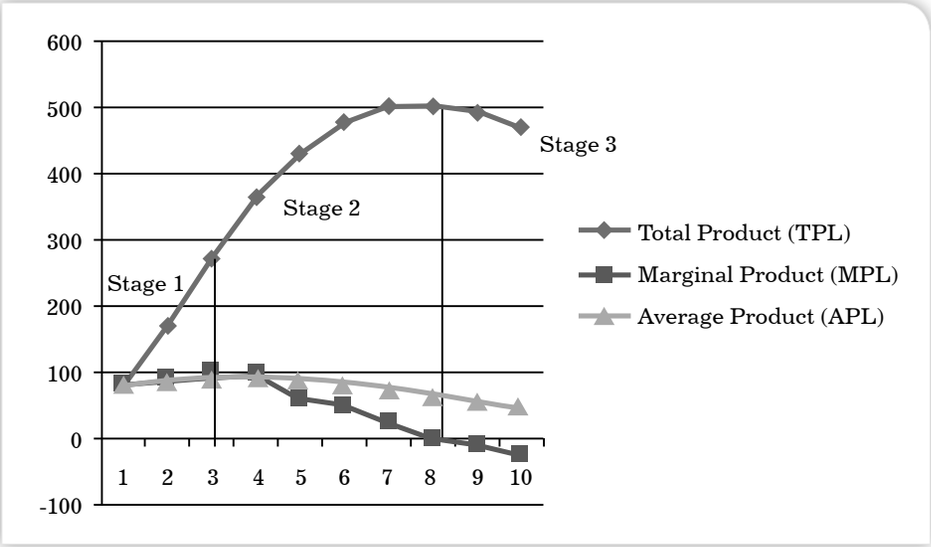


Figure 7.2: Stages of Production

From Figure 7.2, the following can be inferred:

- **Stage 1:** $MP_L > AP_L$
- **Stage 2:** $MP_L < AP_L$ (both greater than zero)
- **Stage 3:** $MP_L < 0$, $AP_L > 0$

7.7.1 SIGNIFICANCE OF LAW OF DIMINISHING RETURNS

The law of diminishing returns has a very wide application. Earlier, it was thought that the law of diminishing returns can be applied only to

the agriculture field. However, now it is held that the law of diminishing returns can be applied in all the fields, namely, agriculture, mining manufacturing, etc.

The validity of the law of diminishing returns is based upon the empirical evidence. This can be explained by an instance. Suppose if there are no diminishing returns to scale, the production in an economy can be increased by increasing the number of labour and capital. The whole population can be fed by growing crops on tiny pieces of land. As the demand increases with the increase in population, more labour and capital can be used to increase the output. Thus, there would be no starvation and recession. However, this is not true in the real world. Also, it is not possible to keep pace with technology and capital with the increasing population.

The law of diminishing returns determines the optimum labour required to produce the maximum output.

In Figure 7.2, stages 1 and 3 depict the increasing and negative returns, respectively. If an organisation is in stage 1 of the production, more increase in labour is required to increase the production. If an organisation is in stage 3, then it needs to reduce the labour to reduce production. Thus, only stage 2 is important that depicts the diminishing returns. This stage provides information about the number of workers that needs to be employed for reaching the maximum level of production. Thus, this stage is helpful in making important business decisions.

7.7.2 OPTIMAL EMPLOYMENT OF LABOUR

As shown in Table 7.2, when the number of workers is 8, then the output reaches to its maximum level. In such a case, an organisation would prefer to hire 8 workers to meet the optimum level of output, if the labour is available at free of cost, which is not possible. Hiring workers always incur a cost for an organisation in terms of payment of wages in exchange of services rendered by the workers. Therefore, the number of workers employed depends on optimum output, product price and wage rate. The maximum profit can be attained if the marginal cost is equal to the marginal revenue. In the present case, marginal cost would be equal to marginal wages that is MC=MW.

In case of factor employment, the concept of Marginal Revenue Product (MRP) is used. The general principle is that additional units of labour should be hired until the MRP of the last unit of labour employed is equal to the cost of the input. MRP is defined as marginal revenue times marginal product (represents the value of an extra unit of labour). Thus, labour is hired till MRP = wage rate, w

The following formula is used to calculate MRP:

$MRP = MR * MP_L$

MR= ΔTR/ΔQ

MP_L=ΔQ/ΔL

Thus, MRP= Δ TR/ΔL

SELF ASSESSMENT QUESTIONS

9. _____ refers to the stage of production in which the total output increases, but the marginal product starts declining with the increase in the number of workers.

10. If $MP_L > AP_L$, then the production stage is _____.

ACTIVITY

Suppose the production function for labour-output relation is:

$Qc = -L^3 + 30L^2 + 20L$

The different values of Qc can be obtained by substituting different values of L in the equation of production function. Find the value of Qc, if L=10.

7.8 PRODUCTION IN THE LONG RUN

Long run is the period in which the supply of labour and capital is elastic. It implies that labour and capital are variable inputs. The long run production function can be expressed as:

Q = f (L, K)

where

L= labour, which is variable

K=capital, which is variable

In the long run, inputs-output relations are studied by the laws of returns to scale. These are long-run laws of production. The laws of returns to scale functional can be explained with the help of the isoquant curve, which is discussed in the next section.

7.8.1 ISOQUANT CURVES

A technical relation that shows how inputs are converted into output is depicted by an isoquant curve. It shows the optimum combinations of factor inputs with the help of prices of factor inputs and their quantities that are used to produce the same output. The term ISO implies equal and quant means quantity or output. For example, for producing 100 calendars, 90 units of capital and 10 units of labour are used.

Isoquant curves are also called as equal product curves or production indifference curves.

According to **Ferguson**, "*An isoquant is a curve showing all possible combinations of inputs physically capable of producing a given level of output.*"

NOTES

According to **Peterson**, "*An isoquant curve may be defined as a curve showing the possible combinations of two variable factors that can be used to produce the same total product.*"

The assumptions of an isoquant curve are as follows:

- There are only two factor inputs, labour and capital, to produce a particular product.
- Capital, labour and goods are divisible in nature.
- Capital and labour are able to substitute each other up to a certain limit.
- Technology of production is given over a period of time.
- Factors of production are used with full efficiency.

Let us learn isoquant with the help of the following table.

Table 7.3 shows the different combinations of two factor inputs, namely, labour and capital for producing 150 tonnes of output:

TABLE 7.3: COMBINATIONS OF TWO FACTOR INPUTS

Labour	Capital
6	40
7	28
8	18
9	12
10	8

Figure 7.3 shows the isoquant curve of different labour capital combinations that help in producing 150 tonnes of output:

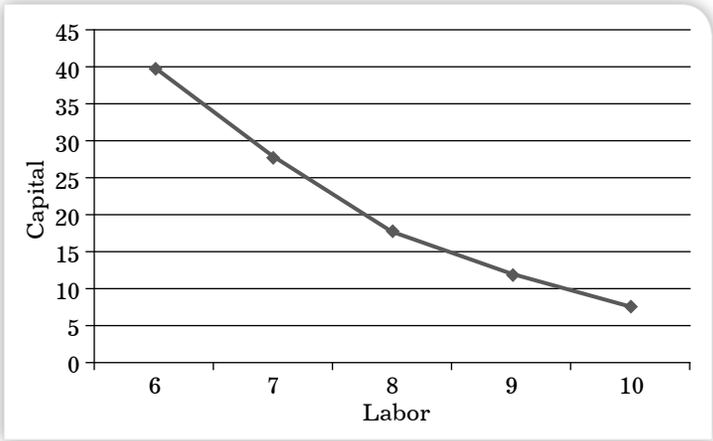


Figure 7.3: Isoquant Curve

Some of the properties of the isoquant curves are as follows:

- **Isoquant curves slope downwards:** It implies that the slope of the isoquant curve is negative. This is because when capital (K) is increased, the quantity of labour (L) is reduced or vice versa, to keep the same level of output.

- **Isoquant curves are convex to origin:** It implies that factor inputs are not perfect substitutes. This property shows the substitution of inputs and diminishing marginal rate of technical substitution of isoquant. The marginal significance of one input (capital) in terms of another input (labour) diminishes along with the isoquant curve.

Figure 7.4 shows the convex isoquant curve:

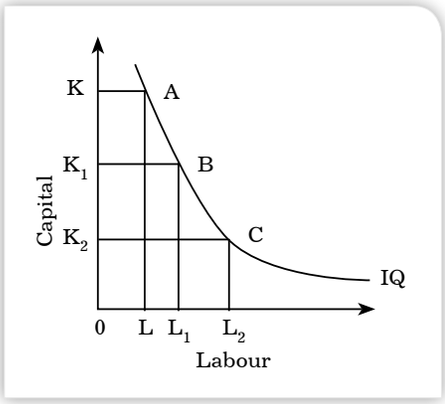


Figure 7.4: Convex Isoquant Curve

The convexity represents that the MRTS diminishes if we move from point A to B and from B to C along the isoquant. The MRTS diminishes because the two inputs labour and capital are not perfect substitutes. Thus, for every increase in labour, there is a decrease in capital. If isoquant is concave, the MRTS of labour for capital increases. Figure 7.5 shows the concave isoquant curve:

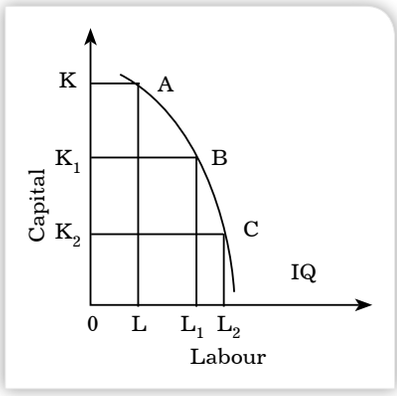


Figure 7.5: Concave Isoquant Curve

As shown in Figure 7.5, if we move from point A to B and from B to C along the isoquant, the MRTS increases. It shows that the two inputs labour and capital are perfect substitutes. Thus, for every increase in labour, there is an increase in capital.

- **Isoquant curves cannot intersect each other:** An isoquant implies the different levels of combination producing different levels of in-

puts. If the isoquants intersect each other, it would imply that a single input combination can produce two levels of output, which is not possible. The law of production would fail to be applicable.

- **The higher the isoquant the higher the output:** It implies that the higher isoquant represents higher output. The upper curve of the isoquant produces more output than the curve beneath. This is because the larger combination of input results in a larger output as compared to the curve that is beneath it.

7.8.2 MARGINAL RATE OF TECHNICAL SUBSTITUTION

The slope of the isoquant curve is the rate of substitution that shows how one input can be substituted for another while holding the output constant. This is called marginal rate of technical substitution (MRTS). According to **Lipsey**, "the marginal rate of technical substitution may be defined as the rate at which one factor is substituted for another with output held constant."

The formula for calculating MRTS is as follows:

$$MRTS = - \Delta K/\Delta L$$

where, ΔK = Change in capital

ΔL= Change in labour

The formula shows that at a given level of output, MRTS of capital for labour would imply the amount of labour that the firm would be willing to give up for an additional unit of capital. Similarly, MRTS of labour for capital would imply the amount of capital that the firm would be willing to give up for an additional unit of labour.

MRTS is also equal to the ratio of marginal product of one input to the marginal product of another input. The output along the isoquant is constant. If the change in labour is substituted for the change in capital, then the increase in output due to increase in labour should match with the decrease in output due to decrease in capital. Mathematically,

$$\Delta L \times MP_L = \Delta K \times MP_K$$

$$\Delta Q = \Delta L \times MP_L + \Delta K \times MP_K$$

Since the output remains unchanged at a given isoquant,

$$\Delta L \times MP_L + \Delta K \times MP_K = 0$$

$$\frac{MP_L}{MP_K} = -\frac{\Delta K}{\Delta L}$$

$$MRTS_{LK} = \frac{MP_L}{MP_K}$$

Thus, we can say that MRTS between inputs is equal to marginal products of the inputs.

The MRTS is calculated as shown in Table 7.4:

TABLE 7.4: MRTS

Labour	Capital	MRTS
6	40	
7	28	12:1
8	18	10:1
9	12	6:1
10	8	4:1

7.8.3 FORMS OF ISOQUANTS

There is a continuous substitution of one input variable by the other input variable at a diminishing rate. Perfect complements and perfect substitutes give different forms of isoquants.

The different forms of isoquants are as follows:

- **Linear isoquant:** It is a straight line isoquant and represents a perfect substitutability between the inputs, capital and labour of the production function. MRTS between inputs remains constant. Figure 7.6 shows a linear isoquant:

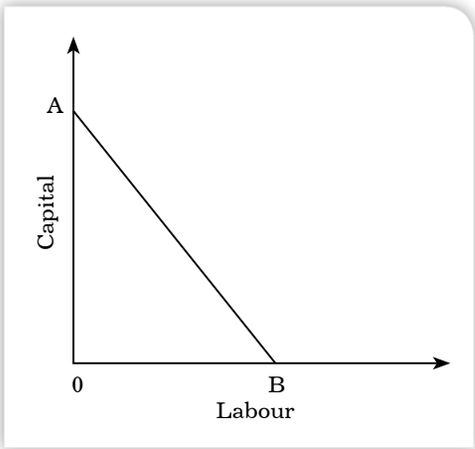


Figure 7.6: Linear Isoquant

The algebraic form of production function in case of linear isoquant is as follows:

$$Q = aK + BL$$

Here, Q is the weighted sum of K and L. The slope of the curve can be calculated with the help of following formula:

$$MP_K = \Delta Q/\Delta K = a$$

$MP_L = \Delta Q/\Delta L = b$

$MRTS = MP_L / MP_K$

MRTS = -b/a (b/a is constant)

However, linear isoquant does not have existence in the real world.

- **L-shaped isoquant**: This is the case of perfect complements. Under this, the combination between capital and labour is in a fixed proportion. Only one combination of labour and capital is possible to produce a product with affixed proportion of inputs. For increasing the production, an organisation needs to increase both inputs proportionately. The graphical representation of fixed factor proportion isoquant is L in shape, shown in Figure 7.7:

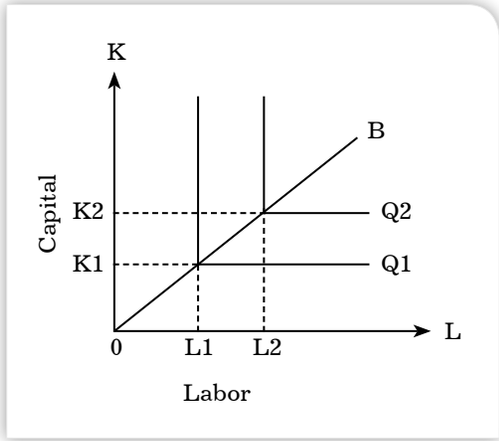


Figure 7.7: L-Shaped Isoquant

As shown in Figure 7.7, the L-shaped isoquant represents that there is no substitution between labour and capital and they are assumed to be complementary goods. It can be seen that OK_1 units of capital and OL_1 units of labour are required for the production of Q_1. On the other hand, to increase the production from Q_1 to Q_2, an organisation needs to increase inputs from K_1 to K_2 and L_1 to L_2 both. This relationship between capital and labour can be expressed as follows:

Q = f (K, L) = min (aK, bL)

where, min implies Q equals to lower of the two terms, aK and bL

For example, in case aK > bL, then Q = bL and in case aK < bL then, Q = aK.

This isoquant is same as leontif production function.

7.8.4 ELASTICITY OF SUBSTITUTION BETWEEN FACTORS

We know that MRTS is the slope of the isoquant. However, it does not reveal the degree of substitutability of one factor to another. It is

important to measure the degree of substitutability between the two inputs. Therefore, economists have developed a formula for estimating the extent of substitutability between the two inputs, capital and labour, which is known as elasticity of factor substitution. Elasticity of factor substitution (σ) refers to the ratio of percentage change in capital-labour ratio to the percentage change in MRTS. It is mathematically represented as follows:

σ = percentage change in capital labour ratio/percentage change in MRTS

Or,

$\sigma = [(\Delta K/\Delta L) / \Delta MRTS] * [MRTS/ (K/L)]$

If $\Delta K/\Delta L = \Delta MRTS$; $\sigma = 1$

If $\Delta K/\Delta L > \Delta MRTS$; $\sigma > 1$

If $\Delta K/\Delta L < \Delta MRTS$; $\sigma < 1$

High elasticity of substitution between factors implies that the factors can easily be substituted to each other, while a low elasticity represents that substitution of factors is possible to a certain extent.

In case of linear isoquant, the substitution elasticity would be infinite, and in case of L-shaped isoquants, it would be zero.

7.8.5 ISO-COST CURVES

Iso-cost curve is the locus of points of all different combinations of labour and capital that an organisation can employ, given the price of these inputs. Iso-cost line represents the price of factors along with the amount of money an organisation is willing to spend on factors. In other words, it shows different combinations of factors that can be purchased at a certain amount of money. The slope of the iso-cost line depends upon the ratio of price of labour to the price of capital.

For example, a producer has a total budget of ₹120, which he wants to spend on the factors of production, namely, X and Y. The price of X in the market is ₹15 per unit and the price of Y is ₹10 per unit. Table 7.5 depicts the combinations:

TABLE 7.5: COMBINATIONS OF X AND Y

Combinations	Units of X	Units of Y	Total expenditure
A	8	0	120
B	6	3	120
C	4	6	120
D	2	9	120
E	0	12	120

The iso-cost line is shown in Figure 7.8:

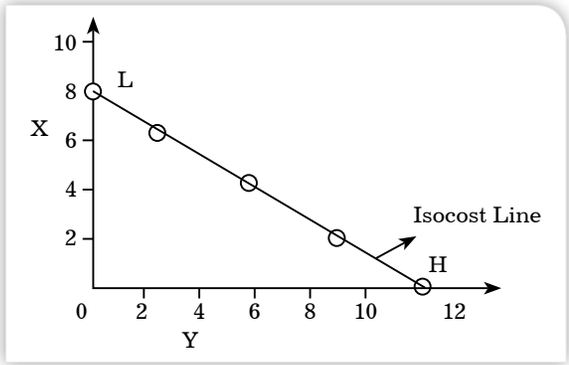


Figure 7.8: Iso-cost Line

As shown in Figure 7.8, if the producer spends the whole amount of money to purchase X, then he/she can purchase 8 units of X. On the other hand, if the producer purchases Y with the whole amount, then he/she would be able to get 12 units. If points H and L are joined on X and Y axes, respectively, then a straight line is obtained, which is called iso-cost line. All the combinations of X and Y that lie on this line, would have the same amount of cost that is ₹120. Similarly, other iso-cost lines can be plotted by taking cost more than ₹120, in case the producer is willing to spend more amount of money on the production factors.

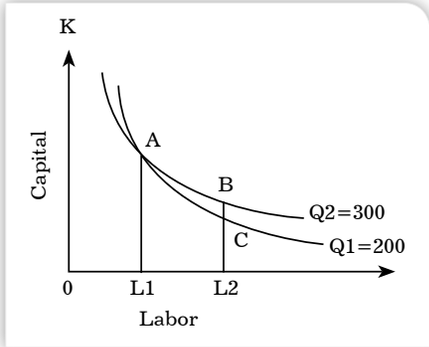
With the help of isoquant and iso-cost lines, a producer can determine the point at which inputs yield maximum profit by incurring minimum cost. Such a point is termed as producer's equilibrium.

SELF ASSESSMENT QUESTIONS

11. L-shaped isoquant is the case of perfect substitutes. (True/ False)

ACTIVITY

In the following figure, the two isoquant curves cut each other. Is it possible that two curves can intersect each other? If not, why?



Hint: As per the figure, the output produced at A is the same as produced at the B and C points, which is not possible.

7.9 PRODUCER'S EQUILIBRIUM

Producer's equilibrium implies a situation in which a producer maximises his/her profits. Thus, he /she chooses the quantity of inputs and output with the main aim of achieving the maximum profits. In other words, he/she needs to decide the appropriate combination among different combinations of factors of production to get the maximum profit at the least cost. Least cost combination is that combination at which the output derived from a given level of inputs is maximum or at which the total cost of producing a given output is minimum.

Let us learn producer's equilibrium with the help of an example. Suppose a producer wants to produce pencils with a total expenditure of ₹1500. The factors of production to produce pencils involve labour and capital, where the price of labour is ₹ 50/ unit and the price of capital is ₹ 75 per unit. He can hire 30 units of labour with no capital or 20 units of capital with no labour. However, for producing pencils, he wants to have the optimum combination of both the factors. This can be explained with the help of Figure 7.9:

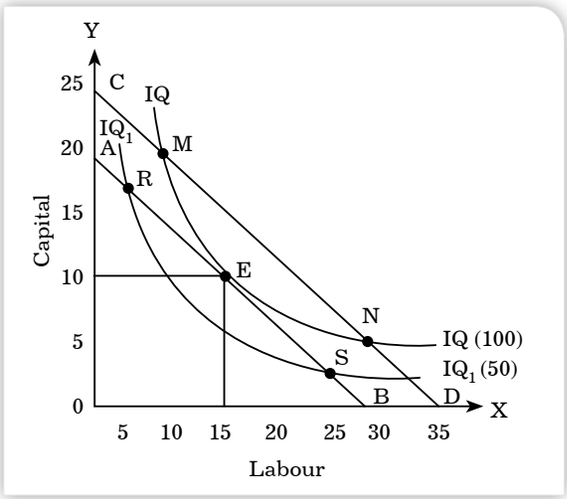


Figure 7.9: Producer's Equilibrium

In Figure 7.9, the optimum combination is depicted by point E, where 10 units of capital and 15 units of labour are used. At point E, isoquant curve IQ is tangent to iso-cost line AB. The producer can produce 1500 units of output by using any combinations that are E, M and N, on curve IQ. He/she would select the combination that would obtain the lowest cost. It can be seen from the Figure 7.9 that E lies on the lowest iso-cost line and would yield same profit as on M and N points, at the lowest cost. In such a case, E is the point of equilibrium; therefore, it would be selected by the producer.

7.9.1 EXPANSION PATH

Expansion path can be defined as the locus of all the points that show least combination of the factors corresponding to different levels of

output. The expansion path is also called scale line as the expansion of the organisation is based upon the scale of operation.

As per **Stonier** and **Hague**, "*expansion path is that line which reflects the least cost method of producing different levels of output, when factor prices remain constant.*"

Let us learn the concept of the expansion path with the help of Figure 7.10:

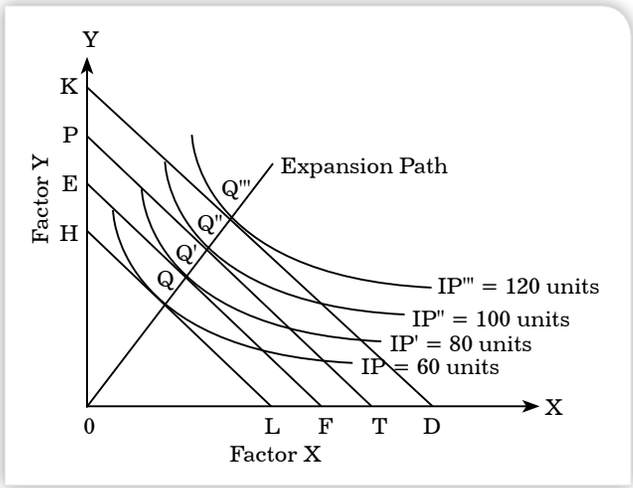


Figure 7.10: Expansion Path

As shown in Figure 7.10, earlier the producer was producing 60 units of output. Suppose the producer wants to expand his/her production and wants to produce 80 units of output. The equilibrium would be achieved at the point Q', where the iso-cost line is tangent to an isoquant curve of IP'. Similarly, the equilibrium point for producing 100 and 120 units are Q'' and Q''', respectively. When the points Q, Q', Q'' and Q''' are joined, a straight line is obtained, which is called the expansion path.

SELF ASSESSMENT QUESTIONS

12. _____can be defined as the locus of all the points that show the least combination of the factors corresponding to different levels of output.

ACTIVITY

Take an example of any organisation in your area and learn how it achieves producer's equilibrium.

7.10 RETURNS TO SCALE

Returns to scale implies the behaviour of output when all the factor inputs are changed in the same proportion given the same technology.

In other words, the law of returns to scale explains the proportional change in output with respect to proportional change in inputs.

The assumptions of returns to scale are as follows:

- The firm is using only two factors of production that are capital and labour.
- Labour and capital are combined in one fixed proportion.
- Prices of factors do not change.
- State of technology is fixed.

There are three aspects of the laws of returns:

- Increasing returns to scale
- Constant returns to scale
- Diminishing returns to scale

Let us learn these in the next sections.

7.10.1 INCREASING RETURNS TO SCALE

It is a situation in which output increase by a greater proportion than increase in factor inputs. For example, to produce a particular product, if the quantity of inputs is doubled and the increase in output is more than double, it is said to be an increasing returns to scale. When there is an increase in the scale of production, the average cost per unit produced is lower. This is because at this stage an organisation enjoys high economies of scale. Figure 7.11 shows the increasing returns to scale:

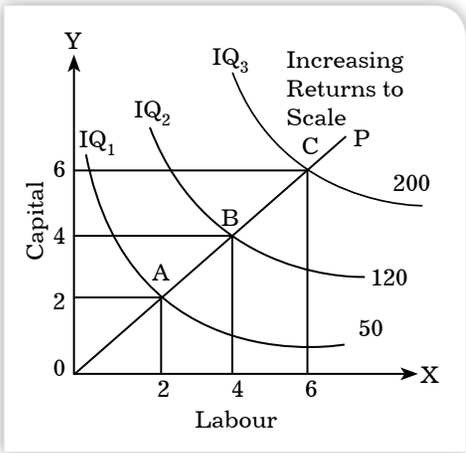


Figure 7.11: Increasing Returns to Scale

As shown in Figure 7.11, a movement from A to B shows that the amount of input is doubled. When labour and capital are doubled from 2 to 4 units, output increases more than double, that is, from 50 units to 120 units. This is increasing returns to scale, which occurs because of economies of scale.

7.10.2 CONSTANT RETURNS TO SCALE

A constant return to scale implies the situation in which an increase in output is equal to the increase in factor inputs. For example in the case of constant returns to scale, when the inputs are doubled, the output is also doubled. Figure 7.12 shows the constant returns to scale:

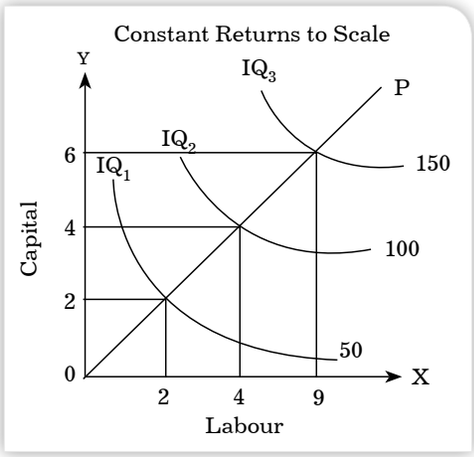


Figure 7.12: Constant Returns to Scale

As shown in Figure 7.12, a movement from A to B shows that the amount of input is doubled. When labour and capital are doubled from 2 to 4 units, output also doubles from 50 units to 100 units. This is constant returns to scale.

7.10.3 DIMINISHING RETURNS TO SCALE

Diminishing returns to scale refers to a situation in which output increases in lesser proportion than increase in factor inputs. For example, when capital and labour are doubled, but the output generated is less than double, the returns to scale would be termed as diminishing returns to scale. Figure 7.13 shows the diminishing returns to scale:

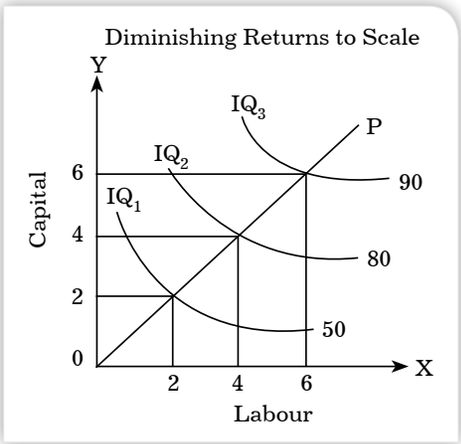


Figure 7.13: Diminishing Returns to Scale

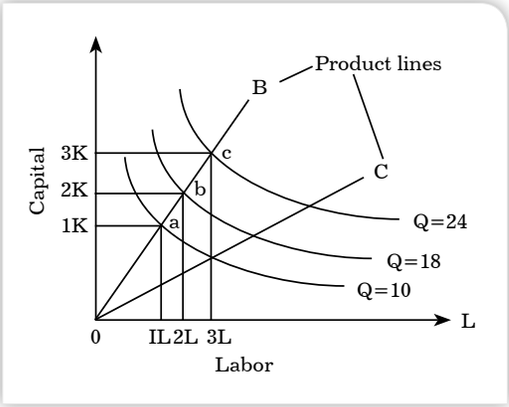
As shown in Figure 7.13, a movement from A to B shows that the amount of input is doubled. When labour and capital are doubled from 2 to 4 units, output increases less than double that is from 50 units to 80 units. This is diminishing returns to scale. Diminishing returns to scale is due to diseconomies of scale, which arises because of the managerial inefficiency.

SELF ASSESSMENT QUESTIONS

13. A constant return to scale implies the situation in which an increase in output is _____to the increase in factor inputs.

ACTIVITY

From the following figure, identify the returns to scale.



7.11 DIFFERENT TYPES OF PRODUCTION FUNCTIONS

There are different types of production functions that can be classified according to the degree of substitution of one input by the other. Figure 7.14 illustrates different types of production functions:

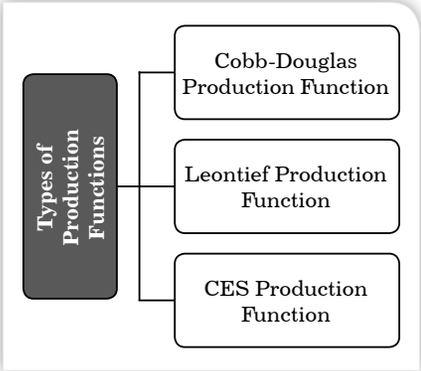


Figure 7.14: Types of Production Functions

The different types of production functions (as shown in Figure7.14) are discussed in detail in the next sections.

7.11.1 COBB-DOUGLAS PRODUCTION FUNCTION

The Cobb-Douglas production function, given by American economists, Charles W. Cobb and Paul. H Douglas, studies the relation between the input and the output. Cobb-Douglas production function is that type of production function wherein an input can be substituted by other to a limited extent. For example, capital and labour can be used as a substitute of each other, however to a limited extent only. Cobb-Douglas production function can be expressed as follows:

$Q = AK^a L^b$

Where, A = positive constant

a and b = positive fractions

b = 1–a

Another way of expressing Cobb- Douglas production function is:

$Q = AK^aL^{1-a}$

Let us take up an example to understand the calculations involved in the cobb-Douglas function.

Assume A = 40, a = 0.3 and b= 0.7

K = 3 and L = 5

Therefore,

$Q = 40\ (3)^{0.3}\ (5)^{0.7}$

$\log Q = \log 40 + 0.3 \log 3 + 0.7 \log 5$

$\log Q = 1.6020 + (0.3 \times 0.4771) + (0.7 \times 0.6989)$

$\log Q = 1.6020 + 0.1431 + 0.4892$

$\log Q = 2.2343$

Now, we will take the antilog of the above to get the value of Q.

antilog log Q = antilog 2.2343

Q = 171.5141

The main attributes of Cobb- Douglas production function are discussed as follows:

- It enables the conversion of the algebraic form into log linear form, represented as follows:

  $\log Q = \log A + a \log K + b \log L$

  This production function has been estimated with the help of linear regression analysis.

- It acts as a homogeneous production function, whose degree can be calculated by the value obtained after adding values of a and b. If the resultant value of a+b is 1, it implies that the degree of homogeneity is 1 and indicates the constant returns to scale.
- It makes use of parameters a and b, which signifies the elasticity coefficients of output for inputs, labour and capital, respectively. Output elasticity coefficient is the change in output that occurs due to adjustment in capital while keeping labour at constant.
- It depicts the non-existence of production at zero cost.

7.11.2 LEONTIEF PRODUCTION FUNCTION

Leontief production function, evolved by W. Wassily Leontif, uses fixed proportion of inputs having no substitutability between them. It implies that if the input-output ratio is independent of the scale of production, there is existence of Leontief production function. It assumes strict complementarity of factors of production. Leontief production function is also called as fixed proportion production function.

This production function can be expressed as follows:

$q = \min (z_1/a, z_2/b)$

where, q = quantity of output produced

z_1 = utilised quantity of input 1

z_2 = utilised quantity of input 2

a and b = constants

Minimum implies that the total output depends upon the smaller of the two ratios.

The coefficients a and b are the fixed input requirements for producing a single unit of output. It means that if we want to produce q units of output, we need aq units of capital (z_1) and bq units of labour (z_2). Or we can mathematically state that, z_1 = aq represents the capital requirements and z_2 = aq represents the labour requirements. Therefore, z_1 / z_1 = a/b. that is, there is a particular fixed proportion of capital and labour required to produce output. That is if we increase one of the factors without increasing the other factor proportionally, then there will be no increase in output.

For example, suppose the Leontief production functions for goods X is

$X = \min [3 Lx , 7 Kx]$

This implies that for producing a single unit of X, a minimum of 1/3 unit of labour and 1/7 unit of capital would be required.

$X = \min [Lx / (1/3) , Kx / (1/7)]$

In this case, the values 1/3 and 1/7 depict labour activities and therefore, are activity coefficients as they depict labour activities.

Now, say 1/3 of a day's work is required to produce 1 unit of X, and the activity required of capital 1/7 of a day's work to produce 1 unit of X.

With Lx = 5 and Kx = 3, X = min [15, 21] = 15 units of X.

Therefore, with 15 units of X ; Lx = 5 and Kx = 2, you get X = min [15, 14] = 14 units of X.

The logical capital labour ratio in the X industry to choose will be Kx / Lx = 3/5 = 0.6.

7.11.3 CES PRODUCTION FUNCTION

CES stands for constant elasticity substitution. CES production function displays a constant change produced in the output due to change in input of production. It is expressed as:

$$Q = A [aK^{-\beta} + (1-a) L^{-\beta}]^{-1/\beta}$$

Or,

$$Q = A [aL^{-\beta} + (1-a) K^{-\beta}]^{-1/\beta}$$

CES has the homogeneity degree of 1 that implies that output would be increased with the increase in inputs. For example, labour and capital has increased by constant factor m. In such a case, production function can be represented as follows:

$$Q' = A [a (mK)^{-\beta} + (1-a) (mL)^{-\beta}]^{-1/\beta}$$

$$Q' = A [m^{-\beta} \{aK^{-\beta} + (1-a) L^{-\beta}\}]^{-1/\beta}$$

$$Q' = (m^{-\beta})^{-1/\beta} .A [aK^{-\beta} + (1\text{-}a) L^{-\beta}]^{-1/\beta}$$

Because, $Q = A [aK^{-\beta} + (1\text{-}a) L^{-\beta}]^{-1/\beta}$

Therefore, $Q' = mQ$

This implies that CES production function is homogeneous with degree one.

For example, let us assume that the CES production function's parameters are as follows:

A = 1.0

a = 0.3

b = 0.7

$\beta = 0.18$

$s = 1/(1+\beta) = 1/(1+0.18) = 0.847$

L = 50

K = 30

The CES production function will be formed as follows:

$Q = A\,[aK^{-\beta} + (1-a)\,L^{-\beta}]^{-1/\beta}$

$Q = 1.0 * [.3 \text{ X } (L^{0.18}) + .7 \text{ X } (K^{0.18})]^{(-1/.18)}$

$Q = 1.0 * [.3 \text{ X } 50^{0.18} + .7 \text{ X } 30^{0.18}]^{(-1/.18)}$

$Q = 1.0 * [.3 \text{ X } 1 + .7 \text{ X } 1]^{(-1/.18)}$

$Q = 1.0 * [1]^{(-1/.18)}$

$Q = 1.0 / 1^{1/.18}$

$Q = 1$

The properties of CES function are as follows:

- The value of elasticity of substitution depends upon the value of a.
- The marginal products are positive and slope downwards.

The merits of CES production are as follows:

- Covers a number of parameters, such as efficiency and substitutability
- Easy to estimate
- Free from unrealistic assumptions, such as fixed technology, etc.

The demerits of CES production system are as follows:

- Fails to fit for manufacturing industries
- Cannot be generalised in case of n factors of production
- Fails to give correct economic implications

SELF ASSESSMENT QUESTIONS

14. _____ production function uses fixed proportion of inputs having no substitutability between them.

ACTIVITY

Using the Internet, search which organisations use the Leontief production function.

7.12 SUMMARY

- Production is an act of creating value or utility that can satisfy the wants of individuals. The production process is dependent on a number of inputs, such as raw materials, labour, capital and technology. These inputs are also known as factors of production.

NOTES

- Production possibility curve can be defined as a graph that represents different combinations of quantities of two goods that can be produced by an economy, under the condition of limited available resources.
- Production function represents the maximum output that an organisation can attain with the given combinations of factors of production (land, labour, capital and enterprise) in a particular time period with the given technology.
- On the basis of the time period, production function can be classified in two types, namely, short-run production function and long-run production function.
- In short-run, the supply of capital is inelastic (except for individual organisation in perfect competition). This implies that capital is constant. In such a case, the organisation only increases labour to increase the level of production.
- In the long-run, the organisation can increase labour and capital both for increasing the level of production.
- The law of production studied under short-run production is called the law of variable proportions or law of diminishing marginal returns, whereas the law of production studied under long-run production function is called the law of returns to scale.
- The relationships between changing input and output are studied in the laws of returns to scale, which is based on production function and the isoquant curve.
- A producer can attain equilibrium by applying the least cost combination of factors of production to attain maximum profit. Therefore, he/she needs to decide the appropriate combination among different combinations of factors of production to get the maximum profit at the least cost.
- Law of returns can be classified into three categories, namely, increasing returns to scale, constant returns to scale and diminishing returns to scale.
- Different types of production function are Cobb-Douglas Production Function, Leontief Production Function and CES Production Function.

KEY WORDS

- **MRTS**: It is a rate at which one input can be substituted by the other input.
- **Isoquant**: It depicts equal quantity of total product that can be produced with different combinations of capital and labour.
- **Iso-cost line**: The line that represents the price at which various factors of production are purchased by an entrepreneur.

- **Production Function**: It implies functional relationship between inputs and output of production.
- **Perfect Competition**: In this market, there are a large number of buyers and sellers in the market. These buyers and sellers cannot influence the market price by increasing or decreasing their purchases or output, respectively.

7.13 DESCRIPTIVE QUESTIONS

1. Explain the concept of production.
2. Describe the different forms of isoquants
3. Discuss Production Possibility Curve.
4. Explain the law of diminishing returns
5. Elaborate on returns to scale
6. Explain Cobb-Douglas production function

7.14 ANSWERS AND HINTS

ANSWERS FOR SELF ASSESSMENT QUESTIONS

Topic	Q. No.	Answers
Concept of Production	1.	Production
	2.	False
Factors of Production	3.	Land, labour, capital, enterprise
Production Possibility Curve	4.	d. Production Possibility Curve
	5.	Concave
Production Function	6.	True
Production in the Short Run	7.	Average Product = Total Product/ variable inputs employed
	8.	Law of variable proportions or the law of diminishing marginal returns
Law of Diminishing Returns (Law of Variable Proportions)	9.	Diminishing returns to scale
	10.	Increasing returns
Production in the Long Run	11.	False
Producer's Equilibrium	12.	Expansion path
Returns to Scale	13.	Equal
Different Types of Production Functions	14.	Leontief production function

N O T E S

HINTS FOR DESCRIPTIVE QUESTIONS

1. Production refers to an economic activity of converting inputs into output. Refer to section **7.2 Concept of Production**.
2. Different forms of isoquants are linear isoquant and L-shaped isoquant. Refer to section **7.8 Production in the Long Run**
3. Production possibility curve decides the optimum utilisation of resources to produce various goods. Refer to section **7.4 Production Possibility Curve**
4. The law of diminishing returns explains that when more and more units of a variable input are employed on a given quantity of fixed inputs, the total output may initially increase at an increasing rate and then at a constant rate, but it will eventually increase at diminishing rates. Refer to section **7.7 Law of Diminishing Returns (Law of Variable Proportions)**
5. The law of returns to scale explains the proportional change in output with respect to proportional change in inputs. Refer to section **7.10 Returns to Scale**.
6. The Cobb-Douglas production function refers to the production function in which one input can be substituted by the other, but to a limited extent. Refer to section **7.11 Different Types of Production Functions**.

7.15 SUGGESTED READINGS FOR REFERENCE

SUGGESTED READINGS

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8

CHAPTER

COST AND REVENUE ANALYSIS

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INTRODUCTORY CASELET

NOTES

HOBSONS COST PER TRANSACTION ASSESSMENT

Hobsons, a publishing business, was established in 1974 as a part of the Daily Mail and General Trust (DMGT), one of the oldest and most successful international media organisations. Hobsons is a leading provider of innovative technology and integrated marketing solutions to empower education professionals, including recruitment, enrolment and retention. Hobsons has developed a gamut of products that assist educational institutions to plan, manage and track students more effectively. Hobsons software products include enquiry management software, customer relationship management, group messaging technology and online application systems.

Hobsons was aware the profitability of its business was directly dependent on the cost of developing, maintaining and sustaining its main business applications that provide services to external parties, such as students, teachers and other education professionals. Therefore, Hobsons required assistance in determining the right approach, methodology and process of cost estimation in order to ensure the accuracy and relevance of the results. With the help of financial consultants, the Fujitsu TCO, Hobnobs was able to decide the baseline cost of its applications and compute the cost per transaction. This provided Hobsons with the facility to manage its costs more effectively and plan for constant improvement.

LEARNING OBJECTIVES

After completing this chapter, you will be able to:

- Explain the concept of cost and discuss various types of costs
- Describe the short-run and long-run costs of production
- Derive cost schedule from production function
- Explain the concept of economies and diseconomies of scale
- Explain the concept of economies of scope
- Explain the concept of revenue

8.1 INTRODUCTION

When an organisation decides to produce a commodity, it has to pay the price for various inputs that are used in the production. The organisation requires labour, raw materials, fuel and power, rent for the factory building and so on. Business decisions are taken by considering the money value of inputs with respect to the output. Inputs multiplied by their respective prices are combined together to obtain the money value of inputs (cost of production). Cost analysis is important in organisational decision making as the term cost has different meaning in different situations and is subject to varying interpretations. A thorough understanding of the different cost concepts is required for an organisation to make effective resource allocation decisions. For example, decisions regarding capital investments, such as purchase or replacement of machinery, introduction of a new product, recruitment of new workers, etc., are made by comparing the rate of return on the investment.

Apart from cost concepts in business, revenue analysis is also important for effective decision making. Revenue refers to the amount of money that a company earns through the sale of its goods or services in a given time period. Organisations need to consider the amount of revenue generated by them against the cost of production to assess the profitability of their businesses. The knowledge of different types of revenue and their relationship is also required for effective decision making. In this chapter, you will study about the concepts of cost and revenue, in detail.

8.2 CONCEPT OF COST

For the production of commodities and services, organisations incur various expenditures on different activities, such as purchase of raw material, payment of salaries/wages to the labour and purchase or leasing machines and building. These expenditures constitute the cost borne by the organisation for the production of its products and services. Inputs utilised multiplied by their respective prices, when added together constitute the money value of these inputs referred to as the cost of production. In other words, cost refers to the amount

of resources required for the production of commodities and services. The resources utilised in the production would be money or money's worth usually expressed in monetary units. Chartered Institute of Management Accountants, CIMA defines cost as, "the amount of expenditure (actual or notional) incurred on, or attributed to, a specified thing or activity". Cost is the expenditure, measured in monetary terms, incurred or to be incurred in order to achieve a specific objective. Cost is an important factor in business analysis and decision making especially pertaining to the following aspects:

- Identifying the weak points in production management
- Minimising the cost of production
- Finding the optimum level of production
- Estimating the cost of business operations
- Determining the price margins for selling the goods produced

An organisation needs to have an understanding of the different costs for effective decision making. The several cost concepts that an organisation needs to consider to understand their effect on the overall performance are as shown in Figure 8.1:

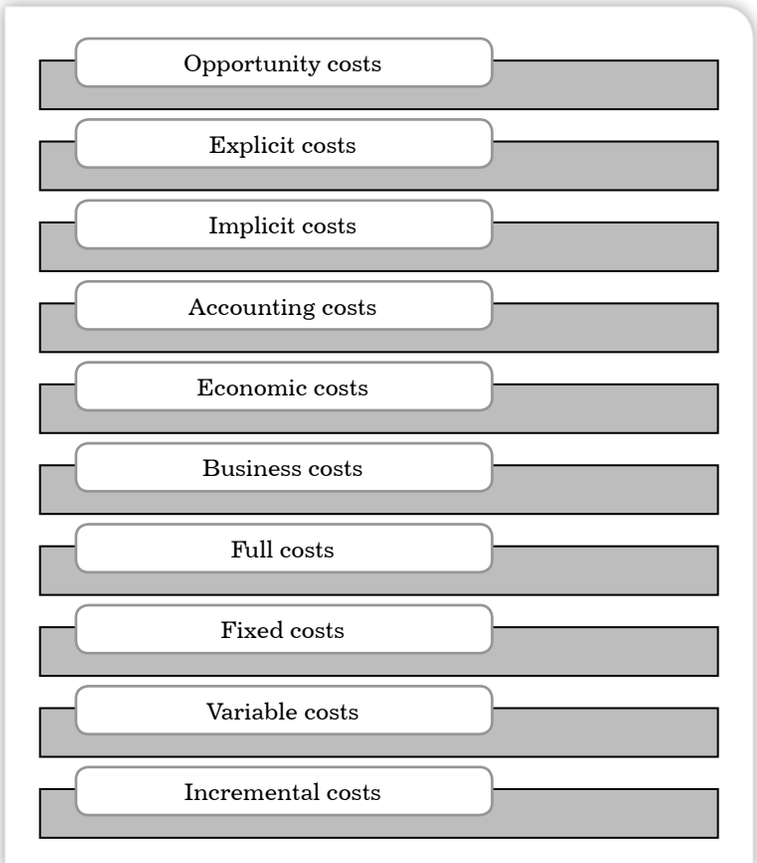

Figure 8.1: Different Cost Concepts

These cost concepts have been discussed in detail in the next section.

SELF ASSESSMENT QUESTIONS

1. Inputs utilised multiplied by their respective prices, when added together constitute the money value of these inputs referred to as _____.

ACTIVITY

List the different inputs required by an organisation to carry out their production activities.

8.3 DIFFERENT TYPES OF COSTS

While computing the total cost of production, there are several types of costs that an organisation needs to consider apart from those involved in the procurement of raw material, labour and capital. It is thus essential for the organisation to have a clear understanding of the other types of cost involved in the production process. Different circumstances give way to different types of costs, such as accounting costs, opportunity costs, explicit and implicit costs, fixed costs, variable costs, full costs, incremental costs, etc. For effective decision-making, it is essential to distinguish between and interpret the various cost concepts that affect an organisation's overall profit. Let us study the various costs concepts in an organisation in detail.

8.3.1 OPPORTUNITY COSTS

Opportunity cost is also referred to as alternative cost. An organisation has limited resources, such as land, labour, capital, etc., which can be put to alternative uses having different returns. Organisations tend to utilise their limited resources for the most productive alternative and forgo the income expected from the second best use of these resources. Therefore, opportunity cost may be defined as the return from the second best use of the firm's limited resources, which it forgoes in order to benefit from the best use of these resources. Let us assume that an organisation has a capital resource of ₹ 1,00,000 and two alternative courses to choose from. It can either purchase a printing machine or photo copier, both having a productive life span of 12 years. The printing machine would yield an income of ₹ 30,000 per annum while the photo copier would yield an income of ₹ 20, 000 per annum. An organisation that aims to maximise its profit would use the available amount to purchase the printing machine and forgo the income expected from the photo copier. Therefore, the opportunity cost in this case is the income forgone by the organisation, i.e., ₹ 20, 000 per annum.

8.3.2 EXPLICIT COSTS

Explicit costs, also referred to as actual costs, include those payments that the employer makes to purchase or own the factors of production. These costs comprise payments for raw materials, interest paid on loans, rent paid for leased building or machinery and taxes paid to the government. An explicit cost is one that has occurred and is clearly reported in accounting books as a separate cost. For example, if an organisation borrows a sum of ₹ 70,00,000 at an interest rate of 4% per year, the interest cost of ₹ 2,80,000 per year would be an explicit cost for the organisation.

8.3.3 IMPLICIT COSTS

Unlike explicit costs, there are certain other costs that cannot be reported as cash outlays in accounting books. These costs are referred to as implicit costs. Opportunity costs are examples of implicit cost borne by an organisation. Let us understand the concept of implicit cost with the help of an example. An employee in an organisation takes a vacation to travel to his relative's place. In this case, the implicit costs borne by the employee would be the salary that the employee could have earned if he/she had not taken the leave. Implicit costs are added to the explicit cost to establish a true estimate of the cost of production. Implicit costs are also referred to as imputed costs, implied costs or notional costs.

8.3.4 ACCOUNTING COSTS

Accounting costs include the financial expenditure incurred by a firm in acquiring inputs for the production of a commodity. These expenditures include salaries/wages of labour, payment for the purchase of raw materials and machinery, etc. Accounting costs are recorded in the books of accounts of a firm and appear on the firm's income statement. Accounting costs include all explicit costs along with certain implicit costs of an organisation. For example, depreciation expenses (implicit cost) are included in the books of account as a firm's accounting costs.

8.3.5 ECONOMIC COSTS

Economic costs include the total cost of opting for one alternative over another. The concept of economic costs is similar that of opportunity costs or implicit costs with the only difference that economic costs include the accounting cost (or explicit cost) as well as the opportunity cost (or implicit cost) incurred to carry out an action over the forgone action. For example, if the economic cost of the employee in the above example would include his/her week's pay as well as the expense incurred on the vacation.

8.3.6 BUSINESS COSTS

Business costs include all the expenditures incurred to carry out a business. The concept of business cost is similar to the explicit costs. Business costs comprise all the payments and contractual obligations made by a business, added to the book cost of depreciation of plant and equipment. These costs are used to calculate the profit or loss made by a business, filing for income tax returns and other legal procedures.

8.3.7 FULL COSTS

The full costs include the business costs, opportunity costs, and normal profit. Full costs of an organisation include cost of materials, labour and both variable and fixed manufacturing overheads that are required to produce a commodity.

8.3.8 FIXED COSTS

Fixed costs refer to the costs borne by a firm that do not change with changes in the output level. Even if the firm does not produce anything, its fixed costs would still remain the same. For example, depreciation, administrative costs, rent of land and buildings, taxes, etc. are fixed costs of a firm that remain unchanged even though the firm's output changes. However, if the time period under consideration is long enough to make alterations in the firm's capacity, the fixed costs may also vary.

8.3.9 VARIABLE COSTS

Variable costs refer to the costs that are directly dependent on the output level of the firm. In other words, variable costs vary with the changes in the volume or level of output. For example, if an organisation increases its level of output, it would require more raw materials. Cost of raw material is a variable cost for the firm. Other examples of variable costs are labour expenses, maintenance costs of fixed assets, routine maintenance expenditure, etc. However, the change in variable costs with changes in output level may not necessarily be in the same proportion. The proportionality between the variable costs and output depends upon the utilisation of fixed assets during the production process. The sum of fixed costs and variable costs of a firm constitutes its total cost of production. This can be expressed as follows:

Total Costs of a firm (TC) = Fixed costs (FC) + Variable costs (VC)

8.3.10 INCREMENTAL COSTS

Incremental costs involve the additional costs resulting due to a change in the nature of level of business activity. It characterises the additional cost that would have not been incurred if an additional unit

was not produced. As these costs may be avoided by avoiding the possible variation in the production, they are also referred to as avoidable costs or escapable costs. For example, if a production house has to run for additional two hours, the electricity consumed during the extra hours is an additional cost to the production house. The incremental cost comprises the variable costs.

SELF ASSESSMENT QUESTIONS

2. Which of these costs include the return from the second best use of the firm's limited resources, which it forgoes in order to benefit from the best use of these resources?
   a. Fixed costs
   b. Explicit costs
   c. Implicit costs
   d. Opportunity costs
3. Variable costs refer to the costs borne by a firm that do not change with changes in the output level. (True/False)
4. Match the following:

1. Accounting costs	a. additional cost
2. Fixed costs	b. constant with change in output
3. Economic costs	c. accounting and opportunity costs
4. Incremental costs	d. recorded in the books of accounts

5. Give the formula for Total Costs of a firm (TC).

ACTIVITY

List a few examples of both explicit costs and implicit costs.

8.4 SHORT RUN COSTS OF PRODUCTION

A short-run period refers to a certain period of time where at least one input is fixed while others are variable. In the short-run period, an organisation cannot change the fixed factors of production, such as capital, factory buildings, plant and equipment, etc. However, the variable costs, such as raw material, employee wages, etc., change with the level of output. If a firm intends to increase its output in the short run, it would need to hire more workers and purchase more raw materials. The firm cannot expand its plant size or increase the plant capacity in the short run. Similarly, when demand falls, the firm would reduce the work hours or output, but cannot downsize its plant. Therefore, in the short run only variable factors are changed, while the fixed factors re-

main unchanged. Let us discuss the cost-output relations in the short run in the next section.

8.4.1 SHORT-RUN TOTAL COST

The total cost refers to the actual cost that is incurred by an organisation to produce a given level of output. The Short-Run Total Cost (SRTC) of an organisation consists of two main elements:

- **Total Fixed Cost (TFC):** These costs do not change with the change in output. TFC remains constant even when the output is zero. TFC is represented by a straight line horizontal to the x-axis (output).
- **Total Variable Cost (TVC):** These costs are directly proportional to the output of a firm. This implies that when the output increases, TVC also increases and when the output decreases, TVC decreases as well.

  SRTC is obtained by adding the total fixed cost and the total variable cost.

  SRTC = TFC + TVC

As the TFC remains constant, the changes in SRTC are entirely due to variations in TVC.

Figure 8.2 depicts the short-run costs of a firm:

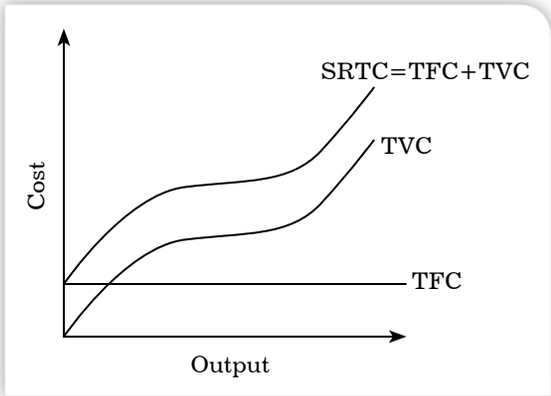

Figure 8.2: Short-Run Costs

8.4.2 SHORT-RUN AVERAGE COST

The average cost is calculated by dividing total cost by the number of units a firm has produced. The short-run average cost (SRAC) of a firm refers to per unit cost of output at different levels of production. To calculate SRAC, short-run total cost is divided by the output.

$$SRAC = \frac{SRTC}{Q} = \frac{TFC + TVC}{Q}$$

$$= = \frac{TFC}{Q} + \frac{TVC}{Q}$$

Where, $\frac{TFC}{Q}$ =Average Fixed Cost (AFC)

and $\frac{TVC}{Q}$ =Average Variable Cost (AVC)

Therefore, SRAC = AFC + AVC

SRAC of a firm is U-shaped. It declines in the beginning, reaches to a minimum and starts to rise. In the beginning, the fixed costs remain the same while only the variable costs, such as cost of raw material, labour, etc. changes. Later, when the fixed costs get distributed over the output, the average cost begins to fall. When a firm utilises its capacities to the full, the average cost reaches to a minimum. It is at this point that the firm operates at its optimum capacity.

Figure 8.3 depicts the short-run average cost of a firm:

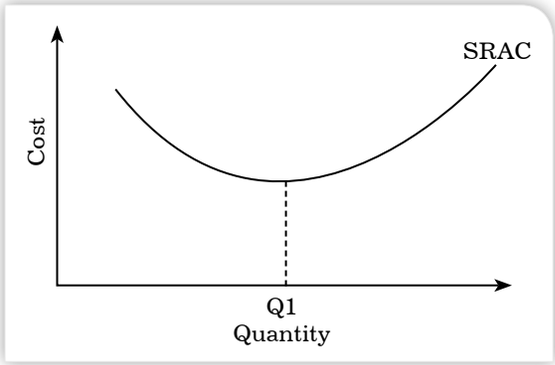

Figure 8.3: U-Shaped Short-Run Average Cost

The SRAC curve represents the average cost in the short run for producing a given quantity of output. The downward-slope of the SRAC curve indicates that as the output increases, average costs decrease. However, the SRAC curve begins to slope upwards, indicating that at output levels above Q1, average costs start to increase.

8.4.3 SHORT-RUN MARGINAL COST

Marginal cost (MC) can be defined as the change in the total cost of a firm divided by the change in the total output. Short-run marginal cost refers to the change in short-run total cost due to a change in the firm's output.

$$SRMC = \frac{\partial SRTC}{\partial Q}$$

In the marginal cost concept, $\Delta Q = 1$,

Therefore, SRMC = TVC

Short-run marginal cost on a graph is the slope of the short-run total cost and depicts the rate of change in total cost as output changes. The marginal cost of a firm is used to determine whether additional units need to be produced or not. If a firm could sell the additional unit at a price greater than the cost incurred to produce the additional unit (marginal cost), the firm may decide to produce the additional unit.

Table 8.1 shows the estimation of SRTC, SRAC, and SRMC of a firm producing paper bags. Quantity expressed is in thousands ('000) and the cost in ₹ (in lakhs):

TABLE 8.1: CALCULATION OF SRTC, SRAC AND SRMC

Quantity (Q)	Total Fixed Cost (TFC)	Total Variable Cost (TVC)	Total Cost (SRTC = TFC + TVC)	Average Cost (SRAC= TC/Q)	Marginal Cost (SRMC=ΔTC/Δ Q)
20	10	15	25	1.25	–
21	10	20	30	1.43	5
22	10	10	20	0.91	10
23	10	12	22	0.96	2

Figure 8.4 depicts the SRMC of a firm:

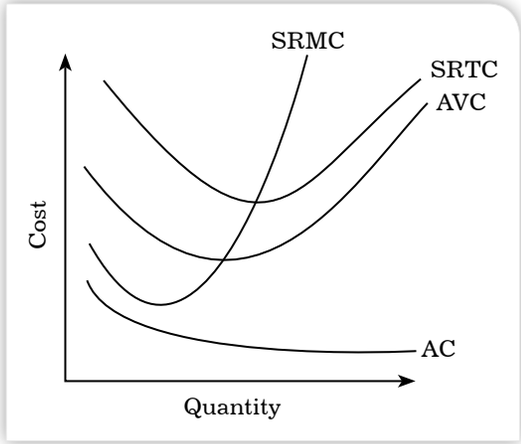

Figure 8.4: Marginal Cost in the Short Run

The short-run marginal cost (SRMC), short-run average cost (SRAC) and average variable cost (AVC) are U-shaped due to increasing returns in the beginning followed by diminishing returns. SRMC curve intersects SRAC curve and the AVC curve at their lowest points.

SELF ASSESSMENT QUESTIONS

6. _____ refers to the change in short-run total cost due to a change in the firm's output.
7. Give the formula for SRAC.

ACTIVITY

Discuss the interpretation of the upward and downward slopes in SRAC of a firm.

8.5 LONG RUN COSTS OF PRODUCTION

Long run refers to the time period in which all factors of production are variable. Long-run costs are incurred by a firm when production levels change over time. In the long run, the factors of production may be utilised in changing proportions to produce a higher level of output. In such a case, the firm may not only hire more workers, but also expand its plant size, or set up a new plant to produce the desired output. For example, downsizing or expanding an organisation, entering or leaving a market, etc., involve long-run costs. To understand the long run cost-output relations, it can be assumed that a long-run cost curve is composed of a series of short-run cost curves. Let us discuss the different types of costs involved in the long-run period of a firm.

8.5.1 LONG-RUN TOTAL COST

Long-run total cost (LRTC) refers to the total cost incurred by an organisation for the production of a given level of output when all factors of production are variable. In other words, long run total cost is the per unit cost incurred by a firm when it expands the scale of its operations not just by hiring more workers, but also by building a larger factory or setting up a new plant. The shape of the long-run total cost curve is S-shaped, much similar to a short-run total cost curve. For relatively small quantities of output, the slope begins to flatten. Then, for larger quantities the slope makes a turn-around and becomes steeper. Figure 8.5 depicts the long-run total cost of a firm:

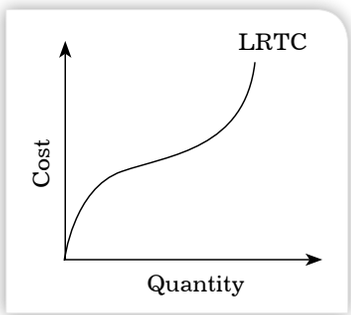

Figure 8.5: Long-Run Total Cost of a Firm

8.5.2 LONG-RUN AVERAGE COST

Long-run average cost (LRAC) refers to per unit cost incurred by a firm in the production of a desired level of output when all the inputs are variable. In other words, LRAC curve of a firm depicts the minimum average cost at which the firm can produce any given level of output in the long run. The LRAC of a firm can be obtained from its individual short-run average cost curves. Each SRAC curve represents the firm's short-run cost of production when different amounts of capital are used. The shape of the LRAC curve is similar to the SRAC curve although the U-shape of the LRAC is not due to increasing, and later diminishing marginal. The negative slope of the LRAC curve depicts economies of scale and increasing returns to scale. On the other hand, the positive slope of the LRAC curve represents diseconomies of scale or decreasing returns to scale. The economies and diseconomies of scale have been discussed later in the chapter. Figure 8.6 depicts the long-run average cost of a firm:

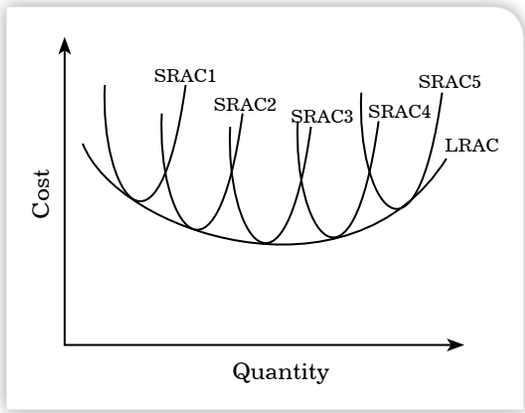

Figure 8.6: Long-Run Average Cost of a Firm

In Figure 8.6, there are five alternative scales of a plant SRAC1, SRAC2, SRAC3, SRAC4 and SRAC5. However, in the long run, the firm will operate the scale LRAC, which is the most profitable to it.

8.5.3 LONG-RUN MARGINAL COST

Long-run marginal cost (LRMC) refers to the incremental cost incurred by an organisation for producing a given output level when none of the input is constant. In other words, long-run marginal cost is the additional cost that the firm incurs when it expands the scale of its operations not just by hiring additional workers, but also by increasing the plant capacity. The LRMC is the slope of the LRTC curve. The shape of the LRMC curve is similar to the SRMC curve although the U-shape of the LRMC is not due to increasing, and later diminishing marginal. The negative slope of the LRMC curve depicts economies of scale and increasing returns to scale. On the other hand, the posi-

tive slope of the LRMC curve represents diseconomies of scale or decreasing returns to scale. LRMC curve can be derived from the LRAC curve.

In Figure 8.7, at output OM1, SRMC1 = LRMC. At SRMC2, LRMC = SRAC2 = LRAC. SRAC1 = LRAC (at tangency) and SRMC1 = LRMC (at intersection).

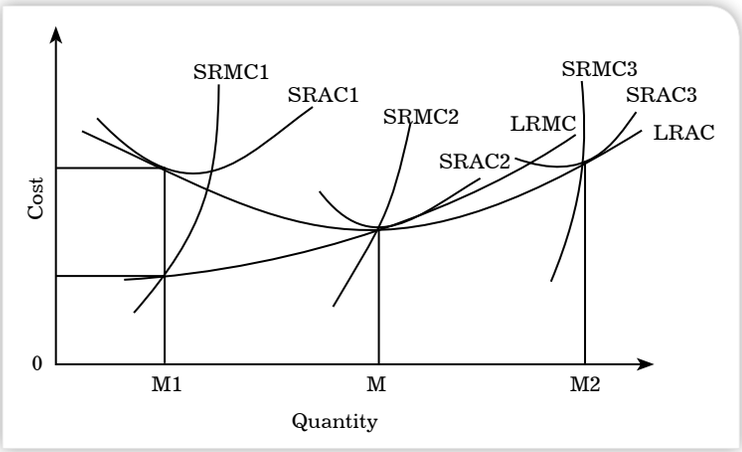

Figure 8.7: Long-Run Marginal Cost of a Firm

SELF ASSESSMENT QUESTIONS

8. Long-run average cost (LRAC) refers to per unit cost incurred by a firm in the production of a desired level of output when all the inputs are variable. (True/False)

9. _____ is the slope of the LRTC curve.

ACTIVITY

Using the Internet, find the SRTC of a manufacturing firm for the last four years and based on these, plot the LRTC curve of the firm.

8.6 DERIVING COST SCHEDULE FROM PRODUCTION FUNCTION

The derivation of the cost schedule from the production function discussed in this chapter is related to the short-run functions. The derivation for long run involves complicated mathematical tools as all the inputs in the long run are variable. In the previous chapter, we studied about the production function of a firm. Let us assume that a firm produces Q_o at the cost minimising input mix "a" as depicted in Figure 8.8:

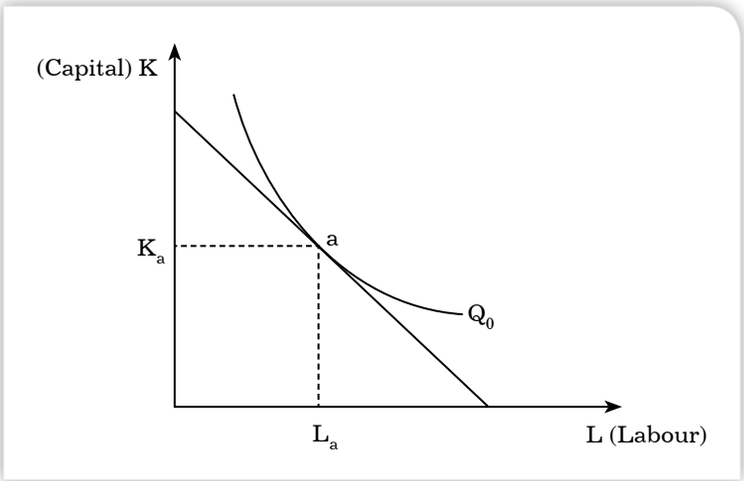

Figure 8.8: Iso-cost Line (rK + wL = TC)

The firm's production function $\mathbf{Qo = F\ (K, L) = K^{1/2}L^{1/2}}$

Where K =Capital resources, L = Labour resources

The slope of the isoquant shows the marginal rate at which the firm is able to substitute between inputs, remaining the output constant. The marginal rate of substitution (MRS) is the ratio of marginal products of capital (MP_K) and marginal products of labour (MP_L):

$$MRTS = \frac{MP_L}{MP_K} \quad \text{where} \quad MP_L \frac{\partial F(K,L)}{\partial L} = \frac{1}{2}\left(\frac{K}{L}\right)^{1/2}$$

$$MP_K \frac{\partial F(K,L)}{\partial K} = \frac{1}{2}\left(\frac{L}{K}\right)^{1/2}$$

$$MRTS = \frac{K}{L}$$

The cost minimising input mix and the marginal rate of technical substitution (MRTS) are equal to the slope of the iso-cost curve at point a:

$$MRTS = \frac{w}{r} \text{ or } \frac{K}{L} = \frac{w}{r} \quad \text{.....(1)}$$

Where w is the wage rate of labour, and r is the rental rate of capital.

Solving for K to find the relationship between capital and labour that must hold at every cost minimising output level:

$$K = \frac{w}{r} L \quad \text{.....(2)}$$

Substituting equation (2) for K into the production function, we derive:

$$Q = \left(\frac{w}{r} L\right)^{1/2} L^{1/2}$$

$$= \left(\frac{w}{r}\right)^{1/2} L \quad \text{.....(3)}$$

Taking equation 3 and solving for L we derive:

$$L = Q\left(\frac{r}{w}\right)^{1/2} \text{.....(4)}$$

Using equation (4) to substitute for L in equation (2), we derive:

$$K = \frac{w}{r} Q\left(\frac{r}{w}\right)^{1/2}$$

$$= Q\left(\frac{w}{r}\right)^{1/2} \quad \text{.....(5)}$$

Equations (4) and (5) are used to calculate the demand for capital and labour as a function of input prices and output level, respectively. The firm's total cost can be represented as the sum of total expenditure on both these inputs:

$$TC = rK + wL \text{ .....(6)}$$

Finally, to derive the equation for the firm's long-run total cost, substituting the functions for L and K in equations (4) and (5) to equation (6), we derive the following cost function:

$$TC = rQ\left(\frac{w}{r}\right)^{1/2} + wQ\left(\frac{r}{w}\right)^{1/2}$$
$$= Q\left(rw\right)^{1/2} + Q\left(rw\right)^{1/2}$$

$$= 2Q\left(rw\right)^{1/2}$$

SELF ASSESSMENT QUESTIONS

10. Give the formula for cost schedule derived from a firm's production schedule.

ACTIVITY

Use the cost schedule function to find the total cost of a firm by substituting different values of cost and labour.

8.7 ECONOMIES AND DISECONOMIES OF SCALE

As a firm expands its production capacity, the efficiency of production also increases. It is able to draw more output per unit of input, leading to low average total costs. This condition is termed as **economies of scale**. Economies of scale result in cost saving for a firm as the same level of inputs yield a higher level of output. Higher level of output results in lower average costs as the total costs are shared over the increased output. There are two types of economies of scale:

1. **Internal economies of scale:** These refer to the economies that a firm achieves due to the growth of the firm itself. When an organisation reduces costs and increases the production, internal economies of scale are achieved. Internal economies of scale refer to the lower per unit cost that a firm obtains by increasing its capacity. There are five types of internal economies of scale, as shown in Figure 8.9:

Figure 8.9: Types of Internal Economies of Scale

Let us discuss the different types of internal economies of scale in detail:

- **Bulk-buying economies:** As a firm grows in size, it requires larger quantities of production inputs, such as raw materials. With increase in the order size, the firm attains bargaining power over the suppliers. It is able to purchase inputs at a discount, which results in lower average cost of production.
- **Technical economies:** As a firm increases its scale of production, it may use advanced machinery or better techniques for the production purposes. For example, the firm may use mass production techniques, which provide a more efficient form of production. Similarly, a bigger firm may invest in research and development to increase the efficiency of production.
- **Financial economies:** Often small businesses are perceived as being riskier than larger businesses that develop a credible track record. Therefore, while the smaller firms find it hard to obtain finance at reasonable interest rates, larger firms easily find poten-

tial lenders to raise money at lower interest rates. This capital is further used to expand the production scale resulting in low average total costs.

- **Marketing economies:** The marketing function of a firm incurs a certain cost, such as costs involved in advertising and promotion, hiring sales agents, etc. Many of these costs are fixed and as the firm expands its capacity, it is able to spread the marketing costs over a wider range of products. This results in low-average total costs.
- **Managerial economies:** As a firm grows, managerial activities become more specialised. For example, a larger firm can further divide its management into smaller departments that specialise in specific areas of business. Specialist managers are likely to be more efficient as they possess a high level of expertise, experience and qualifications. This reduces the managerial costs in proportion to the scale of production in the firm. Therefore, economies of scale can be achieved with efficient management.
- **External economies of scale:** The other category of economies of scale is the external economies of scale. These refer to the economies in production that a firm achieves due to the growth of the overall industry in which the firm operates. External economies of scale transpire outside a firm, within an industry. Therefore, when an industry's scope of operations expands, external economies of scale are said to have been achieved. For example, the creation of a better transportation network, which results in a subsequent fall in the transportation cost of a firm operating within that industry, leads to external economies of scale. Some of the main factors that lead to external economies of scale are as follows:
  - Improvement in transport and communication network
  - Focus on training and education within the industry
  - Support of other industries

On the other hand, **diseconomies of scale** refer to the disadvantages that arise due to the expansion of a firm's capacity leading to a rise in the average cost of production. Similar to the economies of scale, diseconomies of scale can also be categorised into internal and external diseconomies of scale. Let us discuss the internal and external diseconomies of scale in detail:

1. **Internal diseconomies:** These refer to the diseconomies that a firm incurs due to the growth of the firm itself. These diseconomies of scale result in a decrease in the firm's output and increase in the long-run average cost. The two main reasons for internal diseconomies of scale are as follows:
   - **Managerial inefficiency:** When a firm expands its production capacity, control and planning also need to be increased. This requires the administration to be more efficient. Often

due to the challenge of managing a bigger firm, managerial responsibilities are delegated to the lower level personnel. As these personnel may lack the required experience to undertake the challenge, it may result in low output at higher cost.

- **Labour inefficiency:** When a firm expands its production capacity, work areas may become more crowded leaving little space for each worker to work efficiently. Moreover over-specialisation and division of labour in a bigger firm create over-dependence on workers. In such situations, labour absenteeism, lethargy, discontinuation of services, etc., become common, which increase the long-run average cost of production.

2. **External diseconomies:** External diseconomies of scale refer to the disadvantages that arise due to an increase in the number of firms in an industry leading to over production. Several factors that give rise to external diseconomies of scale are as follows:

   - The concentration of firms within an industry increases the demand for raw materials. This leads to an increase in the prices of raw materials consequently increasing the cost of production in the industry.
   - The concentration of firms within an industry increases the demand for skilled labour. This leads to an increase in the wages of the skilled workers consequently increasing the cost of production in the industry.
   - The concentration of firms within an industry may lead to problems of waste disposal. Firms are bound to employ expensive waste disposal or recycling methods, which increases the long run cost of production.
   - The concentration of firms within an industry may lead to excessive need for advertising and promotion, consequently increasing the cost of production in the industry.

SELF ASSESSMENT QUESTIONS

11. Which of these arises due to an increase in the number of firms in an industry leading to over production?

    a. Internal economies of scale
    b. External economies of scale
    c. External diseconomies of scale
    d. Internal diseconomies of scale

ACTIVITY

Give examples of factors that lead to diseconomies of scale.

8.8 ECONOMIES OF SCOPE

Economies of scope refer to the decrease in the average total cost of a firm due to the production of a wider variety of goods or services. Let us consider the example of Proctor & Gamble, which is a multinational manufacturer of product ranges, including personal care, household cleaning, laundry detergents, prescription drugs and disposable nappies. Procter & Gamble can lower the average total cost of production for each product by spreading the input costs across its range of products. Economies of scope can be attained by sharing or joint utilisation of inputs leading to reductions in unit costs.

Economies of scope allow organisations to generate operational efficiencies in production. Economies of scope are usually attained by manufacturing small batches of many items as opposed to economies of scale where organisations produce large batches of a few items.

There are several ways through which an organisation can attain economies of scope. Some of these ways are as follows:

- **Flexibility in manufacturing:** The use of flexible manufacturing systems results in economies of scope as it allows low-cost swapping of one product line with another. If a manufacturer can produce multiple products using the same equipment and maintains flexibility in manufacturing as per the market demand, the manufacturer can attain economies of scope.
- **Sharing of resources:** When a firm expands its existing capacities, resources or areas of expertise for greater competitiveness, this result in lowered cost of production as the firm can use the expertise in one business to gain from a new business. These businesses could share the operational skills, manufacturing know-how, plant facilities, equipment or other existing assets. This leads to the attainment of economies of scope.
- **Mergers and acquisitions:** Mergers may be undertaken to enhance or expand a manufacturer's product portfolio, increase plant size and combine costs. For example, several pharmaceutical organisations have consolidated their research and development expenses for bringing new products to market. This leads to the attainment of economies of scope.

SELF ASSESSMENT QUESTIONS

12. Economies of scope are usually attained by manufacturing large batches instead of small batches of many items. (True/False)

ACTIVITY

Using the Internet, make a report of how McDonalds achieves economies of scope by offering a range of snacks.

8.9 CONCEPT OF REVENUE

Profit making is the most important objective of a firm. The profit earned by a firm can be increased either by reducing the cost of production or by increasing the revenue. Revenue is the total amount of money received by an organisation in return of the goods sold or services provided during a given time period. In other words, revenue of a firm refers to the amount received by the firm from the sale of a given quantity of a commodity in the market. For example, if a firm obtains ₹ 2, 50,000 from the sale of 10 computers, the received amount of ₹ 2, 50,000 is its revenue earned during the time period. The concept of revenue consists of three important types of revenue, as shown in Figure 8.10:

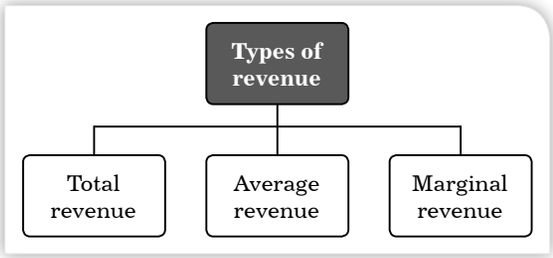

Figure 8.10: Type of Revenue

The different types of revenues in a firm are discussed in the next section.

8.9.1 TOTAL REVENUE

Total Revenue (TR) of a firm refers to total receipts from the sale of a given quantity of a commodity. In other words, total revenue is the total income of a firm. Total revenue is calculated by multiplying the quantity of the commodity sold with the price of the commodity. Symbolically,

Total Revenue = Quantity × Price

For example, if a firm sells 10 fans at a price of ₹ 2,000 per fan, then the total revenue would be calculated as follows:

10 fans × ₹ 2,000 = ₹ 20, 000

8.9.2 AVERAGE REVENUE

Average Revenue (AR) of a firm refers to the revenue earned per unit of output sold. It is calculated by dividing the total revenue of the firm by the total number of units sold. Symbolically,

$$\text{Average Revenue} = \frac{\text{Total Revenue}}{\text{Total number of units sold}}$$

For example, if total revenue from the sale of 10 fans at the rate of ₹ 2000 per fan is ₹ 20, 000, then:

$$\text{Average Revenue} = \frac{20000}{10} = ₹\ 2{,}000$$

Here, it is important to note that AR and price of a commodity are equal in value. This can be explained as follows:

$$TR = \text{Quantity} \times \text{Price} \quad \text{.....(1)}$$

$$AR = \frac{TR}{Q} \quad \text{.....(2)}$$

Substituting the value of TR from equation (1) in equation (2),

$$AR = \frac{\text{Quantity} \times \text{Price}}{\text{Quantity}}$$

Therefore, AR = Price

8.9.3 MARGINAL REVENUE

Marginal Revenue (MR) of a firm refers to the revenue earned by selling an additional unit of the commodity. In other words, the change in total revenue resulting from the sale of an additional unit is called marginal revenue. Symbolically,

$$MR_n = TR_n - TR_{n-1}$$

Where MR_n = marginal revenue of nth unit (additional unit), TR_n = total revenue from n units, TR_{n-1} = Total revenue from (n – 1) units and n = number of units sold.

For example, if the total revenue realised from the sale of 10 fans is ₹ 2,000 and that from sale of 11 fans is ₹ 2,500, then MR of the 11th fan will be calculated as follows:

$$MR_{11} = TR_{11} - TR_{10}$$

Or MR_{11} = ₹ 2,500 – ₹ 2,000 = ₹ 500

Another method to calculate MR is as follows:

As discussed earlier, MR is the change in TR when an additional unit is sold. However, when change in units sold is more than one, MR can also be computed using the following method:

$$MR = \frac{\text{Change in Total Revenue}}{\text{Change in number of units}}$$

$$MR = \frac{\varnothing TR}{\varnothing Q}$$

Let us understand this with the help of an example. Suppose the total revenue realised from sale of 10 fans is ₹ 2,000 and that from sale of 14 fans is ₹ 4,000, marginal revenue will be calculated as follows:

$$MR = \frac{\text{TR of 14 fans} - \text{TR of 10 fans}}{\text{14 fans} - \text{10 fans}}$$

$$MR \ \frac{4000 - 2000}{14 - 10} = \frac{2000}{4} \ ₹\ 500$$

8.9.4 RELATIONSHIP BETWEEN TOTAL REVENUE AND MARGINAL REVENUE

Marginal revenue is the additional revenue added by an additional unit of output, expressed as follows:

$$MR = \frac{\varnothing TR}{\varnothing Q}$$

Let us consider an example to understand the relationship between TR and MR. A firm sells 100 units of a commodity at the rate of ₹10 per unit. Therefore,

$$TR = 10 \times 100 = ₹1000$$

To increase sales, the firm needs to cut down its prices. The firm then sells 101 units at the rate ₹9.95. Therefore, TR is ₹1004.95 (101×9.95). In this case, MR would be calculated as follows:

$$MR_{101} = TR_{101} - TR_{100}$$

$$MR = 1004.95 - 1000 = ₹\ 4.95$$

As discussed earlier, AR = Price of the commodity. Therefore, if the firm sells 100 units at the rate of ₹10, the AR for each unit is ₹10. However, as the firm intends to sell more units, the AR (or price) drops. This can only happen if the MR is below price or AR.

From the above illustrations, the following conclusions are drawn:

- If MR is greater than zero, the sale of an additional unit increases the TR.
- If MR is below zero, then the sale of an additional unit decreases the TR.
- If MR is zero, then the sale of an additional unit results in no change in the TR.

These relationships between TR and MR exist as marginal revenue measures the slope of the total revenue curve. Figure 8.11 shows the relationship between TR and MR:

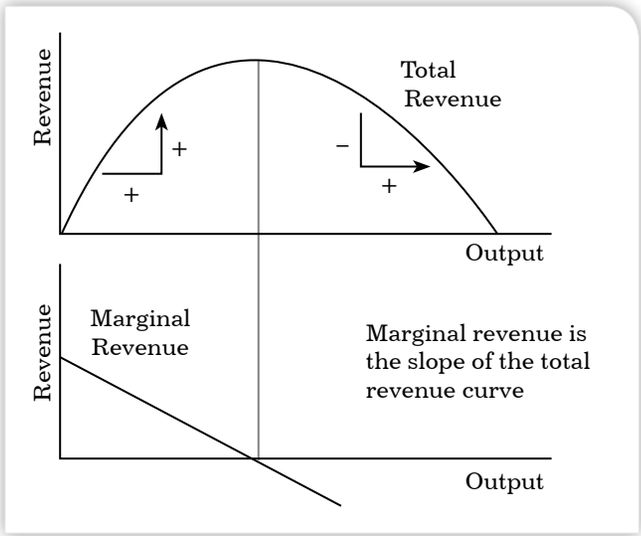

Figure 8.11: Marginal Revenue and Total Revenue

The TR curve is shaped like an inverted U. Slope of a curve is measured as the rise over the run. The rise in the slope of the TR curve represents the change in TR, whereas the run in the TR curve represents the change in output. Therefore,

$$\text{Slope of TR curve} = \frac{\text{Change in Total Revenue}}{\text{Change in number of units}} = \text{MR}$$

8.9.5 RELATIONSHIP BETWEEN AVERAGE REVENUE AND MARGINAL REVENUE

In a perfectly competitive market, where there is no market control, marginal revenue is equal to average revenue, and the average revenue remains constant. On the other hand, under imperfect competition and monopoly, where there is sufficient market control, marginal revenue is less than average revenue, and the average revenue falls. The general relationship between AR and MR is as follows:

- **Marginal revenue is less than average revenue:** MR < AR occurs for a firm selling an output in a monopoly market, where a single firm sells to several customers. A monopoly market faces market control and has a negatively-sloped demand curve. In order to sell more units, a firm in the monopoly market must charge a lower price. For example, if a firm wants to increase the quantity of a commodity (priced ₹10) sold from 400 units to 500 units, it has to decrease the price from ₹10 to ₹9.95. The average revenue generated from 500 units would be the new price. The revenue lost in lowering the price for the first 400 units is only slightly offset by the revenue gained from the sale of the additional 100 units. The loss of revenue on existing units is the reason that marginal revenue is less than the price (AR). In Figure 8.12, the negatively-sloped MR

curve lies below the negatively-sloped AR curve. As the marginal revenue is less than the average revenue, the average revenue curve declines.

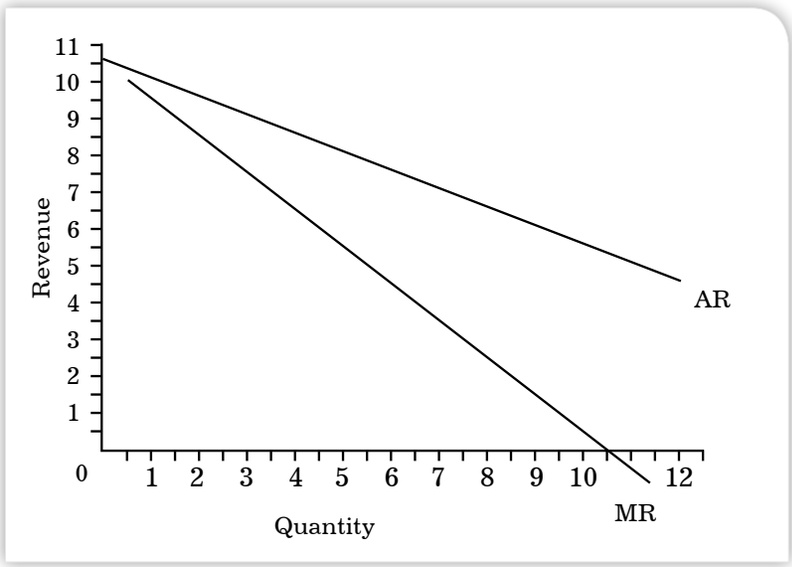

Figure 8.12: Marginal Revenue Less Than Average Revenue

- **Marginal revenue is equal to average revenue:** MR = AR occurs for a firm selling an output in a perfectly competitive market, where there are several sellers and several buyers of a given product. In such a scenario, to sustain in the market firms sell products at the prevailing market price. Since, the firms in a perfectly competitive market receive the same price for each unit (and additional units), the marginal revenue is equal to the per unit price, which is equal to AR. This is shown in Figure 8.13:

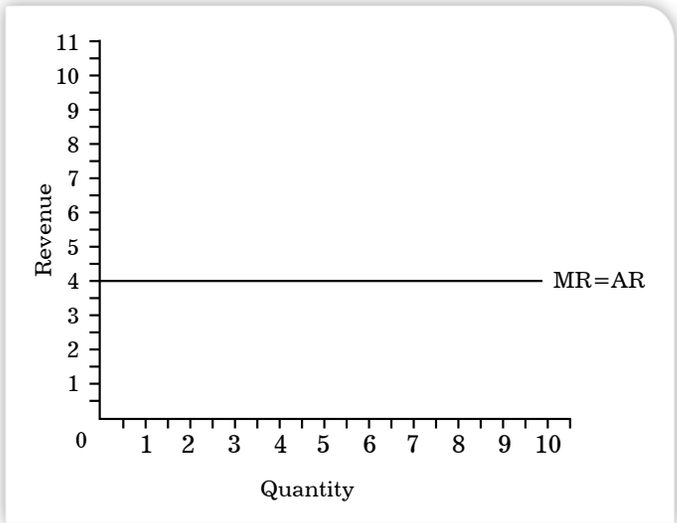

Figure 8.13: Marginal Revenue Equal to Average Revenue

SELF ASSESSMENT QUESTIONS

13. _____ of a firm refers to the revenue earned per unit of the output sold.

14. In a perfectly competitive market, where there is no market control, marginal revenue is less than the average revenue. (True/False)

ACTIVITY

In groups, discuss why the average revenue curve of a perfectly competitive firm is a horizontal, while that of a monopoly market is negatively sloped.

8.10 SUMMARY

- Inputs produced multiplied by their respective prices, when added together constitute the money value of these inputs referred to as the cost of production.
- The different types of cost concepts in an organisation are opportunity costs, accounting costs, economic costs, business costs, full costs, explicit costs, implicit costs, fixed costs, variable costs and incremental costs.
- In the short-run period, an organisation cannot change the fixed factors of production, while the variable costs change with the level of output.
- Long-run costs are incurred by a firm when production levels change over time and all the factors of production are variable.
- Cost schedule derived from production function is as follows:

$$TC = rQ\left(\frac{w}{r}\right)^{1/2} + wQ\left(\frac{r}{w}\right)^{1/2}$$
$$= Q(rw)^{1/2} + Q(rw)^{1/2}$$
$$= 2Q(rw)^{1/2}$$

- Economies of scale result in cost saving for a firm as the same level of inputs yields a higher level of output.
- Diseconomies of scale refer to the disadvantages that arise due to the expansion of a firm's capacity leading to a rise in the average cost of production.
- Economies of scope refer to the decrease in the average total cost of a firm due to the production of a wider variety of goods or services.

- Revenue is the total amount of money received by an organisation in return of the goods sold or services provided during a given time period.
- The different types of revenue are total revenue, average revenue and marginal revenue.

KEY WORDS

- **Short-run period:** It refers to the conceptual time period in which at least one factor of production is fixed in amount, while others are variable.
- **Long-run period:** It refers to the conceptual time period in which there are no fixed factors of production with respect to the changes in output level.
- **Iso-cost line:** It refers to the locus plotted by using various combinations of labour and capital resources, each of which costs the same amount of money.
- **Mergers and acquisitions:** It is a term used to denote the consolidation of organisations. A merger is an amalgamation of two organisations to form a new organisation whereas; an acquisition is the procurement of one organisation by another without the formation of a new organisation.
- **Capital resources:** These refer to the assets like tools, machines and factories, utilised in the production of goods or services as part of a business operation.
- **Labour resources:** These refer to the human capital utilised in the production of goods or services. This includes both the efforts and skills required to produce a commodity.
- **Normal profit:** Normal profit is the minimum earning, which a firm must receive to remain in its present occupation. It is the minimum level of profit required by an organisation to remain competitive in the market.

8.11 DESCRIPTIVE QUESTIONS

1. Explain the concept of cost and discuss various types of costs.
2. Describe the short-run and long-run costs of production.
3. Derive the cost schedule using the production function.
4. Explain the concept of economies and diseconomies of scale.
5. Explain the concept of economies of scope.
6. The following information is given for a firm involved in the manufacture of four wheelers.

Months	Number of four wheelers sold (Q)	Selling price of four wheelers (per unit)
1st	20	₹ 5,00,000
2nd	45	₹ 4,95,000
3rd	46	₹ 4,80,000
4th	50	₹ 4,60,000
5th	60	₹ 4,00,000

Using this information, calculate the following:

1. Total Revenue (TR) at each Quantity (Q) level
2. Average Revenue (TR) at each Quantity (Q) level
3. The Marginal Revenue earned by the firm in the 3rd month (sale of an additional unit).

8.12 ANSWERS AND HINTS

ANSWERS FOR SELF ASSESSMENT QUESTIONS

Topic	Q. No.	Answers
Concept of Cost	1.	Cost of production
Different Types of Costs	2.	d. Opportunity cost
	3.	False
	4.	1(d), 2(b), 3(c), 4(a)
	5.	Total Costs of a firm (TC) = Fixed costs (FC) + Variable costs (VC)
Short Run Costs of Production	6.	Short-run marginal cost
	7.	SRAC = (TFC+TVC)/Q or SRAC = AFC + AVC
Long Run Costs of Production	8.	True
	9.	LRMC
Deriving Cost Schedule from Production Function	10.	$TC = rQ\left(\frac{w}{r}\right)^{1/2} + wQ\left(\frac{r}{w}\right)^{1/2}$ $= Q(rw)^{1/2} + Q(rw)^{1/2}$ $= 2Q(rw)^{1/2}$
Economies and Diseconomies of Scale	11.	c. External diseconomies of scale
Economies of Scope	12.	False
Concept of Revenue	13.	Average Revenue
	14.	False

N O T E S

HINTS FOR DESCRIPTIVE QUESTIONS

1. Inputs produced multiplied by their respective prices, when added together constitute the money value of these inputs referred to as the cost of production.

   The different types of cost concepts in an organisation are opportunity costs, accounting costs, economic costs, business costs, full costs, explicit costs, implicit costs, fixed costs, variable costs and incremental costs. Refer to sections **8.2 Concept of Cost** and **8.3 Different Types of Costs.**

2. In the short run period, an organisation cannot change the fixed factors of production, while the variable costs change with the level of output. Long run costs are incurred by a firm when production levels change over time and all factors of production are variable. Refer to sections **8.4 Short-Run Costs of Production** and **8.5 Long-Run Costs of Production**.

3. The firm's production function is $Qo = F(K, L) = K^{1/2}L^{1/2}$. Cost function derived is:

$$TC = rQ\left(\frac{w}{r}\right)^{1/2} + wQ\left(\frac{r}{w}\right)^{1/2}$$
$$= Q(rw)^{1/2} + Q(rw)^{1/2}$$
$$= 2Q(rw)^{1/2}$$

   Refer to section **8.6 Deriving Cost Schedule from Production Function**.

4. Economies of scale result in cost saving for a firm as the same level of inputs yields a higher level of output. Diseconomies of scale refer to the disadvantages that arise due to the expansion of a firm's capacity leading to a rise in the average cost of production. Refer to section **8.7 Economies and Diseconomies of Scale**.

5. Economies of scope refer to the decrease in the average total cost of a firm due to the production of a wider variety of goods or services. Refer to section **8.8 Economies of Scope**.

6. Total Revenue = Quantity × Price,

$$\text{Average Revenue} = \frac{\text{Total Revenue}}{\text{Total number of units sold}}$$

   $MR_n = TR_n - TR_{n-1}$. Refer to section **8.9 Concept of Revenue**.

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SUGGESTED READINGS

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9

CHAPTER

MARKET STRUCTURE

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INTRODUCTORY CASELET

NOTES

MONOPOLY OF RAILWAYS IN INDIA

Indian Railways (IR) is the state-owned railway company of India having more than 115,000 kilometres of tracks and 7,112 stations. It has the world's 3rd largest railway network after that of the United States, and China. It has also been one of the great monopolies in India, until recently. IR is also the world's largest employer having more than 1.4 million employees as of February 2015.

By February 2015, IR had the ownership of 239,281 wagons, 59,713 passenger coaches and 9,549 locomotives. It also had a network of 19,000 trains running on a daily basis including 12,617 passenger trains that carry over 23 million passengers daily.

The concept of railways was introduced in India in 1853. By 1947, forty-two rail systems were in operation. By the year 1951, all the systems were nationalised as one unit, making IR as one of the largest rail networks in the world.

The monopoly of IR could be attributed to the presence of government rules and regulations, and achievement of economies of scale through nationwide operations; thereby eliminating the probability of a new entry in the railway sector.

LEARNING OBJECTIVES

After completing this chapter, you will be able to:

- Define the concept of market
- Identify different types of market structures
- Discuss monopolistic competition
- Explain the concepts of oligopoly and monopoly
- Define the concept of profit maximisation
- Measure the market power
- Identify the determinants of market power

9.1 INTRODUCTION

In the previous chapter, you have studied about various types of costs (such as opportunity costs, accounting costs, economic costs and business costs) incurred by organisations to produce outputs. Therefore, these costs become a vital factor for business analysis and decision making. Other than costs, the market structure in which an organisation operates also plays an important role its decisions making related to pricing, quantity demanded, profit maximisation, etc.

Market is often referred to a physical location where exchange of goods and services takes place between buyers and sellers at a specific price. In economics, it cannot be restricted to a physical place, rather has a broader meaning. Thus, in economics, market is a set of buyers and sellers who may be geographically separated from each other, but are still able to make successful transactions through various means of communication. A market is characterised by various features, such as the nature of competition, quantity of products demanded, price of the product and availability of substitutes.

To understand the structure of the market, the most important factor analysed is competition in the market. Based on this factor, market structure is classified into three categories, namely, a purely competitive market, perfectly competitive market, and imperfectly competitive market. A purely competitive market is characterised by a large number of independent sellers and buyers dealing with standardised products. A perfectly competitive market is a wider term and constitutes a large number of buyers and sellers engaged in transaction of the homogenous products. On the contrary, in an imperfectly competitive market, buyers and sellers deal in differentiated products, and sellers have the power of influencing the market price of products.

An organisation operating in any kind of market structure has only one aim, i.e. profit maximisation, whereby the organisation decides the level of output and price to maximise the profits in the short run and long run. In this chapter, you will study about the concept of market structure and how organisations operate under different structures.

9.2 DEFINING MARKET

Generally, market is referred to as a gathering wherein purchase and sale transactions take place. In other words, it can be defined as a physical space where large numbers of sellers offer a variety of products to consumers for sale. However, in economics, the term market has a different meaning. Let us study about the concept of the market in detail.

In economics, market is defined as a setup under which buyers and sellers come and interact to make successful transactions in terms of the price and quantity of a product for buying and selling. It includes a variety of systems, procedures, social interactions, and infrastructures for successful exchange between various parties (buyer and sellers). According to Cournot, a French Economist, "Economists understand the term market not any particular market place in which things are bought and sold, but the whole of any region in which buyers and sellers are in such free intercourse with one another that the price of the same good tends to equality easily and quickly."

From the above definitions, it is clear that market is not restricted to any one particular place, rather includes regional, national and international market. As per the definition given by Cournot, following are the essentials of a market:

- Products, which are dealt with
- Presence of buyers and sellers
- A place, whether a certain region, country, or the whole world
- A type of intercourse between buyers and sellers, so that the same price prevails for the same product at the same time

As discussed, market is a system under which buyers and sellers interact to set a price and quantity of a product for making transactions. However, all markets are not similar as they consist of different types of buyers and sellers. Thus, markets must be classified on the basis of certain factors as shown in Figure 9.1:

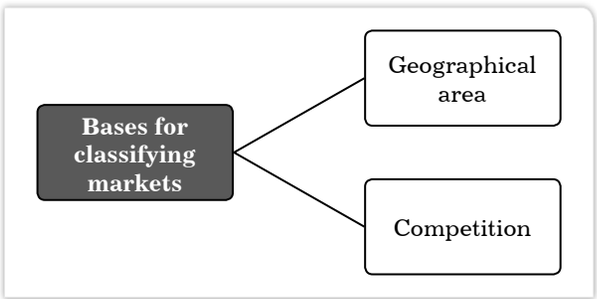

Figure 9.1: Bases for Classifying Markets

Let us discuss these bases in detail.

- **Geographical area:** The geographical area of a market is dependent upon the region where buyers and sellers are dispersed. The geographical area can be as small as a neighbourhood market where one goes to buy groceries, or as large as the oil market. Thus, on the basis of geographical area, markets can be classified into local markets, national markets and international markets. Local market is the place where both the demand and supply of a product are limited to a small area, such as fruit market and vegetable market. When the place where both demand and supply of a product cover the entire country, it is called national market, such as sugar market in India. When both demand and supply of a product cover different countries across the world, it is called international market. For example, metals like silver and gold have an international market.
- **Competition:** A state wherein large number of sellers exist offering similar products is known as competition. Competition provides a firm base for the classification of the market. On the basis of competition, markets are classified as perfect markets and imperfect markets. A perfect market exists when both the buyers and sellers have complete knowledge about the prices of products prevailing in the market. Thus, the price of a product is same all over the market. On the contrary, an imperfect market exists when the price of a product is different all over the market. This is because, buyers and sellers are not aware about the prices of the products.

SELF ASSESSMENT QUESTIONS

1. Which one of the following is not an essential of a market?
   a. Products
   b. Presence of buyers and sellers
   c. A place
   d. Economy
2. The geographical area of a market is dependent upon the region where buyers and sellers are dispersed. (True/False)

ACTIVITY

Find five products each for national market and international market. Make a report on the functioning of these markets.

9.3 TYPES OF MARKET STRUCTURES

Market structure can be defined as a group of industries characterised by number of buyers and sellers in the market, level and type of

competition, degree of differentiation in products and entry and exit of organisations from the market. The study of market structure helps organisations in understanding the functioning of different firms under different circumstances. Based on the study, organisations can make effective business decisions. There are mainly four types of market structures, as shown in Figure 9.2:

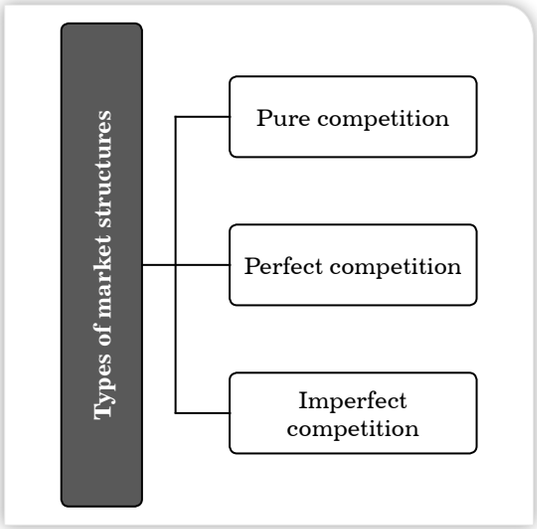

Figure 9.2: Types of Market Structures

Let us study about these three types of market structures in the subsequent sections.

9.3.1 PURE COMPETITION

Pure competition exists in a market when there is large number of sellers offering homogenous products to equal population of buyers. Due to presence of high population of producers, price does not get affected so as to cause inflation. Thus, buyers can purchase products from any seller as there is no difference in the price and quality of products of different sellers. This is because the market sets the price for the market, making sellers as price takers. Moreover, in a purely competitive market, all the products are considered as substitutes of one another. Therefore, if there is a rise in the price of a product from one producer, buyers can easily purchase the similar product from the other seller.

In a purely competitive market, due to the absence of legal, technological, financial or other barriers, it is easy for a new organisation to enter or exit the market. However, the existence of pure competition is not possible in the real world.

In pure competition, the homogeneity of the products with a fixed market price is shown by the average revenue curve or the demand curve as a horizontal straight line.

Figure 9.3 shows the average revenue curve under pure competition:

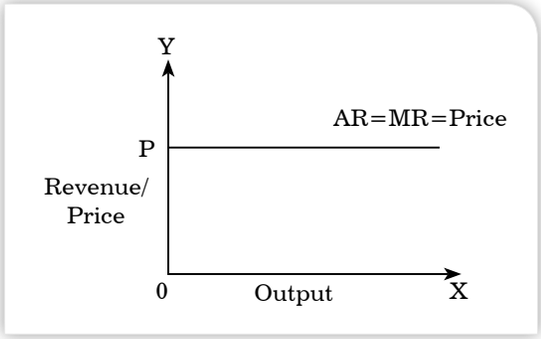

Figure 9.3: Average Revenue Curve under Pure Competition

In Figure 9.3, OP is the price level at which a seller can sell any quantity of products.

9.3.2 PERFECT COMPETITION

A perfect competition is an extension of pure market subject to wider scope. According to Robinson perfect competition can be defined as, "When the number of firms being large, so that a change in the output of any of them has a negligible effect upon the total output of the commodity, the commodity is perfectly homogeneous in the sense that the buyers are alike in respect of their preferences (or indifference) between one firm and its rivals, then the competition is perfect, , and the elasticity of demand for the individual firm is infinite." Some other important definitions of perfect competition are:

In the words of Spencer, "Perfect competition is the name given to an industry or to a market characterised by a large number of buyers and sellers all engaged in the purchase and sale of a homogeneous commodity, with perfect knowledge of market price and quantities, no discrimination and perfect mobility of resources."

According to **Bilas**, "*The perfect competition is characterised by the presence of many firms. They all sell identical products. The seller is a price taker, not price maker.*"

In the words of Prof. Leftwitch, "Perfect competition is a market in which there are many firms selling identical products with no firm large enough relative to the entire market to be able to influence the market price."

Thus, from the above discussion it can be concluded that perfect competition is a market where various firms selling identical products exist along with a large number of buyers who are well aware of the prices. However, the existence of perfect competition is not possible in the real world. The main characteristics of perfect competition are shown in Figure 9.4:

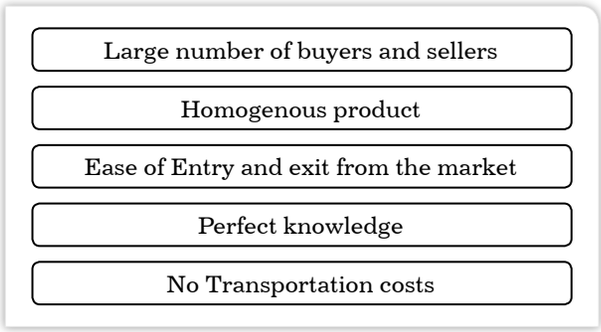

Figure 9.4: Characteristics of Perfect Competition

Let us discuss these characteristics in detail.

- **Large number of buyers and sellers**: In perfect competition, a large number of buyers and sellers exist. However, the high population of buyers and sellers fails to affect the prices, and the output produced by a seller or purchases made by a buyer are very less in comparison to the total output or total purchase in an economy.
- **Homogenous product**: Another important characteristic of perfect competition is the existence of homogenous product for buying and selling. This makes it possible for buyers to choose the product from any seller in the market. Due to the presence of large number of sellers, the market price remains same throughout the market.
- **Ease of entry and exit from the market**: In perfect competition, there are hardly any barriers, such as government regulations and policies, to enter or exit the market. Consequently, firms find it easy to enter the markets as all the organisations earn normal profits. Similarly, organisations also easily exit the market as they are not bound by any rules and regulations.
- **Perfect knowledge**: In the perfectly competitive scenario, both buyers and sellers are completely aware of the product price prevailing in the market. Thus, no seller would try to sell the product at a higher price. However, this also leaves no scope for bargaining for buyers too.
- **No transportation costs**: In perfect competition, the existence of the same price is because of zero transportation costs. Due to the absence of transportation costs, there is no scope of price variation in all sectors of the market.

9.3.3 IMPERFECT COMPETITION

Imperfect competition is a competitive market where a large number of sellers are engaged in selling heterogeneous (dissimilar) goods as opposed to the perfectly competitive market. The concept of imperfect competition was first explained by an English economist, Joan Robinson. Under imperfect competition, both buyers and sellers are

unaware of the prices. Therefore, producers can influence the price of the product they are offering for sale. Imperfect competition can be classified into three categories, as shown in Figure 9.5:

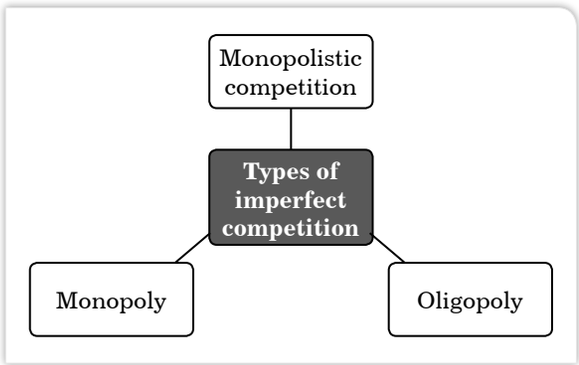

Figure 9.5: Types of imperfect competition

These types of imperfect competition are discussed in detail in the following sections.

SELF ASSESSMENT QUESTIONS

3. In _____ markets, all the products are considered as substitutes of one another.
4. In perfect competition, the absence of transportation costs results in price variation in all the sectors of the market. (True/ False)
5. Under_____, both buyers and sellers are unaware of the prices.
   a. Pure competition
   b. Imperfect competition
   c. Perfect competition
   d. Impure competition

ACTIVITY

Using the Internet, find examples of two industries that have characteristics of perfect competition.

9.4 MONOPOLISTIC COMPETITION

Monopolistic competition is a type of imperfect competition, wherein a large number of sellers are engaged in offering heterogeneous products for sale to buyers. The term monopolistic competition was given

by Prof. Edward H. Chamberlin of Harvard University in 1933 in his book, Theory of Monopolistic Competition. Monopolistic competition is the most realistic situation that exists in the market.

In the words of **J.S. Bains**, "*Monopolistic competition is a market structure where there are a large number of small sellers, selling differentiated, but close substitute products.*"

Another definition of monopolistic competition was provided by Baumol, who defined monopolistic competition as, "The market structure in which the sellers do have a monopoly (they are the only sellers) of their own product, and they are also subject to substantial competitive pressures from sellers of substitute products." Thus, monopolistic competition can be defined as a competitive scenario wherein close substitutes are offered to consumers in the market. For example, there is variety of shoes offered by different organisations, such as Nike, Woodland, Puma, Reebok and Addidas. The conditions of monopolistic competition resemble with that of perfect competition. However, the main difference between the two is that the products sold in monopolistic competitive markets are not perfect substitute of each other and differ from each other in one aspect or the other. Some important characteristics of monopolistic competition are:

- **Large number of sellers and buyers:** The presence of large number of sellers offering different products to equal number of buyers is a primary characteristic of monopolistic competition.
- **Product differentiation:** Another important characteristic of monopolistic competition is product differentiation; wherein products that are sold in the market vary in style, quality standards, trademarks and brands. This helps buyers in differentiating among the available products in more than one way. However, under monopolistic competition, products are close substitutes of each other.
- **Ease of entry and exit:** Similar to perfect competition, under monopolistic competition, organisations are free to enter or exit the market due to the limited number of restrictions imposed by the government.
- **Restricted mobility**: Dissimilar to perfect competition, the factors of production are not perfectly mobile in monopolistic competition. This is due to organisation's willingness to pay heavy transportation costs to move the factors of production or goods and services. This results in difference in the prices of products of organisations.
- **Price control policy**: Under monopolistic competition, organisations do not have much control over the price of the product. If the prices of products are higher, then the buyers would switch to other sellers due to close substitutability of products. Therefore, the price policy of competitors greatly influences the price policy of an organisation.

SELF ASSESSMENT QUESTIONS

6. Name the type of imperfect competition, wherein a large number of sellers are engaged in offering heterogeneous products for sale to buyers.
7. Which one of the following is not a characteristic of oligopoly?
   a. Existence of few sellers
   b. Easy entry and exit
   c. Enhanced role of the government
   d. Mutual interdependence
8. In a cartel, all the firms sell at the same price, and each organisation sets its individual production volume for sale, so that the marginal cost of operation remains same. (True/ False)

ACTIVITY

Using various sources (magazines, books, internet, journals, etc.), find how the price is influenced under monopolistic competition and make a report of it.

9.5 OLIGOPOLY

Oligopoly is a type of imperfect competition, wherein there are few sellers dealing either in homogenous or differentiated products. The term oligopoly has been derived from the two Greek words, oligoi means few and poly means control. Thus, it means the control of the few organisations in the market. For example, oligopoly in India exists in the aviation industry where there are just few players, such as Kingfisher, Air India, Spice JetIndigo, etc. All these airlines depend on each other for setting their pricing policies. This is because the prices are affected by the prices of the competitors' products. Some of the popular definitions of oligopoly are as follows:

In the words of **Prof. George J. Stigler**, "*Oligopoly is a market situation in which a firm determines its marketing policies on the basis of expected behavior of close competitors.*"

According to **Prof. Stoneur** and **Hague**, "*Oligopoly is different from a monopoly on one hand, in which there is a single seller. On the other hand, it differs from perfect competition and monopolistic competition also in which there are a large number of sellers. In other words, while describing the concept of oligopoly, we include the concept of a small group of firms.*"

According to **Prof. Leftwitch**, "*Oligopoly is a market situation in which there are a small number of sellers, and activities of every seller are important for others.*"

In oligopoly market structure, the interdependency of organisations may either leads to conflicts or cooperation among sellers. Let us discuss the characteristics of oligopoly in detail, as follows:

- **Existence of few sellers:** One of the primary features of oligopoly is the existence of a few sellers who dominate the entire industry and influence the prices of each other, greatly. In addition, the number of buyers is also large. Moreover, in oligopoly, there are a large number of buyers.
- **Identical or differentiated products:** An important characteristic of oligopoly is the production of identical products or differentiated products. This implies that organisations may either produce homogenous products, such as cement, asphalt, concrete and bricks, or differentiated products, such as an automobile. If organisations produce homogenous products, it is said to be pure oligopoly.
- **Impediments in entry:** Another important characteristic of oligopolistic competition is that organisations cannot easily enter the market; nor can they make an exit from the market. The reasons for difficult entry in the market are various legal, social and technological barriers. This also implies that the existing organisations have a complete control over the market.
- **Enhanced role of government**: Under oligopolistic market structure, the government has a greater role as it acts as a guard to anti-competitive behaviours of oligopolists. It is often observed that oligopolists may engage in the illegal practice of collusion, where they together make production and pricing decisions. Oligopolists may start acting as a single organisation and further increase prices and profits. Thus in such an environment, the government requires to keep a watch on such activities to curb the illegal practices.
- **Mutual interdependence:** Under oligopoly market structure, mutual interdependence refers to the influence that organisations create on each other's decisions, such as pricing and output decisions. In oligopoly, a few numbers of sellers compete with each other. Therefore, the sale of an organisation is dependent on its own price of products, as well as the price of its competitor's products. Thus, in oligopoly, no organisation can make an independent decision.
- **Existence of price rigidity:** Under oligopolistic market, organisations do not prefer to change the prices of their products as this can adversely affect the profits of the organisation. For instance, if an organisation reduces its price, its competitors may reduce the prices too, which would bring a reduction in the profits of the organisation. On the other hand, the increase in prices by an organisation will lead to loss of buyers.

9.5.1 THE CARTEL MODEL IN OLIGOPOLY

The cartel model can be defined as a special case of oligopoly in which rival firms in an industry come together as a cartel to create formal agreements to make decisions to attain high profits. The formation of a cartel is more applicable to oligopoly where there are a small number of firms. Organisations that form cartel come to an agreement on issues, such as price fixing, total industry output, market share, the allocation of customers, the allocation of territories, bid rigging, establishment of common sales agencies and the division of profits. In a cartel, all the firms sell at the same price, and each organisation set its individual production volume for sale, so that the marginal cost of operation remains same. The most important example of an effective cartel is the Organization of Petroleum Exporting Countries (OPEC), which was formed at the Baghdad Conference on 10–14 September, 1960. The aim of the OPEC is to coordinate the policies of oil producing countries in a way that the member states receive a steady income. The member states also collude to influence the prices of oil all over the world. Presently, there are 12 member countries in OPEC cartel.

SELF ASSESSMENT QUESTIONS

9. _____is a type of imperfect competition, wherein there are few sellers dealing either in homogenous or differentiated products.

ACTIVITY

Name the key players in the how telecommunication industry in India? Make a report on the behaviour of these organisations as an oligopoly.

9.6 MONOPOLY

Monopoly can be defined as a market structure, wherein a single producer or seller has a control on the entire market. The term monopoly has been derived from a Greek word Monopolian, which means a single seller. Thus, in monopoly, a single seller deals in the products that have no close substitutes in the market. Some of the definitions of monopoly are:

In the words of **Prof. Chamberlain**, "*Monopoly refers to the control over supply.*"

According to Prof. Thomas, "Broadly, the term monopoly is used to cover any effective price control, whether of supply or demand of services or goods; narrowly it is used to mean a combination of manufacturers or merchants to control the supply price of commodities or services."

In the words of **Robert Triffin**, "*Monopoly is a market situation in which the firm is independent of price changes in the product of each and every other firm.*"

Thus by studying the abovementioned definitions, we can conclude that the demand, supply and prices of a product are controlled by a single seller in monopoly. Therefore, the slope of the demand curve moves downward towards the right. A common example of a monopoly is Indian Railways, which has control of railroad transportation. Some important characteristics of monopoly are described as follows:

- **Existence of a single seller**: Under monopoly market structure, there is always a single seller producing large quantities of the products. Due to availability of only one seller, buyers are forced to purchase from the only seller. This results in total control on the supply of products by the seller in the market. Moreover, the seller has complete power to decide the price of products.
- **Absence of substitutes**: Another important characteristic of monopoly is the absence of substitutes of the products in the market. In addition, differentiated products are absent in the case of monopoly market.
- **Barriers to entry**: The reason behind the existence of monopoly is the various barriers that restrict the entry of new organisations in the market. These barriers can be in the form of exclusive resource ownership, copyrights, high initial investment and other restrictions by the government. Some of the barriers that limit the entry of new organisations are:
  - Restrictions imposed by the government. For example, electricity in India is considered as an old monopoly.
  - Control over resources required for production of other goods. For example, Japan is considered to have a monopoly over electronic products.
  - Technological efficiencies resulting in economies of scale.
- **Limited information**: Under monopoly, information cannot be disseminated in the market and is restricted to the organisation and its employees. Such information is not easily available to public or other organisations. This type of information generally comes in the form of patents, copyrights or trademarks.

9.6.1 PRICE DISCRIMINATION UNDER MONOPOLY

It is generally observed that different prices are charged from various users by a monopolist to achieve more profits. This policy of charging different prices by a monopolist is known as price discrimination. Some other important definitions of price discrimination are:

NOTES

In the words of **J.S. Bains**, "*Price discrimination refers strictly to the practice of a seller to charge different prices from different buyers for the same goods.*"

According to **Dooley**, "*Discriminatory monopoly means charging different rates from customers for the same goods or services.*"

According to **Mrs. Joan Robisnon**, "*The act of selling the same article produced under single control at a different price is known as price discrimination.*"

Thus, by studying the abovementioned definitions, it can be concluded that price discrimination is charging different prices from buyers by monopolists. Price discrimination can be classified into three types, as shown in Figure 9.6:

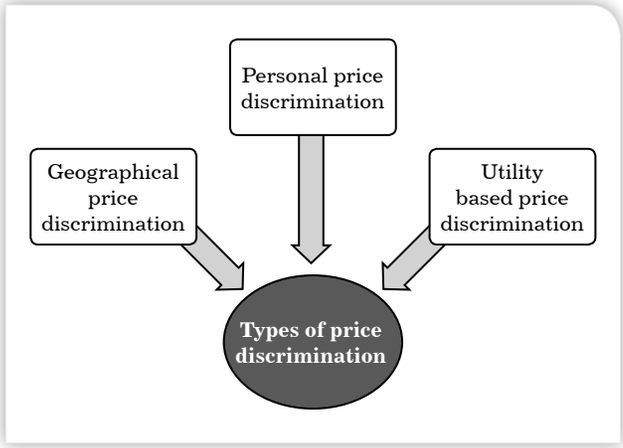

Figure 9.6: Types of Price Discrimination

Let us discuss these types of price discrimination in detail.

- **Geographical price discrimination**: In this type of price discrimination, a monopolist charges different prices for the products in different areas. Generally, if the demand of a product is inelastic in an area, the monopolist charges higher price and vice versa. For example, rice is sold at different prices by Food Corporation of India in Kashmir and Himachal Pradesh.
- **Personal price discrimination**: In this type of price discrimination, a monopolist charges different prices from different users or buyers. Personal price discrimination occurs mainly due to ignorance among buyers related to the prices of the products. For example, a grocery seller may charge different prices for similar vegetables from different customers depending on the negotiation power of customers. If a customer is aware of the prices and is able to bargain, the seller may become willing to sell the product at a lower price. On the other hand, the seller may sell the same product at a higher price if the customer is ignorant and unaware of prevailing prices in the market.

- **Utility based price discrimination:** In this type of price discrimination, the seller charges different prices from buyers in accordance with the use of the products. For example, the price of electricity differs on the basis of consumption, i.e., rate per unit for commercial use is higher than that for the domestic use.

SELF ASSESSMENT QUESTIONS

10. Under monopoly market structure, there is always a single seller producing small quantities of the products. (True/False)
11. Technological efficiencies resulting in economies of scale is a _____ to entry of new organisations.
12. In which type of price discrimination, the seller charges different prices from buyers in accordance with the use of the products?

ACTIVITY

Find three examples each of personal price discrimination and utility based price discrimination.

9.7 PROFIT MAXIMISATION

Profit maximisation can be defined as a process in the long run or short run to identify the most efficient manner to increase the profits. It is mainly concerned with the determination of price and output level that returns the maximum profit. It is an important assumption that helped economists in the formulation of various economic theories, such as price and production theories. According to conventional economists, profit maximisation is the only objective of organisations, making it as the base of conventional theories. It is also regarded as the most reasonable and productive business objective of an organisation. In addition, profit maximisation helps in determining the behaviour of business organisations and effect of various economic factors, such as price and output, in different market conditions.

The total profit (∏) of a business organisation is calculated by taking the difference between Total Revenue (TR) and Total Cost (TC). Thus,

$$\prod = TR - TC$$

Profit is maximum when the difference between the total revenue and total cost is maximum. For profit maximisation, two conditions must be fulfilled, namely, the first order condition and the second order condition. Under first order condition, Marginal Revenue (MR) should be equal to Marginal Cost (MC). Marginal revenue can be defined as the revenue generated from sale of the last unit of output, on the other hand, marginal cost can be described as the cost incurred in the pro-

duction of one additional unit of output. Both TR and TC functions involve a common variable, which is output level (Q).

The first order condition states that the first derivative of profit must be equal to zero.

We know $\prod$ =TR- TC

Taking its derivative with respect to Q,

$\partial\prod / \partial Q = \partial TR/ \partial Q - \partial TC/ \partial Q = 0$

This condition holds only when $\partial TR/ \partial Q = \partial TC/ \partial Q$

$\partial TR/ \partial Q$ provides the slope of the TR curve, which, in turn, gives MR. On the other hand, $\partial TC/ \partial Q$ gives the slope of the TC curve, which is the same as MC. Thus, the first-order condition for profit maximisation is MR=MC.

Second order condition requires that the first order condition must be satisfied in case of decreasing MR and rising MC. This condition is shown in Figure 9.7:

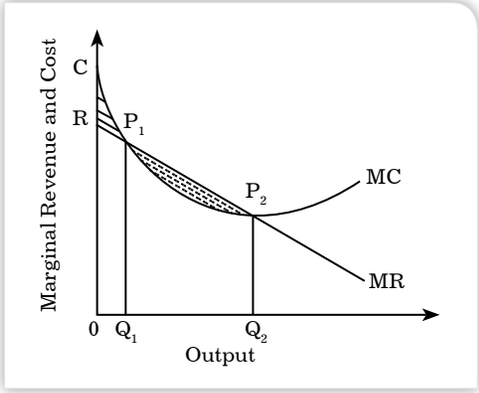

Figure 9.7: Marginal Conditions of Profit Maximisation

As shown in Figure 9.7, MR and MC curves are derived from TR and TC functions. It can also be observed from Figure 9.7 that MR and MC curves intersect at points P1 and P2. At point P2, MR is less than MC, thus, the second order condition is satisfied at point P2. Numerically, the second order condition is given as:

$\partial^2\prod / \partial Q^2 = \partial^2 TR/ \partial Q^2 - \partial^2 TC/ \partial Q^2$

$\partial^2 TR/ \partial Q^2 - \partial^2 TC/ \partial Q^2 < 0$

$\partial^2 TR/ \partial Q^2 < \partial^2 TC/ \partial Q^2$

Slope of MR < Slope of MC

From the aforementioned equation, it can be concluded that MC must have a steeper slope than MR or MC must intersect from below. Thus,

profit is maximised when both the first and second order conditions are satisfied.

As mentioned, profit maximisation happens both in the short run as well as long run. Let us study about both the cases in the subsequent sections.

9.7.1 PROFIT MAXIMISATION IN SHORT RUN

Short run can be defined as a time period in which at least one input is fixed. However, the period of time that can be considered as the short run is completely dependent on the industry's characteristics. For example, service industries can attain profit in two weeks after operations. In this case, two weeks can be considered as short run. In the short run, profit maximisation occurs in different types of market structures (perfect competition and imperfect competition). Let us study about the profit maximisation in these two market structures:

UNDER PERFECT COMPETITION

As discussed earlier, under perfect competition, a large number of buyers exist producing the same products. Thus, the profit-maximising output is determined at the point where extra revenue obtained by selling the last unit becomes equal to the marginal cost incurred in the production of that unit. Figure 9.8 shows the profit maximisation under perfect competition:

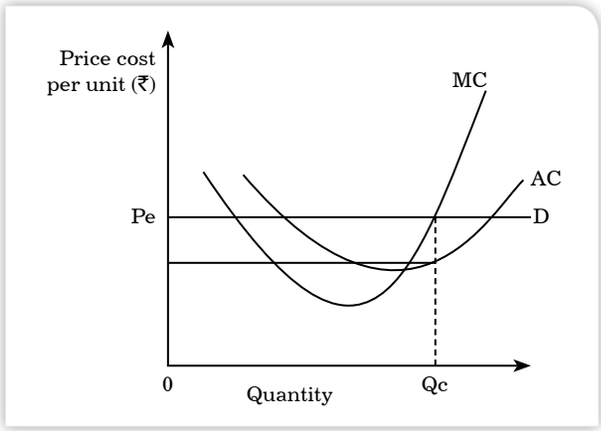

Figure 9.8: Profit Maximisation under Perfect Competition

In Figure 9.8, D is the demand curve and the condition of profit maximisation is satisfied at the point Qc, where price equals marginal cost. If the quantity to be produced is increased by the organisation, the marginal revenue Pe becomes less than the marginal costs, as shown by the curve MC. This in turn decreases the profits. Thus, Qc is the short run equilibrium point, where MR = MC. Therefore, the organisation needs to produce an output level of Qc in order to maximise its profit under perfect competition.

UNDER IMPERFECT COMPETITION

Under imperfect competition, organisations are responsible for determining the profit maximising rate of output levels and price. The demand, marginal revenue and cost curves for a profit maximising organisation under imperfect competition is shown in Figure 9.9:

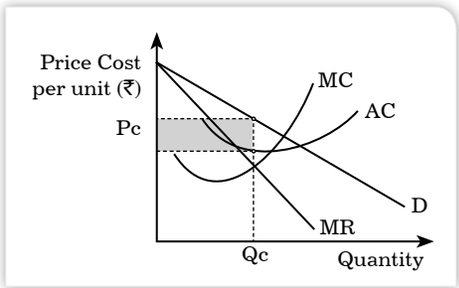

Figure 9.9: Profit Maximisation under Imperfect Competition

In Figure 9.9, it can be seen that at point Qc, the profit of the organisation is maximised. At Qc, the corresponding price is Pc as shown by the demand curve D. Thus, at the quantity produced Qc, marginal revenue becomes equal to marginal cost, i.e., MR = MC. The profit earned by the organisation is depicted by the shaded area.

9.7.2 PROFIT MAXIMISATION IN LONG RUN

Long run can be described as the time period in which all the inputs are variable. Similar to profit maximisation in the short run, organisations maximise profits under perfect competition and imperfect competition. Let us study about the profit maximisation in these two market structures:

UNDER PERFECT COMPETITION

As mentioned, in the long run, all inputs are variable. Similar to short run, in the long run, an organisation must satisfy the condition of MR = MC to maximise its profit. Figure 9.10 shows the profit maximisation of an organisation under perfect competition:

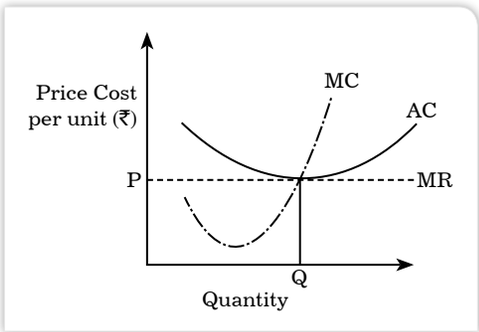

Figure 9.10: Profit Maximisation under Perfect Competition

In Figure 9.10, the profit maximising level of output, where marginal cost equals marginal revenue, results in an equilibrium quantity of Q units of output. Thus, the equilibrium point at which the organisation maximises its profit in perfect competition is at the output rate Q.

UNDER IMPERFECT COMPETITION

In the long run, the profits are similar to the way generated in perfect competition. Therefore, an organisation maximises its profit by equalising its marginal revenue and marginal costs. Figure 9.11 shows the profit maximisation of an organisation under imperfect competition:

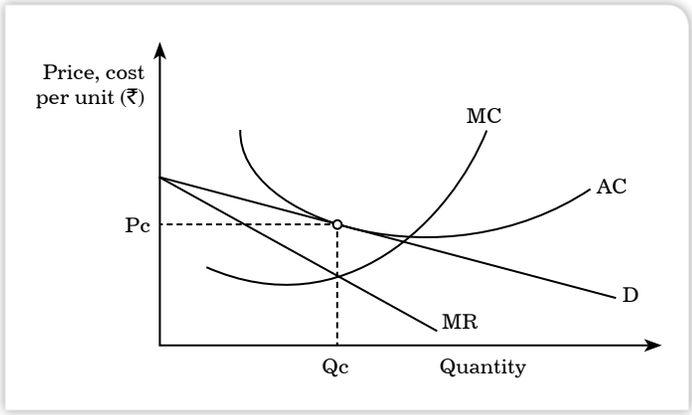

Figure 9.11: Profit maximisation under Imperfect Competition

From Figure 9.11, it can be concluded that to maximise its profit the organisation must produce the quantity Qc units at the price Pc. Also, in Figure 9.11, demand curve is tangent to average cost equalising price and average cost at Pc and Qc. Thus, there is no scope of economic profits for other firms, restricting their entries in the markets. Therefore, Pc and Qc are the equilibrium points for the organisations for a long period of time in imperfect competition.

SELF ASSESSMENT QUESTIONS

13. _____ is mainly concerned with the determination of price and output level that returns the maximum profit.

14. Which one of the following is the condition to be satisfied for profit maximisation?

    a. MR > MC

    b. MR < MC

    c. MR = MC

    d. MR = MC = 0

15. _____ can be defined as a time period in which at least one input is fixed.

ACTIVITY

Make a study of the profit maximisation process of any organisation of your choice and prepare a report of it.

9.8 MEASUREMENT OF MARKET POWER

Market power can be defined as the ability of an organisation to raise the *market price* of a good or service over *marginal cost* to achieve profits. It can also be defined as the degree of control an organisation has over the price and output of a product in the market. A firm with total market power is in a position to raise the prices without any loss of customers. This type of control generally occurs in imperfect competition. Organisations having total market power are also known as price makers. On the contrary, organisations have no market power in perfectly competitive markets. Such organisations are known as price takers.

In the market, the share of an organisation can be determined by measuring its market power. The most common measure for determining the market power is concentration ratios. These ratios are used to determine the degree of control of firms in the market. Thus, concentration ratios can be defined as a measure of market power in relation to the size of the business firm with that of product's size. There are two types of concentration ratios: four firm concentration ratio and eight firm concentration ratio.

- **Four firm concentration ratio**: It can be defined as the fraction of output produced by the top four organisations in an industry.
- **Eight firm concentration ratio**: It can be defined as the fraction of output produced by the top eight organisations in an industry.

Both these ratios are used to provide a clear view of industry concentration in the market. For example, in the case of cigarettes, the four biggest organisations have 98 percent share in the US market. These concentration ratios may range from 0 to 100 percent, where a 0 percent concentration ratio is an indication of a highly competitive market and a 100 percent concentration ratio indicates a highly oligopolistic market that is imperfectly competitive. The concentration ratios fall under three types of concentration, discussed as follows:

- **Low concentration**: An industry is considered to be under low concentration ratio if its concentration ratio falls bewteen 0 and 50 percent. Monopolistic competition falls into the bottom of this with oligopoly emerging near the upper end.
- **Medium concentration**: An industry is considered to be under medium concentration if its concentration ratio is from 50 to 80 percent. Example of such industries are very much oligopoly.

- **High concentration**: An industry is considered to be highly concentrated if its concentration ratio falls between 80 and 100 percent. Government regulators generally fall under this category.

In addition to Concentration ratios, there is another method that is used to determine the market power, i.e., **Herfindahl-Hirschman Index (HHI).** This index is used as an indicator of competition among organisations in an industry. Thus, it helps in determining if the industry is competitive or moving towards monopoly. The HHI is calculated by squaring the market share for each firm (up to 50 firms) and then summing the squares. HHI comes close to zero in a perfectly competitive market, whereas in a monopoly, HHI nears 10,000. Let us understand the estimation of market share using HHI. Assume that there are four grocery stores in your town: A, B, C and D and their market shares are:

A = 25%, B = 50%, C = 20%, D = 5%

Then,

$HHI = 25^2 + 50^2 + 20^2 + 5^2 = 3550$

SELF ASSESSMENT QUESTIONS

16. A firm with total market power is in a position to raise the prices without any loss of customers. (True/False)
17. _____ can be defined as a measure of market power in relation to the size of the business firm with that of product's size.
18. _____ index is used as an indicator of competition among organisations in an industry.
19. An industry is considered to be under low concentration if its concentration ratio is from 50 to 80 percent. (True/False)

ACTIVITY

Find the market power of the following five shoes stores in a locality using HHI?

Shoes Store : A B C D E

Market Share: 10 25 35 12 8

9.9 DETERMINANTS OF MARKET POWER

The market power of organisations is threatened, when there is a new entrant in the market. Thus, as long as there are barriers to entry, the market power of the existing organisations remains strong. These barriers often act as the determinants of market power of organisations.

For example, retail stores have generally very low market power as it is easy for a new participant to enter the market. There are various determinants of market power that explain the existence of organisations' control in the market. Some of the important determinants of market power are shown in Figure 9.12:

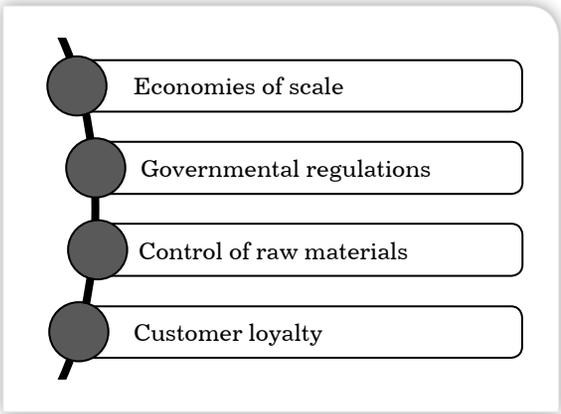

Figure 9.12: Determinants of Market Power

Let us discuss these determinants in detail, as follows:

- **Economies of scale**: It often occurs that the organisation that has a fair amount of the share in the market produces large quantities to maximise its profit. Thus, when a new organisation decides to enter the market, it has to produce in large quantities to keep its cost low in comparison to the market rulers. Thus, economies of scale actually indicate the market power of an organisation in the market.
- **Governmental regulations**: Governmental regulations also act as a major determinant of market power. In the market, where these regulations are strict and numerous, there is a strong control of the existing organisations. For instance, by licensing and franchising monopolies are created along with government decree. In such a scenario, starting up a new venture becomes difficult due to the high market power of the leaders.
- **Control of raw materials:** An important determinant of market power is the control of raw material supplies in the market. For instance, an organisation that controls the supply of all the raw materials required for a product in the market may refuse to sell the raw materials at low prices to make the manufacturing organisations compete.
- **Customer loyalty:** With time, an organisation builds its reputation in the market. In the eyes of customers too, these organisations hold a great image. Thus, customers find it difficult to switch to other products, even at a low price. Due to brand establishment in the market, the market power of the organisation remains high making it difficult for new entrants to gain share in the market.

SELF ASSESSMENT QUESTIONS

20. Which one of the following is not a determinant of market power?

    a. Economies of scale

    b. Governmental regulations

    c. Control of raw materials

    d. Outdated technology

21. Due to brand establishment in the market, the market power of the organisation remains high making it difficult for new entrants to gain share in the market. (True/False)

ACTIVITY

Using the determinants of market power, find the market power of beverage industry. Draft a report on it.

9.10 SUMMARY

- Market can be defined as a system, wherein buyers and sellers interact to establish a price and quantity of a product for making transactions.
- Markets are generally classified on the basis of geographical area and degree of competition.
- Market structure is a group of industries characterised by the number of buyers and sellers in the market, level and type of competition, degree of differentiation in products and entry and exit of organisations from the market.
- Market structure is classified into three categories, namely, pure competition, perfect competition and imperfect competition.
- Under pure competition, there is large number of sellers offering homogenous products to equal population of buyers.
- Under perfect competition various firms exist offering identical products for sale along with a large number of buyers who are well aware of the prices.
- Under imperfect competition, there are three categories: monopolistic competition, oligopoly and monopoly.
- In monopolistic competition, a large number of sellers exist in the market offering heterogeneous products for sale to buyers.
- In oligopoly, few sellers are present in the market dealing either in homogenous or differentiated products. Organisations form cartel under oligopoly to make decisions for attaining high profits.

- Under monopoly, a single producer or seller has a control on the entire market.
- Profit maximisation is a long-run or short-run process, wherein price and output levels are determined to increase the profits.
  - Market power can be defined as an organisation's ability to increase the market price of a good or service over marginal cost to achieve profits. It is also considered as a measure of the degree of control an organisation has over the price and output of a product in the market.
  - The determinants of market power mainly include economies of scale, governmental regulations, control of raw materials and customer loyalty.

KEY WORDS

- **Competition:** It can be defined as a type of rivalry in which a seller makes an attempt at obtaining the same profits, market share, quality, etc., sought by other sellers.
- **Cartel**: It is a group of organisations or countries that collectively attempts to influence the prices by controlling production and marketing.
- **Monopolist**: It can be an individual or organisation that controls the production and price of a good or service in the market.
- **Profit maximisation**: It is a process in which organisations determine the best output and price levels to maximise its profits/ returns.
- **Economies of scale**: It is the cost advantages, which an organisation derives as a result of increased size, output or scale of operations.

9.11 DESCRIPTIVE QUESTIONS

1. Discuss the concept of market.
2. Write a short note on pure competition.
3. What are the characteristics of perfect competition?
4. Explain monopolistic competition.
5. Discuss the cartel model in oligopoly.
6. Describe the types of price discrimination that take place under monopoly.
7. Write a short note on profit maximisation.
8. Discuss the concentration ratios used for measuring market power.
9. Explain the determinants of market power.

9.12 ANSWERS AND HINTS

ANSWERS FOR SELF ASSESSMENT QUESTIONS

Topic	Q. No.	Answers
Defining Market	1.	d. Economy
	2.	True
Types of Market Structures	3.	Purely competitive
	4.	False
	5.	b. Imperfect competition
Monopolistic Competition	6.	Monopolistic competition
	7.	b. Easy entry and exit
	8.	True
Oligopoly	9.	Oligopoly
Monopoly	10.	False
	11.	Barrier
	12.	Utility based price discrimination
Profit Maximisation	13.	Profit maximisation
	14.	a. MR > MC
	15.	Short run
Measurement of Market Power	16.	True
	17.	Concentration ratios
	18.	Herfindahl-Hirschman Index
	19.	False
Determinants of Market Power	20.	d. Outdated technology
	21.	True

HINTS FOR DESCRIPTIVE QUESTIONS

1. Market can be defined as a setup under which buyers and sellers interact for buying and selling products at a specific price. Refer to section **9.2 Defining Market**.
2. A market is said to be under pure competition, when there is a large number of sellers offering homogenous products to equal population of buyers. Refer to section **9.3 Types of Market Structures**

3. The characteristics of perfect competition include existence of a large number of buyers and sellers, homogenous products, easy entry and exit, perfect knowledge of prices and absence of transportation costs. Refer to section **9.3 Types of Market Structures**.
4. When a large number of sellers are engaged in offering heterogeneous products for sale to buyers, it is said to be monopolistic competition. Refer to section **9.4 Monopolistic Competition**.
5. In the cartel model, rival firms in an industry come together as a cartel and make formal agreements to make decisions to attain high profits. Refer to section **9.5 Oligopoly**.
6. Price discrimination can be classified into three types, namely, geographical price discrimination, personal price discrimination and utility based price discrimination. Refer to section **9.6 Monopoly**.
7. Profit maximisation is a process of identifying the price and output level that return maximum profits. Refer to section **9.7 Profit Maximisation**.
8. Concentration ratios are used to determine the degree of control of firms in the market. These ratios are of two types, namely, four firm concentration ratio and eight firm concentration ratio. Refer to section **9.8 Measurement of Market Power**.
9. The determinants of market power are economies of scale, governmental regulations, control of raw materials and customer loyalty. Refer to section **9.9 Determinants of Market Power**.

9.13 SUGGESTED READING FOR REFERENCE

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10

CHAPTER

MARKET FAILURE

CONTENTS

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10.2 Meaning of Market Failure
10.2.1 Causes of Market Failures
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N O T E S

INTRODUCTORY CASELET

US MARKET FAILURE AND THE FINANCIAL CRISIS OF 2008

If an individual has a bad credit history, is deep in debt and does not have an income to support a loan, lenders do not trust him/her with a prime interest rate. Rather, the individual is offered a subprime mortgage, with a higher interest rate, high start-up fees and/or penalties for early repayment.

In 1995, the US federal government raised the limit on the loan amount by passing the Community Reinvestment Act of 1977. This act was aimed to provide funding to underprivileged borrowers to support them in purchasing a home. By raising the limits, the US federal government enabled high-risk borrowers to take loans from several banks. However, later the lending banks failed to recover the loan balance from the borrowers who had discontinued with their loan repayments. This resulted in an increase in home foreclosures, thereby increasing the bad debt held by the lending banks. The banks were unable to recover the money and could not lend it out to other borrowers. Apart from the lending banks, a much higher percentage of subprime loans were sold by mortgage brokers. These mortgage brokers worked individually or under a brokerage firm that sold mortgages offered by several lenders. The mortgage brokers further added to the bad debts by offering risky mortgage loans to consumers who could not afford them.

The other major problem in the US housing industry was the rising use of mortgaged back securities. Under this system, if a borrower failed to make his/her payments, the house (generally held as mortgage) could be sold at a profit to recover the money. However, these new investment instruments were loaded with high risks. The price of houses fell and the losses could not be recovered, again adding to the bad debts.

The combined failure of subprime loans, mortgage brokers and mortgaged back securities system due to unregulated market mechanisms led to a severe financial crisis in the US markets.

Alan Greenspan, former head of the Federal Reserve Board, USA, admitted that the failure of the government to regulate the market led to the US market meltdown in 2008.

LEARNING OBJECTIVES

After completing this chapter, you will be able to:

- Define the meaning of market failures
- Discuss price regulations
- Describe the different price regulations in market structure
- Explain the behaviour of firms in response to price regulations

10.1 INTRODUCTION

In the previous chapter, you have studied about the concept of market and different types of market structures. As studied, market comprises various factors, such as buyers, sellers, commodities and resources. The success of the market is mainly dependent on the effective allocation of resources. However, there are situations when markets fail to allocate these resources efficiently, which is also known as market failure.

Market failure occurs when there is an imbalance in the quantity of a product demanded and supplied, which leads to an inefficient allocation of resources. These failures can occur due to a variety of reasons, such as existence of externalities, public goods and incomplete information. The occurrence of market failure is more likely to be in imperfect competition, due to existence of market power of organisations. Thus, these organisations can influence the prices to increase their profits, resulting in total failure of markets.

In order to prevent the market failures, the government intervention is required. The government adopts various measures to keep the law of demand and supply functioning. One such measure is price regulations (price ceiling, price floor, price cap, etc.), whereby government intends to regulate the prices in the market. These regulations impact the efficiencies of various organisations operating under them, thereby affecting their profits.

In this chapter, you will study about the concept of market failures and different regulations used by the government to prevent these failures.

10.2 MEANING OF MARKET FAILURE

Market failure can be defined as a situation where the quantity of a product demanded by consumers is not equal to the quantity supplied by suppliers. It occurs mainly due to inefficient allocation of goods and services in the free market. In such a situation, the social costs

incurred in the production of goods are not minimised, resulting in wastage of resources. Thus, equilibrium between supply and demand of the product is not reached. Let us understand the concept of market failure with the help of an example.

It is known that wages are defined in accordance with the minimum wage laws. Therefore, wage rates are established at the going market-clearing wage to raise market wages. On this, critics argue that employers prefer to employ less minimum-wage employees at a higher wage cost. Consequently, more minimum-wage workers remain unemployed, thereby resulting in market failure due to high social costs.

Thus in simple words, market failure can be referred to as imperfections occurring in exchange of products and services between buyers and sellers; thereby preventing efficient allocation of scarce resources in the market. Market failures are corrected by governmental interventions only.

10.2.1 CAUSES OF MARKET FAILURES

Market failures are not attributed to a single factor. There are various causes that can result in market failures. However, there are four most important causes of market failures, as listed in Figure 10.1:

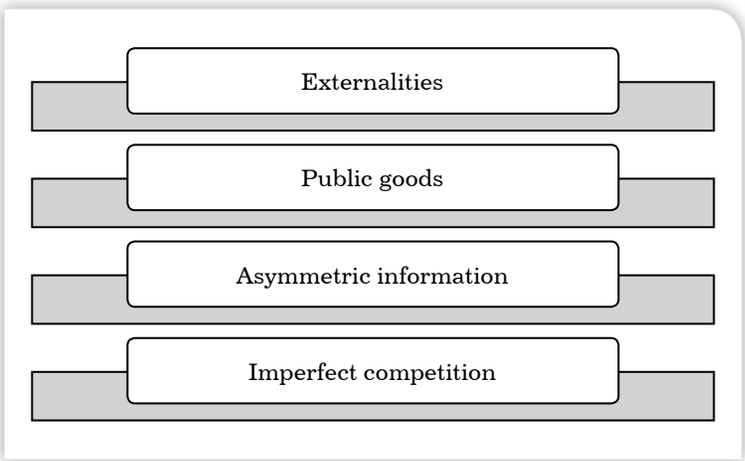

Figure 10.1: Causes of Market Failures

Let us study about these causes in detail.

- **Externalities**: These can be defined as an impact of production and consumption of products affecting the third-party (one who is neither a consumer, nor the producer of the product). Externalities can be either positive or negative.
- **Positive externality** can be defined as the positive impact of the consumption of a product on the third-party. For example, increase in education of individuals can result in an increase in productivity, fall in unemployment and a higher political participation in the country. Positive externality is also known as an external benefit.

- **Negative externality** can be defined as the negative impact of the consumption of a product on the third-party. In this case, social cost of an activity exceeds the private cost. Example of negative externality is noise pollution due to various sources, which can be mentally and psychologically disruptive for the nearby people. Negative externalities are also known as an external cost.
- It is to be noticed that both the above-mentioned externalities can result in market inefficiencies. In the case of a positive externality, a producer does not like to invest in the activity unless government aids him with a subsidy. Thus, there is under production of such goods. On the other hand, in a negative externality, producers do not take into consideration the external costs and keep on manufacturing large quantities of goods. Thus, both these externalities require governmental regulations to prevent the market failures.
- **Public goods:** These are the goods that are characterised by non-excludability and non-rivalry. By non-excludability, it means that a good that benefits an individual can be used by others too to derive the same benefits. Non-rivalry implies that the enjoyment of using a product does not reduce the satisfaction of those who have been using it from a certain time. An example of a public good is the defence system, as it provides protection to all the individuals of a nation. The problem with these goods is that they can be used by everyone after made available making it impossible to regain the costs of provision by extracting payment from users resulting in market failures.
- **Information asymmetry:** It deals with the study of decisions in transactions, wherein one party has access to more or better information than others. Due to absence of the same information to all the participants, individuals or organisations are unable to make the right decisions. This results in an imbalance of power in transactions that can lead to market failure. Due to information asymmetry, the following two problems occur:
  - **Adverse selection**: This implies taking the advantage of asymmetric information before transaction. For example, a person may be more eager to purchase life insurance due to health problems than, someone who is healthy.
  - **Moral hazards**: This implies taking the advantage of asymmetric information after transaction. For example, if someone has car insurance he may commit theft by getting his car stolen to reap the benefits of the insurance.
- **Imperfect market conditions:** Market failure is also caused due to imperfect market conditions, such as monopoly (existence of a single supplier in the market) and oligopoly (existence of few firms that control the market). In imperfect market structure, organisations have market power to influence prices. This can result in inefficiencies due to the following:

- Existing firms have the power to raise prices to increase their profits while the demand remains the same.
- Various barriers to entry by other firms restrict competition in the market.
- To prevent market failures due to the presence of market power, government interventions are required to correct the market operations or set prices at a competitive level.

SELF ASSESSMENT QUESTIONS

1. _____ occurs mainly due to inefficient allocation of goods and services in the free market.
   a. Market power
   b. Market sustenance
   c. Market failure
   d. Buyers' control
2. Name the type of goods that are characterised by non-excludability and non-rivalry.
3. In the case of a positive externality, a producer does not like to invest in the activity unless government aids him with a subsidy. (True/False)

ACTIVITY

Using the Internet, draft a report on the U.S. market crisis of 2008.

10.3 PRICE REGULATIONS

Price regulations are governmental measures dictating the quantities of a commodity to be sold at specified price both in the retail marketplace and at other stages in the production process. These regulations act as control measures or emergency economic measures in the case of imperfect competition to prevent probable market failures. For example, in monopolies, sellers have complete market power of controlling the pricing decisions and setting prices higher than in competitive markets. In such a case, demand for the product does not lower down, which can lead to market failure. Thus, the government is required to intervene in the scenario to prevent market failures. By using price regulations, the government not only controls the functioning of the market, rather protects consumer welfare.

There are various price mechanism used by the government to regulate the prices in the market. The most commonly used price regulations are shown in Figure 10.2:

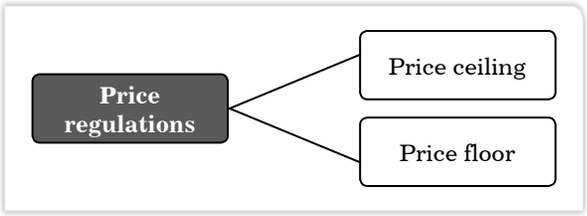

Figure10.2: Commonly used Price Regulations

Let us discuss these two price regulations in detail.

- **Price ceiling**: A price ceiling can be defined as the price that has been set by the government below the equilibrium price and cannot be soared up above that. For instance, price ceiling occurs in rent controls in many cities, where the rent is decided by the governmental agencies. The rent is allowed to rise at a specific rate each year to keep up with inflation. However, the rent must remain below equilibrium.

It is observed that a shortage occurs by setting price ceiling. This is due to more demand than there is at the equilibrium price at which the price of the ceiling is defined. Moreover, supply is also reduced than the supply at the equilibrium price. This results in increased demand of the commodity than the quantity supplied. Consequently, marginal costs are exceeded by marginal benefits resulting in inefficiencies equivalent to the deadweight welfare loss.

Price ceiling is shown in Figure 10.3:

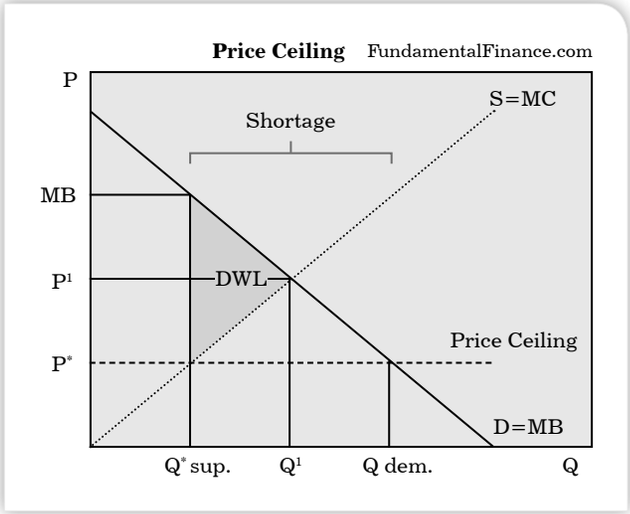

Figure 10.3: Price Ceiling

In Figure 10.3, P^1 and Q^1 are the equilibrium price and P* is the legal price set by the government. However, MB is the cost that the consumer is willing to pay. Thus, MB>P* (resulting in a deadweight welfare loss. Thus, shortage is created at cost P* due to the greater quantity in demand in comparison to the quantity in supply.

NOTES

The shortages created by price ceilings can be resolved in many ways without increasing the price. Following are the ways that can be used to resolve shortages:

- **First come first serve**: This is the most common way of resolving the shortage, wherein, the person who comes first gets to buy the product. A common example of this is the people standing in line at the counter of a cinema hall to buy the tickets to a movie.
- **Lottery**: It is a type of lucky draw, where one lucky person who picks the right numbers is allowed to make the purchase. The lottery system is could be a way to dole out a product that is facing a shortage. For example, some chargers may use this system to determine the persons who could buy the limited tickets to a special game of football.
- **Sellers' selection**: Another way of resolving the shortage due to price ceiling is allowing sellers to select the buyers to whom they want to sell their products. For example, many landlords select renters to rent based on certain criteria (such as preference for the married couple and without pets).
- **Choice of government:** On many occasions it is left to the government to make the selection of buyers. For example, to deal with the shortage of gasoline in 1979, the California government allowed the sale of gasoline to those who had license plates of their vehicles ending in an odd number on the odd days of the month.
- **Price floor**: A price floor is said to exist when the price is set above the equilibrium price and is not allowed to fall. It is used by the government to prevent the prices from hitting a bottom low. The most common example of a price floor is the setting of minimum daily wages of a labour worker, where the minimum price that can be paid to labour is established. This is mostly done to protect the farmers.

A predominant condition for price floor to be effective is to place the price floor above the equilibrium price. If the price is not set above equilibrium, the market does not sell below the equilibrium price and the price floor will become inappropriate.

Price floor is shown in Figure 10.4:

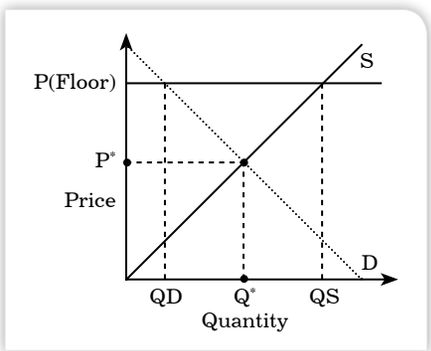

Figure 10.4: Price Floor

In Figure 10.4, the Price (Floor) is the straight line placed above the equilibrium point. It can also be observed that as the price artificially raised above p*, the quantity supplied is more than the quantity demanded. Thus a surplus is created.

There are some problems due to the surplus (quantity in demand is lesser than the quantity in supply) created through the price floor. If the surplus exists in the market for a long period, the price floor begins to fall below the price of equilibrium, which can result in market failure. Thus, the government is required to intervene to avoid the occurrence of surplus. Some of the measures that can be adopted by the government to deal with the surplus are:

- **Purchase of all surplus goods**: A way to deal with the surplus is the purchase of all the surplus goods by the government. The surplus can be sold to other countries. For example, the US government had bought all the surplus grain in the US and sold it to Africa
- **Control of production by the government**: Another way to control the surplus is the government's control over the production. The government can offer rights of production to some of the selected suppliers. If the government gives out the rights for production to some suppliers (selected on a specific criterion) or compensates them for not making any additional supply, then the unnecessary production of goods can be eliminated.
- **Sponsorship of consumption**: The government can also sponsor the buyers by paying a part of the cost. This would help the buyers to buy more of the surplus.

SELF ASSESSMENT QUESTIONS

4. _____ are the governmental measures dictating the quantities of a commodity to be sold at specified price both in the retail marketplace and at other stages in the production process.
5. The shortage created by price ceilings can be resolved through government's control of production. (True/False)

ACTIVITY

List down different techniques of price regulations imposed by the Government of India.

10.4 REGULATIONS AND MARKET STRUCTURE

Economic efficiency is not met by simply producing goods at the lowest possible cost, but also providing individuals with products and ser-

vices in the desired quantities, qualities, places and with minimum use of society's scarce resources. Perfect competition is a rare market situation and markets often deviate from the ideal situations. Most deviations from the ideal do not impose significant costs on the society. However, when these deviations are significant there is a need for government regulation. For example, firms may acquire extreme market power (monopoly), undertake deceptive practices, conspire, etc. In this section, you will study about major regulations imposed on monopolies. To protect the interest of the consumers, the government exhibits certain regulations on monopolies. If an organisation controls the market share, smaller organisations may find it difficult to enter and flourish in the market. For example, the dominance of Microsoft incites the government need to exercise some regulations. The government regulates the monopoly market by using the following methods:

1. **Price regulation using RPI – X:** Using the price capping method, the government can control the price charged by private industries dealing in the supply of water, electricity, fuel, etc. The government is able to limit the potential price rise imposed by these industries based on the RPI – X (Retail Price Index) method. RPI – X is calculated by subtracting the mortgage interest payments from the Retail Price Index. The value of X is meant to reflect the potential cost savings by the firm due to either increased efficiency or technological progress. Let us understand this with the help of an example:

   Suppose the RPI inflation rate is 5% and the government predicts that an organisation gains 2% at this inflation rate. In this case, the government would permit the organisation to increase its prices by 5 – 2 = 3%. This way, the organisation can raise its prices as per the prevailing inflation. In addition, organisational gains are translated into lower prices owing to the government regulation.

2. **Merger policy:** Mergers and acquisitions expand monopoly power. The Competition Commission of India prohibits anti-competitive agreements, abuse of dominant position by monopolies and regulates mergers and acquisitions.

3. **Regulation price using rate of return method:** The rate of return regulation method considers the firm size to evaluate a reasonable level of profit from its capital base. If the firm earns more profit compared to its size, the government may enforce price cuts or charge a tax.

SELF ASSESSMENT QUESTIONS

6. Name the method that considers the firm size to evaluate a reasonable level of profit from its capital base.

ACTIVITY

List down the main points of differences between the RPI – X and rate of return method of price regulation.

10.5 PRICE REGULATION AND FIRM BEHAVIOUR

As discussed in the previous section, there are basically two types of price regulation used by the government, which are price ceiling and price floor. These price regulatory mechanisms have an impact on a firm's behaviour as price regulations affect the efficiency (profits) of the firm. In this section, you will study the effect of price ceiling and price floor on the firm's efficiency.

- **Price ceiling and firm efficiency:** The most common regulatory system under the price ceiling is the price cap regulation. A price cap regulation is used to set a maximum allowed price for a specific product. Price cap regulation has a direct impact on the firm's efficiency. Let us understand this with the help of an example. Consider a gas distributor that sells LPG to local consumers. The firm can be regulated using the two policies. The firm may either operate under a regulatory system that limits profits to a set level (assuming the limit at ₹20 lakh). Alternatively, the firm may operate under price cap regulation, where it can set the price of LPG at a cap of 5 cents per megajoule (Mj). At this price, the firm can sell 1,00,000 Mj resulting in a profit of ₹30 lakh. Firm profits are computed as revenue less costs of production. The costs of production would include billing and servicing customers, routine and emergency maintenance, cost of wholesale gas, etc. If the costs of retailing and distributing 1,00,000 Mj of gas are ₹10 lakh, then the firm would earn a profit of ₹20 lakh under the price cap regulation. In other words, the firm makes identical profits under either of the two regulatory systems with identical levels of output and costs of production.

  However, if the owners of the firm using the profit limiting regulatory system reduce the costs of production, then the increase in profit would need to be offset by using other measures, such as lowering the price of LPG. Therefore, there is a little incentive for the firm to operate efficiently under profit regulation system.

  On the other hand, if the firm follows the price cap regulation, any reduction in the costs of production can be retained by the firm. If the owners reduce the costs of producing 1,00,000 Mj of LPG to ₹8 lakh (from ₹10 lakh), then the entire ₹2 lakh is retained as the increased profits. As the firm retains the benefits of cost reductions under price cap regulation, the price cap regulatory system provides dominant efficiency incentives to the firm.

However, price ceiling imposed on suppliers as a government's intervention may sometimes lead to the shortage of goods. Generally, the government apply price ceilings on the sale of petroleum by various private organisations such as Reliance Petroleum Limited. Any supplier charging more than this maximum price would be guilty of fraud. This may often lead to the shortage of petroleum in the market. Assume that the equilibrium price is ₹70 per gallon of petrol. The maximum price set by the government is ₹67.50 per gallon. At the price of ₹67.50 per gallon, the quantity demanded is 10 million gallons per week and the quantity supplied is 5 million gallons per week. Thus, there is a shortage of 5 million gallons per week. This is shown in Figure 10.5:

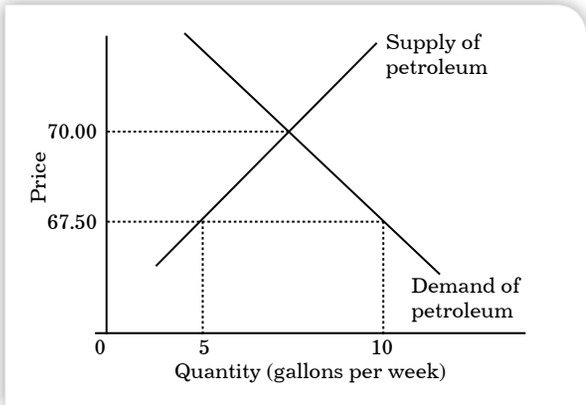

Figure 10.5: Price Ceiling on Petroleum

- **Price floor and firm efficiency:** Price floor is a price regulation system where a minimum price is determined for selling a firm's product. A price floor encourages firms to increase their output beyond the consumers' demand. The government purchases the surplus, which is equal to the quantity supplied minus the quantity demanded, at the floor price. As a result, the marginal cost of production exceeds the marginal profits of the firm resulting in a deadweight loss for the firm. Therefore, price floor results in a decline in the efficiency of the firm.

Deadweight loss refers to the benefits lost to either consumers or producers when markets do not operate efficiently. The term deadweight denotes that these benefits are not available to either party in a transaction. A price ceiling may result in a deadweight loss because at any price below the market equilibrium price, quantity supplied will be below the quantity supplied at market equilibrium, resulting in a loss of surplus to producers.

Consumers would purchase less than the market equilibrium quantity, resulting in a loss of surplus to consumers. Consumers would also tend to purchase less than the quantity they demand at the price set at the ceiling. The surplus lost by consumers and producers is deadweight loss.

One of the main reasons for deadweight loss is the government intervention in the market by increasing taxes on goods. The imposition of taxes reduces supply, resulting in the creation of deadweight loss (Harberger's triangle bounded by the demand curve and the vertical line representing the after-tax quantity supplied). Deadweight loss represents lost efficiency. Harberger's triangle results from the intersection of the supply and demand curves above market equilibrium resulting in a reduction in consumer surplus and producer surplus compared to the values before the imposition of the tax by the government. The loss of the surplus, not recovered by tax revenues, is deadweight loss. This is shown in Figure 10.6:

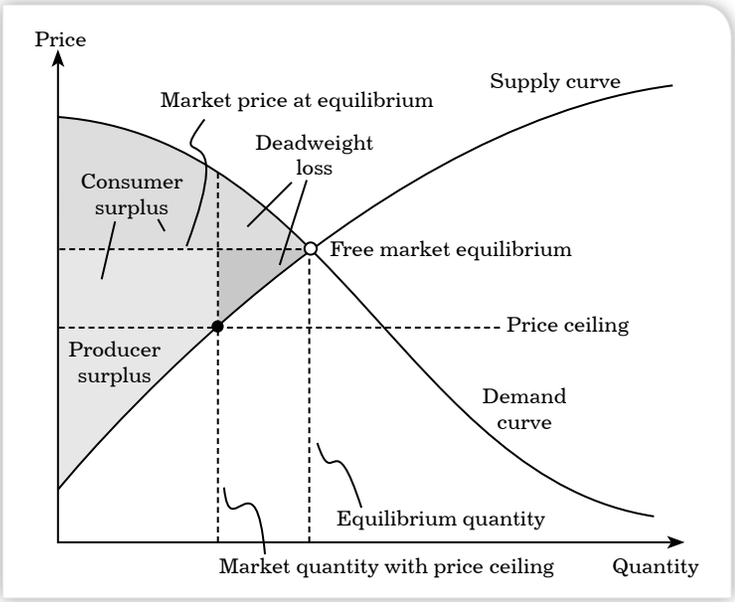

Figure 10.6: Harberger's Triangle (Deadweight Loss)
(**Source:** https://www.boundless.com/economics/taxes-and-public-finance/)

SELF ASSESSMENT QUESTIONS

7. A price cap regulation is used to set a maximum allowed price for a specific product. (True/False)

ACTIVITY

List down a few examples of firms that have increased their efficiencies under the price ceiling regulation.

10.6 SUMMARY

- A market failure can be defined as an inability of markets in allocating resource efficiencies. In a market failure, equilibrium between supply and demand of products is not reached.

NOTES

- There are mainly four causes of market failures, namely externalities, public goods, asymmetric information, and imperfect competition.
- Price regulations can be described as governmental measures to decide the quantities of a commodity to be sold at specified price both in the retail market and at other stages in the production process.
- Commonly two price regulations are used namely price ceiling and price floors.
- A price ceiling is the price that has been set by the government below the equilibrium price and cannot be allowed to rise above that.
- A price floor occurs when the price is set above the equilibrium price and is not allowed to fall.
- Government uses various methods to regulate monopoly, such as the price capping method, mergers and acquisitions, and rate of return method.
- As the firm retains the benefits of cost reduction under the price cap regulation, it receives dominant efficiency incentives.
- A price floor encourages firms to increase their output beyond the consumers' demand.

KEY WORDS

- **Deadweight loss**: It refers to a loss of economic efficiency with respect to the utility for consumers/producers such that the optimal efficiency of a firm is not achieved.
- **Price cap**: It refers to a form of price ceiling limiting the price an organisation can charge for its product or services.
- **Rate of return**: It refers to the profit on an investment expressed as a percentage of the total amount invested.
- **Economic efficiency:** It refers to the use of organisations' resources to maximise the production of goods and services.
- **Sponsorship:** It refers to a form of marketing in which a government or private corporation pays for all or some of the costs associated with a given project.

10.7 DESCRIPTIVE QUESTIONS

1. Explain the causes of market failure.
2. Write a short note on price regulations.
3. Discuss the various measures adopted by the government to regulate monopoly market.

10.8 ANSWERS AND HINTS

ANSWERS FOR SELF ASSESSMENT QUESTIONS

Topic	Q.No.	Answers
Meaning of Market Failure	1.	Market failure
	2.	Public goods
	3.	True
Price Regulations	4.	Price regulations
	5.	True
Regulations and Market Structure	6.	Rate of return
Price Regulation and Firm Behaviour	7.	True

HINTS FOR DESCRIPTIVE QUESTIONS

1. Market failure can cause because of various reasons, such as externalities, public goods, asymmetric information, and imperfect market conditions. Refer to section **10.2 Meaning of Market Failure**.
2. Price regulations can be described as control measures used in case of imperfect competition to prevent probable market failures. Refer to section **10.3 Price Regulations**.
3. To regulate monopoly, the government may adopt various measures such as price regulation using RPI-X, merger policies and rate of return method. Refer to section **10.4 Regulations and Market Structure**

10.9 SUGGESTED READING FOR REFERENCE

SUGGESTED READINGS

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CHAPTER

CASE STUDIES

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CASE STUDY 1

INFLATION IN INDIA 2007

This Case Study discusses the concepts of business economics. It is with respect to Chapter 1 of the book.

In the year 2007, the inflation rate between 5-5.5% was set as an acceptable rate by Reserve Bank of India (RBI). However, the actual inflation rate that was hovering around in the beginning of the year itself was 6 – 6.8% giving rise to high inflation. The main cause behind the high inflation at that time was the rise in prices of food articles due to increased constraints in supply and demand. According to analysts, high economic growth and increased money supply resulted in an increase in the demand, whereas stagnant agricultural productivity failed to deal with supply constraints.

In order to curb inflation various measures were taken by the government of India (GoI) along with RBI. The RBI decided to increase the Cash Reserve Ratio (CRR) 8 per cent and repo rates 9 per cent to keep a check on money supply. Due to increase in the repo rates, banks were forced to increase the rate at which they lent to their customers to pay a higher interest rate their borrowings from the RBI. The GoI also reduced import duties on several food products and decreased the price of diesel and petrol. Moreover, the RBI also decided not to intervene when the Indian Rupee was recovering against the US Dollar between March 2007 and May 2007; this would help in reducing the domestic price of the goods by bringing down the cost of imports.

However, the measures taken by GoI were not sufficient to curb the inflation in the country and faced harsh criticisms from various economists. According to some analysts, increased rates of interests would induce recession in the Indian economy. Many economists also felt that strengthened Rupee may also impact the long-term competitiveness of Indian exports reducing the profits of the export firms.

QUESTIONS

1. Identify the reasons for the rise in inflation in India 2007?

   (**Hint:** Rise in the price of primary articles, increased money supply, and high economic growth.)

2. Discuss how the measures taken by RBI could curb inflation. Suggest what other measures could have been taken.

   (**Hint:** Increase in the cash reserve ratio, repo rates, decrease import duties, rise in the value of rupee, etc.)

CASE STUDY 2

NOTES

RUSSIAN ECONOMY: AN EXAMPLE OF ECONOMIC RECOVERY

This Case Study discusses the economic recovery of Russia. It is with respect to Chapter 1 of the book.

Before 1991, Russia was known as one of the biggest republic with the name Russian Soviet Federative Socialist Republic (RSFSR) in Soviet Union. However, in 1990-1991, Russia faced high inflation rate and the shortage of supply in all industries. At that time, the GDP of Russia also witnessed a decline of 17% and retail prices soared upto 140%. Moreover, Russian political conditions were in a bad shape. Consequently, the dissolution of the Soviet Union took place in 1991. In order to recover from the economic crises, Boris Yeltsin, the first President of Russia, implemented various measures for the economic growth of Russia, such as stabilisation policies and economic restructuring. These measures helped the Russian economy to focus on becoming market-based economy market economy from a centrally planned economy.

Boris Yeltsin along with his advisors and an economist, Yegor Gaidar decided to implement measures for bringing up the Russian economy from inflation. The stabilisation measures adopted by them involved decreasing the government budget deficit, increasing government revenues, and controlling the supply of money by subsidizing credit provided to business persons. Moreover, Boris Yeltsin implemented policies for price control in the market, amended existing tax policies. He also took measures for increasing the privatisation in the country.

Initially, the policies made by Boris Yeltsin failed to achieve its goals. The government then introduced monetary and fiscal policies, that helped in the implementation of the measures successfully and achievement of the goals and objectives. In the election of 1996, Boris Yeltsin was again elected as the President of Russia. However, after that, the economy began to witness another decline and Russia foreign exchange reserves decreased. By the year 1998, the currency showed a decline of 75%. As a result, people of Russia turned against Boris and the opposition towards him in the parliament was also high.

In 2000, Vladimir Putin was elected as the President of Russia in 2000. He along with Mikhail Kasyanov, the Prime Minister of Russia implemented initiatives and legislative measures to transform the Russian economy in a market-based economy. As a result, in 2007, the Gross Domestic Product (GDP) of Russia rose above $1 trillion. The domestic energy industry of Russia majorly contributed to the fast growth of Russian economy. Oil exports were

CASE STUDY 2

another factor that played a significant role in drastic change in economic conditions of Russia.

As the major contribution in the GDP of Russia came from its fossil fuels and natural resources, the impact of global economic slowdown of 2007 was minimum. In addition, Russian trade with United States, which is the source of financial crisis of 2007, was very limited.

QUESTIONS

1. Why the measures taken by Boris failed after the second election that brought economic decline in Russia?

   (**Hint:** Due to default the debts, collapse of rouble, etc.)

2. Discuss the main reasons that increased inflation leading to economic crisis in Russia?

   (**Hint:** Ineffective reforms introduced by Boris, sudden release of price and currency controls, withdrawal of state subsidies, immediate trade liberalisation within the country, and so on.)

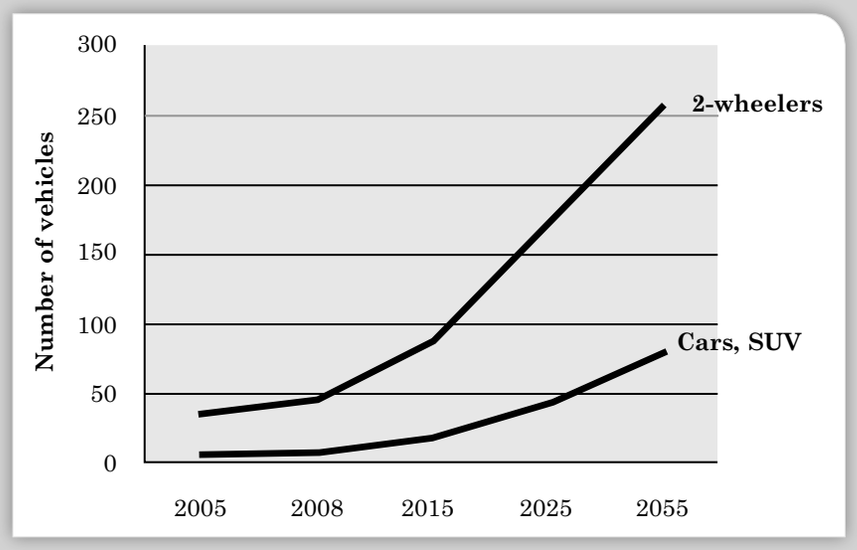
CASE STUDY 3

NOTES

DEMAND FOR PRIVATE VEHICLES AND URBAN TRANSPORTATION PROBLEMS

This Case Study discusses the problems in urban transportation and demand for privately owned vehicles in Indian cities. It is with respect to Chapter 2 of the book.

Various Indian cities are facing serious problems in the urban transportation. This is because of the increase in urban population (natural as well as migration from the rural areas and smaller towns). Other reasons for the transportation problem are the increase in the number of motorised vehicles and commercial and industrial activities. In most cases, the demand for vehicles has outdone the existing road capacity. This has become evident with the increasing congestion on roads and undesirable delays, which are widespread in Indian cities. The consequent pollution levels are another undesirable feature of these overloaded roads. The crisis in transport has a great impact on human lives as well. Statistics show that traffics and overloaded roads are the primary causes of accidental deaths in most of the Indian cities. The following graph depicts the demand for privately owned vehicles in India as estimated by the Ministry of Urban Transport:



Demand for Vehicles in Indian Cities
(**Source:** Ministry of Urban Transport)

The main reasons causing these problems are as follows:

- Prevailing imbalance in modal split
- Inadequate transport infrastructure
- Sub-optimal use of existing transport infrastructure

NOTES

CASE STUDY 3

The current public transport system in India is not sufficient as compared to the rapid and substantial increase in demand over the past few decades. Of these, the bus services have particularly deteriorated both in condition and number. The number of buses is further going down as most of the commuters are switching to personal modes of transportation. Although the demand for two-wheelers and cars is increasing rapidly, the cities are not meant to cater only to private cars and two-wheelers. To overcome the problems of urban transportation, there is a need to encourage public transport instead of self-owned two-wheelers and cars. This can be done by increasing the quantity as well as quality of public transport in the Indian cities, introducing metro rail services in more cities, etc. Therefore, the government needs to institute adequate policies to increase the share of public transport by improving the service quality and convenience of public transport. The shift from private to public transportation can have numerous advantages, such as reduced pollution, increased safety, increased savings, etc.

QUESTIONS

1. What are the major factors leading to an increase in the demand for private transport?

   (**Hint:** The current public transport system in India is not sufficient as compared to the rapid and substantial increase in demand. Also, the public transport is inconvenient.)

2. What measures can be taken by the government to reduce the demand for cars and two-wheelers in the Indian cities?

   (**Hint:** Encourage the use of public transport, improve the service quality and convenience of public transport, introduce metro rail services in more cities, make policies for environmental conservation stressing on the need for public transport, restrict the resale of private vehicles, set sales limits for automobile manufacturers, etc.)

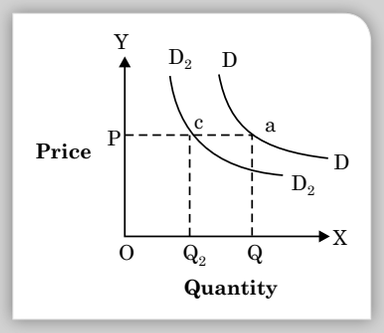
CASE STUDY 4

NOTES

DEMAND AND SUPPLY ANALYSIS OF ABC PVT. LTD

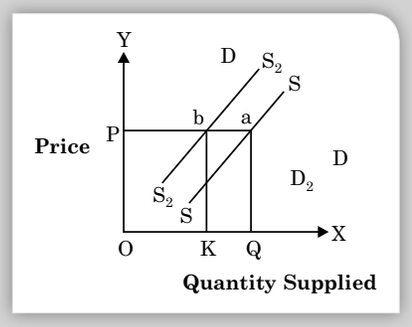
This Case Study discusses the importance of demand and supply analysis. It is with respect to Chapter 3 of the book.

ABC Pvt. Ltd. established in 1988, was involved in the business of leather shoemaking. It acquired a prestigious position in the shoemaking industry. Due to high competition, ABC Pvt. Ltd. started losing its position in the shoe manufacturing market. Apart from this, there were several other reasons for the decline of market share of ABC Pvt. Ltd. These reasons were failure of diversification in products, price war and introduction of a new variety of shoes by its competitors. ABC evaluated the main reasons for its failure and determined different ways to increase its market share. In addition, the organisation analysed the market and prepared the demand and supply curves for leather shoes before and after liberalisation. It also studied the shifts in demand and supply curves. The following figure shows the shifts in the demand curve of ABC:



Decrease in Demand

In the preceding figure, the movement from DD to D2D2 shows a decline in demand, while the price is constant (OP). However, the quantity has also decreased from OQ to OQ2. This decline has occurred due to various factors, such as change in income, distribution of national income, change in consumer's tastes and preferences, increase in product variety and change in the prices of related goods. This decline also affected the supply of the organisation. The following figure shows the shift in the supply curve of ABC:



Decrease in Supply

N O T E S

CASE STUDY 4

In the preceding figure, the shift from SS to S_2S_2 with shift in quantity supplied from OQ to OK shows a decrease in supply, while the price is constant (OP). The decrease in supply was the result of several factors, such as cost of production, change in technology, transport conditions and prices of related goods.

After analysing the demand and supply of leather shoes, ABC Pvt. Ltd. found that the shifts in the demand and supply curves are due to the advance technology used by its competitors and their different varieties of shoes. Therefore, it decided to enter a new segment of athletic shoes. It wanted to determine the price of athletic shoes at which the supply and demand of the product would be stable. Therefore, the organisation kept the price of its product as ₹ 200, initially. At this price, the supply of the product was 1,000 per week, and the demand of the product was only 20,000. This indicated a positive sign for the organisation. After a certain point of time, ABC increased the price of the product to ₹ 300 and increased its supply to 5,000 per week. This time the demand went up to 15000 units. After that, it increased the price to ₹ 400. At this stage, the demand and supply for the organisation's product became equal, which were 10,000 units. Now, the organisation started earning high profit margins. Therefore, it fixed the price as ₹ 500 per pair of athletic shoes at the supply of 10,000 per week.

QUESTIONS

1. Prepare a demand schedule and demand curve for the leather shoes of ABC Pvt. Ltd. when the demand function is as follows:

   $D_x = 100 - 2 (P_x)$

   (**Hint:** When price is 200, demand is 300.)

2. Represent shifts in the demand and supply curves of leather shoes of ABC graphically.

   (**Hint:** A shift in supply or demand curve also shifts the equilibrium point.)

CASE STUDY 5

NOTES

GLOBAL SMARTPHONES DEMAND ANALYSIS

This Case Study discusses the demand analysis of smartphones on a global scale. It is with respect to Chapter 4 of the book.

The global smartphone market is experiencing an exponential growth. Two organisations that dominate the market, sweeping 92% of the market share, are Google and Apple. Sales data during Q4 2012 provides information about the rise in the demand for smartphones. The smartphone market is believed to be one of the most extreme oligopolies of the 21st century. According to the International Data Corporation (IDC), Worldwide Quarterly Mobile Phone Tracker, the global smartphone market sales were 448.6 million units in Q2 2013, up by 3.9% compared to 431.8 million units sold in Q1 2013. As the market continues to grow, Android's market share went from 48.7% in 2012 to a whopping 70.1% in Q4 2013.

The success of iPhone, Blackberry and Samsung indicates that consumers have a demand for an intelligent and multifunctional device. On the basis of the past trends and forecasting, smartphone developers assess that there is a need for devices with converged video, voice and data applications. According to the BI Intelligence, the demand analysis of smartphones is based on the following factors, which are as follows:

- **Replacement of nearly 5 billion 'dumbphones' with smartphones:** Smartphones currently make up only 10% of handsets worldwide, and with more customers replacing old mobiles with new smartphones, the demand is expected to increase.
- **Decline in the price of smartphones:** The average price of a smartphone will drop from approximately ₹ 20000 to ₹ 10000 over the next few years.
- **Income effect:** The per capita income of individuals has grown over the years owing to which while the prices of smartphones are relatively stable. Owing to this, the disposable income of an average individual has increased, making smartphones more affordable.
- **Substitution effect:** With increased use of high-end technology in smartphones such as the Internet, data storage, data transfer, global connectivity, etc., customers are substituting smartphones for computers, laptops, etc.

All these factors lead to the conclusion that the demand for smartphones is expected to increase in the coming years.

These factors will also have a significant impact on the mobile Internet industry, which is already expanding, owing to the growth

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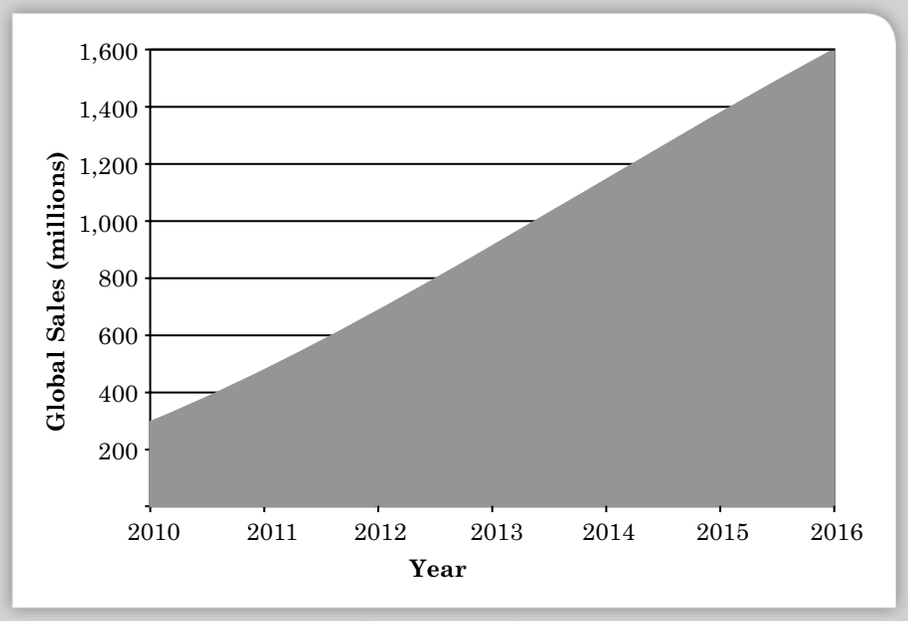
CASE STUDY 5

of smartphone customer base in the past few years. The other highlights of the report state that the smartphones sales will observe nearly 30% compound annual growth rate over the next five years. The demand analysis of smartphones estimates that smartphones would constitute about two-thirds of all mobile phone purchases by 2016. The following graph shows the estimated demand figures based on the previous years' trends and existing consumer behaviour:



(**Source:** BI Intelligence Smartphones Report, 2014)

QUESTIONS

1. What are the possible reasons for the expected rise in the demand for smartphones in the coming years?

   (**Hint:** Replacement of nearly 5 billion 'dumbphones' with smartphones, decline in the prices of smartphones, increase in per capita income, younger population, multi-utility, etc.)

2. Do you think that the demand for smartphones is based on the concept of utility?

   (**Hint:** The success of iPhone, Blackberry and Samsung indicates that consumers have a demand for an intelligent and multifunctional device. On the basis of the past trends and forecasting, smartphone developers assess that there is a need for devices with converged video, voice and data applications.)

CASE STUDY 6

NOTES

ELASTICITY OF DEMAND OF CIGARETTE SMOKING

This Case Study discusses the elasticity of demand in the nicotine market. It is with respect to Chapter 5 of the book.

In modern times, smoking has become an increasingly followed trend across all nations. Dating back to the 1990s, a substantial increase in the number of smokers has been reported globally. One of the prime causes for the rising trend is due to the increase in the number of teenage smokers, particularly girls. Contemplating the potential harms of smoking, various nations raised taxes on tobacco products. However, a change in price did not seem to have much impact on the demand for cigarettes. This is visible in the example of the UK where during the period between 1980 and 1986, there had been a large increase in the prices of cigarettes. However, rise in prices resulted in marginal decline in the number of cigarettes that smokers consumed. Thus, it can be deduced that price alone played a very little role in affecting the demand for cigarettes.

The fall in the consumption was mainly due to the deep recession in the economy that came in the 1980s, wherein unemployment rose from 1.5 million to 3 million. Thus, the income of consumers lowered resulting in the fall in consumption. Lately, rising awareness of health risks had also resulted in the fall in demand of tobacco smoking, particularly amongst professional middle aged workers. Some have argued that the actual harm comes from tar and carbon monoxide associated with the smoking of cigarettes. The nicotine present in these cigarettes has little effect on the health of smokers. Thus, the nicotine market should be regulated. However, only tobacco companies and manufacturers of patches, gums and inhalers are licensed to sell nicotine based products. If there can be a firm that offers safe nicotine products, the smoking of cigarettes can be lowered considerably.

N O T E S

CASE STUDY 6

QUESTIONS

1. What is the price elasticity of demand of cigarettes in the above scenario? Explain why?

   (**Hint:** The price elasticity of demand of cigarettes is relatively inelastic.)

2. What could be the factors that can bring down the consumption of cigarettes? Discuss.

   (**Hint:** Introducing safe substitutes in the market, creating awareness of health hazards arising from tobacco smoking, defining legal age for smoking to prevent adolescents from indulging in the activity, etc.)

CASE STUDY 7

NOTES

DEMAND FORECASTING IN THE INDIAN RETAIL SECTOR

This Case Study discusses the need and challenges in demand forecasting in the Indian retail sector. It is with respect to Chapter 6 of the book.

The Indian retail sector has been dominated by small-scale independent business owners like traditional grocery stores, convenience stores, etc. Lately, the retail market in India has become more organised with the multi-outlet retail concept. Owing to changing lifestyles, steady income growth and favourable demographic outlines, the Indian retail sector is expanding at a rapid pace. For example, there are malls of the size of 40 million square feet that are expected to reach 60 million square feet, according to the Jones Lang LaSalle's third annual Retailer Sentiment Survey-Asia. Indian metropolitans are observing a paradigm shift from the traditional forms of retail to an advanced and organised sector. The top ten players in the Indian retail sector are Shoppers' Stop, Westside (Trent), Pantaloon (Big Bazaar), Lifestyle, RPG Retail (Foodworld, Musicworld), Crossword, Wills Lifestyle, Globus, Piramals (Pyramid and Crosswords) and Ebony Retail Holdings Ltd.

These retailers need to update themselves constantly with the changes in the demand of consumers. This is done with the help of several demand forecasting techniques. However, retailers face a number of challenges in demand forecasting. These are as follows:

- Scale of forecast (how many goods to include in the forecast?)
- Sporadic demand (erratic sales for many items in the store)
- Introduction of new products
- Changing prices and promotional techniques

Forecasting is an expensive method, thus a retailer cannot forecast for all the goods he/she sells. Moreover, it is important for retailers to provide customers with the specific goods that they desire. Under stocking would cause unsatisfied customers, whereas over stocking might increase the money locked up in inventories.

A report 'Indian retail on the fast track' by FICCI states that different organised retailers are currently experimenting with the different techniques of demand forecasting. As the Indian market is not mature enough, it is hard to predict the feasibility of the different demand forecasting techniques in providing precise information. This also implies that the internationally accepted techniques may not be applicable or may not yield similar results in India as in other developed countries.

NOTES

CASE STUDY 7

Another article by 'Tata Strategic Management Group' in September 2006 estimated the retail market to grow to about ₹40,000 crore by 2015. It highlighted three significant implications for the retail sector in India. They are as follows:

- Existing and new entrants need to achieve scale quickly to drive efficiencies in procurement, supply chain and marketing. Else, they risk being marginalised by larger players.
- Demand forecasting will be the critical drivers to build scale.
- Retailers need to invest on the training needs of the forecasters to ensure the availability of reliable data.

QUESTIONS

1. What are the challenges faced by the Indian retailers with regard to demand forecasting of their products and services?

   (**Hint:** Scale of forecast (how many goods to include in the forecast, sporadic demand, introduction of new products, changing prices and promotional techniques.)

2. According to you, which demand forecasting technique would be favourable to use in the Indian retail sector and how would you use it?

   (Hint: Cost-effective demand forecasting techniques and flexible demand forecasting techniques, such as questionnaires, interviews, etc. To use them, prepare a description of the situation for which forecasts are required, select experts who are likely to be familiar with analogous situations, select a sample from the population, ask questions, and interpret the outcomes from the data collected.)

CASE STUDY 8

NOTES

ONION PRODUCTION IN INDIA

This Case Study discusses onion production in India. It is with respect to Chapter 7 of the book.

As of 2015, India is the second largest producer of onions in the world after China. Maharashtra, Karnataka, Gujarat, Bihar and Madhya Pradesh are the top five onion producing states in India. The demand for onion has been increasing in India with an increase in the disposable income of people.

In the 1980s, despite large production every year, the demand for onions was met by import, which required large foreign exchange. The instability in production of onions was caused by erratic weather and volatile market price which resulted in excess supply or demand.

India is also the fourth largest exporter of onion; thus, it is crucial to improve the yield for enhancing the export level so that foreign exchange can be earned for the exchequer of the country. The following table shows the onion exports from India:

Onion Exports from India

Year	Qty (MT)	Value (Rs Lakh)	Price (Rs/MT)
1951-52	56,986	106.69	187.22
1961-62	1,14,023	291.3	255.47
1971-72	54,866	227.56	414.76

N O T E S

CASE STUDY 8

Year	Qty (MT)	Value (Rs Lakh)	Price (Rs/MT)
1981-82	1,69,771	2,943.81	1,733.99
1990-91	2,89,380	11,803.00	4,078.72
1991-92	4,06,135	16,296.86	4,012.67
1996-97	5,12,879	33,163.40	6,466.13
2001-02	5,06,924	41,140.53	8,115.72
2008-09	17,83,820	2,24,312.30	12,578.63
2009-10	18,73,002	2,83,428.50	15,132.31
2010-11 (up to Nov 10)	11,58,698	1,52,115.60	13,128.15
2011-12	1188287.96	1,72,285	144.98
2012-13	1822000	2,29,400	125.90
2013-14	1358000	2,87,700	213.11
2014-15	1086000	2,01,000	185.08

(**Source:** http://in.reuters.com/article/2014/07/08/india-onions-idINKBN0FD2NJ20140708)

Onion crop suffers from price fluctuations. Price rise leads to inflationary pressures on economy whereas price fall decreases the farmer's income by increasing poverty in rural areas. The instability in the production and prices of onions lead to failure of optimal resource allocation in the agriculture industry. The major constraints for onion production are capital and labour. This is because of land preparation, planting, and harvesting require more labour and capital.

Instability in the production of onion may affect growth in investment, employment, consumption, income and distribution, which may impede the economic development and growth of the country. The yield of onion increases over the years; however, still there is a lot of potential for reaching global levels. Though there is increase in the yield of onion over the years, still there exists lot of potential to reach to the global level yields.

As per the research on onion production, a time series analysis reveals that there is significant increase in onion production resulting in rise in market arrivals. The major reason for decline in the production of onion in India is unseasonal rains. However, the reduction in production is always offset by marginally higher production in states such as Rajasthan and MP. In addition stock hoarding is also the reason for high price of onions.

CASE STUDY 8

The supply gap in onions can be covered by proper staggered planting of onions. The market reforms include setting minimum support prices for onions and implementing market intelligence systems that help in discovering the right prices for producers as well as consumers. However, increasing production through scaling up an area may not be feasible without reducing acreage under other important high value crops. If this is not done, consumer price increases, or export activities restrict or import has to be resorted, which entail the loss of foreign exchange. Hence, the solution for optimal production is bridging the yield gap or increasing the yield potential in the long run.

QUESTIONS

1. How can onion production be controlled through optimum utilisation of resources?

   (**Hint:** By calculating marginal revenue product.)

2. Draw the PPC curve for onion with the effect of:
   - ♦ An increase in the resources of the nation
   - ♦ An improvement in agricultural technology

   (**Hint:** PPC shifts the rightward)

CASE STUDY 9

NOTES

PEPSICO INC. - ECONOMIES OF SCALE OR OPPORTUNITY COSTS?

This Case Study discusses whether PepsiCo Inc. is benefitting from economies of scale or it should split up to benefit from the associated opportunity costs. It is with respect to Chapter 8 of the book.

PepsiCo Inc. is an American multinational food and beverage corporation that manufactures, markets and distributes grain-based snack foods, beverages and other products. The organisation was formed in 1965 by the merger of Pepsi-Cola Company and Frito-Lay, Inc.

Indra Nooyi is the current CEO of PepsiCo Inc. Nooyi has been constantly questioned by investors who think that PepsiCo has shifted from its core business of snacks and fizzy drinks to new healthier markets. The carbonated drinks business has lost its market share considerably and the same seems true for its snacks business.

Several diversified businesses are splitting up into independent organisations. Some analysts suggest that PepsiCo should also split into two smaller organisations, a beverages manufacturing and marketing firm and a snacks manufacturing and marketing firm. If this is the case, the two organisations for snacks and drinks would be segregated as Frito-Lay (Doritos, Tostitos and Walkers), and Pepsi Gatorade (a sports drink) and Tropicana (a maker of fruit juices). Although, the opportunity costs of running a single organisation are mounting, the CEO seems determined to maintain PepsiCo as a single unit. Nooyi admits that as a stand-alone corporation, Frito-Lay, the star performer of PepsiCo portfolio, might be the best consumer-goods maker in America. Moreover, it could also be sold for a fortune, which along with sales PepsiCo might be worth more than the current worth of the organisation.

In spite of these opportunity costs, Indira Nooyi believes in the economies of scale, given the organisation's power over its suppliers, retailers and customers. This could be attributed to the organisation's ability to market and distribute several of its brands together. By taking over Tropicana and Quaker Oats, PepsiCo is now selling less sugary drinks and healthier snacks, which are 25% less salty and 15% less fatty. Nooyi aims to increase PepsiCo's portfolio of "good for you" products (nuts, oats and fruit juices) from about $10 billion to $30 billion. However, the reality is not the same. Since the initiative for healthier products has been taken up by PepsiCo, its market share has declined by 7%, whiles those of Coca-Cola (its biggest rival) have increased by 50 %.

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CASE STUDY 9

QUESTIONS

1. Do you think that PepsiCo's business is trading on powerful economies of scale?

   (**Hint:** Since the initiative for healthier products has been taken up by PepsiCo, its market share has declined by 7%, whiles those of Coca-Cola (its biggest rival) have increased by 50 %.)

2. Suppose PepsiCo Inc. decides to segregate into two different firms. What could be the possible advantages or disadvantages of the act?

   (**Hint:** Advantages: Frito-Lay might be the best consumer-goods maker in America. It could also be sold for a fortune, which along with sales PepsiCo might be worth more than the current worth of the organisation. Disadvantages: Losing on economies of scale and marketing of several brands together.)

CASE STUDY 10

NOTES

END OF DE BEERS MONOPOLY

This Case Study discusses the functioning of a company in monopoly. It is with respect to Chapter 9 of the book.

One classic example of a monopoly has been exhibited in the diamond industry by South African company, De Beers. The company was formed by Cecil Rhodes and financed by Alfred Beit and N M Rothschild & Sons by merging two biggest mines in the country. The company is responsible for the production of 80% of the world's production of diamonds.

In 1927, Ernest Oppenheimer, a German Jewish immigrant, took over the empire and consolidated the company's global monopoly over the world's diamond industry. Throughout the 20th century, the company was well known for its monopolistic prices to manipulate the international diamond market by using its dominant position. Some of the methods used by De Beers included were:

- Creation of single channel monopoly by inviting various independent producers
- Producing diamonds similar to those of independent firms who refused to join the De Beers Group
- Purchasing and stocking diamonds produced by other manufacturers to control prices through supply

In 2000, De Beers began to observe various problems:

- Corruption of diamonds by condition blood diamonds was observed, wherein the revenue generated by the excavation and marketing of diamonds in a few African nations was used to finance warfare and warfare law-breakings.
- There was a shift in customers' preferences towards marked luxuriousness commodity. Diamonds were considered as a class product meant for elites, whereas gemstones became a luxury commodity giving rise to the sale of gemstones.
- Secondary distributers inherited prominence that led to the loss of market power of primary producers.

However, the major blow to De Beers came when producers in Russia, Canada and Australia decided to distribute diamonds outside of the De Beers channel, which ultimately ended the monopoly that existed for more than 100 years.

Some of the current major players in the diamond industry include African producers Debswana and Namdeb, De Beers, Rio Tinto, BHP Billiton, Lev Leviev, Harry Winston, and Alrosa. In

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CASE STUDY 10

November 2011, one of the world's largest, Anglo-American groups had purchased the 40% share owned by the Oppenheimer family for $5.1 billion. This ultimately increased the ownership of Anglo American's share in De Beers to 85%.

With an end of the monopoly, De Beers is now facing the biggest challenge of overpowering numerous competitors in the diamond industry to become a global leader in the market.

QUESTIONS

1. Discuss various reasons that led to the end of monopoly of De Beers?

   (**Hint:** Corruption of diamonds by condition blood diamonds, shift in customers' preferences, decision of distributing diamonds of other manufacturers, etc.)

2. Suggest the measures that De beers can take to polish its image after the end of its monopoly in the market.

   (**Hint:** Creating a brand name through effective marketing and advertising, focusing on middle class, etc.)

CASE STUDY 11

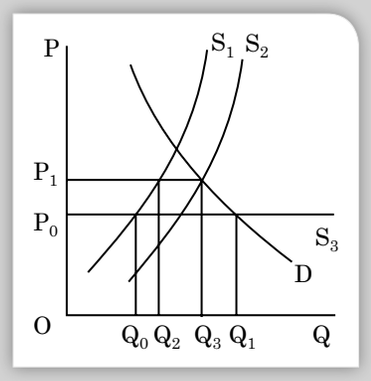
NOTES

THE CARTEL OF OPEC

This Case Study discusses the behaviour of an oligopolistic cartel. It is with respect to Chapter 9 of the book.

Organisation of Petroleum Exporting Countries (OPEC) is a cartel that is formed by oil producing countries. It has control on about three-fourths of the world's oil reserves. The cartel was formed in 1960 by Iran, Iraq, Kuwait, Saudi Arabia, and Venezuela. By 1973, it was joined by additional eight nations, namely Qatar, Indonesia, Libya, the United Arab Emirates, Algeria, Nigeria, Ecuador, and Gabon. The cartel also sets production levels for all member nations and raises prices through a coordinated reduction in the quantity produced.

Because of high prices, member countries of OPEC enjoyed vast wealth which they spent on arms and economic development. The cartel was tempted to further increase prices in the 1980s which resulted in the price hike from $3 to nearly $12 in 1973 to $30 in the 1980s. The success of OPEC is illustrated in the following figure:



In the above figure, the supply curve S_1 represents non-OPEC nations, P_0 is the price of oil, and the supply curve S_3 represents world supply of oil. The production of non-OPEC countries at P_0 price is Q_0. The demand curve is represented by D at the quantity demanded Q_1 and price P_0. When the output is limited by OPEC, the world supply curve is shifted to S_2 from S_3. As a result, the price of oil increased to P_1 at which non-OPEC countries supply quantity Q_2 and OPEC countries supply Q_2Q_3. Thus, due to the inelastic demand of oil, an increase in price leads to a rise in OPEC revenues even though quantity fell considerably.

However, in the long run, the act or restricting the supply led to an increase in supply by non-OPEC countries due to high prices. This resulted in the shift in the supply curve of these countries to the right. Consequently, the share of OPEC declined. Thus, by 1985,

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OPEC had to reduce the price by 30 percent for which they also lowered down their output. Consequently, the income of OPEC fell and the members of OPEC began to violate quotas to maintain their profits. Ultimately OPEC eliminated quotas by 1985.

QUESTIONS

1. Why the OPEC cartel was unable to retain its monopoly in the long run during 80s?

   (**Hint:** Rise in price increased the supply by other non-OPEC members, resulting in a decrease in supply and profits of OPEC members.)

2. Do you think that other industries can also form a cartel and behave like a monopoly?

   (**Hint:** Yes, for example in the telecommunication industry, a few leaders have created a monopoly to regulate the prices of products and services.)

CASE STUDY 12

NOTES

THE MICROSOFT ANTITRUST CASE

This Case Study discusses about the antitrust case filed against Microsoft Corporation. It is with respect to Chapter 10 of the book.

Microsoft is a computer software manufacturer that deals in the Windows family of operating systems for personal computers and servers. It also produces applications software that run on the Windows family of operating systems, such as MS-Office. In the 1990s, the Federal Trade Commission and the Department of Justice, United States investigated Microsoft on various antitrust allegations. The trial was presided over by Judge Thomas Penfield Jackson. Jackson's 205-page "Findings of Fact" established three major facts that were crucial to the case:

- Microsoft possessed monopoly power in the market for Personal Computer (PC) operating systems.
- Microsoft engaged in a wide-ranging effort to protect its operating system monopoly using unfair practices.
- Microsoft's actions were harmful to innovation, other organisations as well as consumers.

Judge Jackson's Findings claimed that Microsoft had a monopoly in the market for Intel-compatible operating systems. He drew this conclusion based on the following three factors:

- Microsoft's share of the market for Intel-compatible PC operating systems was extremely large and stable.
- Microsoft's dominant market share was protected by a high entry barrier.
- Microsoft's customers lacked a commercially viable alternative to Windows.

As monopolies are considered to engage in activities that are harmful to consumers, Judge Jackson investigated and concluded the same for Microsoft. He found that Microsoft was especially concerned about technologies, such as Netscape's Navigator browser, that had the potential to erode Microsoft's position in the market. To overcome the Netscape threat, Microsoft undertook a wide array of anticompetitive practices to increase its market share of Internet Explorer. Moreover, Jackson claimed that Microsoft attempted to persuade IBM to stop competing in the market for applications software. In addition to the above, the 'Findings of Fact' also established that Microsoft engaged in anticompetitive conduct on several other occasions, involving major organisations, such as Apple, AOL, Intuit, Real Networks and Sun Microsystems.

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Microsoft vigorously defended itself arguing that its attempts to innovate were under attack by rival organisations that were jealous at its success, and that government litigation was merely their counter attack to let Microsoft down.

In the year 2011, the U.S. Supreme Court ended the lawsuit that accused Microsoft Corporation of illegally protecting its Windows computer operating system from market competition. Microsoft won the antitrust case and the Supreme Court gave out the remedies decree in the antitrust case, "Microsoft must seek to unfetter a market from anticompetitive conduct, terminate the illegal monopoly, deny to the defendant the fruits of its statutory violation, and ensure that there remain no practices likely to result in monopolisation in the future".

QUESTIONS

1. What were the reasons behind Microsoft being referred to as 'practising monopoly'?

   (**Hint:** Microsoft possessed monopoly power in the market for Personal Computer (PC) operating systems, it was engaged in a wide-ranging effort to protect its operating system monopoly using unfair practices and Microsoft's actions were harmful to innovation, other organisations as well as consumers.)

2. List the major accusations against Microsoft made by Judge Thomas Penfield Jackson.

   (**Hint:** Microsoft undertook a wide array of anticompetitive practices to increase its market share of Internet Explorer.)