Centre for Distance & Online Education

UNIVERSITY OF JAMMU

JAMMU

SELF LEARNING MATERIAL

OF

MANAGERIAL ECONOMICS

FOR

M.COM SEMESTER-I

For the examination to be held in 2025 onwards

SEMESTER- I **LESSON NO. 1-20**

COURSE NO. MCOMC153 **UNIT I-IV**

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COURSE NO. MCOMC153

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SYLLABUS

CENTRE FOR DISTANCE AND ONLINE EDUCATION
UNIVERSITY OF JAMMU
M.COM. Semester – I (NON-CBCS)
MANAGERIAL ECONOMICS
(Core Course)

Course: MCOMC153 **Max Marks: 100 Marks**
Credit: 4 **External: 70 Marks**
Time: 3.00 Hrs. **Internal: 30 Marks**

(Syllabus for the examinations to be held in December 2025, 2026, 2027)

COURSE OBJECTIVES

1. To familiarize the students with the conceptual underpinning of managerial economics and demand analysis
2. To impart knowledge about the theory of consumer choice.
3. To provide insight to the students about the product theory and functions.
4. To aware students about the pricing practices in different market conditions.

COURSE OUTCOMES

After the completion of this course, the student will be able to:

1. understand the role of managerial economics in business contexts;
2. understand consumer choices and decisions;
3. how production theory helps the managers in determining short run and long run costs;
4. understand the price setting in varied market conditions; and
5. to develop managerial insights using economic principles for making decision under varied environmental constraints.

UNIT I NATURE AND SCOPE OF MANAGERIAL ECONOMICS

Objective of the firm; Managerial economist's role and responsibilities; Fundamental economic concepts: Incremental principle, opportunity cost principle, discounting principle, equi-marginal principle, principle of time perspective; Demand Analysis: Individual and market demand functions; Law of demand, determinants of demand; Elasticity of demand: Price elasticity, income elasticity and cross elasticity; Supply

function; Firm theory: Objectives and Theory of the growth of the firm: Marris Model.

UNIT II THEORY OF CONSUMER CHOICE

Consumer Behavior: Cardinal and ordinal utility approach, indifference approach, revealed preference and theory of consumer choice under risk; Demand estimation for major consumer durable and non-durable products; Demand forecasting techniques.

UNIT III PRODUCTION THEORY

Production function – production with one and two variable inputs, Stages of production; Economies of scale; Estimation of production function; cost theory and estimation; Economic value analysis; Short and long run cost functions -their nature, shape and inter-relationship; Law of returns to scale.

UNIT IV PRICE DETERMINATION UNDER DIFFERENT MARKET CONDITIONS

Characteristics of different market structures; Price determination and firm's equilibrium in short- run and long-run under perfect competition, monopolistic competition, Duopoly, oligopoly and monopoly; Pricing Practices: Methods of price determination in practice; Pricing of multiple products; Price discrimination.

Suggestive Readings

1. Craig P. H. and Cris, M. Managerial Economics, PHI Publication, New Delhi.
2. Dominick, S. Managerial Economics, Oxford University Press, New Delhi.
3. Ahuja, H. L. Managerial Economics, S. Chand Company, Delhi.
4. Baumol, W. J. Economics Theory and Operations Analysis, Prentice Hall, London.
5. Dwivedi D. N. Managerial Economics, Vikas Publishing House, Delhi.
6. Chopra O. P. Managerial Economics, Tata McGraw Hill, Delhi.
7. Varshney, R.L. and Maheshwari, K.L. Managerial Economics, Sultan Chand & Sons, New Delhi.
8. Joel, D. Managerial Economics, Prentice Hall of India, New Delhi.

Note for Paper Setting:
External (End Semester) Assessment will comprise of 70 Marks.
The Question Paper will be divided into two sections, covering whole of the syllabus.

Section A: This section will comprise of 4 questions of short answer type from all four units, selecting one from each unit. All questions will be compulsory and each question will carry 5 marks. (4 x 5 = 20 marks)

Section B: This section will comprise of six questions of long answer type from all four units, selecting atleast one question from each unit. Students will be required to attempt any 5 questions and each question will carry 10 marks. (5 x 10 = 50 marks)

Dear Learners,

Welcome to your journey of studying Managerial Economics through the Distance Education Program. This study material has been specially prepared with your learning needs in mind, recognising that as a distance education student, you may have limited access to classroom interaction and face-to-face guidance. However, we are confident that with this resource, you will gain a solid understanding of the core principles and practical applications of Managerial Economics, enabling you to excel academically and professionally.

Managerial Economics serves as a bridge between economic theory and business practices, focusing on how economic principles can be applied to solve real-world business problems. The concepts you'll explore here—ranging from demand analysis, production and cost theories, to pricing strategies and market structures—will empower you with critical analytical skills. These skills are invaluable for decision-making in dynamic business environment and are relevant to a variety of roles across industries.

Since you are in a distance learning setup, it is crucial to manage your time effectively. Set aside dedicated study hours each week, and don't hesitate to reach out to us if you have any questions. We are here to support you and provide guidance whenever necessary. In addition, leverage online resources, discussion forums and study groups to enhance your learning experience.

Remember, the knowledge and skills you gain skillstuding Managerial Economics will equip you with a strategic mindset essential for addressing business challenges. Your commitment to understanding and applying these concepts will serve you well in your academic pursuits and beyond.

Wishing you success and an enriching learning experience!

CDOE

University of Jammu

CONTENTS

UNIT - IV PRICE DETERMINATION UNDER DIFFERENT MARKET CONDITIONS (CREDIT: 1)

M.Com 1st Sem. **UNIT-I (CREDIT: 1)**
Course No. 153 **Lesson No. 1**

NATURE & SCOPE OF MANAGERIAL ECONOMICS AND OBJECTIVES OF FIRM

STRUCTURE

1.0 LEARNING OBJECTIVES AND OUTCOMES

Learning Objectives

- To understand the concept of managerial economics;
- To analyse scope of managerial economics;
- To describe the nature of managerial economics;
- To evaluate the importance of managerial economics;
- To classify and distinguish the various types of managerial economics; and
- To articulate the meaning and objectives of firm.

Learning Outcomes

After reading this lesson, you will be able:

- understand the concept of managerial economics;
- to identify and assess the various areas within the scope of managerial economics;
- to analyse the interdisciplinary nature of managerial economics and its relevance to real-world business environments;
- to recognize the significance of managerial economics in improving managerial decision-making, resource allocation, and business strategy formulation;
- to distinguish between different types of managerial economics and apply these distinctions in decision-making contexts; and
- to understand meaning and objectives of firm.

1.1 INRTODUCTION

Imagine you're the manager of a business or even a CEO. Every day, you'll face decisions—like how much of a product to produce, what price to set, or whether to invest in new technology. These decisions require more than just intuition or guesswork; they need careful analysis and understanding of economic principles.

Managerial Economics is exactly that: it's the application of economic theory and tools to help managers make better, more informed decisions. It bridges the gap between theoretical economics and practical business management. We use economic concepts like supply and demand, cost analysis, pricing strategies, and market structures to solve real-world business problems.

By studying Managerial Economics, you'll learn how to optimize resources, evaluate risks, and predict market trends—skills that are crucial for making smart decisions in any business environment.

Economics is generally categorised into two main branches: microeconomics and macroeconomics. Macroeconomics, as its name implies,

examines the broader economy and its aggregates, such as Gross National Product, inflation, unemployment, exports, imports, and taxation policy. It addresses questions related to investment shifts, government expenditures, employment, price fluctuations, and the exchange rate of the rupee, among other things. In macroeconomics, the focus is on aggregate levels of these variables. However, these aggregates conceal details about individual firm outputs, consumer decisions, and price changes for specific goods and services. While macroeconomic issues often dominate media discussions and headlines, microeconomic factors also play a critical role, especially in addressing the day-to-day challenges a manager faces. Microeconomics examines individual

components of the economy, like firms and consumers. Managerial economics can be viewed as applied microeconomics, concentrating on how firms and individuals interact in markets.

Economics is typically defined as the study of how goods and services are produced, distributed, and consumed, as well as how choices are made in allocating scarce resources. The goal of managerial economics is to use economic concepts and reasoning to enhance managerial decision-making within an organisation. Although much of managerial economics has a microeconomic focus, it is essential for managers to also consider the broader economic environment when making decisions. Understanding and forecasting macroeconomic trends can be valuable for informed decision-making. Managerial economics integrates economic theory with business practices, helping management make decisions and plan for the future. It aids managers in finding rational solutions to the challenges faced by their firms and uses economic concepts to support logical decision-making. By focusing on the efficient use of limited resources, managerial economics helps develop analytical skills and provides a rational framework for problem-solving. In summary, while microeconomics focuses on individual choices regarding resource allocation and pricing, macroeconomics studies the overall behavior of industries and entire economies.

1.2 CONCEPT OF MANAGERIAL ECONOMICS

From a firm's perspective, managerial economics can be described as the application of economic principles to address issues related to making choices or allocating scarce resources. It is a branch of management studies focused on solving business problems and making decisions through the application of both microeconomic and macroeconomic theories. This specialised field tackles internal organisational challenges using various economic theories.

Economics plays a crucial role in business, influencing assumptions, forecasts, and investments. Managerial economics, once referred to as "Business Economics," deals with applying economic theory to business management, helping managers make informed decisions. It encompasses the use of economic

concepts and principles to analyse business problems and support rational decision-making.

Managerial economics is essentially a science focused on the efficient use of scarce resources. It aids managers in making decisions related to customers, competitors, suppliers, and the internal operations of the firm. By using statistical and analytical tools, it applies economic theories to solve real- world business problems. Key areas of study in managerial economics include:

- Business firm objectives
- Demand analysis, estimation, and forecasting
- Production and cost analysis
- Capital budgeting for investment decisions
- Competition
- Profit analysis, including break-even analysis

1.3 DEFINITIONS OF MANAGERIAL ECONOMICS

"Managerial Economics is economics applied in decision making. It is a special branch of economics bridging the gap between abstract theory and managerial practice." **(Haynes, Mote and Paul.)**

According to **McNair and Meriam,** "Business Economics consists of the use of economic modes of thought to analyse business situations."

According **to Prof. Evan J Douglas,** "Managerial economics is concerned with the application of economic principles and methodologies to the decision-making process within the firm or organisation under the conditions of uncertainty"

According to **Spencer and Seegelman,** "Business Economics (Managerial Economics) is the integration of economic theory with business practice for the purpose of facilitating decision making and forward planning by management."

Mansfield defined Managerial economics as "it is concerned with application of economic concepts and economic analysis to the problems of formulating rational managerial decision."

According to **E.F. Brigham and J.L. Pappar,** Managerial Economics is "The application of economic theory and methodology to business administration practice."

In the opinion of **W.W. Haynes,** "Managerial Economics is the study of the allocation of resources available to a firm of other unit of management among the activities of that unit."

According to **Floyd E. Gillis,** "Managerial Economics deals almost exclusively with those business situations that can be quantified and dealt with in a model or at least approximated quantitatively."

According to **Hailstones and Rothwel,** "Managerial economics is the

A. CHECK YOUR PROGRESS

Multiple Choice Questions

1. Which of the following best defines Managerial Economics?
   a) The study of how individuals make economic decisions
   b) The application of economic theory and quantitative methods to business decision-making
   c) The analysis of government policies affecting the economy
   d) The study of macroeconomic policies and their impact on businesses

   Answer: b

2. Managerial Economics primarily focuses on which of the following?
   a) Political decision-making
   b) Market structures and pricing strategies
   c) Economic growth and inflation rates
   d) Profit maximisation and resource allocation

   Answer: d

3. In the context of Managerial Economics, which of the following is an example of a normative statement?
   a) The price of smartphones has increased by 10% this year.
   b) Firms should reduce prices to increase market share.
   c) Higher production costs lead to reduced profits.
   d) Increasing demand will result in higher prices.

   Answer: b

application of economic theory and analysis to practice of business firms and other institutions.”

1.4 NATURE OF MANAGERIAL ECONOMICS

Managerial economics utilises economic tools and techniques to aid in business and administrative decision-making, ensuring that business goals are achieved by efficiently utilizing available resources. While economic theory is important, it is of little value without practical application. Managerial economics serves as a bridge between theoretical knowledge and its practical use in real-world economies. It establishes guidelines for making effective managerial decisions and helps managers understand how economic forces impact organizations and the potential economic outcomes of their decisions.

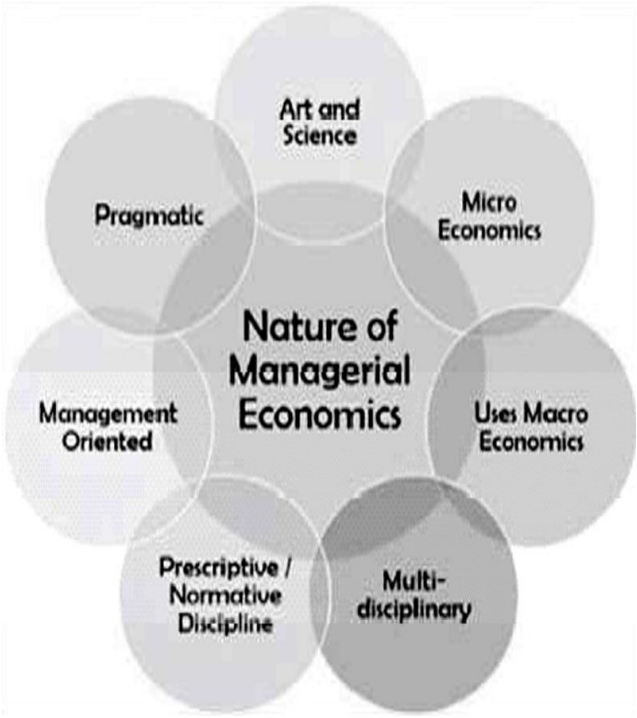

Figure 1.1

It is a crucial managerial skill to understand the principles that guide the economic behaviour of firms and individuals, leading to better decisions, increased profits, and enhanced firm value.

1. **Art and Science**: Managerial economics involves both logical thinking and creative skills for decision-making and problem-solving. Some economists also view it as a scientific discipline, as it applies various economic principles, techniques, and methods to address business issues.

2. **Microeconomics Focus**: In managerial economics, managers primarily address issues specific to an organization, rather than the broader economy, making it a branch of microeconomics.

3. **Use of Macroeconomics**: Since businesses operate within a larger external environment, managers must consider macroeconomic factors like market conditions, economic policies, and government reforms, and understand their impact on the organization.

4. **Multi-disciplinary Approach**: Managerial economics integrates tools and concepts from various fields, including accounting, finance, statistics, mathematics, production, operations research, human resources, and marketing.

5. **Prescriptive/Normative Discipline**: It focuses on achieving goals by addressing real-world problems and applying corrective actions.

6. **Management-Oriented**: It serves as a tool for managers to tackle business challenges and uncertainties, while also aiding in goal setting, policy formulation, and effective decision-making.

7. **Pragmatic**: It takes a practical and logical approach to solving everyday business problems.

1.5 SCOPE OF MANAGERIAL ECONOMICS

Managerial economics is widely applied in organisations to deal with different business issues. Both the micro and macroeconomics equally impact the business and its functioning. It provides an essential tool for determining the business goals and targets, the actual position of the organisation, and what the management should do to fill the gap between the two. It provides strategic planning tool that helps in analyzing the problem and formulating rational

managerial decisions. Decision making is a crucial aspect in any business problem. It is an evolutionary science which correlates the understanding and application of economic knowledge with the emerging business problems in the economy. The basic business problems that arise in any decision making or forward planning process involves operational and environmental issues.

The following fields may be said to generally fall under scope of Managerial economics:

i. Demand Analysis and Forecasting

ii. Cost and Production Analysis

iii. Pricing Decisions, Policies and Practices

iv. Profit Management

v. Capital Management

Figure 1.2

1. **Demand Analysis and Forecasting:** A business firm functions as an economic entity that converts resources into goods for sale in the market.

A significant part of managerial decision-making relies on accurate demand estimates. Sales forecasts provide crucial insights for management in planning production schedules and allocating resources efficiently. This helps the firm maintain or enhance its market position and profitability. Demand analysis also highlights other factors affecting product demand. As a result, demand analysis and forecasting hold a key role in managerial economics.

2. **Cost and Production Analysis:** A firm's profitability is heavily influenced by its production costs. A prudent manager will estimate costs for various output levels, identify the factors causing cost fluctuations, and select the output level that minimizes costs, while accounting for production uncertainties. Although engineers oversee production processes, managers must conduct production function analysis to prevent wastage of materials and time. Effective pricing strategies depend significantly on cost control. Key topics under cost and production analysis include cost concepts, cost-output relationships, economies and diseconomies of scale, and cost control methods.

3. **Pricing Decisions, Policies, and Practices:** Pricing is a critical aspect of managerial economics, as it directly impacts a firm's revenue. The success of a business largely depends on making correct pricing decisions. Important elements in this area include determining prices in different market structures, pricing methods, differential pricing strategies, product-line pricing, and price forecasting.

4. **Profit Management:** Business firms typically operate with the goal of earning profits, which, over the long term, are the primary measure of success. Economics teaches that profits are the reward for taking on risk and uncertainty. A successful manager accurately estimates costs and revenues at different output levels. The more effectively a manager reduces uncertainty, the higher the profits the firm can achieve. Profit planning and measurement are among the most challenging areas of managerial economics.

5. Capital Management: Managing a firm's capital investments presents some of the most complex challenges. Capital management involves the careful planning and control of capital expenditures, which require significant resources. Additionally, the complexity of disposing of capital assets necessitates time and effort. Key topics in capital management include the cost of capital, rate of return, and project selection.

B. CHECK YOUR PROGRESS

1: Define Managerial Economics. How does it integrate economic theory with business practice?

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2. List and briefly explain the key areas that fall within the scope of Managerial Economics.

a) Demand Analysis and Forecasting

b) Cost and Production Analysis

c) Pricing Decisions, Policies, and Practices

d) Profit Management

e) Capital Management

....

....

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3. Why is Managerial Economics considered a key tool for managerial decision- making? Provide examples of how it helps in pricing, production and profit maximization

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....

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1.6 IMPORTANCE OF MANAGERIAL ECONOMICS

Managerial economics has a number of applications; it can be used both for profit and non-profit sectors. For instance, in a limited staff, equipment's, resources if a hospital wants to provide the best facilities and care to its patients it can readily make use of the concepts of managerial economics. Thus, we can see that managerial economics helps in meeting with the organisational goals effectively and efficiently.

For Example: During an economic boom, businesses might invest more, while in downturn, they might cut costs. Similarly, during COVID-19, business contracted production and customers switched to only essential trying.

The points given below will help you to understand the importance of managerial economics in an organisation:

1. Business economics is concerned with those aspects of traditional economics which are relevant for business decision making in real life. These are adapted or modified with a view to enable the manager to take better decisions. Thus, business economic accomplishes the objective of building a suitable tool kit from traditional economics.
2. It also incorporates useful ideas from other disciplines such as psychology, sociology, etc. If they are found relevant to decision making. In fact, business economics takes the help of other disciplines having a bearing on the business decisions in relation to various explicit and implicit constraints subject to which resource allocation is to be optimized.
3. Business economics makes a manager more competent model builder. It helps him to identify the essential elements of businesses for value generation.
4. At the level of firm. where its operations are divided into functional areas, such as finance, marketing, personnel and production, business economics serves as an integrating agent by coordinating the activities in these different areas.

5. Business economics takes cognizance of the interaction between the firm and society, and accomplishes the key role of an agent in achieving its social and economic welfare goals. As business, apart from its obligations to shareholders, has certain social obligations. Thus, Business economics serves as an instrument in furthering the economic welfare of the society through socially oriented business decisions.

1.7 TYPES OF MANAGERIAL ECONOMICS

All managers take the concept of managerial economics differently like some may be more focused on customer's satisfaction while others may prioritize efficient production. So, to fulfill all the aspects of business organisations they adopt different approaches and those various approaches to managerial economics can be seen in detail below:

Figure 1.3

1. **Liberal Managerialism:** A market operates as a democratic space where individuals are free to make their own choices and decisions. Organisations and managers must adapt to customer demands and market trends, or they risk business failure.

2. **Normative Managerialism:** This perspective of managerial economics suggests that administrative decisions are rooted in real- world experiences and practices. It emphasises a practical approach to aspects such as demand analysis, forecasting, cost management, product design and promotion, and recruitment.

3. **Radical Managerialism:** Managers should adopt a revolutionary mindset when addressing business challenges, aiming to change existing conditions. Their focus should prioritise customer needs and satisfaction over mere profit maximisation.

1.8 APPLICATIONS OF MANAGERIAL ECONOMICS

Managerial economics can guide a firm in making key business decisions, such as:

1. **Pricing Decisions**: When planning production, a firm must set the price of its product, which depends on the market structure. In a perfectly competitive market, the firm acts as a price taker, while in a monopoly, it has more control over pricing. Therefore, price determination requires a thorough understanding of various market structures.

2. **Demand Forecasting and Estimation**: The firm must estimate and forecast the demand for its product to determine the appropriate production levels. Managers need to anticipate future demand increases, which requires insight into demand patterns and accurate forecasting methods.

3. **Production Technique Choices**: Managers must decide whether to use labor-intensive or capital-intensive technology. This decision depends on the availability and abundance of production factors within the economy, requiring an understanding of cost and production analysis.

4. **Advertising Expenditures**: In markets with imperfect competition, firms may need to invest in advertising to boost sales. They must determine the advertising budget and choose appropriate mediums such as television or newspapers. This requires knowledge of optimal advertising

spending under monopoly, monopolistic competition, and oligopoly conditions.

5. **Investment Decisions**: In the long run, a firm may need to expand production, requiring capital investments. This involves an understanding of capital budgeting principles to make sound investment decisions.

C. CHECK YOUR PROGRESS

Objective: Apply Managerial Economics principles to real-life scenarios.

Instructions:

1. Read the following scenarios and identify which Managerial Economics concept is being applied (e.g., marginal cost, opportunity cost, demand elasticity).

Scenarios:

1. A company decides to produce one more unit of its product to meet increasing demand. Before doing so, they calculate the additional costs of production. *Concept:* **Marginal Cost**
2. A firm faces a decision to either invest in advertising or in new equipment. They weigh the potential gains from each option to make the best decision.*Concept:* **Opportunity Cost**
3. A manager reviews the effect of a 10% price increase on the quantity demanded of their product, observing a sharp decline in sales.

   Concept: **Elasticity of Demand**
4. A business is planning to introduce a new product line. They analyze expected demand over the next few years based on consumer trends.*Concept:* **Demand Forecasting**
5. A firm operates in an oligopoly and decides to lower prices after analyzing the actions of their competitors in the market.

   Concept: **Game Theory**

1.9 MEANING OF FIRM

A firm is a commercial enterprise, a company that buys and sells products and services to consumers with the aim of making a profit. A business entity such as a corporation, limited liability company, public limited company, sole proprietorship, or partnership that has products or services for sale is a firm. Whenever the word used in a title, "firm" is typically associated with businesses that provide professional law and accounting services, but the term may be used for a wide variety of businesses, including finance, consulting, marketing, and graphic design firms, among others. It typically excludes the sole proprietorship business and generally refers to a for- profit business managed by two or more partners providing professional services, such as a law firm.

Below mentioned definitions make the meaning of firm more clear

1. **According to the Online Etymology Dictionary 1744,** "the term first emerged in the English language with the meaning of 'business house'. It is believed to have come from the German Firm a meaning 'a business, name of a business,' which came from the Italian word Firm a, meaning 'signature' and Firm are 'to sign'.

2. **Business Dictionary.com** defines the word firm as "A commercial organisation that operates on a for-profit basis and participates in selling goods or services to consumers. The management of a business firm will typically develop a set of organisational objectives and a strategy for meeting those goals to help employees understand where the company is headed and how it intends to get there."

On the basis of above definitions some of the important facts about firm are:

- A firm is for-profit business, usually formed as a partnership that provides professional services, such as legal or accounting services.
- The theory of the firm posits that firms exist to maximize profits.
- Not to be confused with a firm, a company is a business that sells goods and services for profit and includes all business structures and trades.

- A business firm has one or more locations which all have the same ownership and report under the same employer indentification number.

1.10 OBJECTIVES OF THE FIRM

A firm's basic objective is to produce and distribute goods and services. The firm also earns profit by achieving these objectives. The concept of firm plays a very crucial role in the theory and practice of managerial economics. A management's decision can only be evaluated against the objective that is attempting to achieve. It was assumed that a firm's main objective is to maximize profit. Also, it is assumed that the decisions taken by the managers are for the same. But the issue arises when the period of the decision is taken into account i.e., whether the decision is for next 5 years or 15 years? Usually, the managers reduce the current year profits in order to make future gains. As both the current year and the future year is important, it is assumed that the goal is to maximize the present or discounted value of all future profits. Thus, formally the goal of the firm is to:

- **Maximise Efficient Use of Labor:** In managerial economics, the concept of comparative advantage is used to maximize the output of employees. For example, in a hairstyling salon, Marissa and Joan both work as assistants to the stylists. Their duties are to shampoo clients, clean stylists' work areas, and to answer the telephone. If Marissa takes three minutes to shampoo a client, but in that time, she could have cleaned two work areas, or taken three phone calls, Joan should perform the shampooing to allow Marissa to be efficient on cleaning work areas and taking phone calls.
- **Optimise Price and Output:** In a purely competitive firm (assuming many sellers and buyers in the industry), managerial analysis holds that a company should set its price where marginal revenue equals marginal costs. Marginal revenue is the amount of money earned on the last product sold. Similarly, marginal cost is amount of money spent on the last product made. While marginal revenue often stays static, marginal cost tends to increase. This is due to wear and tear on machinery, reduced

productivity of the employees and other inputs. This is the law of diminishing returns. For example, if a t-shirt manufacturer sells each t- shirt for $10, this amount is also the marginal revenue. As marginal costs increase, the t-shirt manufacturer should sell t-shirts as long as the marginal costs are less than or equal to $10.

- **Minimize Business Uncertainty:** In managerial economics, uncertainty is always an unknown input. In our salon example above, the hairstylist may not know how many haircuts she will do in the next month. She reduces her uncertainty by requesting that clients make an appointment for their next haircut to ensure they get the desired time slot. Other companies may reduce uncertainty by offering discounts if a client signs a long-term contract.
- **Minimise Opportunity Costs:** Opportunity costs refer to the sacrifice made when one option is chosen over another. In a firm, the goal is to ensure that the foregone revenue is always less than the chosen option. If a t-shirt manufacturer could use the same machinery to produce jogging shorts that would sell for $7 each, his opportunity cost is $7 per t-shirt. The two objectives of reducing uncertainty and minimizing opportunity cost may

D. CHECK YOUR PROGRESS

True or False Questions:

1. A firm's primary objective is always to maximise profits**. (True / False)**
2. Revenue maximisation is the same as profit maximisation. **(True / False)**
3. Firms that focus on growth may prioritise increasing market share over immediate profitability. **(True / False)**
4. A firm can achieve higher profits by increasing its market share, even if it means temporarily lowering prices. **(True / False)**

Answers:

1. False
2. False
3. True
4. True

sometimes seem to be in conflict with each other, but when uncertainty cannot be quantified, it is often preferable to take the less profitable, more certain option.

1.11 DIFFERENT CONCEPTS OF PROFIT AS BUSINESS OBJECTIVE

In general perspective, the basic objective of most business firms is to make a profit. In accounting sense, 'profit' means the surplus of the total revenue over the total paid out cost. However, as economists have pointed out, profit means different things to different section of people. The economists have themselves defined profit in different ways in different context and for different purpose of analysis. For analytical purpose, they use two different concepts of profit, *viz., accounting profit and economic profit.* In this section, we take the view of what profit means to different class of people and discuss the meaning and application of the two analytical concepts, i.e., *accounting profit and economic profit*, generally used in business analysis.

1.11.1 What Profit Means to Different People

As mentioned above, profit means different things to different people. According to Jeol Dean, "The word 'profit' has different meaning to business men, accountants, tax collectors, workers and economists and it is often used in a polemical sense that buries its real significance…" And he adds that, 'profit' is regarded as income accruing to entrepreneurs, in the sense as wage accrue to the labour, rent accrues to the owners of rentable assets and interest accrues to the moneylenders. In general sense of the term, 'profit' means the surplus of the firm's total revenue over all its paid-out costs. This concept of profit refers to ***accounting profit*** also known a *business profit.* For all practical purpose, 'profit' means accounting profit plus non-allowable expenses. The amount of profit recorded in firm's books of account is regarded as 'accounting profit'. On the other hand, the economists use a different concept of profit, referred to as 'economic profit'. The conceptual difference between ***economic profit*** and ***accounting profit*** has been discussed.

1.11.2 Accounting Profit vs. Economic Profit

The concepts of 'accounting profit' and 'economic profit' are generally

used in the analysis of business performance and managerial decisions. These concepts of profit are therefore discussed here in detail.

Accounting Profit: As mentioned above, ***accounting profit*** refers to the difference between the total revenue and the total paid-out costs the costs recorded in books of account. In economic analysis, the paid-out costs are referred to as ***explicit costs.*** Given the concept of *explicit cost*, *accounting profit* may be redefined as the total revenue minus *explicit costs*. Explicit costs consist of (i) wages and salaries paid by the firm, (ii) rent paid on hired land and building, (iii) interest paid on borrowed capital and (iv) cost of raw materials. Given these explicit costs, accounting profit may be measured as follows.

$$\text{Accounting Profit} = TR - (W + R + I + M)$$

(where TR = total revenue, W = wages and salaries, R = rent on hired land and building, I = interest on borrowed capital, M = material costs).

Economic Profit: The concept of ***economic profit*** has been devised and applied by the economists to analyze business performance theoretically under the condition of limitedness of resources. Specifically, ***economic profit*** refer refers to the ***accounting profit*** minus opportunity cost, i.e., the loss of income expected from the alternative use of firm's resources. Alternatively, ***economic profit*** may be expressed as the surplus of the ***total revenue*** minus ***explicit cost*** and ***implicit cost***. The ***economic profit*** is known also as ***pure profit***.

In order to comprehend the concept of economic profit, it is important to understand the nature of the explicit cost and the implicit cost. The nature and kinds of explicit costs have already been explained above. As regards the implicit cost, it is an implied cost, not a real cost. The implicit cost refers to the opportunity cost. The opportunity cost is, in fact, the income foregone which could be earned from the alternative use of firm's resources. The concept of implicit cost can be clarified by applying some real-life examples.

Let us suppose that a businessman manages his own business and uses his own capital to run his business. By managing his business, he makes an

accounting profit of Rs.50 crore per year. Although he runs a business, he has the following two alternative options.

(i) Working as manager in another firm for annual salary of Rs. 10 crores, and

(ii) Depositing his capital in banks for annual interest of Rs. 20 crores.

Since the man has forgone these opportunities, he loses a salary income of Rs. 10 crores as manager and interest income of Rs. 20 crores from his deposits. Thus, he loses an annual expected income of Rs. 30 crores. In economics, this loss of income is referred to as the ***opportunity cost*** of his current business. The economists call it ***implicit cost***. Given the meaning and measure of the implicit cost, ***economic profit*** can be defined as the difference between the accounting profit and the implicit cost. Now, the ***economic profit*** can be measure as follows.

Economic Profit = Accounting – Implicit Cost

Economic Profit = 50 crores – 20 crores

The application of accounting and economic profits depends on the purpose of the business analysis – whether purpose is to assess the performance of the business or to make choice of alternative business. While the concept of accounting profit is generally used to assess the performance of the firm and the efficiency of the managerial manpower, the concept of economic profit is used to assess the inter-sectoral performance for making choice of the alternative business.

1.12 PROBLEMS IN PROFIT MEASUREMENT

The following are the problems in profit measurement:

1. Problem in Measuring Depreciation

Problems in measuring depreciation arise because of the different views and methods suggested by the economists and accountants. Economists view depreciation as capital consumption. From their point of view, there are two distinct ways of measuring depreciation: (i) the depreciation of an equipment must be equal to its *opportunity cost*, or alternatively,

(ii) the depreciation must be equal to replacement coat that will produce comparable earning.

Opportunity cost of an equipment is 'the most profitable alternative use of it that is forgone by putting it to its present use'. But, if equipment has no alternative use, the problem is then how to measure the opportunity cost. One method of estimating opportunity cost, suggested by Jeol Dean, is measure *the fall* in the value of the equipment during a year. This method, however, cannot be applied when a capital equipment has no alternative use, like a harvester, a printing machine and a hydropower project, etc. In such cases, replacement cost is the appropriate measure of depreciation.

From accountants' points of view, there are different methods of measuring depreciation over the lifetime of an equipment. The use of different methods of measuring depreciation results in different levels of profit reported by the accountants. The firm can apply any of the following four methods of accounting depreciation: (1) straight-line method, (2) reducing balance method, (3) annuity method, and (4) sum- of-the-year's digit approach. These four methods yield four different measures of annual depreciation and hence the different levels of profit. So, the problem arises 'what method to use'?

2. Treatment of Capital Gains and Losses

Capital gains and losses are regarded as 'windfalls'. Fluctuation in the stock prices is one of the most common sources of 'windfalls'. According to Joel Dean, in a progressive society, capital losses are greater than capital gains. Many of the capital losses are of insurable nature, and when a businessman over-insures, the excess insurance premium becomes eventually a capital gain. Treatment of capital gains and losses is another problem in profit measurement.

Profit is affected by the way capital gains and losses are treated in accounting. As Dean has suggested, 'A sound accounting policy to follow concerning windfalls is never to record them until they are turned into

cash by a purchase or sale of assets, since it is never clear until then exactly how large they are ….". In practice, however, companies follow a diverse method of accounting for capital gains and losses. Most companies do not record capital gains until it is realized in money term, but they do write off capital losses from the current profit. It means, they treat capital gains and losses differently. If 'sound accounting policy' is followed, there will be one profit and if the other method is followed, there will be another figure of profit. That is the problem.

3. Current vs. Historical Costs

Accountants prepare income statements typically in terms of historical costs, i.e., the actual purchase price, not in terms of current price. The reasons given for using the historical cost for preparing income statement are following:

(i) Historical costs produce more accurate measurement of income

(ii) Historical costs are less debatable and more objective than the present replacement value and,

(iii) Accountants' job is to recorded historical costs whether or not they have relevance for future decision making.

The accountant's approach ignores certain important changes in earnings and losses of the firms, e.g., (a) the value of assets presented in the books of accounts is understated in times of inflation and overstated at the time of deflated, and (b) depreciation is understated during deflation. Historical cost recording does not reflect such changes in value of assets and profits. This problem assumes a critical importance in case of inventories and material stocks. The problem is how to evaluate the inventory and the goods in the pipeline.

4. Evaluation of Inventories and Material Stocks

The inventories and material have to be evaluated to be accounted for in the balance sheet of the firm.

There are three popular methods of inventory valuation: (i) first-in-first- out (FIFO), (ii) last-in-last-out (LIFO), and (iii) weighted average cost (WAC).

Under FIFO method, material is taken out of stock for further processing in the order in which they are acquired. The material stocks, therefore, appears in the firm's balance sheet at their actual cost price. This method is suitable when price has a secular trend. However, this system exaggerates profits at the time of rising prices.

The LIFO method assumes that material stocks purchased most recently become the costs of the raw material in the current production. If inventory levels are stable, the cost of raw materials used at any point in the calculation of profits is always close to market or replacement value. But, when inventory levels fluctuate, this method loses its advantages.

The WAC method takes the weighted average of the costs of materials purchased at different prices and different points of time to evaluate the inventory.

All these methods have their own weaknesses and therefore, they do not reflect the 'true profit' of business. So, the problem remains as how to evaluate inventories so that it yields a true profit figure.

1.13 THE CONTROVERSY ON PROFIT MAXIMISATION AS BUSINESS OBJECTIVE

The conventional economic theory assumes profit maximization as the only object of business firms profit measured as TR-TC. Profit maximisation as the objective of business firms has a long history in economic literature. It forms the basis of conventional price theory. Profit maximisation is regarded as the most reasonable and analytically the most 'productive' business objective. The strength of this assumption lies in the fact that this assumption has never been unambiguously disproved.

Besides, profit maximisation assumption has a greater predictive power. It helps in predicting the behaviour of business firms in the real world and also the behaviour of price and output under different market conditions. No other hypothesis explains and predicts the behaviour of firms better than the profit maximisation assumption. Nevertheless, the profit maximisation has been questioned strongly by some modern economists.

Some modern economists refute the profit maximisation assumption because, in their opinion, it is practically non achievable. Their own findings reveal that business firms, especially big corporations, pursue several other objectives, rather than profit maximization objective. This has created a controversy on the profit maximization objective of the business firms. The arguments against and for-profit maximisation objective are discussed here briefly.

1.13.1 Arguments against Profit-Maximisation Objective

(i) ***Dichotomy between Ownership and Management Diverse the Objective:*** The first argument against the profit maximization objective is based on the dichotomy between the ownership and management of business firms. It is argued that, in modern times, due to rapid growth of large business corporations, management of business firms has got separated from the ownership. The separation of management from ownership gives managers an opportunity and also the discretion to set firm's goals other than profit maximization. The researchers conducted by the economists reveal that in practice, business managers pursue such objectives as *(a) maximization of sales revenue, (b) maximization of the value of the firm, i.e., building up the net worth of the firm, (c) maximization of managerial utility function, (d) maximization of firm's growth rate, (e) making a target profit, and (f) retaining and increasing market share.*

(ii) ***No Perfect Knowledge of Market Conditions:*** Another argument against profit maximisation objective is that traditional theory of firm assumes

managers to have full and perfect knowledge of market conditions and of the probable development in business environment. The firm is thus supposed to be fully aware of demand and cost conditions in both short and long runs. Briefly speaking, under profit maximization objective, a complete certainty about the market conditions is assumed. Some modern economists question the validity of this assumption. They argue that the firms do not possess the perfect knowledge of their costs, revenue and future business environment. They operate in the world of uncertainty. Therefore. Profit maximisation is a difficult proposition.

(iii) ***Profit Maximisation Conditions Not Practically Applicable:*** It is further argued that the equi-marginal principle of profit maximization, i.e., equalizing MC and MR, has been claimed to be ignored in the decision-making process of the firms. Empirical studies of the pricing behaviour of the firms have shown that the marginal rule of pricing does not stand the test of empirical verification. Hall and Hitch have found, in their study of pricing practices of 38 UK firms, that the firms do not pursue the objective of profit maximisation and that they do not use the marginal principle of equalizing MR and MC in their price and output decisions. According to them, most firms aim at long run profit maximisation. In the short run, they set the price of their product on the basis of average cost principle, so as to cover AC = AVC + AFC (where AC = Average cost, AVC = Average variable cost, AFC = Average fixed cost) and a normal margin of profit (usually 10 per cent).

In a similar study, Gordon has found (i) that there is a marked deviation in the real business conditions from the assumptions of the traditional theory, and (ii) that pricing practices were notably different from the marginal theory of pricing. Gordon has concluded that the real business world is much more complex than the one postulated by the theorists. Because of the extreme complexity of the real business world and ever-changing conditions, the past experience of the business firms is of little use in forecasting demand, price and costs. The firms are not aware of

their *MR* and *MC*. The *average cost principle* of pricing is widely used by the firms. Findings of many other studies of the pricing practices lend support to the view that there is little link between pricing theory and pricing practices.

1.13.2 Arguments in Defense of Profit Maximisation

The conventional economic theorists defend the profit maximization hypothesis on the following grounds also.

1. ***Profit is indispensable for firm's survival.*** The survival of all the profit-oriented firms in the long run depends on their ability to make a reasonable profit depending on the business conditions and the level of competition. What profit is reasonable may be a matter of opinion. But, making profit is a necessary condition for the survival of the firm. Once the firms begin to make profit, they try to maximise it.

2. ***Achieving other objectives depends on firm's ability to make profit.*** Many other objectives of business firms have been cited in economic literature, e.g., maximisation of managerial utility function, maximisation of long-run growth, maximisation of sales revenue, satisfying all the concerned parties, increasing and retaining market share, etc. The achievement of such alternative objectives depends wholly or at least partly on the primary objective of making profit.

3. ***Evidence against profit maximization objective is not conclusive.*** Profit maximisation is a time-honoured objective of business firms. Although this objective has been questioned by many researchers, some economists have argued that the evidence against it is not conclusive or unambiguous.

4. ***Profit maximization objective has a greater predicting power.*** Compared to other business objectives, profit maximisation objective has been found to provide a much more powerful basis for predicting certain aspects of firms' behaviour. As Friedman has argued, the validity of the profit maximisation objective cannot be judged by a priori logic or by asking business executives, as some economists have done. In his

opinion, ultimate test of its validity lies in its ability to predict the business behaviour and the business trends.

5. ***Profit is a more reliable measure of a firm's efficiency.*** Though not perfect, profit is the most quick and reliable measure of the efficiency of a firm. It is also the source of internal finance. Profit as a source of internal finance assumes a much greater significance when financial market is highly volatile. The recent trend shows a growing dependence on the internal finance in the industrially advanced countries. In fact, in developed countries, internal sources of finance contribute more than three-fourths of the total finance.

6. ***Finally, according to Milton Friedman, whatever one may say about firms' motivations***, if one judges their motivations by their managerial acts, profit maximisation appears to be a more valid business objective.

E. CHECK YOUR PROGRESS

1. What are the key reasons why profit maximisation is considered the primary objective of a firm?

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2. Explain how profit maximisation leads to efficient resource allocation within a firm.

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3. What are the main criticisms of profit maximisation as the sole objective of a firm?

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4. Explain how focusing only on profit maximisation might lead to unethical business practices.

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1.14 LET US SUM UP

Managerial economics serves as a tool for analysing business challenges to make rational decisions. Often referred to as business economics or economics for firms, it helps in decision-making by considering various explicit and implicit constraints. It involves applying an analytical framework to reach informed decisions that maximise a firm's objectives, typically in uncertain environments. In this way, managerial economics is used by companies to enhance profitability. It applies economic theory and decision science techniques to address the challenges of resource allocation and decision-making in a firm. Managerial decisions are assessed using concepts, tools, and techniques from economic analysis, connecting it to various fields of study.

1.15 GLOSSARY

- **Vision:** A long-term perspective of what is the final destination of the organisation.
- **Economics:** The branch of knowledge concerned with the production, consumption, and transfer of wealth.
- **Business Forecasting:** The practice of predicting what will happen in the future by taking into consideration events in the past and present.
- **Imperfect competition:** Where there are many sellers, but they are selling heterogeneous (dissimiliar) goods.

1.16 SELF-ASSESSMENT QUESTIONS

Q1. Define the term Managerial economics.

Q2. Write down the importance of managerial economics.

Q3. Discuss the scope of managerial economics.

1.17 LESSON END EXERCISE

Q1. In what ways can managerial economics be applied to solve real-world business problems?

Q2. How does managerial economics contribute to decision-making in various business functions such as production, pricing, and marketing?

Q3. What factors contribute to a firm's objectives beyond profit maximization, such as social responsibility and stakeholder interests?

1.18 SUGGESTED READINGS

- Maheshwari K. L., Varshney R.L. (2014). Managerial Economics: Text, Problem and Cases. Sultan Chand & Sons.
- Paul, J., Kaushal, L., & Sebastian, V. J. (2012). Managerial Economics. CengageIndia.
- M. Prachi (2018). Managerial Economics.

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MANAGERIAL ECONOMIST'S ROLE & RESPONSIBILITIES AND FUNDAMENTAL ECONOMIC CONCEPTS

STRUCTURE

2.0 LEARNING OBJECTIVES AND OUTCOMES

Learning Objectives

- To understand the role and significance of a managerial economist in a business context.
- To describe the role of a managerial economist in decision-making processes.
- To examine the primary responsibilities and tasks of a managerial economist.

- To understand and apply core economic concepts, such as demand, supply, and elasticity, to managerial decisions.

Learning Outcomes

After reading this lesson, you are able to:

- describe the role of a managerial economist within an organization and how it influences decision-making processes.
- identify and explain who a managerial economist is, including their qualifications and areas of expertise.
- analyse the key responsibilities of a managerial economist and how these contribute to the strategic goals of the organisation.
- apply fundamental economic concepts to real-world business scenarios to enhance decision-making and problem-solving skills.

2.2 INTRODUCTION

Application of economic concepts and theories alone is not sufficient to make a specific decision. It has to be combined with quantitative methods to find a numerical solution to the problems. For example, once the choice of product is finalised, next question arises 'how much to produce' to optimise

the output. To find answer to this question, quantitative methods have to be combined with the theories of production and cost. It means that to make a sound decision, economic concepts and theories have to be integrated with quantitative methods and models. The integration of economic theories and concepts with quantitative methods creates managerial economics and it is a part of the study of economics that applies decision science theory, quantifying the concepts learned in microeconomics, or the study of the firm. The study of economics is based on the tenet that all companies are in the business to maximise the wealth of its owners. Applying this goal requires quantitative methods or measurable objectives, to maximise owner wealth. It helps to assess business goals and strategies on a continuous basis like weekly, monthly and quarterly. Using managerial economics helps to scrutinise the hazards of business choices and evaluate marketing techniques and procedures. The primary function of managers is to take appropriate decisions and implement them effectively to achieve the objective of the organisation to maximum possible extent, given the resources. Application of economics contribute a great deal to managerial decision-making as it provides guidance in finding an appropriate solution to the business problem. Just as biology contributes to medical profession and physics to engineering, economics contributes to managerial functions. As such, a working knowledge of economics is essential for managers. Managers are, in fact, practicing economists.

2.3 ROLE OF MANAGERIAL ECONOMIST

Managerial economist is a person who manages business efficiently using various economic theories and methodologies. He supports the management team in better decision making through his analytical skills and specialized techniques. He is also termed as an economic advisor or business economist and is responsible for analyzing various internal and external environmental forces that influence the functioning of business organisations. Managerial economist makes several successful business forecasts and updates the management team regarding the economic trends from time to time as they always remain in touch with all the latest economic developments and environmental changes

for informing the management. He has an efficient role in earning reasonable profits on invested capital as it supplies all relevant information which helps in making proper plans and strategies. A managerial economist helps the management by using his analytical skills and highly developed techniques in solving complex issues of successful decision-making and future advanced planning.

A Managerial economist has three important roles in every business

organisation i.e., Demand analysis and forecasting, capital management and profit management. On the basis of these three aspects the role of managerial economist can be summarized as follows:

i. He studies the economic patterns at macro-level and analysis it's significance to the specific firm he is working in.

ii. He has to consistently examine the probabilities of transforming an ever-changing economic environment into profitable business avenues.

iii. He assists the business planning process of a firm.

iv. He also carries cost-benefit analysis.

v. He assists the management in the decisions pertaining to internal functioning of a firm such as changes in price, investment plans, type of goods /services to be produced, inputs to be used, techniques of production to be employed, expansion/ contraction of firm, allocation of capital, location of new plants, quantity of output to be produced, replacement of plant equipment, sales forecasting, inventory forecasting, etc.

vi. In addition, a managerial economist has to analyse changes in macro-economic indicators such as national income, population, business cycles, and their possible effect on the firm's functioning.

vii. He is also involved in advising the management on public relations, foreign exchange, and trade. He guides the firm on the likely impact of changes in monetary and fiscal policy on the firm's functioning.

viii. He also makes an economic analysis of the firms in competition. He has to collect economic data and examine all crucial information about the environment in which the firm operates.

ix. The most significant function of a managerial economist is to conduct detailed research on industrial market.

x. In order to perform all these roles, a managerial economist has to conduct an elaborate statistical analysis.

xi. He must be vigilant and must have ability to cope up with the pressures.

xii. He also provides management with economic information such as tax rates, competitor's price and product, etc. They give their valuable advice to government authorities as well.

xiii. At times, a managerial economist has to prepare speeches for top management.

A. CHECK YOUR PROGRESS

Application Based Questions:

1. As a managerial economist, how would you analyse the competitive landscape of the smartphone market in your region? What data would you gather, and what models would you use to assess market share and pricing strategies?

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2. Imagine your company is considering launching a new product. As a managerial economist, how would you conduct a cost-benefit analysis to determine the feasibility of this launch? What factors would you include in your analysis?

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3. You are tasked with forecasting demand for a new service in the hospitality industry. What statistical methods and economic indicators would you utilize to create accurate demand forecasts? How would you present your findings to the management team?

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2.4 RESPONSIBILITIES OF MANAGERIAL ECONOMIST

In order to serve the management a managerial economist has to know his responsibilities. He must keep in mind the main objective of making a reasonable profit on the invested capital in his firm. Firms are not always after profits maximization, but to continue in business every firm has to operate profits therefore business economist has the chief obligation of helping the management to make more profits than before and he can best serve the management when he recognizes and adhere to his responsibilities towards the management.

1. **Studies Business Environment:** The managerial economist is responsible for analyzing the environment in which business operates. Proper study of all external factors that affect the functioning of organization is must for proper functioning so he studies various factors like growth of national income, competition level, price trends, phase of the business cycle and economy and updates the management regarding it from time to time.

2. **Analyse operations of Business:** He analyses the internal operation of business and helps management in making better decisions with regard to internal workings. Managerial economist through his analytical and forecasting skills provides advice to managers for formulating policies regarding internal operations of the business.

3. **Demand Forecasting and Estimation:** Proper estimation and forecasting of future trends helps the business in achieving desired profitability and growth. Managerial economist through proper study of all internal and external forces makes successful forecasting of future uncertainties or trends.

4. **Production Planning:** Managerial economist is responsible for scheduling all production activities of business. He evaluates the capital budgets of organizations and accordingly helps in deciding timing and locating of various actions.

5. **Economic Intelligence:** He provides economic intelligence services by communicating all economic information to management. Managerial economist keeps management always updated of all prevailing economic trends so that they can confidently talk in seminars and conferences.

6. **Performing Investment Analysis:** A managerial economist analyses various investment avenues and chooses the most appropriate one. He studies and discovers new possible fields of business for earning better returns.

7. **Focuses on Earning Reasonable Profit:** He assists management in earning a reasonable rate of profit on capital employed in the business. Managerial economist monitors activities of organisations to check whether all operations are running efficiently as per the plans and policies.

8. **Maintaining Better Relations:** A managerial economist maintains better relations with all internal and external individuals connected with the business. It is his duty to develop a peaceful and cooperative environment within the organization and aims to reduce any opposition taking place.

9. **Decision-Making Support:** Managerial economists provide analytical support for strategic decision-making. They use economic theories and quantitative methods to assess market conditions, predict outcomes, and evaluate the potential impact of various business decisions.

10. **Market Analysis:** They conduct thorough market analyses to understand demand and supply dynamics, competitive landscapes, and pricing strategies. This involves gathering and interpreting data to identify market trends and consumer behaviors, which inform strategic planning.

B. CHECK YOUR PROGRESS

Activity 1

Read the following scenario: "A manufacturing company is facing increased competition and rising costs. The managerial economist is asked to provide insights for strategic planning."

Questions:

What specific analyses would the managerial economist conduct to address the company's challenges?

Identify the potential outcomes of the economist's recommendations on pricing and production strategies.

Activity 2

Imagine you need to present your findings from a recent market analysis to a group of stakeholders.

Questions:

1. What key points would you emphasize in your presentation?
2. How would you ensure that your communication is clear and persuasive for a non-technical audience? These activities are designed to reinforce understanding of the managerial economist's role and encourage critical thinking and application of economic principles.

2.5 FUNDAMENTAL ECONOMIC CONCEPTS

At the most basic level, economics attempts to explain how and why we make the purchasing choices we do. There are four key economic concepts—scarcity, supply and demand, costs and benefits, and incentives that can help explain many decisions that humans make.

1. Scarcity

Everyone has an understanding of scarcity whether they are aware of it or not because everyone has experienced the effects of scarcity. Scarcity explains the basic economic problem that the world has limited or scarce resources to meet seemingly unlimited wants. This reality forces people

to make decisions about how to allocate resources in the most efficient way possible so that as many of their highest priorities are met.

For example, there is only so much wheat grown every year. Some people want bread and some would prefer beer. Only so much of a given good can be made because of the scarcity of wheat. How do we decide how much flour should be made for bread and beer? One way to solve this problem is a market system driven by supply and demand.

2. Supply and Demand

A market system is driven by supply and demand. Taking the example of beer, if many people want to buy beer, the demand for beer is considered high. As a result, you can charge more for beer and make more money on average by using wheat to make beer than by using wheat to make flour. Hypothetically, this could lead to a situation where more people start making beer and, after a few production cycles, there is so much beer on the market the supply of beer increases that the price of beer drops. Although this is an extreme and overly simplified example, on a basic level, the concept of supply and demand helps to explain why last year's popular product is half the price the following year.

3. Costs and Benefits

The concept of costs and benefits is related to the theory of rational choice (and rational expectations) that economics is based on. When economists say that people behave rationally, they mean that people try to maximize the ratio of benefits to costs in their decisions. If demand for beer is high, breweries will hire more employees to make more beer, but only if the price of beer and the amount of beer they are selling justify the additional costs of their salary and the materials needed to brew more beer. Similarly, the consumer will buy the best beer they can afford to purchase, but not, perhaps, the best-tasting beer in the store. The concept of costs and benefits is applicable to other decisions that are not related to financial transactions. University students perform

cost-benefit analyses on a daily basis by choosing to focus on certain courses that they've deemed more important for their success. Sometimes this even means cutting the time they spend studying for courses that they see as less necessary. Although, economics assumes that people are generally rational, many of the decisions that humans make are actually very emotional and do not maximize our own benefit. For example, the field of advertising preys on the tendency of humans to act non-rationally. Commercials try to activate the emotional centers of our brain and fool us into overestimating the benefits of a given item.

4. Everything is in the Incentives

Economic incentives explain how the operation of supply and demand encourage producers to supply the goods that consumers want, and consumers to conserve on scarce resources. When consumer demand for a good increase, then the market price of the good rises, and producers have an incentive to produce more of the good because they can receive a higher price. On the other hand, when the increasing scarcity of raw materials or inputs for a given good drive costs up and producers to cut back on supply, then the price they charge for the good rises, and consumers have an incentive to conserve on their consumption of that good and reserve it's use for their most highly valued uses. In the example of a brewery, the owner wants to increase production so they decide to offer an incentive bonus to the workers that produces the most bottles of beer in a day. The brewery has two sizes of bottles: one 500 milliliter bottle and a one-liter bottle. Within a couple of days, they see production numbers shoot up from 10,000 to 15,000 bottles per day. The problem is that the incentive they provided focused on the wrong thing, i.e. the number of bottles rather than the volume of beer. They begin receiving calls from suppliers wondering when orders of the one- litre bottles are going to come. By offering a bonus for the number of bottles produced, the owner made it beneficial for the competing shifts to gain an advantage by only bottling the smaller bottles. When incentives are correctly aligned

with organizational goals the benefits can be exceptional. These practices include profit sharing, performance bonuses, and employee stock ownership. However, these incentives can go awry if the criteria for determining if an incentive has been met falls out of alignment with the original goal.

For example, poorly structured performance bonuses have driven some executives to take measures that improve the financial results of the company in the short-time just enough to get the bonus. In the long-term, these measures have then proven detrimental to the health of the company.

5. Principles of Managerial Economics

Economic principles assist in rational reasoning and defined thinking. They develop logical ability and strength of a manager. Some important principles of managerial economics are:

a) Incremental Principle and Decision Rule:

The concept of 'incremental' value is similar to the concept of 'managerial' value but with a difference. While 'marginal' concept is basically a theoretical concept, 'incremental' is an accounting concept. Given a demand function or a production function, the marginal quantity of demand or marginal quantity produced may be zero or even negative. In contrast, the incremental quantity is always positive. Marginal principle can be applied only when change in cost or revenue, e.g., *MC* and *MR*, can be calculate precisely in unit terms. In general, however, firms find it difficult to estimate *MC* and *MR* as defined conceptually. The reason is that most business firms produce and sell their profits in bulk, not in terms of units unless, of course, it is the case of production and sale of such large-unit goods as aero planes, ships, large buildings, turbines, etc. Where production and sale activities are carried out in bulk and where both *fixed* and *variable* costs are subject to change, business managers use the *incremental principle* in their business decisions.

The ***incremental principle*** is applied to business decisions which involve bulk production and a large increase in total cost and in total revenue. Such an increase in total cost and total revenue is called 'incremental cost' and 'incremental revenue' respectively, related to 'incremental output'.

Let us first exemplify the concept of ***incremental cost***. Conceptually, incremental costs refer to the costs that arise due to a business decision of increasing production. For example, suppose a firm decides to increase production by using more inputs or by adding a new plant to the existing capacity. This decision increases the firm's total cost of production from Rs. 100 million to Rs. 115 million. Then Rs. 115 million – Rs. 100 million = Rs. 15 million is the *incremental cost*. Thus, an increase in the total cost of production due to a business decision is *incremental cost.*

The ***incremental revenue***, on the other hand, refers to the increase in the total revenue due to a business decision, i.e., to increase production and sale of the firm's product. When a business decision is successfully implemented, it does result in a significant increase in its total revenue. The increase in the total revenue resulting from a business decision is called *incremental revenue*. Suppose that after the installation of the new plant, the total production increases and the firm is bale to sell the incremental product. As a result, the firm's total sales revenue increases, let us suppose, from Rs. 130 million to 150 million. Thus, the post- decision total revenue of Rs. 150 million *less* the pre-decision total revenue of Rs. 130 million = Rs. 20 million is the *incremental revenue.*

Incremental Reasoning in Business Decision

The use of the incremental concept in business decisions is called *incremental reasoning*. The incremental reasoning is used for accepting or rejecting a business proposition or option. For instance, suppose that in our example, the firm is considering whether or not to install a new plant. As noted above, the firm estimates an incremental cost of installing a new plant at Rs. 15 million and an incremental revenue of Rs. 20

million. The incremental revenue exceeds the incremental cost by Rs. 5 million which means a 33.33 per cent return (gross of overheads) on the investment in the new plant. The firm will accept the proposition of installing a new plant, provided there is no better business proposition available to the firm.

It may be added at the end, by way of comparison, that the *marginal concept* (especially when defined and measured by calculus) is used in economic analysis where a high degree of precision is involved, whereas the incremental concept is used where large values of cost and revenue are involved. Besides, incremental concept and reasoning are used in business decisions more frequently than the marginal concept. There are at least **two reasons** for this.

First, marginal concept used in business analysis is generally associated with one (marginal) unit of output produced or sold whereas most business decisions involve large quantities and values.

Secondly, the precise calculation of marginal change (defined in terms of the first derivative of a function) is neither practicable nor necessary in real life business decisions. However, marginal concept is of great significance in theoretical analysis.

b) **Equi-Marginal Principle:** The equi-marginal principle was originally associated with consumption theory and the law is called 'the law of equi-marginal utility'. The law of equi-marginal utility states that a utility maximizing consumer distributes his consumption expenditure between various goods and services he/she consumes in such a way that the utility derived from each marginal unit of expenditure on various goods and services is the same. This pattern of distribution of consumption expenditure maximises a consumer's total utility.

The law of equi-marginal principle was over time applied by the economists to the application of business decisions in regard to the allocation of resources between their alternative uses with a view to

maximizing profit in case a firm carries out more than one business activity. According to this principle, the available resources (inputs) are so allocated between the alternative options that the marginal productivity (MP) of all inputs are equalized. For example, suppose a firm has a total capital worth Rs. 100 million which it has the option of spending on three projects A, B and C. Each of these projects requires a unit of expenditure on the three projects is given as shown in Table 2.1.

Table 2.1 Marginal Productivity (MP) Schedule of Projects A, B and C

Units of Expenditure (Rs. 10 million)	*Units of Marginal Productivity (MP)*		
	Project A	*Project B*	*Project C*
1st	50_1	40_3	35_4
2nd	45_2	30_5	30_6
3rd	35_7	**20_8**	**20_9**
4th	**20_{10}**	10	15
5th	10	0	12

Note: Subscripts 1,2,3,……indicate the order of the unit of expenditure on Projects A, B and C

Going by the equi-marginal principle, the firm will allocate its total resources (Rs. 100 million) among the projects A, B and C in such a way that marginal product of each project is the same, i.e., $MP_A = MP_B = MP_C$. It can be seen from Table 2.1 that, going by this rule, the firm will spend 1st, 2nd, 7th and 10th unit of finance on Project A, 3rd, 5th and 8th unit on Project B and 4th, 6th and 9th unit on Project C. In other words, given its total finances of Rs. 100 million, a profit maximising firm would invest Rs. 40 million in Project A, Rs. 30 million each in Projects B and C and equalise the marginal productivity of ach project at 20 units. This pattern of investment maximises the firm's productivity gains. No other pattern of investment will ensure this objective.

Now the application of the equi-marginal principle can be formally stated

as that a profit (gain) maximising firm allocates its resources in such a proportion that

$$MP_A = MP_B = MP_C = \ldots\ldots = MP_N$$

If Cost of Project (COP) varies from project to project, then resources are so allocated that MP per unit of COP is the same. That is, resources are allocated in such proportions that

$$\frac{MP_A}{COP_A} = \frac{MP_B}{COP_B} = \frac{MP_C}{COP_C} = \frac{MP_N}{COP_N}$$

The equi-marginal principle can be applied only when (i) firms have limited investible resources, (ii) resources have alternative uses, and
(iii) the investment in various alternative uses is subject to diminishing marginal productivity or returns.

c) **Opportunity Cost Principle:** Conceptually, the ***opportunity cost*** refers to the ***opportunity lost*** to make extra income due to scarcity of resources. The opportunity cost is, in fact, the income foregone which could be earned from the alternative use of firm's resources. The concept of opportunity cost is based on the four economic facts of human life (1) economic resources are limited, (ii) resources have alternative uses, (111) return varies from the alternative uses of the resources, and (iv) people tend to derive maximum returns from the use of their resources. Since people are return maximisers, they put their total resources to the use that yields maximum returns. As a result, they lose the opportunity to earn income from the second-best use of the resources. The economists have termed the income so lost as the ***opportunity cost***. The opportunity cost is referred to also as implicit cost particularly in measuring the ***economic profit*** of the firm. The concept of opportunity cost is applied mainly to business decision-making. Before we proceed to explain the application of the opportunity cost, let us exemplify the concept of opportunity cost.

Let us suppose that a firm has an investible fund of R100 million at its

disposal with no possibility of additional funds. After investigating the market conditions, the firm finds three alternative options for its investment and the corresponding annual returns from the alternative investment options as given below.

Options	*Alternative Investment Options*	*Annual Returns (Rs. Mn)*
1	Expansion of the scale of production	20
2	Setting a production unit in another city	18
3	Buying shares in stock market	16

Given the investment options and corresponding returns, the rational decision of the firm would be to invest its money in alternative 1, i.e., the expansion of the firm. This investment decision of the firm implies that it foregoes the opportunity of making an annual income 18 million from the second-best investment alternative, i.e., setting UP a unit in another city. In economic jargon, this loss of expected income is called as ***opportunity cost.***

As regards the application of the concept of the opportunity cost, it is used to work out the ***economic profit*** of the firm. As shown

Economic profit = Actual Earning - Opportunity Cost

Given this formula, the economic profit in our example can be worked out as follows.

Economic profit = Rs. 20 mn – Rs.18 mn = Rs. 2 mn.

The concept of economic profit is applied in managerial decision regarding the choice of the investment and other business decisions also. For instance, in our example given above, the economic profit equals Rs. 2 mn. It means that the firm has taken a rational decision. Had the firm opted for the second or the third investment option, its economic profit would have been negative. So, the firm's decision would have been irrational. It may thus be concluded that firms' investment decision

may yield a positive economic profit or a zero economic profit or a negative economic profit. Under these conditions, the firms will have to decide whether to hold their decision or to change their business decisions. According to the decision rule, in case of ***positive*** and ***zero economic profit***, the firm is not required to change its current decision, but in case of negative economic profit, the firm will have to reverse its decision.

d) **Time Perspective Principle:** All business decisions are taken with a certain time perspective. The time perspective refers to the duration of time period extending from the relevant past and foreseeable future taken in view while taking a business decision. Relevant past refers to the period of past experience and trends which are relevant for business decisions with long run implications. The duration of time perspective depends generally on the past experience and the anticipated time required for the effective implementation of the business decision. As a result, all business decisions do not have the same time perspective. Some have short run outcome or pay off and therefore, involve short run time perspective. Some have short run or pay off and therefore, involve short run time perspective. For example, a decision to buy explosive materials for manufacturing crackers involves short run demand prospects. Similarly, a decision regarding building inventories of finished product involves a short run time perspective.

There are, however, a large number of business decisions which have long run repercussions, e.g., investment in plant, building, machinery, land, spending on labour welfare activities, expansion of the scale of production, introduction of a new product may not be profitable in the short run but may prove very profitable in the long run. For example, the introduction of a newly designed laptop computer – a book size laptop priced at Rs. 10000 – may not succeed in the market quickly and smoothly. It may be difficult to even cover the variable costs because potential buyers have already one laptop or they may be uncertain about

its usefulness, quality, serviceability and cost of operation. But in the long run, it may enjoy a roaring business. Also, spending on labour welfare may enhance costs in the present scenario and may lead to a decline in profit. But in the long run, it may increase labour productivity in a much greater proportion than the increase in cost. Therefore, while taking a business decision with long run implications, it is immensely important to keep a well worked out time perspective in view.

The business decision makers are supposed to assess and determine the time perspective of business propositions well in advance and make decisions accordingly. Determination of time perspective is of great significance especially where projections are involved. The decision makers must decide on an appropriate future period for projecting the value of a variable. Otherwise, projections may prove meaningless from analysis point of view and decisions based thereon may result in poor pay off. For example, in a business decision regarding the establishment of a manufacturing unit to produce battery cars projecting a short run demand and taking a short run time perspective will be unwise. Similarly, in decision on buying explosive materials for manufacturing crackers for Deepawali, a long run time perspective is unwise.

5. **Discounting Principle:** According to this principle, if a decision affects costs and revenues in long-run, all those costs and revenues must be discounted to present values before valid comparison of alternatives is possible. This is essential because a rupee worth of money at a future date is not worth a rupee today. Money actually has time value. Discounting can be defined as a process used to transform future dollars into an equivalent number of present dollars.

   For instance, $1 invested today at 10% interest is equivalent to $1.10 next year.

   $$\mathbf{FV = PV*(1+r)\ t}$$

   Where, FV is the future value (time at some future time), PV is the

present value (value at t_0, r is the discount (interest) rate, and t is the time between the future value and present value.

C. CHECK YOUR PROGRESS

Multiple Choice Questions

1. What does the Incremental Principle emphasize in decision-making?

A) Total costs B) Marginal changes

C) Historical costs D) Average costs

Answer: B) Marginal changes

2. The Equi-Marginal Principle states that resources should be allocated such that:

A) Total expenditure is minimized

B) The ratio of marginal utility to cost is equal across all options

C) Average costs are minimized

D) Fixed costs are equal across all projects

Answer: B) The ratio of marginal utility to cost is equal across all options

3. Opportunity cost is defined as:

A) The total cost of a decision

B) The cost of the next best alternative foregone

C) The fixed costs associated with a decision

D) The average cost of all alternatives

Answer: B) The cost of the next best alternative foregone

4. The Time Perspective Principle highlights the importance of:

A) Immediate costs B) Future benefits and costs

C) Average costs over time D) Historical data

Answer: B) Future benefits and costs

2.6 LET US SUM UP

The lesson helps us to know about the objectives of the firm as well as various responsibilities of the economists. Apart from the above information the economists have pointed out some other objectives such as achieving a target growth rate, making a target profit, and making a satisfactory or reasonable profit is also very important. Since it is the responsibility of business managers to achieve the objective of the firm, they need to have a clear perception and understanding of the objective they have to achieve. All the areas of managerial decisions have economic perspective. Therefore, economic theories, concepts and tools of analysis are applied as roadmap to find solution to business problems. It has been found empirically that application of economic theories and tools of analysis makes significant contribution to the process of business decision making in many ways.

2.7 GLOSSARY

- **Marginal Cost:** Change in cost that comes from making one more unit.
- **Marginal Costing:** Change in the cost of producing one additional unit of a commodity.
- **Marginal Revenue:** Increase in Revenue resulting from sale of one additional unit of output.
- **Marginal Utility:** Added satisfaction a customer gets from one more unit of a good / service.
- **Profit:** It is a financial benefit that is realized when the amount of revenue gained from a business activity exceeds the expenses, costs and taxes needed to sustain the activity.
- **Perspective:** A particular attitude towards or way of regarding something; a point of view.
- **Uncertainty:** It refers to epistemic situations involving imperfect or unknown information.

2.8 SELF-ASSESSMENT QUESTIONS

Q1. How does managerial economics assist in taking business decisions?

Q2. Discuss the role and responsibilities of a managerial economist.

Q3. Explain the concept of:

i. Opportunity cost

ii. Equi-marginal utility

iii. Time Perspective principle

2.9 LESSON END EXCERCISE

Q1. What skills and tools do managerial economists utilize to assess the economic environment and its impact on business operations?

Q2. How does the time perspective influence decision-making in the context of investment and capital budgeting?

Q3. What is the equi-marginal principle, and how does it apply to resource allocation decisions?

2.10 SUGGESTED READINGS

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DEMAND ANALYSIS: INDIVIDUAL & MARKET DEMAND FUNCTIONS, LAW OF DEMAND AND DETERMINANTS OF DEMAND

STRUCTURE

3.0 LEARNING OBJECTIVES AND OUTCOMES

Learning Objectives

- To understand the definition of demand and its significance in economics and business.
- To identify the key factors affecting demand
- To explain the concept of a demand function and its use in representing the relationship between demand and influencing factors.
- To describe the law of demand and its underlying assumptions.

Learning Outcomes

In this lesson, you are able to:

- define the concept of demand and explain its significance in economic theory and business practices.
- identify and analyse the various determinants of demand, including price, consumer preferences, income levels, and the prices of related goods.
- describe the meaning of demand functions and differentiate between various types of demand functions and their applications in real-world scenarios.
- articulate the Law of Demand, demonstrating how it explains the relationship between price and quantity demanded, and apply this law to interpret market behavior and consumer choices.

- to evaluate how changes in determinants affect the demand curve, illustrating shifts in demand through graphical representations.

3.1 LEARNING OBJECTIVES AND OUTCOMES

In this lesson, we are going to dive into the fascinating world of markets. Now, when I say "market," what comes to mind? Maybe a local grocery store, a shopping mall, or even an online platform like Amazon? Well, all of these are correct because a market isn't just a physical place—it's any setup where buyers and sellers come together to exchange goods, services, or even information.

Markets are the heart of any economy. They're where businesses sell products and consumers make choices. It's where prices get set based on demand and supply. And here's a cool thing: markets aren't just about products like phones or clothes. They can be markets for services, labour, ideas, even foreign currencies!

A market is a place where buyers and sellers meet each other through various modes for buying and selling of goods or services. Further, the market is governed by two important forces of demand and supply. These forces help in determining the price of the product and service and market share.

The market mechanism always works towards bringing equilibrium in the market. Demand refers to the quantities of goods that consumers are willing and able to purchase at various prices during a given period of time. If you want your demand to be meaningful in the marketplace you must be able to make a purchase; that is, you must have enough money to make the purchase. There are, no doubt, many items for which you have a willingness to purchase, but you may not have an effective demand for them because you don't have the money to actually make the purchase. For example, you might like to have a 3600-square-foot resort in Mussoorie, an equally large beach house in Goa, and a private jet to travel between these places on weekends and between semesters. But it is likely that you have a budget constraint that prevents you from having these items. For demand to be effective, a consumer must also have the ability along with willingness to purchase. There are many products that you could afford, but for which you may not be willing to spend your income. Each of us has a unique perspective on our own personal satisfaction and the things that may enhance that

satisfaction. The important point is that if you do not expect the consumption of something to bring you added satisfaction, you will not be willing to purchase that good or service. Therefore, you do not have a demand for such things despite the fact that you might be able to afford them. When we discuss demand, we are always referring to purchases made during a given period of time. The important point here is that when we refer to a person's demand for a product, we usually mean the demand over some appropriate time period, not necessarily over the rest of the person's life.

3.2 MEANING AND DEFNITION OF DEMAND

Demand in economics means demand backed up by enough money to pay for the goods demanded. This means that the demand becomes effective only if (a) it is backed by purchasing power (b) there is willingness to buy a commodity. Demand conveys wider meaning in economic sense as it is more than the desire to have a good or service. We can say that it is a want supported by affordability, willingness to purchase the product and service at the given price, per unit of time. The demand of a product can be defined as the quantity of a product that a consumer is eager to purchase, can afford at a given price, and is according to his/her preferences and tastes. Demand is an economic principle referring to a consumer's desire to purchase goods and services and willingness to pay a price for a specific good or service. Holding all other factors constant, an increase in the price of a good or service will decrease the quantity demanded, and vice versa.

Market demand is the total quantity demanded across all consumers in a market for a given good. Aggregate demand is the total demand for all goods and services in an economy. It is said that demand is closely related to supply. While consumers try to pay the lowest prices, they can for goods and services, suppliers try to maximise profits. If suppliers charge too much, the quantity demanded drops and suppliers do not sell enough product to earn sufficient profits. If suppliers charge too little, the quantity demanded increases but lower prices may not cover suppliers' costs or allow for profits. Some factors affecting demand include the appeal of a good or service, the availability of competing goods, the availability of financing, and the perceived availability of a good or service.

Example: If a person is willing to buy 50 notebooks at a price of Rs.20 each at a given point of time, it is termed as demand for the notebook.

Definition:

According to **Prof. Bober**, "By demand we mean the various quantities of a given commodity or service which consumers would buy in one market in a given period of time at various prices or at various incomes or at various prices of related goods."

Demand is the quantities of a good or service that potential buyers are willing and able to purchase during a certain period.

3.2.1 Basis of Consumer Demand: The Utility

Consumers demand a commodity because they derive or expect to derive utility from the consumption of that commodity. The expected utility from a commodity is the basis of demand for it. Though 'utility' is a term of common usage. it has a specific meaning and use in the analysis of consumer demand. We will, therefore, describe in this section the meaning of utility, the related concepts and the law associated with utility.

1. The Concept of Utility

The concept of utility can be looked upon from two angles-from the product angle and from the consumer's angle. From the product angle, utility is the want-satisfying property of a commodity. From consumer's angle, utility is the psychological feeling of satisfaction, pleasure, happiness or well-being, which a consumer derives from the consumption, possession or the use of a commodity.

There is a subtle difference between the two concepts of utility. The concept of a want- satisfying property of a commodity is 'absolute' in the sense that this property is ingrained in the commodity irrespective of whether one needs it or not. For example, a pen has its own utility irrespective of whether a person is literate or illiterate. Another important attribute of the absolute concept of utility is that it is *'ethically neutral'* because a commodity may satisfy a frivolous or socially immoral need, e.g., alcohol, drugs, porn-CDs, etc.

On the other hand, from a consumer's point of view, utility is a post-consumption phenomenon as one derives satisfaction from a commodity only when one consumes or uses it. Utility in the sense of satisfaction is a 'subjective' or 'relative' concept because (i) a commodity need not be useful for all cigarettes do not have any utility for non-smokers, and meat has no utility for strict vegetarians; (i) utility of a commodity varies from person to person and from time to time; and (ii) a commodity need not have the same utility for the same consumer at different points of times, at different levels of consumption and for different moods of a consumer. In consumer analysis, only the 'subjective' concept of utility is used.

Having explained the concept of utility, we now turn to some quantitative concepts related to utility used in utility analysis, viz. total utility and marginal utility.

a. Total Utility

Assuming that utility is measurable and additive, total utility may be defined as the sum of the utility derived by a consumer from the various units of a good or service he consumes at a point or over a period of time. Suppose a consumer consumes four units of commodity, X, at a time and derives utility from the successive units of consumption as u_1, u_2, u_3 and u_4. His total utility (U_x) from commodity X can be then measured as follows.

$$U_x = u_1 + u_2 + u_3 + u_4$$

If a consumer consumes a large number of commodities, say, n number of commodities, his total utility, TU_n, is the sum of the total utility derived from each commodity. For instance, if the consumption goods are X, Y and Z and their total respective utilities are U_x, U_y and U_z, then TU_n,

$$= U_x, + U_y, + U_z,$$

b. Marginal Utility

Marginal utility is another very important concept used in economic analysis of consumer behaviour Marginal utility can be defined as the utility derived from the marginal or one additional unit of a commodity consumed. lt may also be defined as the addition to the total utility resulting from the consumption of one additional unit. Marginal Utility (MU) thus refers to the change in the Total Utility (i.e., □ TU) obtained from the consumption of an additional unit of a commodity, say X. It may be expressed as

$$MUx = \frac{\square\, TU}{\square\, Q}$$

where □ TU, = change in total utility, and □ Q, = change in quantity consumed by one unit,

In case the number of units consumed is n, MU can be measured as follows.

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

3.2.2 Cardinal and Ordinal Concepts of Utility

The cardinal and ordinal concepts of utility arise out of question whether "utility" is measurable quantitatively. The question arises because utility is a psychological phenomenon. It is a feeling of satisfaction, pleasure or happiness. Measurability of utility has, therefore, been a contentious issue in analysing consumer behaviour. Classical economists, viz., Jeremy Bentham, Leon Walrus, Carl Menger, etc. and ne0-classical economists, notably Alfred Marshall, believed that utility is cardinally or quantitatively measurable like height, weight, length, temperature and air pressure. This belief resulted in the Cardinal Utility concept. However, modern economists, most notably J.R. Hicks and R.G.D. Allen, hold the view that utility is not quantitatively measurable-it is not measurable in absolute terms. Utility can be expressed only ordinally in terms of less than or 'more than' or in terms of "high and "low. It is, therefore, possible

to list the goods and services in order of their preferability or desirability. For example, supposed person prefers chocolate to ice cream and ice cream to cold drink. He or she can express his/her preference as utility (U) of chocolate> U of ice cream > U of cold drink. This method of expressing utility of goods gives the ordinal concept of utility. Let us now look into the origin of the two concepts of utility and their use in the analysis of demand.

a. Cardinal Utility

Some early psychological experiments on an individual's responses to various stimuli led neo-classical economists to believe that utility is measurable and cardinally quantifiable. According to neo-classical economists, utility can be measured in terms of money. In their opinion, utility of a unit of a commodity for a person is equal to the amount of money he is willing to pay for it. This belief gave rise to the concept of cardinal utility. It implies that utility can be assigned a cardinal number like 1, 2, 3, etc. Neo-classical economists built up the theory of consumption on the assumption that utility is cardinally measurable. They coined and used a term 'util meaning 'units of utility'. In their measure of utility, they assumed (i) that one "util equals one unit of money, and (ii) that utility of money remains constant.

It has, however, been realised over time that absolute or cardinal measurement of utility is not possible. Difficulties experienced in measuring utility have proved to be insurmountable. Neither economists nor scientists have succeeded in devising a technique or an instrument for measuring the feeling of satisfaction, i.e., utility. Nor could an appropriate measure of unit be devised because numerous factors affect the state of consumer's mood, which are impossible to determine and quantify. *Utility is therefore not measurable in cardinal terms*. Nevertheless, cardinal utility concept continues to remain the basis of the analysis of consumer behaviour.

b. Ordinal Utility

As mentioned above, there are insurmountable difficulties in cardinal measurement of utility. Therefore, modern economists have discarded the concept of cardinal utility and have instead applied the concept of ***ordinal utility*** for analysing consumer behaviour. The concept of ordinal utility was conceived and introduced by Italian economist Vilfredo Pareto in 1904. It is based on the fact that it may not be possible for consumers to express the utility of a commodity in absolute or quantitative terms, but it is always possible for a consumer to tell introspectively whether a commodity is more or less preferable compared to another commodity. For example, a consumer willing to consume two goods, say, chocolate and ice cream, may not be able to measure the utility of any of the two goods in numerical terms. But the consumer can express his preference for one good for the other. For example, he may say that he prefers chocolate to 1ce cream or other way round. This is the general behaviour of the consumer. As such, consumers consuming several goods and services can rank them *in order of their preferability*. Based on this kind of known consumer behaviour, the neo-classical economists have devised the concept of ***ordinal utility*** and have formulated the theory of consumer demand by applying the concept of ordinal utility.

A. CHECK YOUR PROGRESS

1. **Situation**: John loves eating ice cream. The first scoop of ice cream gives him 15 units of satisfaction, the second scoop gives him 12 units of satisfaction, and the third scoop gives him 10 units.
   - **Question**: What is John's total utility after consuming three scoops of ice cream? How does his satisfaction change with each additional scoop?
2. **Situation**: Sarah drinks two cups of coffee each day. The first cup gives her 30 units of satisfaction, while the second gives her 20 units
   - **Question**: What is the marginal utility of Sarah's second cup of coffee? How does the concept of diminishing marginal utility apply to Sarah's coffee consumption?

3. **Situation**: You have three favorite foods: pizza, burgers, and tacos. You prefer pizza the most, followed by burgers, and then tacos.
    - **Question**: Rank your preference for these three foods using ordinal utility. Does the ranking provide information about how much more you like pizza than tacos?
4. **Situation**: A consumer is choosing between two products: a pair of shoes and a jacket. The consumer assigns 70 units of satisfaction to the shoes and 50 units of satisfaction to the jacket.
    - **Question**: Using cardinal utility, how much more satisfaction does the consumer get from the shoes compared to the jacket? Can we determine by how much one product is preferred over the other?

3.3 MEANING OF DEMAND FUNCTION

The demand function outlines the variables that are thought to influence the demand for a specific product. The factors affecting demand can vary between products and are not always the same for each one. This section presents a general demand function that includes some of the most common variables impacting demand. However, not all of these variables may apply to every individual product. Therefore, when a firm tries to forecast demand using the demand function, it will need some prior knowledge or educated assumptions about the factors likely to influence that particular product's demand.

The demand function can be written as:

$$Qd = f (Po, Pc, Ps, Yd, T, A, CR, R, E, N, 0)$$

The first three variables in the function relate to price. They are the own price of the product (Po), the price of complements (Pc) and the price of substitutes (Ps) respectively. In the case of the own price of a good, the expected relationship would be, the higher the price the lower the demand, and the lower the price the higher the demand. This is the law of demand which is explained in greater detail in the next section. In the case of complements, if the price of complementary goods increases, we would expect demand to fall both for it and for the good that itis complementary to. This is the case as fewer people

would now wish to buy either good given that the complementary good is now more expensive and this has the effect of reducing demand for the other good as well. In contrast, if the price of a substitute good rises, then demand for the good that it is a substitute for would be expected to rise as people switched to buying the latter rather than its more expensive substitute. Complements and substitutes are also explained in detail later on.

The fourth variable in the demand function is disposable income (Yd), which represents the money people have available to spend. As disposable income increases, people can afford to buy more, leading to higher demand for most products. This applies to 'normal' goods, where purchases rise with increasing income, unlike 'inferior' goods, which are bought less as income grows. The focus on disposable income, rather than total income, is important because individuals don't have full control over their gross income due to deductions like taxes. Therefore, disposable income can fluctuate over time, such as with changes in tax rates.

The effect of changes in disposable income on the demand for individual products will of course be determined by the ways in which it is spent. This is where the fifth variable, tastes (T), needs to be taken into account. Over a period of time, tastes may change significantly, but this may incorporate a wide range of factors. For example, in case of food, greater availability of alternatives may have a significant effect in changing the national diet. Thus, in India for instance, the demand for bajra has fallen over the past 10 years as people have switched to eating rice and wheat instead. Social pressures may also act to alter tastes and hence demand. For example, tobacco companies have been forced to seek new markets as smoking has become less socially acceptable in the USA and Western Europe, thus reducing demand in these areas. Changes in technology may also have an impact. For example, as the demand for smart televisions increased, the demand for normal televisions fell as tastes changed and the latter were deemed to be inferior goods. Thus, there are a number of ways in which tastes may change over time.

The next set of variables, represented by A, pertains to advertising levels.

These include advertising for the product itself, its substitutes, and its complementary goods. Generally, the higher the level of advertising for a particular product, the greater the demand for it, assuming all other factors remain constant. Similarly, increased advertising for complementary goods boosts demand for both the complement and the original product due to their interrelated nature. Conversely, more advertising for a substitute product tends to decrease demand for the original product, as people opt for the more heavily promoted substitute. The overall impact of advertising depends on the balance of these various types, as they can partially offset one another. Firms need to consider this to optimize their advertising strategies.

The variables CR and R relate to credit availability and interest rates, respectively. These are especially relevant for purchasing consumer durables, such as cars. A person's ability to buy a car depends on their access to credit. The easier it is to obtain credit, the more likely they are to make a purchase. However, credit also needs to be affordable, meaning the interest rate must be manageable. Traditionally, these variables have been seen as external to the firm, beyond its control. However, in recent years, major car manufacturers have started offering finance packages to bring these factors under their control.

The letter E in the demand function represents expectations, which may include expectations about changes in prices or income. For instance, if consumers anticipate a future price increase for a product, they may choose to buy it earlier to avoid paying the higher price. This leads to a short-term rise in demand, but in the medium term, demand may decrease once the higher price is in effect, requiring the firm to adjust its production accordingly. A common example is when consumers expect an increase in taxes on goods like alcohol or cigarettes, often announced after the Central Budget. In such cases, people might buy more before the tax hikes to avoid paying higher prices. Similarly, expectations about income changes are important. People expecting a rise in income may increase their purchases, while those anticipating a decrease, such as during a recession, will likely buy less. While this might seem insignificant at the individual level, when aggregated across a country, it can have a substantial

impact. During economic booms, the expectation of increased purchasing power typically drives up demand for many products, whereas during recessions, the fear of lower incomes leads to reduced demand as consumers become more cautious.

The variable N refers to the number of potential customers. Each product has a target market, and the size of this market can vary. The number of potential customers may depend on factors such as age or location. For example, the quantity and type of toys sold in a country will be influenced by the demographic spread, specifically the number of children and their ages.

Finally, we have 0, which represents any miscellaneous factors that might influence the demand for a specific product. For instance, it could account for seasonal variations in demand if demand fluctuates at certain times of the year rather than being consistent. Examples of such products include umbrellas, ice creams, and holidays. Essentially, this is a 'catch-all' variable used to represent any other factor that the decision maker believes affects the product's demand.

In conclusion, each product will have its own unique demand function, determined by which of the above variables impact its demand.

B. CHECK YOUR PROGRESS

Application Based Questions

Question 1: A smartphone company decides to reduce the price of its latest model by 10%. Using the demand function, predict how this price change might affect the quantity demanded. What other factors could influence whether this price reduction leads to a significant increase in demand?

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Question 2: Consumers expect the price of gasoline to increase significantly in the next three months. How will this expectation affect the current demand for gasoline and gasoline-powered cars? Use the demand function to explain both short-term and long-term effects.

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Question 3: During the summer months, ice cream sales typically rise. Using the demand function, explain how a company could adjust its production and marketing strategy to take advantage of this seasonal demand increase. What other factors might the company need to consider?

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3.4 TYPES OF DEMAND FUNCTIONS

Based on whether the demand function is in relation to an individual consumer or to all consumers in the market, the demand function can be categorized as:

3.4.1 Individual Demand Function

Individual demand function refers to the functional relationship between demand made by an individual consumer and the factors affecting the individual demand. It shows how demand made by an individual in the market is related to its determinants such as price, income, price of related goods and tastes preferences. One could map out a schedule for the quantity demanded by the consumer at various prices. Mathematically, individual demand function can be expressed as,

$$\mathbf{Dx = f\ (Px, Pr, Y, T, F)}$$

Where, Dx= Demand for commodity x;

Px= Price of the given commodity x;

Pr= Price of related goods;

Y= Income of the individual consumer;

T= Tastes and preferences;

F= Expectation of change in price in the future.

3.4.2 Market Demand Function

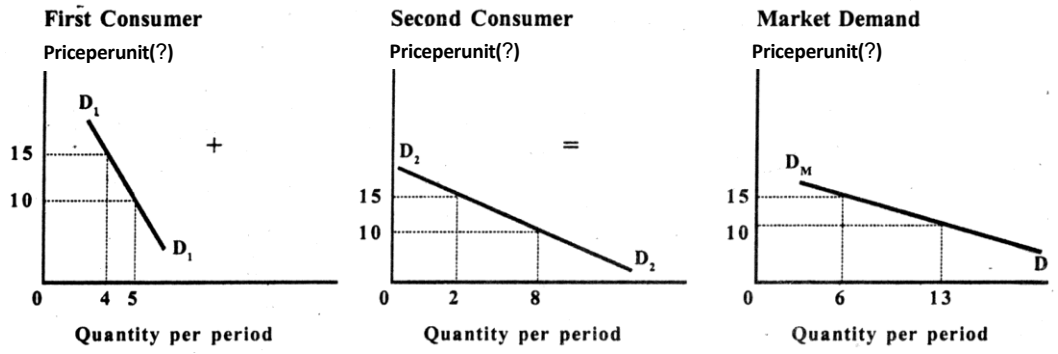

Figure 3.2

The market demand curve is the total of the quantities demanded by all individual consumers in an economy (or market area) at each price. Economic theory supports the proposition that individual consumers will purchase more of a good at lower prices than at higher prices. If this is true of individual consumers, then it is also true of all consumers combined. This relationship is demonstrated by the example in Figure 3.2, which shows two individual demand curves and the market demand that is estimated by adding the two curves together.

A market demand curve is the sum of the quantities that all consumers in a particular market would be willing and able to purchase at various prices. If we plotted the quantity that all consumers in this market would buy at each price, we might have a market demand curve such as the one shown in Figure 3.2. The market demand curve in Figure 4.2 shows that at a price of ¹ 15, the market demand would be 4 for the first consumer and 2 for the second consumer, giving a total of 6 units as market demand. Analogously, at ¹ 10.00 the total market demand is 13 units.

Another way of showing the derivation of the market demand curve is through equations representing individual consumer demand functions. Consider the following three equations representing three consumers' demand functions:

Consumer 1: $P = 12 – Q1$

Consumer 2: $P = 10 – 2Q2$

Consumer 3: $P = 10 – Q3$

You should substitute some value of Q (such as Q = 4) in each of these equations to verify that they are consistent with the data in Table 4.2. Now, add these three demand functions together to get an equation for the market demand curve. Be careful while doing this. There is sometimes a temptation to just add equations without thinking about what is to be aggregated. In Table 4.2, it is easy to see that the quantities sold to each consumer at each price have been added. For example, at a price of ¹ 6, consumer number 1 would buy six units ($Q_1 = 6$), consumer number 2 would buy two units ($Q_2 = 2$), and consumer number 3 would buy four units ($Q_3 = 4$). Thus, the total market demand at a price of ¹ 6 is 12 units (6 + 2 + 4 = 12). The important point to remember is that the quantities are to be added; *not* the prices. To add the three given demand equations, we must first solve each for Q because we want to add the quantities (that is, we want to add the functions horizontally, so we must solve them for the variable represented on the horizontal axis). Solving the individual demand functions for Q as a function of P (for consumers 1, 2 and 3), we have—

$Q_1=12–P$ $Q_2=5–$

$0.5P$ $Q_3=10–P$

Adding these equations results in the following:

$Q_1 + Q_2 + Q_3 = 27 — 2.5P$

And letting $Q_M = Q_1 + Q_2 + Q_3$where Q_M is market demand.

$Q_M = 27 – 2.5P$

Q_M is the total quantity demanded.

This is the algebraic expression for the market demand curve. We could solve this expression for P to get the inverse demand function:

$$P = 10.8 - 0.4Q_M$$

Now, check to see that this form of expressing the market demand is consistent with the data shown in Table 3.1.

Table 3.1: Derivation of a Market Demand Schedule

Price	Q_1	Q_2	Q_3	Q_M
10	2	0	0	2
8	4	1	2	7
6	6	2	4	12
4	8	3	6	17
2	10	4	8	22

The market demand curve shows that the quantity purchased goes up from 12 to 22 as the price falls from ¹ 6.00 to ¹ 2.00. This is called a change in quantity demanded. As the price falls, a greater quantity is demanded. As the price goes up, a smaller quantity is demanded. A change in quantity demanded is caused by a change in the price of the product for any given demand curve. This is true of individual consumers' demand as well as for the market demand. But what determines how much will be bought at each price? Why are more televisions bought now than ten years ago, despite higher prices? Why are more paperback books bought today than in previous years, even though the price has gone up? Questions such as these are answered by looking at the determinants of demand.

C. CHECK YOUR PROGRESS

Activity 1:

Write a short essay explaining the market demand function in your own words. Include the key variables (price, income, tastes, advertising, substitutes, etc.) that affect market demand. Use real-world examples to explain how changes in each variable can influence the market demand for a product.

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Activity 2: Draw a demand curve showing the relationship between the price of a product and the quantity demanded. Label the axes correctly and explain how the curve slopes downward, indicating that as the price decreases, the quantity demanded increases. Then, write a brief description of why this relationship exists.

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Activity 3: Suppose demand for a product in each of three regions is shown below: Region 1 Demand: Q = 307 – 5PRegion 2 Demand: Q = 204 – 3P Region 3 Demand: Q = 500 – 9PFind the total demand for the three regions.

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The following factors affect the market demand pattern of a commodity:

1. **Price of the Product:** The law of demand states that if other things remain the same when price falls, demand increases and vice-versa.

2. **Standard of living and spending habits:** When people are accustomed to high standard of living their spending on comforts and luxuries also increase, which inturn increases the demand.

3. **Distribution of Income Pattern:** If the distribution pattern of income is fair and equal, the market demand for essential items tends to be greater.

4. **The scale of preferences:** The market demand for a product is also affected by the scale of preference of buyers. If there is a shift in consumers' preference from x to y, the demand for y tends to increase and x decrease.

5. **The growth of population:** The growth of population is also another important factor that affects the market demand. With the increase in population, people naturally demand more goods for their survival.

6. **Social customs and ceremonies:** Social customs and ceremonies are usually celebrated collectively. They involve extra expenditure on certain items and thereby increase the demand.

7. **Future expectation:** People are not sure about their future, because future is uncertain. If the consumers expect a rise in prices of products, they buy more at present and preserve the same for the future, thereby the market demand would be affected.

8. **Tax Rate:** The tax rate also affects the demand. High tax rate would generally mean a low demand for the goods. At certain times the government restricts the consumption of a commodity and uses the tax as a weapon. A highly taxed commodity will have a lower demand.

9. **Inventions and innovations:** Inventions and innovations introduce new goods in the market. The consumers will have a strong tendency to purchase the new product. The preference over the new goods adversely affects the demand for the existing goods in the market.

10. **Weather conditions:** Seasonal factors also affect the demand. The demand for certain items purely depends on climatic and weather

conditions. For example, the growing demand for cold drinks during the summer season and the demand for sweaters during the winter season.

11. **Availability of credit:** The purchasing power is influenced by the availability of credit. If there is availability of cheap credit, the consumers try to spend more on consumer durables thereby the demand for certain products increase.

12. **Pattern of saving:** Demand is also influenced by the pattern of saving. If people begin to save more, their demand will decrease. It means the disposable income will be less to purchase the goods and services. On the contrary, if saving is less their demand will increase.

13. **Demonstration effect:** Demonstration effect helps to increase human wants. In under developed countries, there is a desire in the minds of the people to imitate other people for conspicuous consumption and that is why they are not able to save. This change in the saving habits of the people is due to "contact effect". The demonstration effect has a positive effect on the demand for comforts and luxury goods.

14. **Circulation of money:** An expansion or a contraction in the quantity of money will affect demand. When more money circulates among the people, more of a thing is demanded by the people because they have more purchasing power, and vice versa.

3.5 LAW OF DEMAND

For most goods, consumers are willing to purchase more units at a lower price than at a higher price. The inverse relationship between price and the quantity consumers will buy is so widely observed that it is called the law of demand. The law of demand is the rule that people will buy more at lower prices than at higher prices if all other factors are constant. This idea of the law of demand seems to be a pretty logical and accurate description of the behaviour we would all expect to observe and for now, this will suffice.

The law of demand states that consumers are willing and able to purchase

more units of a good or service at lower prices than at higher prices, other things being equal. Have you ever thought about why the law of demand is true for nearly all goods and services? Two influences, known as the income effect and the substitution effect, are particularly important in explaining the negative slope of demand functions. The income effect is the influence of a change in a product's price on real income, or purchasing power. If the price of something that we buy goes down, our income will go up farther and we can purchase more goods and services (including the goods for which price has fallen) with a given level of money income. The *substitution effect* is the influence of a reduction in a product's price on quantity demanded such that consumers are likely to substitute that good for others that have thus become relatively more expensive.

The concept of demand is often depicted in a graphic model as a demand curve. A demand curve is a graphic illustration of the relationship between price and the quantity purchased at each price. When plotting a graph for demand, the price is measured along the vertical axis and the quantities that would be purchased at various prices are measured along the horizontal axis. The demand curve shows the relationship between the own price of a good and the quantity demanded of it. Any change in own price causes a movement along the curve as shown in Figure 3.3. In this case, a rise in price from P1 to P2 results in a fall in quantity demanded from Q1 to Q2 i.e. a move from B* to A* in the figure.

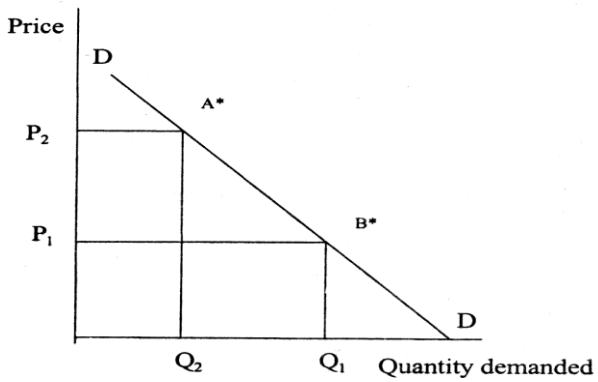


Figure 3.3: Demand Curve

The same information can also be given in a table or demand schedule, such as Table 3.2, or by an equation for the demand function such as the following:

$$P = 100 - 0.25Q$$

where P is price and Q is quantity. The advantage of the equation is that it is compact to work with, and modern managers in both the private and public sector rely on such functions (which are estimated by using regression analysis, explained in unit 6) with increasing frequency.

Table 3.2: Demand Schedule

Price (Rs.)	Quantity (units)
90	40
70	120
50	200
30	280
10	360

3.5.1 Causes for Downward Sloping of Demand Curves

The law of demand explains the functional relationship between the price of a commodity and its demand. The most important tool that explains this relationship is the demand curve. This curve is always downward sloping due to an inverse relationship between price and demand.

Following are some of the reasons explaining why demand curves always slope downwards:

1. **The Law of Diminishing Marginal Utility (MU):** According to this principle, the marginal utility of a commodity reduces when the quantity of goods is more. Consequently, when the quantity is more, the prices will fall and demand will increase. Hence, consumers will demand more goods when prices are less. This is why the demand curve slopes downwards.

2. **Substitution effect:** Consumers often classify various commodities as substitutes. For example, many Indian consumers may substitute coffee and tea with each other for various reasons. When the price of coffee rises, consumers may switch to buying tea more as it will become relatively cheaper. Economists refer to this as the substitution effect. Hence, if the price of tea reduces, its demand will increase and the demand curve will be downward sloping.

3. **Income effect:** According to this principle, the real income of people increases when the prices of commodities reduce. This happens because they spend less in case of falling prices and end up with more money. With more money, they will, in turn, purchase more and more. Therefore, the demand increases as prices fall.

4. **New buyers:** Whenever the price of a commodity decreases, new buyers enter the market and start purchasing it. This is because they were unable to purchase it when the prices were high but now, they can afford it. Thus, as the price falls, the demand rises and the demand curve becomes downward sloping.

5. **Old buyers:** This rule is basically a corollary of the new buyer's rule. When the price of a commodity decreases, the old buyers can afford to buy even more quantities of it. These results increase in demand and the demand curve slopes downwards.

3.5.2 Exceptions to the Law of Demand

The law of demand applies to demand for almost all consumer goods. However, there are some exceptions to the law of demand. The exceptions of the law of demand are described here briefly.

(a) ***Expectations about future trends in price.*** When consumers expect a continuous increase in the price of a durable commodity, they tend to buy more of it despite the increase in its price with a view to avoiding the pinch of a much higher price in future. For instance, in pre-budget months, prices generally tend to rise. Yet, people buy more storable

goods in anticipation of further rise in prices due to raising of or imposition of indirect taxes. Similarly, when consumers anticipate a further fall in future in the falling prices, they postpone their purchases rather than buying more when there is a fall in the price just to take the advantage of any further fall in price.

(b) ***Status Goods.*** The law of demand does not apply to the commodities which are used as a 'status symbol' or for enhancing social prestige or for displaying wealth and richness, e.g., gold, precious stones, rare paintings, antiques, etc. Rich people buy such goods mainly because their prices are high and buy more of them when their prices move up rather than buying less. For example, gold price was rising up in August and September 2013 and yet demand for gold continued of increase so much so that import increased to such an extent that current account deficit had increased heavily.

(c) ***Giffen Goods.*** Another exception to the law of demand is the classic case of Giffen goods.' A Giffen good is defined as an interior good whose demand increases when its price increases. There are several inferiors' commodities (much cheaper than its superior substitutes) consumed by the poor households as an essential commodity. If the price of such goods increases (price of its substitute remaining constant), its demand increases instead of decreasing because, in case of a Giffen good, income effect of a price rise greater than its substitution effect. The reason is, when price of an inferior good increases' income remaining the same. poor people cut the consumption of the superior substitute so that they are able to buy sufficient quantity of the inferior necessity good to meet their basic need. For instance, let us suppose that the monthly minimum consumption of foodgrains by a poor household is 20 kg of bajra (an inferior good) and 10 kg of wheat (a superior good). Suppose also that bajra sells at 20 per kg and wheat at 40 per kg and that the household spends its affordable income of T800 on these items. Now, if price of bajra increases to25 per kg. the household will be forced

to reduce the consumption of wheat by 2.5 kg' and increase that of bajra by the same quantity in order to meet its minimum monthly consumption requirement of 30 kg of food-grains, its expenditure on foodgrains remaining the same. The consumer substitutes bajra for wheat because he can in no other way meet his basic minimum consumption needs. Obviously, the household's demand for bajra increases from 20 kg to 22.5 kg per month despite the increase in its price. This trend in consumption shows the exception of the law of demand.

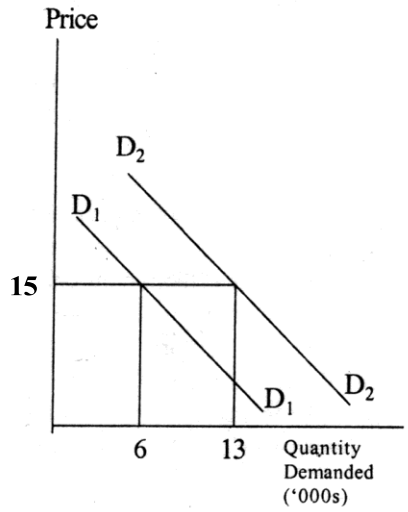
3.6 DETERMINANTS OF DEMAND

Many forces influence our decisions regarding the bundle of goods and services we choose to purchase. It is important for managers to understand these forces as fully as possible in order to make and implement decisions that enhance their firms' long-term health. It is probably impossible to know about all such forces, let alone be able to identify and measure them sufficiently to incorporate them into a manager's decision framework.

However, a small subset of these forces is particularly important and nearly universally applicable. As stated above, the overall level of demand is determined by consumers' incomes, their attitudes or feelings about products, the prices of related goods, their expectations, and by the number of consumers in the market. These are often referred to as the determinants of demand. Determinants of demand are the factors that determine how much will be purchased at each price. As these determinants change over time, the overall level of demand may change. More or less of a product may be purchased at any price because of changes in these factors.

Such changes are shown by a shift of the entire demand curve. If the demand curve shifts to the right, we say that there has been an increase in demand. This is shown as a move from the original demand D1D1 to the higher demand D2D2 in Figure 3.4a. The original demand curve can be thought of as being the market demand curve for soft drinks. At a price of ₹ 15 given the initial level of demand, consumers would purchase 6,000 soft drinks. If demand

increases to the higher demand, consumers would purchase 13,000 soft drinks rather than the 6,000 along the original demand curve.



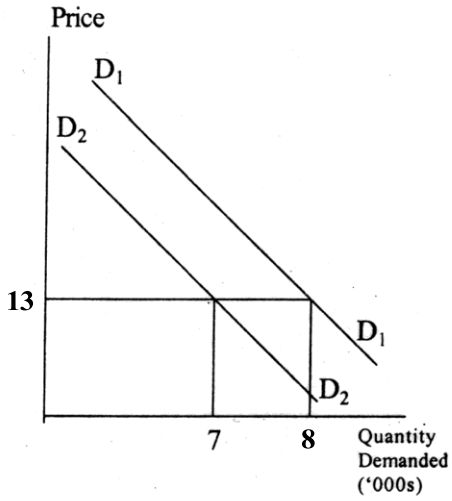


Figure 3.4a: Increased demand **Figure 3.4b: Decreased demand**

A decrease in demand can be illustrated by a shift of the whole demand curve to the left. In Figure 4.3 b this is represented by a move from the original demand D1D1 to the lower demand D2D2. At the price of Rs. 13 initially 8,000 soft drinks are purchased, while following the decrease in demand only 7,000 soft drinks are bought.

It is important to see that these changes in demand are different from the changes in quantity demanded. We discussed how changes in price cause a change in quantity demanded. As price changes, people buy more or less along a given demand curve. Movement from A* to B* in Figure shows the change in quantity demanded as price changes. It is not a shift in the whole demand curve, such as that shown in Figure 4.3a and 4.3b. When the whole demand curve changes, there is a change in demand. Some of the variables that cause a change in demand are changing incomes, changing tastes of consumers, changes in other prices, changes in consumer expectations, and changes in the number of consumers in the market etc. These variables that cause a change in demand are also known as shifter variables.

Some of the determinants are as follows:

1. **Price of the Product:** It has already been noted that consumers are expected to be willing and able to purchase more of a product at lower prices than at higher prices. In evaluating a demand or sales function for a firm or an entire industry, one of the first things a thoughtful analyst or manager will consider is the price of a product. If inventories have built up, a firm may consider lowering the price to stimulate quantity demanded. Rebates have become a popular way of doing this. Rebate programmes of one type or another have appeared for cars, home appliances, toys and even food products. Such rebates constitute a way of lowering the effective purchase price and thereby increasing the quantity that consumers demand without the negative repercussions of raising the price once the excess inventory is eliminated. Instead of raising the price back to its normal level, the firm simply allows the rebate programme to quietly come to an end. As has been stated above, this is called a change in quantity demanded. As the effective price falls, a greater quantity is demanded.

2. **Income of the Consumers:** On the other hand, shifter variables, as the name implies cause the demand curve to shift i.e., there is a change in demand. Nearly all goods and services are what economists refer to as normal goods. These are goods for which consumption goes up as the incomes of consumers rise, and the converse is also true. In fact, it is rare to find a demand function that does not include some measure of income as an important independent variable. Goods for which consumption increases as the incomes of consumers rise are called normal goods. Goods for which consumption decreases as the incomes of consumers rise are called inferior goods.

   This relationship between product demand and income is one of the reasons that so much national attention is given to the level of Gross Domestic Product (GDP) and changes in the rate of growth of GDP. The GDP is the broadest measure of income generated in the economy.

In demand analysis, other more narrowly defined measures, such as personal income or disposable personal income, are often used; but these measures are highly correlated with GDP. Thus, looking at the changing trends in GDP is helpful for understanding what may happen to the demand for a product.

3. **Taste and Preference of Consumers:** We all like certain things and dislike others. A pair of identical twins brought up in the same environment may have different preferences in what they buy. Exactly how these preferences are formed and what influences them is not easy to know. Psychologists, sociologists, and social psychologists have a lot to offer in helping economists and other business analysts understand how preferences are formed and altered.

   Even if we do not have a thorough understanding of preference structures, one thing is clear. Preferences and changes in preferences affect demand for goods and services. All have observed how such changes in tastes and preferences have influenced various markets. For example, consider the automobile market. In the United States, people appeared to have a preference for big, powerful cars throughout the 1950s and 1960s. During the 1970s, the preference structure started to change in favour of smaller, less- powerful, but more fuel-efficient cars. In part, the change in preference structure for cars may also have been related to lifestyle factors, such as being sportier and more concerned with resource conservation.

   Convenience factors, such as ease of driving and parking, may also have been important. Demographic changes, especially a trend toward smaller families, may have had some effect as well. In terms of the theory, the change in preference toward fuel-efficient cars will shift the demand curve for smaller cars to the right (see Figure 4.3a). On the other hand, social attitudes towards smoking have changed and thus one would expect that the demand curve for cigarettes has shifted to the left (see Figure 4.3b). Likewise, the growing awareness in respect of noise and

environmental pollution has resulted in a decline in the demand for crackers during Diwali celebrations.

As much as we may like to think that we know our own minds and make our own purchase decisions without the influence of others, we are very likely influenced quite strongly by various peer groups, including the people with whom we work, classmates, roommates, the people with whom we socialise, neighbours, and so on. Our decisions about clothes, entertainment, college courses, food, and many other things are influenced by these peer groups.

From the business perspective, advertising is a key factor in the formation and alteration of consumers' tastes and preferences. We can think of advertising as being either primarily informational or primarily transformational. Informational advertisements are designed to increase demand for a particular product by providing information about a product: how it is used, how much it costs, where you can buy it, what attributes it has (size, weight, etc.). Newspaper advertisements often have the strongest informational component. They are designed to elicit direct purchase action on the part of consumers.

Transformational advertisements are designed to influence the image of a product or service. They attempt to enhance the satisfaction we get from a product by evoking positive images of how we will feel if we buy it. Think about television or social media commercials for products. How much usable information do they give you? Usually not much. They tell you the name of the product; associate its consumption with some reference group of happy, healthy-looking people (often famous people as well); and generally, try to create a positive image in an attempt to alter your preference structure in favour of that product. A single exposure to such an advertisement is not usually very effective, but repeated exposure to that advertisement and similar ones has been shown to influence consumer preferences.

In terms of measurement, this determinant of demand-tastes and preferences is the most difficult for an analyst to handle. It is hard to identify all the things that influence tastes and preferences, and often just as hard to measure those that are identified. Measures of advertising effort are sometimes used to help account for this determinant of demand.

4. **Price of related goods:** How much consumers buy of a product may be affected by the prices charged for other goods or services as well. Figures 4.4a and 4.4b show the effect on the demand curve following a change in the price of a related good or service. Both graphs are self-explanatory. Earlier, it was noted that the rise in the price of gasoline during the 1970s had some effect on the demand for large versus small cars in the United States. Gasoline and cars are complementary goods; they are used together and complement one another. When the price of gasoline rose, there were at least two effects on the automobile market. First, the higher price of gas increased the cost of driving, and thus reduced the total number of miles individuals tended to drive. Second, smaller, more fuel-efficient cars became more attractive relative to big cars.

   This relationship can be stated in more general terms. Suppose that we observe two goods, A and B, and B is complementary to A. If the price of B goes up, we can expect the quantity demanded for A to be reduced. Why? Because as the price of goods B increases, its quantity demanded decreases according to the law of demand. But now, some individuals who would have purchased B at the lower price are no longer making those purchases. These same individuals now no longer have any use for A, because A was a good useful only in conjunction with B. Thus, the quantity demanded of A goes down as well. The reverse is also true: if the price of B falls, the demand for A will rise. It should be clear why business analysts are concerned not only about the effect that their product's price has on sales but also with the effect of the prices of complementary products.

(a) Substitutes **(b) Complementary**

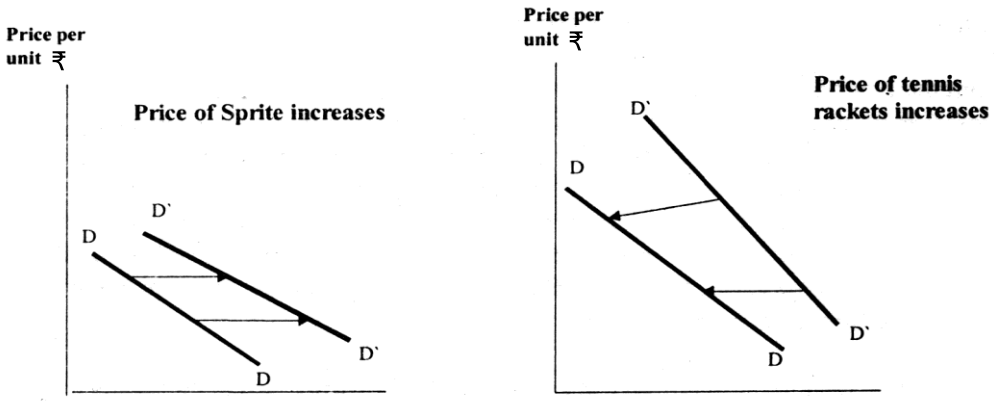


Figure 4.4: Demand Curves for Substitutes and Complements

What effect would you expect of an increase in the price of tea to have on the demand for coffee? These are substitute goods. That is, we assume that people view tea and coffee in much the same manner; some people would be willing to drink either depending upon the price of the two drinks, the convenience of obtaining each, and so on. If the price of tea goes up, we would expect the demand for coffee to rise as well. Why? If the price of tea rises, fewer people drink tea (according to the law of demand). Some of them will now substitute coffee for the tea they would have drunk, and this is seen as an increase in the quantity demanded of coffee. In general, if we have two products, C and D, which are substitutes, we can expect that a rise in the price of C (or D) will cause the demand for D (or C) to go up.

Economists and other business analysts are, therefore, concerned with all other prices that may affect the products they are analysing. The prices of both complementary and substitute products can be expected to influence demand. Later in this block, we will see how a measure called the cross-price elasticity of demand can be helpful in determining whether two goods are complements, substitutes or neither.

5. **Consumer Expectations:** Expectations of a higher income or expecting an increase in prices of goods will lead to an increase the quantity demanded. Similarly, expectations of a reduced income or a lowering in prices of goods will decrease the quantity demanded. People expected prices to continue falling, so they didn't feel an urgency to buy a home. Record levels of foreclosures entered the market due to the subprime mortgage crisis. Demand for homes didn't increase until people expected future home prices would, too.

6. **Number of Buyers in the Market:** The number of buyers has a major effect on the total or net demand. As the number increases, the demand rises. Furthermore, this is true irrespective of changes in the price of commodities. The number of consumers affects overall, or "aggregate," demand. As more buyers enter the market, demand rises. That's true even if prices don't change, and the U.S. saw this during the housing bubble of 2005. Low-cost and sub-prime mortgages increased the number of people who could afford a house. The total number of buyers in the market expanded. This increased demand for housing. When housing prices started to fall, many realised they couldn't afford their mortgages. At that point, they foreclosed. That reduced the number of buyers and drove down demand.

7. **Expectation regarding Future Price:** If the consumer is thinking or expecting rise in price in the coming future then the demand of the product at present will increase as there will be price hike in the future. On the other hand, if the consumer is expecting that the future price will be low then their demand right now will be less.

8. **Climatic Conditions:** The demand of the persons also depends upon the climatic conditions of that place. If the climate over there is hot then there will be no need of woolen clothes in the particular region otherwise there will be need of woolens.

D. CHECK YOUR PROGRESS

Multiple Choice Questions

1. Which of the following is NOT a determinant of demand?

   a) Price of the product b) Consumer income

   c) Price of related goods d) Government regulations on production

2. An increase in consumer income will lead to an increase in the demand for:

   a) Normal goods b) Inferior goods

   c) Complementary goods d) Substitute goods

3. Which factor would cause the demand for a product to decrease?

   a) A rise in consumer income

   b) A decrease in the price of a substitute good

   c) A fall in the price of the product

   d) An increase in the population

4. What is the impact of an increase in the price of a complementary good on the demand for the primary good?

   a) Increase in demand b) Decrease in demand

   c) No effect on demand d) Increase in supply

3.7 LET US SUM UP

This lesson briefly explains the demand function with each aspect weather it may be the determinant, types and factors that affect demand functions. This means the whole range of price quantity relationship and not just the quantity demanded at a given price per unit of time. The demand function expressed above is really just a listing of variables that affect the demand. It must be made explicit and clear for use in managerial decision making. The industry must have reasonably good knowledge and information about its demand function to formulate effective long run planning decisions and short run operating decisions. The basic assumption in demand schedule and demand curve has been the relationship between price and quantity of a commodity

signifying a change in price to bring a change in quantity demanded with all other variables assumed constant and unchanged. In demand function this assumption is relaxed and it is held emphatically that besides change in price there are other variables which influence the demand for a particular commodity. Classical economists were aware of the fact that the price is not the only factor which determines sales but that other factors, too, have an important effect on them. These other factors are the income of the consumer, their tastes, habits, preferences, etc. When these factors influence the demand, the demand is said to shift. But their price-demand relationship is not as important to the management as the shift in demand, which constitutes the demand function. Shifting of demand curve renders the demand analysis difficult.

Therefore, demand function makes use of mathematical formulation to arrive at correct results. Recently more sophisticated methods have been developed for the study like simultaneous equation and mathematical programming which helps in arriving at precise results.

3.8 GLOSSARY

- **Commodity:** A commodity is a basic good used in commerce that is interchangeable with other commodities of the same type.
- **Demand:** It is the quantity of a good that consumers are willing and able to purchase at various prices during a given period of time.
- **Supply:** It is the amount of a resource that firms, producers, labourers, providers of financial assets, or other economic agents are willing and able to provide to the marketplace or to an individual.
- **Aggregate Demand:** Measurement of total amount of demand for all good and services produced in an economy.
- **Complementary Goods:** Good that are typically used together. For eg. Car and Petrol.
- **Substitute Goods:** Product that can be used an replacement for another product. For e.g. Tea & Coffee.

3.9 SELF-ASSESSMENT QUESTIONS

Q1. What are the factors that affect the market demand?

Q2. Explain various types of demand analysis.

Q3. Is the demand curve of a good always downward sloping?

3.10 LESSON END EXCERCISE

Q1. How can cardinal utility be measured, and what are the implications of this measurement for consumer behavior?

Q2. What are the advantages of using ordinal utility over cardinal utility in economic analysis?

Q3. How can a demand function be used to predict consumer behavior in response to price changes?

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_____

3.11 SUGGESTED READINGS

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ELASTICITY OF DEMAND, PRICE ELASTICITY, INCOME ELASTICITY, CROSS ELASTICITY AND SUPPLY FUNCTIONS

STRUCTURE

4.0 LEARNING OBJECTIVES AND OUTCOMES

Learning Objectives

- To understand the concept of elasticity of demand and its significance in economics.
- To describe how elasticity measures the responsiveness of quantity demanded to changes in various factors such as price and income.
- To calculate and interpret elasticity coefficients to determine whether demand is elastic, inelastic, or unitary.
- To identify and analyse the key determinants of supply, such as input costs, technology, and government policies.

Learning Outcomes

After reading this lesson, you are able to:

- define and explain the concept of elasticity of demand and its significance in economic decision-making.
- differentiate between the various types of elasticity of demand, including price elasticity, income elasticity, and cross-price elasticity.
- explain the supply function and its role in determining the quantity of goods and services supplied at different price levels.

4.1 LEARNING OBJECTIVES AND OUTCOMES

Elasticity is all about understanding how responsive or sensitive the demand or supply of a product is to changes in factors like price, income, or the price of related goods.

Imagine you're buying coffee. What if the price of your favorite brand suddenly goes up by 20%? Will you stop buying it, or just reduce the quantity? Your reaction to that price change—whether it's drastic or minimal—gives us a clue about the elasticity of demand.

Economists use elasticity to measure this sensitivity. If demand changes a lot in response to a price change, we call it 'elastic.' But if demand barely changes, it's considered 'inelastic.' The concept doesn't just apply to price; we also examine how changes in income or the price of other goods affect demand and supply.

Understanding elasticity helps businesses set prices, governments decide on taxes, and us, as consumers, make informed decisions. By the end of today's lesson, we'll delve into the different types of elasticity—price elasticity of demand, cross-price elasticity, and income elasticity—and see how they shape the way we interact with the market.

Elasticity is a general measure of the responsiveness of an economic variable in response to a change in another economic variable. Economists utilise elasticity to gauge how variables affect each other. Elasticity can be defined as the degree of responsiveness of one variable to the change in another variable. From a business and economic point of view, it is a measure of how sensitive an economic factor is to another. For example, changes in the prices of supply or demand, or changes in demand to changes in income. Examples of elastic goods are clothing and electronics; inelastic goods include items like prescribed drugs, food. It is used to measure the change in quantity demanded of goods or services when compared to the price movements of those goods and services.

4.2 ELASTICITY OF DEMAND

The theory of demand, as discussed in preceding lesson, states the kind of response of demand to change in its determinants, other factors remaining constant. For example, according to the law of demand, 'other factors remaining constant, when price of a product increase, the demand for the product decreases, and vice versa'. The law of demand states only the direction of change in demand due to change in price. The law of demand does not reveal the extent of change in demand due to change in demand due to change in price. The law or the theory of demand so stated does not provided sufficient guidance for price
management. Therefore, pricing decisions may produce a result contrary to the objective. In order to justify this point, let us exemplify the case.

For example, let us suppose that a firm sells its product at Rs. 10 per unit and sells 100 units making total revenue of Rs. 1000 per week. The firm reduces its price from Rs. 10 to Rs. 8 with the objective of increasing weekly demand for its product and to increase its total revenue. When the firm reduces the price of its product, its sales increase from 100 units to 110 units but its total weekly revenue declined from Rs. 1000 to Rs. 880. Note that the firm had reduced its price by 20 % but the demand for its product had increased by only 10%. Obviously, the law of demand did work but the objective was defeated. The reason is that the firm had reduced the price randomly without knowing the degree of relationship between the price and demand.

One may find many such other cases related to pricing decision issue. For instance, when a firm decreases the price of its product, the firm producing substitute goods faces the problem whether it should increase or decrease or keep its prices constant. Similarly, a firm intending to adverse its product faces the problem whether advertisement would yield additional revenue more than the advertisement cost. The general theory of demand does not provide a reasonable answer to these questions. The answer to these question lies in the degree of response of demand to the change in its determinants. In economics, the degree of responsiveness of demand to change in its determinants is called the elasticity of demand.

4.2.1 Definitions and Measurement of Elasticity Concept

In general terms, the elasticity of demand is defined as the degree of responsiveness of demand for a product to change in its determinants. The measure of the degree of responsiveness of demand to change in its determinants gives the extent of relationship between the demand for a product and any of its determinants.

Elasticity of demand measures the responsiveness of a products demand to changes in determining factors such as its price (own-price), the price of other goods, and income. It is calculated by dividing the percentage change in demand by the percentage change for these factors. Higher demand elasticity for an economic variable indicates that the customers are more conscious of changes in this variable.

Thus, Demand can be classified as elastic, inelastic or unitary. An elastic demand is one in which the change in quantity demanded due to a change in price is large. An inelastic demand is one in which the change in quantity demanded due to a change in price is small.

In technical terms, the measure of elasticity of demand is called elasticity coefficient measured by the following formula:

$$\frac{\text{Percentage change in Quantity Demanded}}{\text{Percentage Change in Determinant (Price) or}}$$

$$Ed = \frac{(Q1-Q2)/(Q1+Q2)}{(P1-P2)/(P1+P2)} \text{ or } \frac{\Delta Q}{\Delta P} \times \frac{Ps}{\quad} \text{ or } \frac{\Delta Q}{Q} \times \frac{Q}{\Delta P}$$

Ed = 1 = Unitary Elastic

1. Elastic Demand

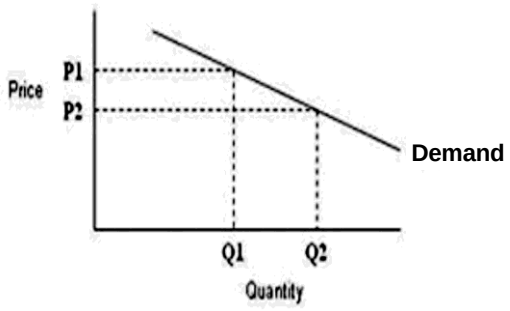

Figure 4.1 Elastic Demand

Elasticity of demand is illustrated in Figure 4.1. Note that a change in price results in a large change in quantity demanded. An example of products with an elastic demand is consumer durables. These are items that are purchased infrequently, like a washing machine or an automobile, and can be postponed if price rises.

For example, automobile rebates have been very successful in increasing automobile sales by reducing price.

Close substitutes for a product affect the elasticity of demand. If another product can easily be substituted for your product, consumers will quickly switch to the other product if the price of your product rises or the price of the other product declines.

For example, beef, pork and poultry are all meat products. The declining price of poultry in recent years has caused the consumption of poultry to increase, at the expense of beef and pork. So, products with close substitutes tend to have elastic demand.

2. Inelastic Demand

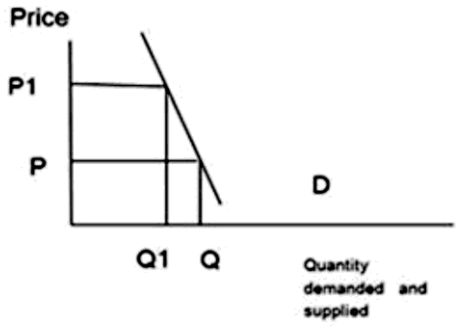

Figure 4.2 Inelastic Demand

Inelastic demand is shown in Figure 4.2. Note that a change in price results in only a small change in quantity demanded. In other words, the quantity demanded is not very responsive to changes in price. Examples of this are necessities like food and fuel. Consumers will not reduce their food purchases if food prices rise, although there may be shifts in the types of food

they purchase. Also, consumers will not greatly change their driving behavior if gasoline prices rise.

3. Unitary Elasticity

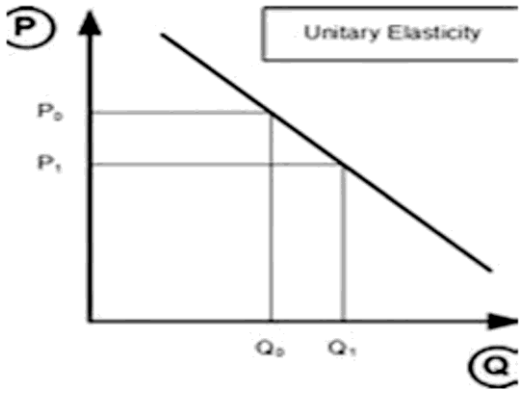

Figure 4.3 Unitary Elasticity

If the elasticity coefficient is equal to one, demand is unitarily elastic as shown in Figure 4.3.

For example, a 10% quantity change divided by a 10% price change is one. This means that a 1% change in quantity occurs for every 1% change in price. Therefore, the elasticity of demand is the percentage change in the quantity demanded as a result of a percentage change in the price of a product.

4.3 DEFINITIONS OF ELASTICITY OF DEMAND

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

According to **Jone Robinson** defines Elasticity of demand as, "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".

According to **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.

4.4 TYPES OF ELASTICITY OF DEMAND

The three major forms of elasticity are price elasticity of demand, cross-price elasticity of demand, and income elasticity of demand.

Figure 4.5 Price elasticity of demand

4.4.1 Price Elasticity of Demand

The price elasticity of demand is the response of the quantity demanded to change in the price of a commodity. It is assumed that the consumer's income, tastes, and prices of all other goods are steady. 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. It is measured as a percentage change in the quantity demanded divided by the percentage change in price.

Or,

$$Ep = \frac{\dfrac{\text{Change in Quantity} \times 100}{\text{Original Quantity}}}{\text{Change in Price} \times 100 \text{ Original Price}}$$

$$= \frac{\text{Change in Quantity}}{\text{Original Quantity}} \text{ X } \frac{\text{Original Price}}{\text{Change in Price}}$$

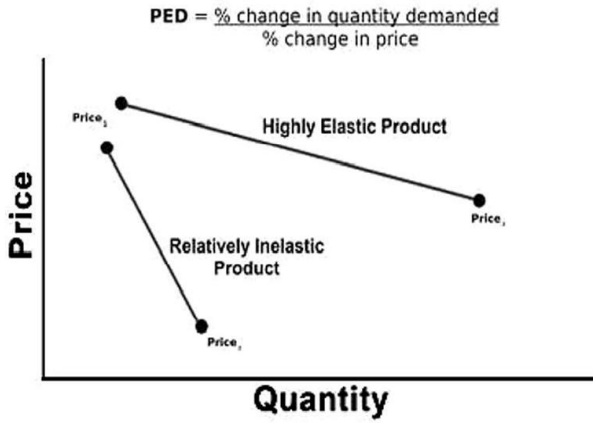

Figure 4.5.1 Price elasticity of demand

4.4.1.1 Types of Price Elasticity of Demand

There are basically 5 types of price elasticity of demand:

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. For e.g. Luxury Cars.

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.

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.

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.

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.

4.4.1.2 Factors Affecting 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:

1. **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.
2. **Availability of Substitute Goods:** 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.
3. **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.
4. **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.
5. **Perishability of the Product:** If products are perishable in nature, the demand for such products would be inelastic as their consumption cannot be postponed.

Addiction: Some products, such as cigarettes and other tobacco-based products, have inelastic demand like smokers may be willing to pay extra for cigarettes even in case of a price rise. Thus, the demand would remain the same.

4.4.1.3 Importance of Price Elasticity of Demand

1. **Price determination:** The concept of price elasticity of demand is used by organisations in determining prices under various situations like, 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.

2. **Price discrimination:** 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 consumption. Thus, the price of petrol is charged differently in different states of India.

3. **Formulation of taxation policies:** The 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.

4. **International trade:** The concept of price elasticity has a significant role in international trade. This is because successful trade transactions between the two countries are dependent on the price elasticity of demand and is used in deciding the level of imports and exports. Like, if the demand for the product is inelastic in the international market, the seller country will have an upper hand in exports.

5. **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.

4.4.2 Income Elasticity of Demand

Income elasticity of demand measures demands responsiveness when income changes, assuming the other factors are constant. As with the previous two demand elasticities, you can calculate this by dividing the percentage change in the demand quantity for a product by the percentage change in income. The following is the formula for the income elasticity of demand:

$$\text{Income elasticity of demand (IE)} = \frac{\%\ \text{Change in the demand quantity of products}}{\%\ \text{Change in income}}$$

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

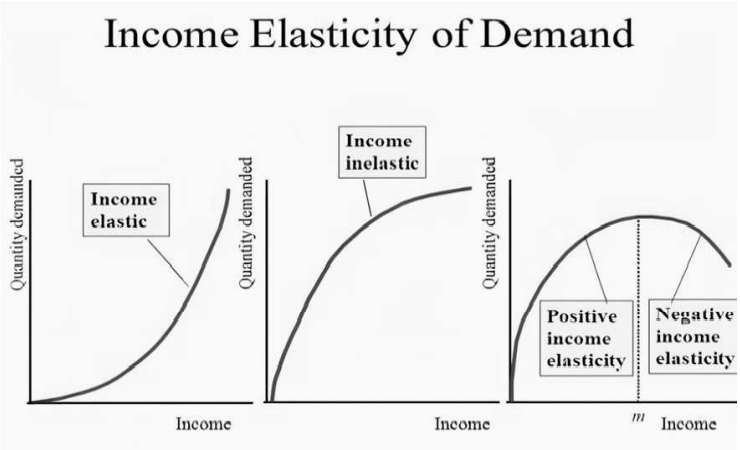

Figure 4.5.2 Income elasticity of demand

4.4.2.1 Types of Income Elasticity of Demand

1 **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.

2 **Negative income elasticity of demand:** When a proportionate change in the income of 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 the 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.

3 **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.

4.4.2.2 Factors Affecting Income Elasticity of Demand

1. **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.

2. **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.

3. **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 a decrease in income.

A. CHECK YOUR PROGRESS

Application Based Questions

Q1. A luxury car manufacturer notices a 15% increase in the sales of their vehicles when the average income of consumers rises by 10%. Calculate the income elasticity of demand for their vehicles and explain what type of good their cars are (luxury, necessity, or inferior).

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Q2. After a recession, the average household income in a country drops by 5%, and the demand for smartphones decreases by 8%. What is the income elasticity of demand for smartphones in this country? Discuss how this might affect the smartphone industry during economic downturns.

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Q3. If the demand for organic food increases by 20% when household income rises by 10%, what does this suggest about the nature of organic food? Calculate the income elasticity of demand and explain whether organic food is a necessity or a luxury based on your findings.

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4.4.3 Cross Elasticity of Demand

The cross elasticity of demand of a commodity X for another commodity Y, is the change in demand of commodity X due to a change in the price of commodity Y. It also measures the responsiveness of a product's demand if the price of an alternative product changes. The alternative product may act as a substitute or complementary. We compare the percentage change in the

demand quantity of a product against the percentage change in the alternative product price to calculate this.

According to **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 following is the formula for the cross-price elasticity of demand:

Cross price elasticity of demand (CPE)= $\frac{\%\text{ Change in demand quantity for Product X}}{\text{Change in the price for Product Y}}$

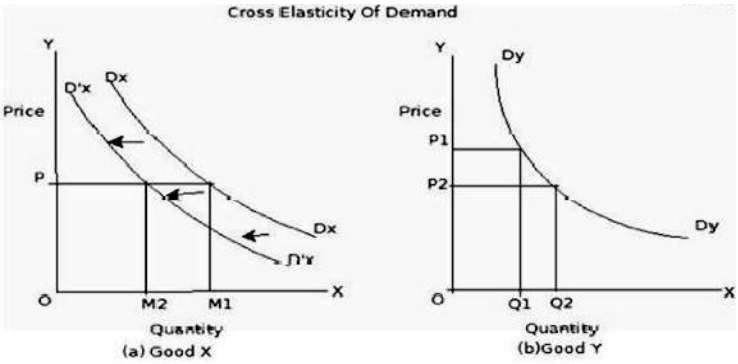

Figure 4.7 Cross elasticity of demand

4.4.3.1 Types of Cross Elasticity of Demand

1 **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 the case of substitute goods. **For example,** the quantity demanded tea has increased from 200 units to 300 units with an increase in the price of coffee from 25 to 30.

2 **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.

3 **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, it becomes zero.

B. CHECK YOUR PROGRESS

Multiple Choice Questions

1. What does cross elasticity of demand measure?

   A. The responsiveness of demand for a good to changes in its own price

   B. The responsiveness of demand for a good to changes in the income of consumers

   C. The responsiveness of demand for a good to changes in the price of another good

   D. The responsiveness of demand for a good to changes in production costs

   Answer: C

2. If the cross elasticity of demand between two goods is positive, the goods are likely to be:

   A. Substitutes B. Complements

   C. Unrelated D. Inferior

   Answer: A

3. If the cross elasticity of demand between two goods is negative, it indicates that the goods are:

   A. Substitutes B. Complements

   C. Perfect substitutes D. Unrelated

   Answer: B

4.5 MEANING OF SUPPLY FUNCTION

Supply function is a mathematical description of the connection between the quantity required of a service or product, its value and other associated factors such as input costs and related goods prices. A supply function has many independent variables and a single dependent variable. A supply equation can be formulated by examining the relationship between the supply and the independent variables. It can also be formulated by defining whether the relationship is positively-or negatively related. For example, in general, the market price and supply are inversely correlated. On the other hand, supply and technological development are positively correlated; for example, better technology indicates added supply.

It explains the relationship between the supply of a commodity and the factors determining its supply. We can better represent the supply function in the form of the following equation:

$$\mathbf{Sx = f\ (Px,\ PI,\ T,\ W,\ GP)}$$

Where,

Sx = supply of commodity x

Px = Price of commodity x

PI = Price of inputs T = Technology

W = Weather conditions

GP = Government Policy

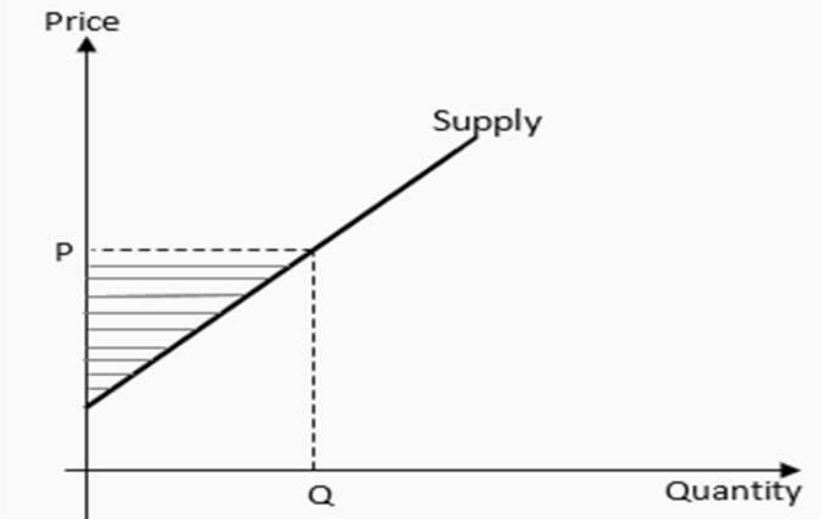

Figure 4.8 Supply Curve

4.5.1 Supply Function in Economics

The supply function in economics is applied to access how much of a given product is provided at a given price. It is used in conjunction with the demand function to identify equilibrium pricing for various markets and products. Supply functions in economics can be calculated in the following steps:

Defining the price of goods correlated to the product whose supply function is to be calculated.

- Finding out how many producers or suppliers of the given good are there.
- Determining the function based on how the assigned quantities would influence the supply of a product.

4.5.2 Determinants of Supply

Some factors can impact a producer's readiness to supply the commodity in the market. These factors are:

1. **Commodity Price:** Any producers' primary goal is to maximise the increase in profit. That is why producers manage to supply more products in the market when the product's price increases, with all other constituents being constant. In the same process, producers supply fewer goods when the prices drop, and different factors remain constant.

2. **Price of Related Goods:** Related goods include complementary and substitute goods. As the price of complementary goods increase, their supply also increases. Also, when the price of the substitute good increases, thus supply increase, but that of the original goods falls.

   For E.g.: If price of Wheat rises, it becomes more profitable for firms to supply it, rather than corn or soya bean.

3. **Price of the Production Factors:** The production factor refers to the input needed to produce a product economically. Usually, land, labour, capital, and entrepreneurship are considered as the factors of production. Producers have to pay a specific amount in terms of wage, rent and interest in the return of using factors of production.

4. **The Goal of Producers:** The primary objective of every firm is to earn revenue and maximize profit. Companies who prioritize prestige to profit may enhance the supply of the products in the market even when they earn very limited or no profit, just to fit out in the business.

5. **Technology:** It is one of the important elements of industries and firms. Improvement in technology has a great influence on the production rate.

4.5.3 Assumptions of Supply Function

1. **Nature of Goods:** If the assets are perishable and the seller cannot anticipate the price rise. Seller may have to give all of his goods at the current market price because he may not jeopardize getting his belongings perished.

2. **Government Policies:** Government may reinforce the producers and firms to offer products at the regular market price. In such a condition the producer may not be able to wait for the price rise.

3. **Alternative Products:** If a number of alternative commodities are obtainable in the market and customers manage to buy those products to fulfil their requirements, the producer will have to move to convert his sources to the production of those products.

4. **Squeeze in Profit:** Production costs like raw materials, overhead costs, labour expenses and selling may increase along with the rise in cost. Such situations may not allow the producer to offer his commodities at a profit.

C. CHECK YOUR PROGRESS

Long Answer Questions

Q1. Define supply and explain how it differs from demand in economics.

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Q2. Discuss how *government policies*, such as taxes and subsidies, can influence supply.

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Q3. Explain the role of *expectations* in determining supply. How might a firm's expectations of future prices affect its current supply decision?

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4.5.4 Law of Supply

The law of supply states that other factors remaining constant, the quantity of a good produced and offered for sale would increase with an increase in its price and decrease as the price falls. It also acts as a bridge between the

supply of a commodity and its price. Further, we can say that there is a direct relationship between the supply of a commodity and its price. This law is true for a majority of day-to-day occurrences of supply. However, there are some exceptions to the law of supply. The supply of labor at high wages, for example, decreases instead of increasing.

This is because an employer pays more only when you possess a skill which is not so common. Thus, the supply depends upon the phenomenon under consideration and the extent to which supply can be altered.

Further, the behavior of supply is also the slave of time, for obvious reasons. When talking about short-run, we can play with supply only up to a certain extent, permissible under the short time frame. Below, is the graphical representation of the law of supply, the supply curve.

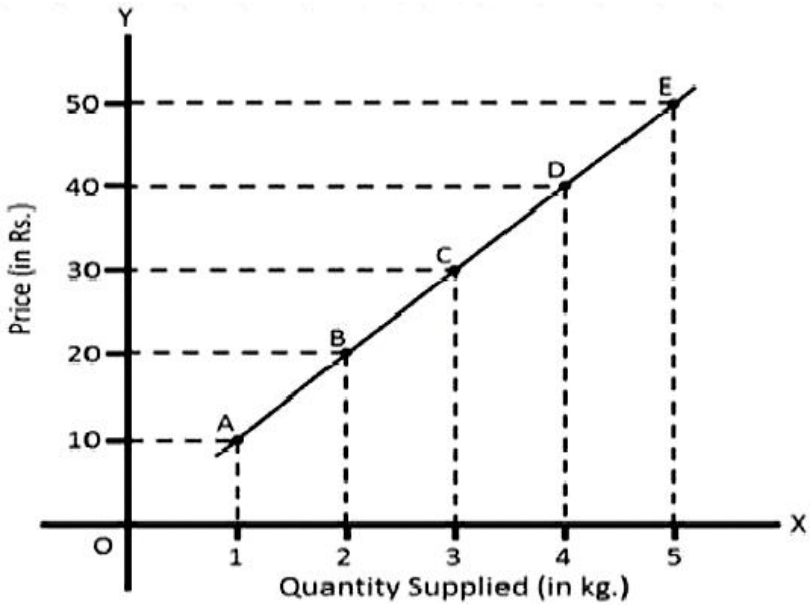

Figure 4.9 Law of supply curve

D. CHECK YOUR PROGRESS

True and False

1. The Law of Supply states that as the price of a good increases, the quantity supplied decreases. (True/False)
2. A supply curve generally slopes upward from left to right, indicating a direct relationship between price and quantity supplied. (True/False)
3. The Law of Supply only applies to goods that are essential for survival. (True/ False)
4. If the price of a product falls, suppliers are likely to decrease the quantity they supply. (True/False)
5. The Law of Supply assumes that all other factors, like production technology and input costs, remain constant. (True/False)

Answers: 1. False 2. True 3. False 4. True 5. True

4.6 LET US SUM UP

In economics, supply and demand is an economic model of price determination in a market. It postulates that, holding all else equal, in a competitive market, the unit price for a particular good, or other traded item such as labor or liquid financial assets, will vary until it settles at a point where the quantity demanded (at the current price) will equal the quantity supplied (at the current price), resulting in an economic equilibrium for price and quantity transacted. It forms the theoretical basis of modern economics. The aggregate demand-aggregate supply model has been used to depict how the quantity of total output and the aggregate price level may be determined in equilibrium. Supply is the amount of a resource that firms, producers, labourers, providers of financial assets, or other economic agents are willing and able to provide to the marketplace or to an individual. Supply can be in produced goods, labour time, raw materials, or any other scarce or valuable object. Whereas, Demand is the quantity of a good that consumers are willing and able to purchase at various prices during a given period of time. The relationship between price

and quantity demanded is also called the demand curve. Demand for a specific item is a function of an item's perceived necessity, price, perceived quality, convenience, available alternatives, purchasers' disposable income and tastes, and many other options.

4.7 GLOSSARY

- **Income:** It is the consumption and saving opportunity gained by an entity within a specified timeframe, which is generally expressed in monetary terms.
- **Elasticity:** It measures the percentage change of one economic variable in response to a change in another.
- **Income Elasticity:** A measure of how much the quantity demanded of a good changes in response to a change in consumers' income.
- **Perfectly elastic demand:** A situation where any small change in price leads to an infinite change in quantity demanded.
- **Cross Elasticity:** A measure of how much the quantity demanded of one good (A) responds to a change in the price of another good (B).

4.8 SELF-ASSESSMENT QUESTIONS

Q1. Describe a situation where demand is perfectly inelastic and explain its significance.

Q2. Explain the law of supply?

Q3. How does the availability of substitutes affect the elasticity of demand?

4.9 LESSON END EXCERCISE

Q1. Define elasticity of demand. Why is it important in economic analysis?

Q2. Calculate the price elasticity of demand if the price of a product increases by 10% and the quantity demanded decreases by 20%.

Q3. What are the implications of high-income elasticity of demand for luxury goods?

4.10 SUGGESTED READINGS

- D. N. Dwivedi (2015). Managerial Economics.
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FIRM THEORY

STRUCTURE

5.0 LEARNING OBJECTIVES AND OUTCOMES

Learning Objectives

- To understand the concepts of the theory of the firm, including the rationale for firm existence and operation.
- To examine different theoretical perspectives on firm behaviour, such as profit maximisation and value creation.
- To identify and evaluate various objectives pursued by firms, including profit maximisation, growth, market share, and social responsibility.
- To understand the Marris Model and its focus on the balanced growth of a firm.

Learning Outcomes

In this lesson, you are able to:

- explain the foundational concepts of the Theory of the Firm and its role in economic decision-making.
- analyse how firms make production, pricing, and output decisions based on various market structures.
- understand and critically evaluate the traditional and modern objectives of firms, such as profit maximisation, sales maximisation, and value creation.
- describe the key assumptions and components of the Marris Model of Growth Maximisation and its relevance in modern corporate strategy.

5.1 LEARNING OBJECTIVES AND OUTCOMES

In this lesson, we are diving into the Theory of the Firm, a central concept in economics that helps us understand the behaviour of businesses. To put it simply, the Theory of the Firm explores why firms exist, how they operate, and what goals they aim to achieve.

Now, let's break this down a bit more.

At its core, a firm is an organisation that brings together resources—like labour, capital, and raw materials—to produce goods or services. Firms are key players in the market, and they exist because producing goods within an organisation is often more efficient than individuals trying to make everything on their own.

But here's the question: Why do firms make the decisions they make?

Economists look at the firm as an entity that seeks to maximise its profits. The goal of the firm is usually to produce at the lowest possible cost while selling at the highest price the market can bear. But there's more to it than just profit maximisation. Firms also respond to other factors like competition, regulation, consumer preferences, and costs of production.

A business firm is a needs-satisfying machine; it is an entity invented and employed by society to better satisfy the society's interests. A society is better off when properly regulated business firms are allowed to carry

the bulk of economic activity than when they are not allowed to exist or are severely regulated by the state. The business firm generates consumer satisfaction in return for income that gets distributed to it s owners, employees, suppliers and public goods recipients. Any firm of any size is in existence because:

- It identifies a consumer need and develops/invents a recipe on how to satisfy that need.
- It makes the right decisions with respect to making or buying inputs so that it delivers its recipe at the lowest possible cost.
- It provides the best incentives to its stakeholders.
- It constantly and deliberately evolves through the relentless pursuit of competitive, organisation and strategic advantage.

5.2 MEANING OF FIRM THEORY

In economics the theory of the firm is a microeconomic concept that states that a firm exists and make decisions to maximise profits which influences decision-making in a variety of areas, including resource allocation, production techniques, pricing adjustments, and the volume of production. It has been debated and expanded to consider whether a company's goal is to maximise

profits in the short-term or long-term. Modern takes on the theory of the firm sometimes distinguish between long-run motivations, such as sustainability, and short-run motivations, such as profit maximisation. If a company's goal is to maximise short- term profits, it might find ways to boost revenue and reduce costs. However, companies that utilise fixed assets, like equipment, would ultimately need to make capital investments to ensure the company is profitable in the long-term. The use of cash to invest in assets would undoubtedly hurt short-term profits but would help with the long-term viability of the company. This theory consists of a number of economic theories that explain and predict the nature of the firm, company, or corporation, including its existence, behaviour, structure, and relationship to the market.

Theory of the firm is related to comprehending how firms come into being, what are their objectives, how they behave and improve their performance and how they establish their credentials and standing in society or an economy and so on. The theory of the firm aims at answering the following questions:

- Existence – why do firms emerge and exist, why are not all transactions in the economy mediated over the market?
- Which of their transactions are performed internally and which are negotiated in the market?
- Organisation – why are firms structured in such a specific way? What is the interplay of formal and informal relationships?
- Heterogeneity of firm actions/performances – what drives different actions and performances of firms?

Firms exist as an alternative system to the market-price mechanism when it is more efficient to produce in a non-market environment. For example, in a labor market, it might be very difficult or costly for firms or organizations to engage in production when they have to hire and fire their workers depending on demand/ supply conditions. It might also be costly for employees to shift companies every day looking for better alternatives. Similarly, it may be costly for companies to find new suppliers daily. Thus, firms engage in a long-term

contract with their employees or a long-term contract with suppliers to minimize the cost or maximise the value of property rights.

The model of business is called the theory of the firm. In its simplest version, the firm is thought to have profit maximisation as its primary goal. The firm's owner-manager is assumed to be working to maximise the firm's short-run profits. Today, the emphasis on profits has been broadened to encompass uncertainty and the time value of money. In this more complete model, the primary goal of the firm is long-term expected value maximization. The value of the firm is the present value of the firm's expected future net cash flows. If cash flows are equated to profits for simplicity, the value of the firm today, or its present value, is the value of expected profits or cash flows, discounted back to the present at an appropriate interest rate.

According to **Jensen Meckling,** "The firm is not an individual. It is legal fiction which serves as a focus for a complex process in which the conflicting objectives of individuals (some of whom may represent other organisation) are brought into equilibrium within a frame work of contractual relations".

Figure 5.1 **variables**

A. CHECK YOUR PROGRESS

Long Answer Questions

Q1. Explain the role of a firm in a market economy. How do firms make decisions regarding production and pricing?

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Q2. Define the term "firm" in economics. How does it differ from other economic agents such as households and governments ?

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5.3 OBJECTIVES OF BUSINESS FIRM

The business firms and the other business entities are guided by certain objectives. Profit maximisation has been one the prime objectives of the private business enterprises. Later on, in recent times new theories of business firms have generated alternative objectives of firms. To be specific, the new theories lay stress on the role of managers and their behavioural pattern in deciding the price and output under Oligopoly. Sales maximisation model of Oligopoly is one of the objectives of a business firm apart from profit maximisation.

The following points high light the main objectives of the business firm:

1. **Profit Maximisation:** In the conventional theory of the firm, the principal objective of a business firm is profit maximisation. Under the assumptions of given tastes and technology, price and output of a given product under perfect competition are determined with the sole objective of maximising profits. The firm is supposed to act as one of a large number of producers which cannot influence the market price of the product. In this theory, maximum profits refer to pure profits which are a surplus above the average cost of production. It is the amount left

with the entrepreneur after he has made payments to all factors of production, including his wages of management.

In other words, it is a residual income over and above his normal profits. It is a necessary payment for an entrepreneur to stay in the business. The rules for profit maximization are (1) MC = MR and (2) MC should cut MR from below.

2. **Multiple Objectives:** The basis of the difference between the objectives of the neo-classical firm and the modern corporation arises from the fact that the profit maximisation objective relates to the entrepreneurial behaviour while modem corporations are motivated by different objectives because of the separate roles of shareholders and managers. In the latter, shareholders have practically no influence over the actions of the managers. As early as in 1932, Berle and Means suggested that managers have different goals from shareholders. They are not interested in profit maximisation. They manage firms in their own interest rather than in the interests of shareholders. Shareholders cannot have much influence on managers because they do not possess adequate information about companies. The majority of shareholders cannot attend annual general meetings of companies and thus give their proxies to the directors. Thus, modem firms are motivated by objectives relating to sales maximisation, output maximisation, utility maximisation, satisfaction maximisation and growth maximisation.

3. **Marris Growth Maximisation:** The managers aim at the maximisation of the growth rate of the firm and the shareholders aim at the maximisation of their dividends and share prices. To establish a link between such a growth rate and the share prices of the firm, Marris develops a balanced growth model in which the manager chooses a constant growth rate at which the firm's sales, profits, assets, etc., grow. If he chooses a higher growth rate, he will have to spend more on advertisement and on R & D in order to create more demand and new products.

4. **Baumol's Sales Maximisation:** Baumol's sales revenue maximisation model highlights that the primary objective of a firm is to maximise its sales rather than profit maximisation. It states that the goal of the firm is maximisation of sales revenue subject to a minimum profit constraint. It should be noted that by sales maximisation, Baumol does not indicate the maximisation of the physical volume of sales but the maximisation of the total revenue of sales, i.e., rupee value of the sales. The rationale in this objective is the dichotomy between management and ownership in large business corporations. This existing situation of dichotomy provides managers a chance to set their purpose other than profit maximisation goal which most owner-businessmen pursue. Prof. Baumol thinks that the managers are more interested in maximising sales rather than profits. So far as empirical validity of sales revenue maximisation objective is concerned, factual evidences are debatable.

5. **Output Maximization:** Milton Kafolgis suggests output maximisation as the objective of a business firm. According to him, "The performance of firms frequently is measured directly in terms of physical output with revenue occupying a secondary position." Thus, Kafolgis prefers output maximisation both to profit maximisation and revenue maximisation as the objective of a firm. Given some minimum level of profits, a firm wants to maximise its output. It will spend its funds on increasing its production rather than on advertising. Thus, the firm will produce a larger output and its revenue sales may be less than the sales- maximisation firm.

6. **Security Profits:** Rothschild has put forward the view that the firm is motivated not by profit maximisation but by the desire for security profits. In his words, "There is another motive which is probably of a similar order of magnitude as the desire for maximum profits, the desire for security profits." He argues that so far as the objective of profit maximisation is concerned, it is valid only under perfect competition or monopolistic competition in which the number of firms is very large, and the individual firm is not faced with the security problem, so is the

case with the monopoly firm. But under oligopoly, a firm is not motivated by profit maximisation. It is engaged in a constant struggle to achieve and maintain a secure position in the market like a military strategist. The desire to increase its security leads to the struggle for position and to the setting of a price which will not be so low that it provokes retaliation from rivals, nor so high that it encourages new entrants, and it must be within the range which will maintain a protection against the aggressive policies of the rivals and brine about a reasonable profit above its cost of production Rothschild's security-profits motive is nothing else but profit maximisation in a little different garb.

7. **Satisfaction Maximisation**: Scitovsky favours maximisation of satisfaction in preference to the profit-maximisation objective of the firm. He is concerned with managerial effort and the distaste that managers have for work. According to him an entrepreneur would maximise profits only if his choice between more income and more leisure is independent of his income. In other words, the supply of entrepreneurship should have zero income elasticity. But an entrepreneur does not aim at profit maximisation. He wants to maximise satisfaction and keep his efforts and output below the level of maximum profits. This is because as his income (profit) increases, he prefers leisure to effort (output).

B. CHECK YOUR PROGRESS

Multiple Choice Questions

1. Which of the following is the most traditional objective of a firm?

   a) Profit maximisation b) Sales maximisation

   c) Revenue maximisation d) Market share maximisation

   Answer: a) Profit maximisation

2. According to modern economic theory, which objective is often pursued by firms aside from profit maximisation?

a) Utility maximisation b) Growth maximisation

c) Cost minimisation d) Risk minimisation

Answer: b) Growth maximisation

3. The concept of 'profit satisficing' refers to:

a) Firms trying to maximise short-term profits

b) Firms aiming for minimum acceptable profits to satisfy stakeholders

c) Firms seeking maximum revenue without considering profits

d) Firms achieving maximum efficiency in production

Answer: b) Firms aiming for minimum acceptable profits to satisfy stakeholders

4. Which theory suggests that managers may prioritise their own objectives over profit maximisation for shareholders?

a) Shareholder theory b) Stakeholder theory

c) Managerial utility theory d) Behavioural theory of the firm

Answer: c) Managerial utility theory

5.4 THEORY OF THE GROWTH OF THE FIRM

Growth is an important dimension of a firm whether it is small or a large one. Maximisation of growth may be the goal of the firm or an instrument to achieve some other goal like maximisation of profit or sales or managerial utility etc.

Most of the large firms that we see around were small when they were established. In the course of time they grew continuously and attained their present status. Why do they grow to such an extent? It is a natural inducement which the market provides to the existing firms for growth. There is a strong case for growth of a firm under competitive pressure not only from the potential firms but from the existing ones also. Through growth, the firm will be able to enlarge its size. The larger the firm the more perfect the control it assumes over its environment and the higher the efficiency with which it plans its over-all- activities.

A growing firm may be able to increase its market share in the industry. It may acquire more market power which will have favorable effects of the firm. Introduction of new products, new production processes and organisational techniques as parts the growth strategy of the firm, will enhance the competitive power of the firm as a result of which it will be able to withstand or survive in the process of the 'the creative destruction' as Schumpeter argued. Growth is therefore very much desirable for the firm to stay in business otherwise it will be relegated to non-entity by the dynamic competitive forces of the market.

Growth is a long-run survival condition for the firm particularly in an uncertain and constantly changing environment. It is a natural process but reinforced considerably by the competitive environment of the market.

Major contributions in the theory of the growth of the firm came from Downie, Penrose and Marris. The concept of the firm used in theories of these authors is significantly different from the one that has been adopted in the traditional theory of the firm. Marris, for example, defined the firm as "...an administrative and social organisation, capable, in principle, of entering almost any field of material activity.

The firm is not necessarily limited to particular markets, industries, or countries; indeed, there is no theoretical reason why firms should not venture anywhere in the universe. The firm is a changeable bundle of human and professional resources, linked through the corporate constitution to a corresponding bundle of material and financial assets."

What determines the growth and hence size of this type of firm was the task before the growth theorists. Generally, it is an accepted fact that there will be an upper limit to the rate of growth of the firm because growth is subject to various dynamic restraints of which financial, demand and managerial restraints will be crucial. The restraints operate from the cost side of the growth, so it is the equilibrium between gains from the growth and the cost of the growth that sets the upper limit to the rate of the firm, given its objective. Marris developed the theories of the growth of the firm by considering these restraints.

5.5 MARRIS MODEL OF GROWTH MAXIMISATION

Robin Marris in his book 'The Economic Theory of Managerial Capitalism' (1964) has developed a dynamic balanced growth maximising model of the firm. He concentrates on the proposition that modern big firms are managed by managers and the shareholders are the owners who decide about the management of the firms. The managers aim at the maximisation of the growth rate of the firm and the shareholders aim at the maximisation of their dividends and share prices. To establish a link between such a growth rate and the share prices of the firm, Marris develops a balanced growth model in which the manager chooses a constant growth rate at which the firm's sales, profits, assets, etc. grow. If he chooses a higher growth rate, he will have to spend more on advertisement and on R & D in order to create more demand and new products. He will, therefore, retain a higher proportion of total profits for the expansion of the firm. Consequently, profits to be distributed to shareholders in the form of dividends will be reduced and the share prices will fall. The threat of take-over of the firm will loom large among the managers. As the managers are concerned more about their job security and growth of the firm, they will choose that growth rate which maximises the market value of shares, give satisfactory dividends to shareholders, and avoid the take-over of the firm. On the other hand, the owners (share-holders) also want balanced growth of the firm because it ensures fair return on their capital. Thus, the goals of the managers may coincide with that of owners of the firm and both try to achieve balanced growth of the firm.

Marris's hypothesis is that, executive actions are limited by the need for management to protect itself from dismissal or take-over raids in the event of failure. Marris tried to improve upon Baumol's model. He offered a variation of Baumol's model that stressed the maximisation of growth subject to the security of management's position.

Marris's approach is also based on the fact that ownership and control of the firm is in the hands of two different set of people. Like Williamson, Marris suggests that managers have a utility function in which salary, status

power, prestige and security are important variables. Owners of the firm (shareholders) are however, more concerned about profits, market share, output etc. The utility function of managers (Um) and that of the owners (Uo) may, therefore, be defined as:

Um = f (salaries, power, status, job security)

UO = f (Profits, market share, output, capital, public esteem).

Robin Marris believes that most of the variables entering into the utility function of managers owners are strongly correlated with single variables: the size of the firm. He, therefore states that the managers would be mainly concerned about the rate of growth of size. In Marris model, there are two constraints:

a) The managerial team constraint

b) The job security constraint

(a) The Managerial Team Constraint: Marris is of the view that the capacity of the top management is given at any one time period. Since management is a team work, hiring new managers does not expand the managerial capacity immediately. New managers take time to get integrated in the team which is extremely essential for the efficient working of the firm.

(b) The Job Security Constraint: Their desire for security is reflected in the preference for service contracts, generous retirement benefits and their dislike for policies which may result in their dismissal. Job security is assumed to be attained by pursuing a prudent financial policy which requires that the three crucial financial ratios must be maintained at optimum levels.

Assumptions of the Model

The Marris model is based on the following assumptions:

1. It assumes a given price structure.
2. Production costs are given.

3. There is no oligopolistic interdependence.

4. Factor prices are constant.

5. Finns are assumed to grow through diversification.

6. All major variables such as profits, sales and costs are assumed to increase at the same rate.

Explanation of the Assumptions:

Given these assumptions, the objective of the firm is to maximise its balanced growth rate, G. The G itself depends on two factors: First, the rate of growth of demand for the firm's product, GD; and second, the rate of growth of capital supply, GS. Thus G = GD = GS. Despite the fact that in big firms' ownership is segregated from management, owners and managers have a common goal of balanced growth of the firm. According to Marris, there are two different utility functions for the manager and the owner of the firm. The utility function of the manager consists of his emoluments, status, power, job security, etc. On the other hand, the utility function of the owner includes profits, capital, output, market share, etc. Thus, the manager of a firm aims at maximising his utility, and his utility depends upon the rate of growth of the firm. Though promoting the growth of the firm is the main aim of the manager, yet he is also motivated by his job security. The manager's job security depends upon the satisfaction of shareholders who are concerned to keep the firm's share prices and dividends as high as possible. Thus, the manager aims at maximising the rate of growth of the firm and the shareholders (owners) aim at maximising their profits in the form of dividends and share prices. Marris analyses the means by which the firm tries to achieve its growth maximisation goal. The firm may grow in size through the creation of new products which create new demands. Marris calls it differentiated diversification. The introduction of new products depends upon the rate of diversification, advertising expenses, R&D expenditures, etc. Marris establishes the relationship between growth and profits on the demand side through diversification into new products. The links between growth and profits are different at different levels of growth. In this growth-

profits relationship, growth determines profits. When the rate of growth of the firm is low, the relationship is a positive one. As new products are introduced, the firm expands (grows) and profits increase. With the further increase in the growth rate due to greater diversification into new products, the growth profits relationship becomes negative. This is because there is the managerial constraint which sets a limit on the rate of managerial growth that restricts the growth of the firm. The firms' managerial ability to cope with a great number of changes at once is limited. It is not possible to develop a larger management team for the development and marketing of new products. The higher rate of diversification requires higher expenditures on advertising and R &D. As a result, beyond a certain growth rate, the higher growth rate leads to a lower rate of profit. This is illustrated in the given figure where the GD curve first rises, reaches the highest point M and then starts falling.

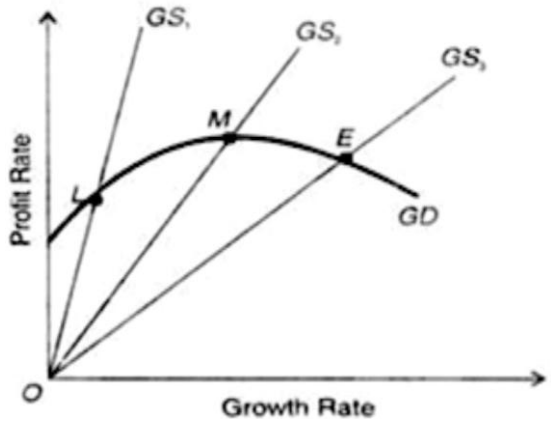

Figure 5.2

The other aspect of the growth profits relationship is the rate of growth of capital supply. The aim of the shareholders is to maximise the growth rate of capital stock. The main source of finance for its growth is profits. Thus, profits determine growth on the supply side. A higher level of profits provides more funds directly for reinvestment. It also allows more funds to be raised on the capital markets. It, therefore, allows a higher rate of growth to be funded. This

gives a direct and positive relationship between profits and growth. This is shown in the above figure as a straight-line GS from the origin. For the equilibrium of the firm, the growth demand and growth supply relationship must be satisfied. This is achieved when the two curves GD and GS intersect at a point where the growth-profits combination gives the optimum solution. Suppose in the figure the GS2 curve intersects the GD curve at point M where profits are maximised. This point does not provide an optimum solution because the managers desire more growth than is consistent with long-run profit maximisation. The extent to which they can increase the growth rate beyond point M depends upon their desire job security. Their job security is threatened if the shareholders feel that the share prices and dividends are falling and there is the threat of take-over by other firms. This will affect the growth rate of capital supply (GS). Thus, it is the financial constraint which sets a limit to the growth of the firm on the supply side. According to Marris, it is the retention ratio which determines the growth rate of capital supply. The retention ratio is the ratio of retained profits to total profits. If the retention ratio is very low, it means that almost all profits have been distributed to the shareholders. As a result, there are limited funds available with the managers for the growth of the firm and the growth rate will be very low. The growth-supply curve will be very steep as shown by GS1 curve. The firm's equilibrium will be at point L where the GS1 curve intersects the GD curve. This is again not the optimal equilibrium point of the firm because here the growth rate is low and profits are below the maximum level. Larger retained profits are required by managers to invest larger funds for the growth of the firm. These raise the retention ratio which, in turn, leads to higher profits and higher growth rates until point M of maximum profits is reached. This is again not the optimum equilibrium point of the firm because the managers feel that this combination of higher growth rate and higher profits is approved by the shareholders and there is no threat to their job security. They will, therefore, be encouraged to raise the retention ratio further, invest more funds, expand and increase the growth rate of the firm. As a result, the growth supply curve will become flatter and take the shape of GS3 curve as in the figure where it intersects the DS curve at point E.

At this point, distributed profits to shareholder's fall. But they are adequate to satisfy the shareholders so that there is no fear of fall in the prices of shares and of the threat of takeovers. There is also job security for managers. Thus point E is the optimal equilibrium point of the firm. If the managers adopt a higher retention ratio than this, the distributed profits will fall further and the shareholders will not be satisfied which will endanger the job security of managers. The existing shareholders may decide to replace the managers. If the distribution of low profits to shareholders brings a fall in the market prices of shares, it may lead to takeover of the firm.

Criticisms of the Model

Marris's growth-maximisation model has been severely criticised for its over- simplified assumptions by Koutsoyiannis and Hawkins.

1. Marris assumes a given price structure for the firms. He, therefore, does not explain how prices of products are determined in the market. This is a serious weakness of his model.
2. Another defect of this model is that it ignores the problem of oligopolistic interdependence of firms in non-collusive market.
3. This model also does not analyse interdependence created by non-price competition.
4. The model assumes that firms can grow continuously by creating new products. This is unrealistic because no firm can sell anything to the consumers. After all, consumers have their preferences for certain brands which also change when new products enter the market.
5. According to Koutsoyiannis, "Marris's model is applicable basically to those firms which produce consumers' goods. The model is not appropriate for analysing the behaviour of manufacturing businesses or traders."
6. Marris lumps together advertising and R&D expenses in his model. This is a serious shortcoming of the model because the effectiveness of these two variables is not the same in any given period.

7. Marris assumes that firms have their own R&D department on which they spend much for creating new products. But, in reality, most firms do not have such departments. For product diversification, they imitate the inventions of other firms and in case of patented inventions they pay royalties for using them.

8. The assumption that all major variables such as profits, sales and costs increase at the same rate is highly unrealistic.

9. It is also doubtful that a firm would continue to grow at a constant rate, as assumed by Marris. The firm might grow faster now and slowly later on.

10. It is difficult to arrive at the growth rate which maximises the market value of the firm's shares and the rate at which the take-over is likely to take place.

C. CHECK YOUR PROGRESS

Application Based Questions

1. A company, XYZ Corp, is experiencing rapid growth in market share but has noticed a decline in its profit margins. Using the Marris Model, how should the management of XYZ Corp respond to balance growth and profit maximisation?

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2. ABC Ltd. has set ambitious targets for growth over the next five years. As a manager, how would you apply the principles of the Marris Model to ensure that this growth does not come at the expense of profitability ?

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3. Assume that a firm's management has decided to prioritise growth over profitability, leading to an increase in debt levels. According to the Marris Model, what potential risks could this decision pose to the long-term sustainability of the firm ?

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5.6 LET US SUM UP

According to the theory of the firm, every business organisation is driven by the motive of maximising profits. This theory influences decisions for allocating resources, methods of production, adjustments in prices, and manufacturing in huge quantum. Both the theory of the firm and the theory of the consumer go hand in hand. As per the theory of the consumer, the customer tends to enhance their total utility to the fullest. In economic terms, utility refers to the estimated value a customer uses for measuring the level of happiness or satisfaction derived from the consumption of a specific product or service. There are a few beliefs such as having less stake in company that are associated with the theory of the firm. Some believe the chief executive officers of public companies not only focus on profit maximisation, but also emphasise on increasing sales, maintaining public relations, and having a good market share. If their goal is profit maximisation alone, public will be susceptible about their intentions, and the company's reputation or goodwill in the market will be highly affected. In case, a company follows a single strategy for running its operations, there can be many risks associated with it. In case, a business depends on just one product for building its revenues, and that very product eventually fails to make adequate sales in the market, the whole financial structure of the business will be affected, or at least one department of the company.

5.7 GLOSSARY

- **Growth:** The process of increasing in amount, value, or importance.
- **Security:** Procedures followed or measures taken to ensure the security of a state or organisation.
- **Firm:** It is a for-profit business organisation such as a corporation,

limited liability company (LLC), or partnership that provides professional services.

5.8 SELF-ASSESSMENT QUESTIONS

Q1. How does the theory of firm work? Explain.

Q2. Discuss the Marris Model of growth Maximisation.

Q3. Write down various objectives of business firms?

5.9 LESSON END EXCERCISE

Q1. What are the primary assumptions of the Marris model that have been criticised by economists?

Q2. In what ways does the internal organisation of a firm affect its potential for growth according to the theory?

Q3. How does the theory of the firm explain the objective of profit maximisation, and what are the assumption of Marris Model?

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M.Com 1st Sem. **UNIT-I (CREDIT: 1)**
Course No. 153 **Lesson No. 6**

CONSUMER BEHAVIOUR, CARDINAL AND ORDINAL UTILITY APPROACH

STRUCTURE

6.0 INTRODUCTION

Learning Objectives

- To understand the concept of Utility
- To analyse and use cardinal utility approach for measurement of utility
- To analyse and use cardinal utility approach for measurement of utility

Learning Outcomes

After completion of this unit, you will be able to:

- explain the Law of Diminishing Marginal utility;
- describe consumer equilibrium with the help of law of equi-marginal utility; and
- distinguish between cardinal and ordinal utility approaches.

6.1 INTRODUCTION

In previous units, we have understood the concept of demand and supply, their determinants and elasticity of demand and supply etc. We have also applied the concepts of demand and supply in practice i.e. equilibrium, determination of price and quantity, rationing and allocation of scarce goods, minimum wage legislation and arbitrage etc. In this and subsequent unit, we shall examine the theory of consumer behaviour. Consumer behaviour has always been a subject of curiosity and research. Researchers have been trying to understand and predict consumer behaviour ever since the commencement of trade. However, relevance of this subject has increased over the time. With global markets and more informed customers today, success of business is entirely dependent on its understanding of consumer behaviour. Traditional businesses are getting obsolete every day and new businesses based on needs of consumers (or utility) are evolving. Increased internet penetration has changed the concept of market. Businesses are increasingly talking about value creation rather than mere product creation.

The concept of value creation is based on the concept of utility. Consumer values a product only if it has 'utility' for him. Thus, the concept of utility has become extremely relevant today. It is guiding marketing team across the globe in

designing business and marketing the company in a way that is likely to attract the maximum number of customers and maximise sales revenues.

6.2 THE CONCEPT OF UTILITY

Utility is the basis of consumer demand. The consumers demand a commodity because they desire or expect to derive utility from that commodity. As discussed above, the concept of market, interaction between consumer and producer has evolved in present times. Today, a consumer is more informed about the choices available to him and someone somewhere is trying to produce a good/service in order to provide utility to the customer. New businesses, like an app to book a cab, maid, grocery, medicine, beauty service etc. which have evolved in present time are successful because they provide high utility to their customers.

What is Utility?

Utility is a psychological phenomenon. It is a feeling of satisfaction, pleasure or well-being experienced by the consumer from the consumption or possession of the commodity or availing of a service. In this sense, it is a subjective or relative concept i.e. level of utility derived from a product differs from person to person. For example, meat has no utility for vegetarians.

Utility of a product can be 'absolute' in the sense that the want satisfying power is ingrained or embeded in it. For example, pen has its own utility whether a person can write or not. However, utility is considered as 'subjective' in consumer analysis because a consumer will demand a good only if that good holds utility for her. Utility not only varies from person to person but also from time to time, at different level of consumption and at different moods of a consumer. The most basic example to understand this concept is food. If a person is not hungry, even her favourite food will not have any utility for her at that point of time.

Based on this understanding, marketing concepts have also evolved over the time. Advertisers target now consumers on the basis of their past purchases, interests, likes/dislikes, sites they visit. Customers are often offered customised coupons for the product/service that might hold 'utility' for them.

Relationship between Want, Utility, Consumption and Satisfaction

Want of the consumer is the basis of understanding her behaviour. A consumer selects a commodity based on its want satisfying power. Consumption of the commodity leads to satisfaction of wants.

Following points can be noted about utility:

a) Utility is a want satisfying power of a commodity

b) Utility varies from person to person

c) It varies from time to time, at different level of consumption and at different moods of a consumer.

There are three concepts related to utility:

1. **Initial Utility-** The utility derived from the first unit of a commodity is called initial utility. For example: utility obtained from consumption of first roti is called initial utility.

2. **Total Utility-** The utility derived by a person from the total number of units of a commodity consumed by her is called total utility.

$$\textbf{i.e. } TU_n = U_1 + U_2 = U_3 = \ldots U_n$$

3. **Marginal Utility-** It means addition made to total utility by consuming an additional unit. It can be measured with the help of following formula:

$$MU_n = TU_n - TU_{n-1}$$

Where: MU_n = Marginal utility of nth unit

TU_n = Total utility of n units

TU_{n-1} = Total utility of n – 1 units or one unit less than the total no. of units

Let us understand the concept with the help of Table 6.1 and Fig. 6.1.

Quantity of commodity X	Total Utility (TU)	Marginal Utility (MU)
1	6	6
2	10	4
3	12	2
4	12	0
5	10	-2
6	6	-4

Table 6.1: Relationship between Total utility (TU) and Marginal utility (MU)

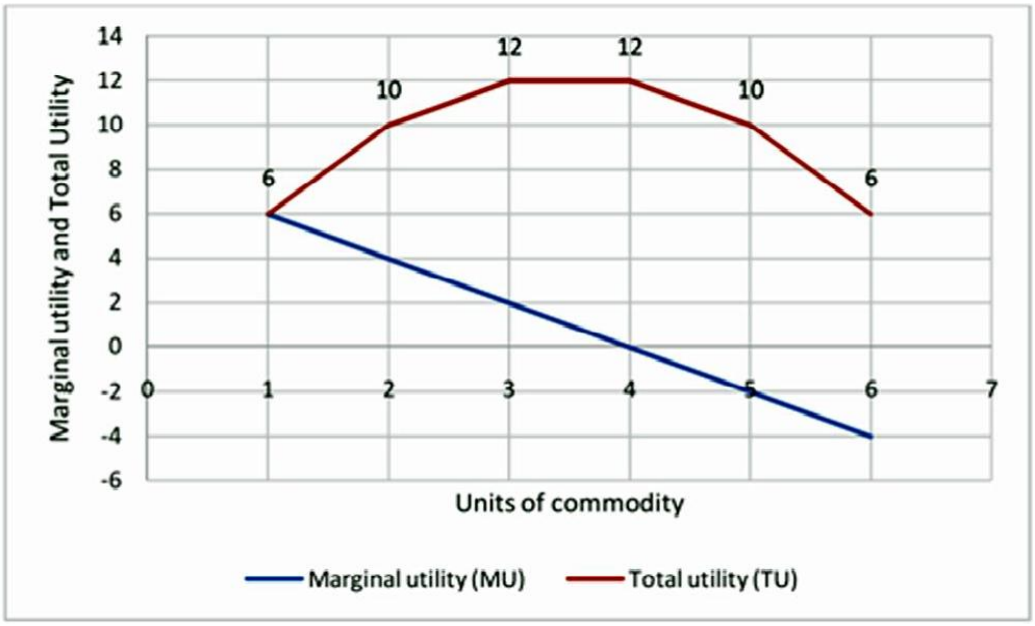

Fig. 6.1: Relationship between Total utility (TU) and Marginal utility (MU)

In Fig. 6.1, units of commodity are measured along x axis and utility is measured along y axis. Up to 3rd unit the total utility is increasing but marginal utility is diminishing but is positive. When a consumer consumes 4th roti, the total utility is maximum and the marginal utility is zero. Consumer is getting maximum satisfaction at this point. If a consumer consumes more than 4 units, total utility will diminish and the marginal utility will be negative. This is also called Law of diminishing Marginal Utility, which is discussed in detail in later part of the lesson.

6.3 THE CARDINAL UTILITY APPROACH

Alfred Marshall (1842-1924), an important member of the neo- classical school of economics, gave us the cardinal utility theory of consumer behaviour in his book Principles of Economics (1890). According to him, a consumer derives utility from consuming a commodity. Following Jeremy Bentham (1748-1832) the founder of the Utilitarian School of Ethics, utility is defined as the subjective sensation - pleasure, satisfaction, wish fulfilment, cessation of need - which are derived from consuming a commodity and the experience of which is the object of consumption. Marshall assumed that utility (which is the want satisfying power of a commodity) could be measured quantitatively in the same way as one can measure weights and heights. In other words, utility is cardinally measurable - numerical or quantitative scale exists for measuring it. See that this is a very highly restrictive assumption. For instance, it is possible to say that a person, say, Mili gets 2 units of utility from a cup of tea. If utility is a cardinal concept, then it requires a complementary assumption specifying the unit of measurement. Bentham used a psychological unit of measurement called Utils. However, it cannot be taken as a standard unit for measurement due to its variation from individual to individual. Hence, Marshall took money as the unit of measurement. It has the advantage of uniformity for all individuals in the economy. In the illustration above Mili would receive 2 rupees worth of utility from a cup of tea. Besides adopting money as a measuring rod for utility, Marshall made another complementary assumption. He assumed the marginal utility of money to remain constant for each consumer. That implies the measuring rod must remain constant.

Cardinal measurability of utility also implies that utilities derived from the consumption of different quantities of a commodity can be added and can be compared across various individual consumers. Thus, one can speak of total utility and marginal utility derived from consuming a commodity. Marginal utility (MU) is defined as the addition to total utility when an additional unit of a commodity is consumed. Thus, MU is the ratio of extra utility to an extra unit of the commodity consumed.

6.3.1 Measurement of Utility

The concept of measurement of utility has evolved over the time. The classical economists viz Jeremy Bentham, Menger, Walras etc. and neoclassical economists like Marshall believed that utility is cardinally or quantitatively measurable like height, weight etc. The belief resulted in Cardinal Utility Approach. The exponents of cardinal utility analysis regard utility to be a cardinal concept. According to them, a person can express utility or satisfaction he derives from the goods in the quantitative cardinal terms. Jeremy Bentham (1748–1832), the founder of Utilitarian school of ethics coined a psychological unit of measurement called 'utils'. Thus, a person can say that he derives utility equal to 10 utils from the consumption of a unit of good A, and 20 utils from the consumption of a unit of good B. Moreover, the cardinal measurement of utility implies that a person can compare utilities derived from goods in respect of size, that is, how much one level of utility is greater than another. According to Marshall, marginal utility is measurable in terms of money and money is the measuring rod of utility. This approach will be discussed in detail in Section 4.4. The modern economists like J.R Hicks, Allen are of view that utility is not quantitatively measurable but can be compared or ranked. This is known as Ordinal concept of utility. Modern Economists hold that utility being a psychological phenomenon, cannot be measured quantitatively, theoretically, and conceptually. However, a person can introspectively express whether a good or service provides more, less or equal satisfaction when compared to one another. In this way, the measurement of utility is ordinal, i.e. qualitative, based on the ranking of preferences for commodities. For example, suppose a

person prefers tea to coffee and coffee to milk. Hence, he or she can tell subjectively, his/her preferences, i.e. tea > coffee > milk. Ordinal Utility approach of measurement of utility is discussed in detail in the next unit.

6.3.2 Cardinal Utility Analysis

Cardinal Utility Analysis was mainly given by neoclassical economists like Jevons, Dupuit, Menger, Walras and Pigou etc. The exponents of this approach regards utility as cardinal concept. In other words, they hold that utility is a measurable and quantifiable entity. For example, According to cardinal utility approach, if a person is drinking a glass of water, it will be possible for him to assign some numerical value say 10 utils or 20 utils to the utility derived from it.

This approach is based on following assumptions:

1. The cardinal measurement of utility- Utility of any commodity can be measured in units called 'utils'.
2. Utilities are additive i.e. total utility can be calculated by measuring utility derived from all the units of a commodity consumed.
3. Utility is independent i.e. not related to the amounts of other commodities purchased by the consumer. Further, it is also assumed that it is not affected by utilities of other individuals.
4. Marginal utility of money remains constant: When a person purchases more of a good, the amount of money diminishes and marginal utility of remaining money may increase. But in this approach, marginal utility of money is treated constant. This assumption is important as cardinalists have used money as a measure of utility and it is necessary to keep the measuring rod of utility as fixed.

6.4 LAW OF DIMINISHING MARGINAL UTILITY

Law of Diminishing Marginal Utility is one of the most fundamental law of utility analysis. It explains the relationship between utility and quantity of a commodity. This law states that after sufficient quantity of a commodity is

consumed, the utility derived from each successive unit decreases, consumption of all other commodities remaining same. Let us take an example to illustrate this law. For example, If a person is hungry, the first roti he consumes will have high utility for him as it will give him high level of satisfaction. As he keeps on consuming more and more roties, utility derived from each successive unit will go on decreasing. After a point of time, when person is satisfied, he will not be able to eat more. The utility will drop to zero here. If the consumption of roti is continued further, a person would get negative utility or disutility. This can be illustrated with the help of following table:

No. of Roti	Marginal Utility (MU)
1	10
2	8
3	5
4	3
5	0
6	-2

Table 6.2: Diminishing Marginal Utility

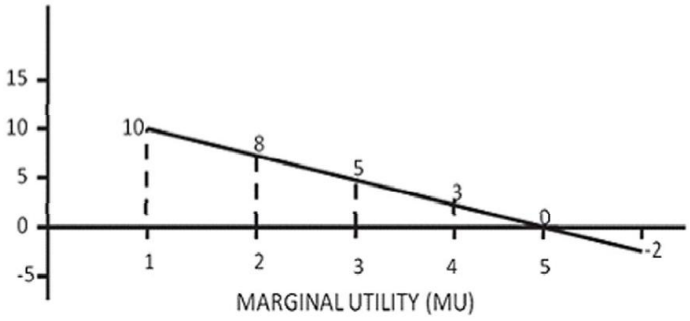

Fig. 6.2: Diminishing Marginal Utility

It can be noted from the above table and diagram, that the utility of first roti is very high i.e. 10 utils. The utilities of 2nd, 3rd, 4th roti falls to 8, 5 and 3 utils respectively. 5th roti gives zero utility, after which each successive roties starts giving negative utility.

6.4.1 Exceptions to the Law/ Limitations of the Law The law of Diminishing Marginal utility does not apply in following cases:

The law of Diminishing Marginal utility does not apply in following cases:

1. **Small initial unit:** The law is not applicable when the initial units of commodity are of very small size. For example, drinking water with a spoon. In such cases, initially utility derived from additional units will go on increasing and the law may not operate for some time. It is only after a stage in consumption is reached that marginal utility begins to diminish.
2. **Rare and curious things like rare paintings, gold, and diamond jewellery:** The law does not apply in such cases because collection of more and more units usually give more satisfaction to the collector/ consumer.

6.4.2 Criticism of the Law

Law of Diminishing Marginal utility has been criticised by modern economists on following grounds:

1. **Measurement of utility is not possible:** The major criticism of this approach is that it is not possible to measure utility in cardinal numbers. Utility is a psychological phenomenon and thus it is not possible to measure it in quantifiable terms. In real life, we can only describe utility of a product in words.
2. **Marginal utility of money does not remain constant:** Cardinal economists believe that marginal utility of money remains constant throughout. However, when a person uses money, stock of money reduces leading to increase in utility of remaining stock.

3. **Utility is not always independent:** Sometimes utility of one commodity is affected by other commodities. Many times, consumer prefers to consume series of related goods. For example, A consumer may prefer to consume biscuits or pakoda along with tea.

4. **Unrealistic assumptions:** The law is based on various unrealistic assumptions. It assumes no change in fashion, taste, income, preferences of a customer. But in real life, environment is extremely dynamic and so are taste, fashion etc. With new products having advanced features being launched so frequently, taste and preferences of customers are also changing frequently. Thus, this law may not operate in present dynamic times, at least not in the same form it was believed to operate, say one century ago.

A. CHECK YOUR PROGRESS

1. Calculate Marginal utility in following table:

Quantity of commodity X	Total Utility (TU)	Marginal Utility (MU)
1	20	
2	36	
3	46	
4	50	
5	50	
6	44	

2. What does the Cardinal Utility Approach assume about utility?

a) Utility cannot be measured.

b) Utility can be measured and expressed in numbers.

c) Utility is only ranked in order of preferences.

d) Utility is based on observed choices.

Answer: b)

3. Which of the following units is often used to measure utility in the Cardinal Utility Approach?

a) Utils b) Dollars

c) Points d) Indifference

Answer: a)

4. Which law is closely associated with the Cardinal Utility Approach?

a) Law of Equi-Marginal Utility

b) Law of Diminishing Marginal Utility

c) Law of Supply

d) Law of Demand

Answer: b)

6.5 CONSUMER EQUILIBRIUM THROUGH UTILITY ANALYSIS

Consumer Equilibrium is a situation wherein a consumer gets maximum satisfaction out of his limited income and has no tendency to change his existing expenditure pattern. A consumer is considered to be extremely satisfied when he allocates his income in such a way that the last rupee spent on each commodity yields the same level of utility. The concept of consumer equilibrium can be examined under one-commodity model and multi commodity model.

Consumer equilibrium through utility analysis is based on following set of assumptions:

1. **Consumer is rational:** This is one of the basic assumption of the law. Consumer is rational i.e. he measures, compares and chooses the best option in order to maximise his utility.
2. **Cardinal measurement of utility:** Utility can be measured in quantifiable terms.
3. **Marginal utility of money is constant:** It is assumed that utility is measured in terms of money and utility of money does not change.

4. **Fixed income and prices:** It is assumed that income of the consumer and prices of goods remain constant.

5. **Constant tastes and preferences:** It is assumed that taste and preferences of the consumer remain same.

6.5.1 Determination of Consumer Equilibrium

As discussed above, Consumer equilibrium can be examined under two cases:

A. Consumer Equilibrium-One Commodity Case

Suppose a consumer with fixed income consumes a single commodity x. He will continue his consumption till a point where marginal utility that he derived from consumption of a unit of commodity is greater than marginal utility of money spent on purchasing that unit. If the marginal utility of commodity x (MU_x) is greater than the marginal utility of money (MUm), then a consumer will exchange his money for a commodity. Consumer will keep on consuming and spending his money so long as $(MU_x)>P_x(MU_m)$ where P_x is the Price of commodity x and MU_m is 1(constant), Thus a utility maximising consumer will be in equilibrium where

$$MU_x=P_x$$

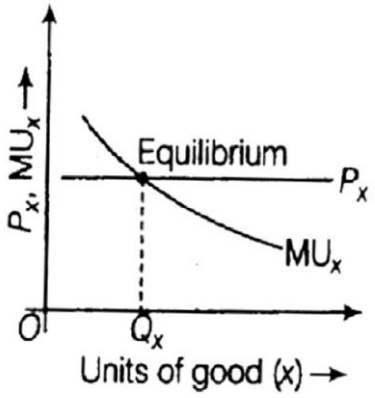

Fig. 6.3: Consumer equilibrium in case of single commodity

Let us understand the concept with the help of an example. Suppose, the consumer wants to buy a good x costing Rs. 10 per unit. Marginal utility derived from each successive unit (in utils is determined and is given in Table 6.3 (It is assumed that 1 util = Re. 1, i.e. MU_m = Re. 1).

Unit of 'x'	Price of 'x' (P_x)	Marginal Utility (MU) in Utils	Difference between MU and P_x	Remarks
1	10	18	8	Since MUx>Px
2	10	16	6	Consumer will increase
3	10	12	2	Consumption
4	10	10	0	Consumer equilibrium MUx=Px
5	10	8	-2	Since $Mu_x<P_x$
6	10	0	-10	Consumer will not
7	10	-2	-12	Buy any more units

Table 6.3: Consumer Equilibrium in case of Single Commodity

B. Consumer Equilibrium in Multi-Commodity Case:

Consumer equilibrium in single commodity is unrealistic model in the sense that in real life, consumer consumes a large number of commodities. This model deals with the equilibrium in case of many commodities. This model works under the assumption of limited income of the consumer and diminishing marginal utility of commodities. Thus, utility maximising consumer will first spend money on commodity which yield highest utility, then the second highest and so on. Finally, a consumer will reach equilibrium when the last rupee he spent on different commodities will yield equal level of utility.

This case of multi-commodities is known as **Law of Equi-Marginal Utility,** a consumer having choices of multiple goods distribute their

limited income in such a way that the last rupee spent on each commodity yields equal marginal utility. Suppose a customer consumes only two goods x (with price P_x) and y (with price P_y). Thus, he will try to maximise his utility by equating his marginal utility and prices.

$$MU_x = P_x\ (MU_m)$$

$$MU_y = P_y\ (MU_m)$$

Given these conditions, a consumer will be in equilibrium when:

$$MU_x / P_x\ (MU_m) = MU_y / P_y\ (MU_m)$$

Or

$MU_x / P_x = MU_y / P_y$ (because MU of each unit of money is assumed to be constant at 1)

Two commodity case can be generalised for multi-commodity case. Suppose a customer consumes various goods, he will be in equilibrium when:

$$MU_x / P_x = MU_y / P_y = MU_c / P_c = \ldots\ldots MU_z / P_z$$

Diagrammatically, equilibrium is achieved at a point when $MU_x / P_x = MU_y / P_y$

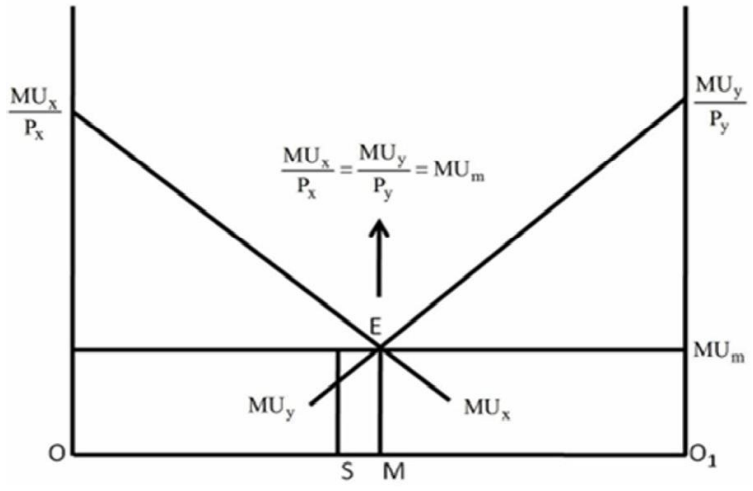

Fig. 6.4: Consumer equilibrium in multi commodity case

Let us understand the law with the help of an example: Suppose, total money income of a consumer is 5 which he wants to spend on two goods 'x' and 'y'. Both these commodities are priced at Re. 1 per unit. Table 4.4 presents marginal utility which consumer derives from various units of the two commodities.

Table 6.4: Consumer Equilibrium in case of multi-commodity

Unit	MU Derived from Good X (in Utils)	MU Derived from Good Y (in Utils)
1	12	9
2	10	8
3	8	6
4	6	4
5	4	2

It can be noted from Table 6.4 that the consumer will spend first and second rupee on commodity 'x', which will provide him utility of 12 and 10 utils respectively. The third rupee will be spent on commodity 'y' to get utility of 9 utils. Fourth and fifth rupee will be spent on X and Y respectively. To reach the equilibrium, consumer should purchase that combination of both the goods, when:

a) MU of last rupee spent on each commodity is same; and

b) MU falls as consumption increases.

It happens when consumer buys 3 units of 'x' and 2 units of 'y' because:

a) MU from last rupee (i.e. 5th rupee) spent on commodity y gives the same satisfaction of 8 utils as given by last rupee (i.e. 4th rupee) spent on commodity x; and

b) MU of each commodity falls as consumption increases.

The total satisfaction of 47 utils will be obtained when consumer buys 3 units of 'x' and 2 units of 'y'. It reflects the state of consumer's

equilibrium. If the consumer spends his income in any other order, total satisfaction will be less than 47 utils.

B. CHECK YOUR PROGRESS

Multiple Choice Questions

1. Consumer equilibrium is achieved when:

   a) Total utility is maximised with respect to income.

   b) Marginal utility per dollar spent on each good is equal across all goods.

   c) The consumer spends all income on the least expensive goods.

   d) Marginal utility of goods is the same.

   Answer: b)

2. In utility analysis, consumer equilibrium is reached when:

   a) Marginal utility (MU) is zero.

   b) Marginal utility (MU) of a good equals the price of the good.

   c) Total utility equals marginal utility.

   d) Marginal utility of each good is greater than its price.

   Answer: b)

3. In the context of consumer equilibrium, the law of diminishing marginal utility implies that:

   a) Consumers will buy more of a good if its marginal utility increases.

   b) Consumers derive less additional satisfaction from consuming extra units of a good.

   c) Consumers will always prefer consuming more of a good.

   d) Marginal utility of money is constant.

   Answer: b)

6.6 CONSUMER SURPLUS

The concept of consumer surplus was first formulated by Dupuit in 1844 to measure social benefits of public goods such as canals, bridges, national

highways. Marshall further refined and played a significant role in providing it a theoretical structure in his book 'Principles of Economics' published in 1890.

Marshall's concept of consumer's surplus was based on the cardinal measurability and interpersonal comparisons of utility. According to him, consumer's surplus is the difference between what 'one is willing to pay' and 'what one actually pays' to acquire a particular good. Concept of consumer's surplus is a very important concept in economic theory, especially in theory of demand and welfare economics. It is also very useful in formulation of economic policies such as taxation by the Government.

The quintessence of the concept of consumer's surplus is that people generally get more utility from the consumption of goods than the price they actually pay for them. This extra satisfaction, which the consumers obtain, from buying a good has been called consumer's surplus.

The concept of consumer's surplus is derived from the law of diminishing marginal utility. As we purchase more units of a good, its marginal utility goes on diminishing. It is because of the diminishing marginal utility that consumer's willingness to pay for additional units of a commodity declines as he has more units of the commodity.

The measurement of consumer surplus from a commodity from the demand or marginal utility curve is illustrated in Fig. 6.5. In the figure, quantity of a commodity is measured along the X-axis, the marginal utility (or willingness to pay for the commodity) and the price of the commodity are measured on the Y axis.

DD' is the demand or marginal utility curve which is sloping downward, indicating that as the consumer buys more units of the commodity, marginal utility derived from the additional units of the commodity falls.

If OP is the price that prevails in the market, then the consumer will be in equilibrium when he buys OM units of the commodity, since at OM units, marginal utility from a unit of the commodity is equal to the given price OP.

The Mth unit of the commodity does not yield any consumer's surplus

to the consumer since this is the last unit purchased and for this price paid is equal to the marginal utility which indicates the price that he is prepared to pay rather than go without it. But for the units before Mth unit, marginal utility is greater than the price and therefore, these units yield consumer's surplus to the consumer. The total utility of a certain quantity of a commodity to a consumer can be known by summing up the marginal utilities of the various units purchased.

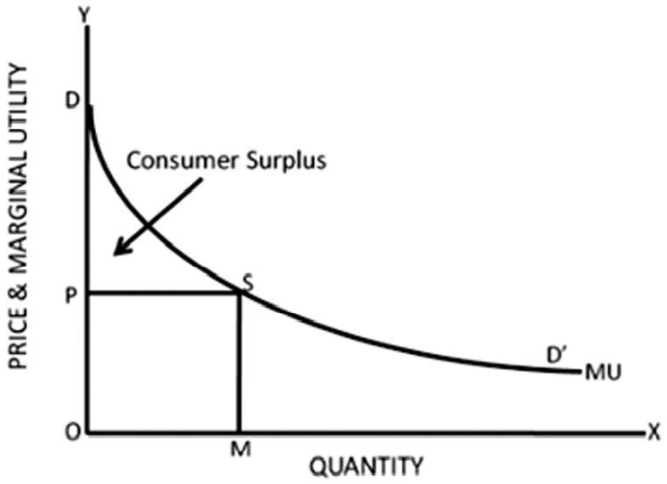

Fig. 6.5: Consumer Surplus

In Fig. 6.5, the total utility derived by the consumer from OM units of the commodity will be equal to the area under the demand or marginal utility curve up to point M. That is, the total utility of OM units in Fig. 6.5 is equal to ODSM.

In other words, for OM units of the good the consumer will be prepared to pay the sum equal to Rs. ODSM. But given the price equal to OP, the consumer will actually pay the sum equal to Rs. OPSM for OM units of the good. It is thus clear that the consumer derives extra utility equal to ODSM minus OPSM = DPS, which has been shaded in Fig. 6.5. If market price of the commodity rises above OP, the consumer will buy fewer units of the commodity than OM. As a result, consumer's surplus obtained by him from his purchase will decline.

On the other hand, if price falls below OP, the consumer will be in equilibrium when he is purchasing more units of the commodity than OM. As a result of this, the consumer's surplus will increase. Thus, given the marginal utility curve of the consumer, the higher the price, the smaller the consumer's surplus and the lower the price, the greater the consumer's surplus.

6.7 THE ORDINAL UTILITY THEORY

The ordinal utility approach is a school of thought that believes that utility cannot be measured quantitatively, that is, utility is not additive rather it could only be ranked according to preference. The consumer must be able to determine the order of preference when faced with different bundles of goods by ranking the various 'baskets of goods' according to the satisfaction that each bundle gives. For instance, if a consumer derives 3 utils from the consumption of one unit of commodity X and 12 utils from the consumption of commodity Y, this means that the consumer derives more satisfaction from consuming commodity Y than from commodity X. Though to the cardinals, the consumer derives four times more utility from one unit of Y than from X. The ordinal utility theory explains consumer behaviour by the use of indifference curve.

6.7.1 Assumptions of Ordinal Utility Approach

i. **Rationality:-** The consumer is assumed to be rational meaning that he aims at maximising total utility given his limited income and the prices of goods and services.

ii. **Utility is Ordinal:-** According to this assumption, utility is assumed not to be measurable but can only be ranked according to the order of preference for different kinds of goods.

iii. **Transitivity and Consistency of Choice:-** By transitivity of choice, it means that if a consumer prefers bundle A to B and bundle B to C, then invariably, the consumer must prefer bundle A to C. Symbolically, it is written as:

If A > B and B > C; then A > C.

By consistency of choice, it is assumed that the consumer is consistent in his choice making. If two bundles A and B are available to the consumer, if the consumer prefers bundle A to B in one period, he cannot choose bundle B over A nor treat them as equal. Symbolically:

If A > B, then B > A and A ‘“ B

iv. **Diminishing Marginal Rate of Substitution (MRS):-** MRS is the rate at which the consumer can exchange between two goods and still be at the same level of satisfaction. This assumption is based on the fact that the preferences are ranked in terms of indifference curves which are assumed to be convex to the origin.

v. **The Total Utility** of the consumer depends on the quantities of the commodities consumed. That is, the total utility is the addition of the different utilities. u = f(q1, q2 ——qn)

vi. **Non Satiation:-** it is assumed that the consumer would always prefer a larger bundle of goods to a smaller bundle of the same good. He is never over supplied with goods within the normal range of consumption.

C. CHECK YOUR PROGRESS

Multiple Choice Questions

1. What does the Ordinal Utility Theory suggest about consumer preferences?

   a) Consumers can assign specific numerical values to their satisfaction.

   b) Consumers can only rank their preferences in order of satisfaction.

   c) Consumers are indifferent to all available choices.

   d) Consumers always have complete information about prices.

   Answer: b)

2. Which tool is commonly used in Ordinal Utility Theory to represent consumer preferences?

   a) Budget constraints b) Demand curves

c) Indifference curves d) Supply curves

Answer: c)

3. In the context of Ordinal Utility Theory, what does an indifference curve show?

a) The total utility a consumer gains from a set of goods.

b) The combination of goods that provides equal satisfaction to the consumer.

c) The optimal bundle of goods based on prices.

d) The point where marginal utility is maximized.

Answer: b)

6.8 LET US SUM UP

Utility is a psychological phenomenon. It is a feeling of satisfaction, pleasure or well-being experienced by the consumer from the consumption or possession of the commodity or a service. In this sense, it is a subjective or relative concept i.e. level of utility derived from a product differs from person to person. We also examined the relationship between want, utility, consumption and satisfaction i.e. how want leads to selection of commodity having utility which in turn leads to consumption and finally satisfaction of want. We further analysed the relationship between Marginal utility and Total utility and the law of diminishing marginal utility. We also explained consumer equilibrium using utility approach in case of single commodity and multiple commodity. We also discussed the basic assumptions of consumer preferences.

6.9 GLOSSARY

- **Consumer Behaviour:** The study of individuals and groups and how they select, purchase, use and dispose of goods, services, and experiences.
- **Utility:** A measure of satisfaction or pleasure derived from consuming goods and services. Utility can be measured either cardinally (numerically) or ordinally (ranked based on preference).

- **Cardinal Utility:** Assumes that utility can be measured numerically and the amount of satisfaction can be quantified in exact numbers. Consumers can assign a specific value to the level of satisfaction they gain from consuming different quantities of goods.
- **Consumer Equilibrium (Cardinal Approach):** A situation where a consumer maximizes their total utility given their income and the prices of goods. Occurs when the marginal utility per dollar spent on each good is equal for all goods consumed.
- **Indifference Curve:** A graph showing different bundles of goods between which a consumer is indifferent; that is, they derive the same level of utility from each bundle. Downward sloping, convex to the origin, and higher indifference curves represent higher levels of satisfaction.

6.10 SELF-ASSESSMENT QUESTIONS

Q1. How does the concept of utility relate to consumer behaviour?

Q2. How does a consumer achieve equilibrium under the cardinal utility approach?

Q3. How does the budget constraint impact consumer choices in the ordinal utility approach?

6.11 LESSON END EXERCISE

Q1. Explain the relationship between total utility and marginal utility.

Q2. Given the price of good, how will a consumer decide as to how much quantity of the good to buy? Use utility analysis.

Q3. A consumer consumes only two goods – x and y. State and explain the conditions of consumer equilibrium using utility analysis.

6.12 SUGGESTED READINGS

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M.Com 1st Sem. **UNIT-II (CREDIT: 1)**
Course No. 153 **Lesson No. 7**

INDIFFERENCE APPROACH

STRUCTURE

7.0 LEARNING OBJECTIVES AND OUTCOMES

Learning Objectives

- To make understanding about the concept of indifference approach;
- To give an overview about the indifference schedule, indifference curve and indifference map;
- To make the learners familiar with properties of indifference curve; and
- To impart knowledge regarding marginal rate of substitution.

Learning Outcomes

After the completion of this lesson, the student will be able to:

- conceptualise the indifference curve concept;
- understand the marginal rate of substitution; and
- comprehend the properties of indifference curve.

7.1 INTRODUCTION

As a topic of economics, utility is used to model worth or value. Its usage has evolved significantly over time. The term was introduced initially as a measure of pleasure or happiness as part of the theory of utilitarianism by moral philosophers such as Jeremy Bentham and John Stuart Mill. The term has been adapted and reapplied within neo classical economics, which dominates modern economic theory, as a utility function that represents a single consumer's preference ordering over a choice set but is not comparable across consumers. This concept of utility is personal and based on choice rather than on pleasure received, and so is specified more rigorously than the original concept but makes it less useful for ethical decisions. Consider a set of alternatives among which a person can make a preference ordering. The utility obtained from these alternatives is an unknown function of the utilities obtained from each alternative, not the sum of each alternative. A utility function is able to represent that ordering if it is possible to assign a real number to each alternative in such a manner that alternative 'a' is assigned a number greater than alternative 'b' if and only if the individual prefers

alternative ‘a’ to alternative ‘b’. In this situation someone who selects the most preferred alternative is necessarily also selecting the alternative that maximises the associated utility function.

7.2 MEANING OF INDIFFERENCE APPROACH

The indifference approach was devised towards the end of the 1 9th century by a famous Italian economist, Vilfredo Pareto (1848—1923), and developed further by 20th-century economists such as the Nobel Prize winner Sir John Hicks. The indifference approach has definite advantages over the traditional utility approach in analysing consumer behaviour. First, many students and economists are not impressed by the notion that consumer satisfaction or utility can be measured and that changes in utility can be compared. Second, indifference curves allow us to distinguish between the income effects and substitution effects of a change in the price of a product. Third, the indifference curve technique is an extremely useful tool which can be used to analyse a variety of other choices, apart from consumers’ choices between different goods and services. An indifference curve, with respect to two commodities, is a graph showing those combinations of the two commodities that leave the consumer equally well off or equally satisfied hence indifferent in having any combination on the curve. Indifference curves are heuristic devices used in contemporary microeconomics to demonstrate consumer preference and the limitations of a budget. Economists have adopted the principles of indifference curves in the study of welfare economics. Standard indifference curve analysis operates on a simple two-dimensional graph. Each axis represents one type of economic good. Along the indifference curve, the consumer is indifferent between any of the combinations of goods represented by points on the curve because the combination of goods on an indifference curve provides the same level of utility to the consumer. For example, a young boy might be indifferent between possessing two comic books and one toy truck, or four toy trucks and one comic book so both of these combinations would be points on an indifference curve of the young boy. The indifference

curve analysis measures utility ordinally. It explains consumer behaviour in terms of his preferences or rankings for different combinations of two goods, say X and Y. An indifferent curve is drawn from the indifference schedule of the consumer. If the various combinations are plotted on a diagram and are joined by a line this becomes an indifference curve, as I1 Î in the Figure 12.1. The indifference curve I1 is the locus of the points L, M, N, P, Q, and R, showing the combinations of the two goods X and Y between which, the consumer is indifferent. "It is the locus of points representing pairs of quantities between which the individual is indifferent, so it is termed an indifference curve."

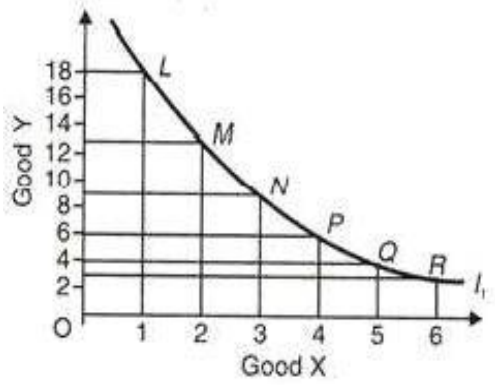

Figure 7.3

It is, in fact, an iso-utility curve showing equal satisfaction at all its points. A single indifference curve concerns only one level of satisfaction. But there are a number of indifference curves, as shown in Figure 7.3 The curves that are farther away from the origin represent higher levels of satisfaction as they have larger combinations of X and Y. Thus the indifference curve I4 indicates a higher level of satisfaction than I3 which, in turn, is indicative of a higher level of satisfaction than I2 and so on.

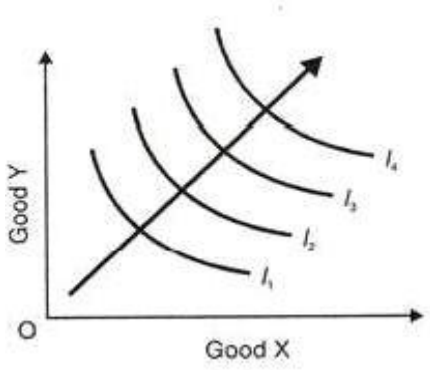

Fig 7.4

Consumers would prefer to move in the direction indicated by the arrow in the figure. Such a diagram is known as an indifference map where each indifference curve corresponds to a different indifference schedule of the consumer. It is like a contour map showing the height of the land above sea- level where instead of height, each indifference curve represents a level of satisfaction.

7.2.1 Assumptions of Indifference Approach

The indifference curve analysis retains some of the assumptions of the cardinal theory, rejects others and formulates its own. The assumptions of the ordinal theory are the following:

1. The consumer acts rationally so as to maximise satisfaction.
2. There are two goods X and Y.
3. The consumer possesses complete information about the prices of the goods in the market.
4. The prices of the two goods are given.
5. The consumer's tastes, habits and income remain the same throughout the analysis.
6. He prefers more of X to less of Ó or more of Y to less of X.

7. An indifference curve is negatively inclined sloping downward.

8. An indifference curve is always convex to the origin.

9. An indifference curve is smooth and continuous which means that the two goods are highly divisible and those levels of satisfaction also change in a continuous manner.

10. The consumer arranges the two goods in a scale of preference which means that he has both 'preference' and 'indifference' for the goods. He is supposed to rank them in his order of preference and can state if he prefers one combination to the other or is indifferent between them.

11. Both preference and indifference are transitive. It means that if combination A is preferable to Â, and Â to C, then A is preferable to C. Similarly, if the consumer is indifferent between combinations Aand B, and Â and C, then he is indifferent between A and C. This is an important assumption for making consistent choices among a large number of combinations.

12. The consumer is in a position to order all possible combinations of the two goods.

7.3 CONCEPT OF INDIFFERENCE CURVE

An **indifference curve** is a graphical representation used in microeconomics to illustrate consumer preferences. It shows all the combinations of two goods that yield the same level of satisfaction or utility to a consumer. The fundamental idea is that a consumer has no preference for one combination over another along the same curve, hence they are "indifferent" among those combinations.

According to Koutsoyiannis, "An indifference curve is a graph that shows the various combinations of two goods that provide a consumer with equal satisfaction. It's a fundamental concept in microeconomics that helps economists understand how consumers make choices and allocate their resources."

In the words of Ferguson, "An indifference curve is a combination of goods, each of which yields the same level of total utility or to which the consumer is indifferent."

According to Leftwitch, "A single indifference curve shows the different combinations of x and y that yield equal satisfaction to the consumer"**.**

7.3.1 Characteristics of Indifference curve

Downward Sloping: Indifference curves slope downwards from left to right. This indicates that if the quantity of one good decreases, the quantity of the other good must increase to maintain the same level of utility.

1. **Convex to the Origin**: Indifference curves are typically convex to the origin. This convexity reflects the assumption of diminishing marginal rates of substitution (MRS), meaning that as a consumer substitutes one good for another, they require increasingly more of the good they are giving up to maintain the same level of satisfaction.
2. **Non-Intersecting**: Indifference curves cannot intersect each other. If two curves were to intersect, it would imply that the same combination of goods could provide different levels of utility, which contradicts the definition of utility.
3. **Higher Curves Represent Higher Utility**: Indifference curves that are further from the origin represent higher levels of utility. This means that combinations on these curves provide greater satisfaction than those on curves closer to the origin.
4. **Numerical Representation**: Each indifference curve can be associated with a specific utility level. For example, a curve labeled as U_1 might represent a utility level of 10, while a curve U_2 (which is further from the origin) represents a utility level of 20.

7.3.2 Indifference Schedule

An **indifference schedule** is a tabular representation of combinations of two goods that provide a consumer with the same level of satisfaction or

utility, that the consumer is indifference. This schedule lists various combinations of the two goods along with the corresponding utility levels, allowing for a clear understanding of consumer preferences. In the words of **Prof. Watson**, "An indifference schedule is a list of combinations of two commodities, the list being so arranged that a consumer is indifferent to the combinations, preferring none of another."

Structure of an Indifference Schedule

The indifference schedule typically includes the following components:

1. **Good X**: Quantity of the first good.
2. **Good Y**: Quantity of the second good.
3. **Utility Level**: The level of satisfaction derived from each combination of the two goods, which remains constant for each row in the schedule.

Combinations	'x' Good (cups of Coffee)	'x' Good (cups of Coffee)
A	1+	12
B	2+	8
C	3+	5
D	4+	3
E	5+	2

Table: 7.1: Indifference Schedule

In Table 7.1**,** five different combinations A, B, C, D and E of two goods, cups of coffee and biscuits, are potrayed. All these combinations give equal satisfaction to the consumer. The consumer is indifferent whether he buys the first combination of 1 unit of x (coffee) + 12 units of y (biscuits) or the fifth combination 5 units of x (coffee) + 2 units of y (biscuits) or any other combination. We have taken only one schedule, any number of schedules can be taken for the two commodities. They may represent higher or lower levels of satisfaction to the consumer.

Importance of Indifference Schedule

1. **Visual Aid**: The schedule serves as a precursor to drawing the indifference curve, providing a clear view of how combinations relate to one another.
2. **Consumer Preferences**: It helps in understanding consumer preferences and how they make choices between different goods based on their utility.
3. **Economic Analysis**: Economists use indifference schedules to analyze how changes in income or prices affect consumer choices, leading to insights about market behavior.

7.3.3 Indifference Curve

The graphic representation of indifference schedule is indifference curve or picturization of indifference schedule is indifference curve. If the various combinations are plotted on a graph and are joined by a line, the diagram depicts an indifference curve as IC in the Figure 7.1. The indifference curve IC is the locus of the points A, B, C, D, E showing the combinations of two goods, which yield equal satisfaction and the consumer is indifferent in the matter of choice among them. As **Eastham** has pointed out, *"It is the locus of points, representing pairs of quantities between which the individual is indifferent, so it is termed as showing indifference curve."*

The indifference curves can also be compared with **Contour Lines** on a geographical map. Just as contour lines represents the places of same height above the sea level on a map, similarly the indifference Curves represents various the combinations of two goods which yields equal satisfaction to the consumer Indifference curves are also known as **Iso-utility Curves or Equal Utility Curves.**

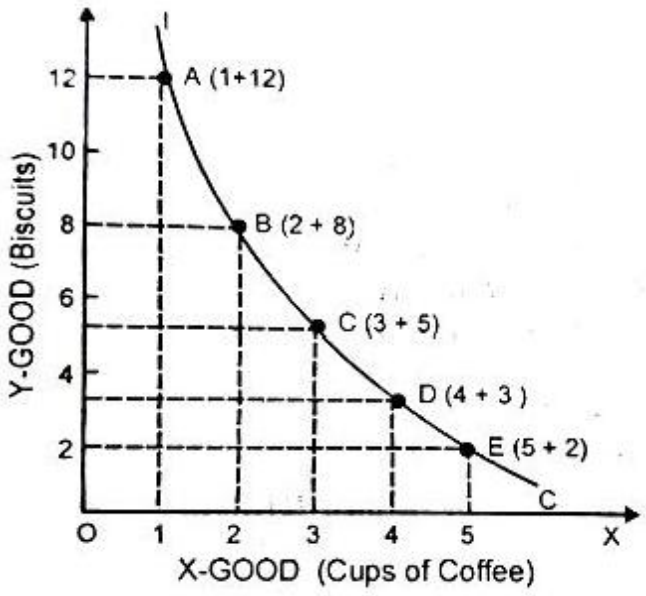

Figure7.1

In the words of **Stonier E. Hague**. *"An indifference curve is thus, like a contour line on a map, which shows all places having the same height above the sea level. Instead of representing height, each indifference curve represents a level of satisfaction."*

7.3.4 Indifference Map

In Fig. 7.l only one indifference curve is shown. But there can be a number of indifference curves for the consumer. A diagram showing a number of indifference corresponding to different indifference schedules of the consumer is indifference map. In other words, a set or family of indifference curves is an indifference map. In this map, a lower indifference curve represents lower level of satisfaction and a higher indifference curve represents higher level of satisfaction.

As is shown in the following figure.

In Figure 7.2 an indifference map of a consumer is shown consists of a consumer is shown which consists of five indifference curves. The consumer

regards all combinations on IC-1 as giving him equal satisfaction. Similarly all combinations lying on IC-II provide the same satisfaction, but the level of satisfaction on IC-II will be greater than the level of satisfaction on IC-I. Likewise, all other higher and higher level of satisfaction. It is evident from the Fig. 7.2 that an indifference curve which is near to the origin O has smaller combinations of x and y having lower levels of satisfaction than the curves which are farther away from the origin.

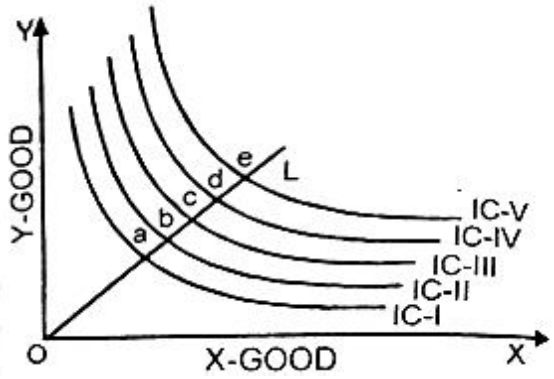

Figure 7.2

A. CHECK YOUR PROGRESS

CASE STUDY

GreenTech Farms is a medium-sized organic farm that produces two primary crops: **organic wheat** and **organic corn**. The company is focused on efficient resource allocation, particularly **labor** (in person-hours) and **land** (in acres).

The farm manager, Mr. Raj, wants to understand how different combinations of labor and land will affect the output of wheat, and he turns to isoquants for this analysis. The farm must maintain a production level of **100 tons of wheat per season**.

Production Technology and Combinations:

Below is a table showing different combinations of **labor (in hours)** and **land (in acres)**, each capable of producing **100 tons** of wheat.

Combinations	Labour (hours)	Land (acres)	Output (tons)
A	1000	50	100
B	800	60	100
C	600	70	100
D	400	90	100

From this table, it is clear that labor and land are substitutable to some extent—if more land is used, the need for labor decreases, and vice versa. These combinations plot an isoquant curve representing the production level of 100 tons of wheat.

Discussion Points and Questions:

1. **Concept of Isoquants:**
   - What is the significance of an isoquant in the context of this case study?
   - How does the isoquant help GreenTech Farms make better production decisions?
2. **Real-World Application:**
   - If labor becomes more expensive due to a wage hike, how should the farm adjust its production strategy?
   - What will happen to the shape of the isoquant if technological improvements reduce the need for labor per acre?

7.4 PROPERTIES OF INDIFFERENCE CURVE

1. Indifference Curves Slope Downward from Left to Right:

Indifference curves have a negative slope. This property shows that any increase in the amount of one commodity is accompanied by a reduction in amount of other commodity. This property is derived from the assumption that both the commodities have **positive marginal utilities**. Addition to total utility on account of more of one commodity, say, 'X'

should be compensated by equivalent reduction in total utility by a reduction in the quantity of other commodity, say, 'Y'

In this way, the total utility or satisfaction will remain the same, which is consistent with the **definition of an indifference curve**. Other possibilities for the shape of an indifference curve (horizontal, vertical, upward sloping, etc.) are ruled out on the ground as these will imply **different levels of satisfaction at different points on the curve.** Let us now explain these…

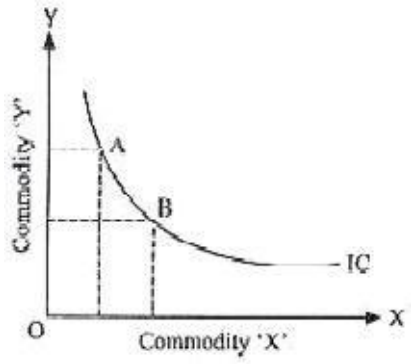

Figure 7.3

- If an indifference curve were horizontal, this would mean that the consumer is indifferent between two combinations (say, 'A' and 'B' in following Fig.7.4 a) both of which contain the same amount of 'Y' but combination 'B' has a greater amount of 'X' than combination 'A'.
- Similarly, if an indifference curve were vertical, this would mean that the two combinations 'A' and 'B' with equivalent satisfaction level have the same amount of 'X', but 'B' contains more 'Y' than 'A'.
- Further, if an indifference curve were upward, this would mean that combinations 'A' and 'B' yield same total satisfaction to the consumer, though combination 'B' contains more amount of commodity 'X' as well as 'Y'.

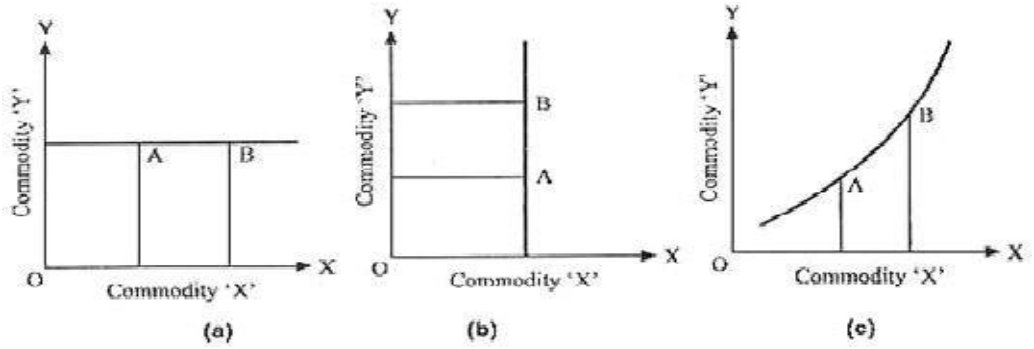

Figure 7.4

A=All the above three situations are contrary to the definition of indifference curves that all points on such curves provide same level of satisfaction to the consumer. In these three situations, the level of satisfaction of the consumer rises, as he moves from point 'A' to point 'B' rightwards (Fig. 7.4 (a)) or upwards (Fig. 7.4 (b), (c)), since he starts consuming more of at least one commodity with such movement, Therefore, indifference curve cannot be horizontal or vertical. Nor can it slope upward to the right. The only possibility, therefore, is that it must slope downwards to the right.

2. Indifference Curves are Convex to Origin:

Indifference curves are convex to the point of origin of the two axes, i.e., in the neighborhood of the point of tangency, the indifference curve must lie above the tangent line. The curve is relatively steep at first in its left hand portion and tends to become flatter in its right hand portion.

Thus, as we move along the curve from left downwards to the right, the absolute slope of the indifference curve decreases. This property of indifference curve is based on the principle of diminishing marginal rate of substitution, explained in the previous section.

In Side Fig.3, as the consumer reduces the consumption of commodity 'Y' and increases the consumption of commodity 'X', his urge for more nits of 'X' declines continuously. On the other hand, he is willing to

leave/sacrifice with fewer and fewer units of commodity 'Y' at each stage to obtain each additional unit of 'X'. In other words, the marginal rate of substitution of 'X' for 'Y' declines, as the consumer moves down on an indifference curve.

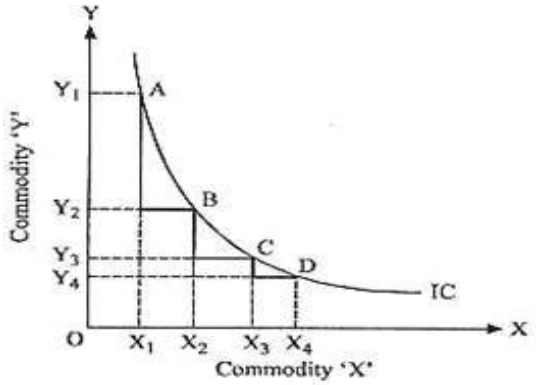

Figure 7.5

Suppose, 'A','B','C', and 'D' are four points on indifference curve IC in above Fig. 7.5. Initially, the consumer is willing to sacrifice Y_1 Y_2 units of commodity 'Y' to get one unit X, X_2 of commodity 'X'. For additional one unit X_2X_3 of 'X', he is ready to sacrifice Y_2 Y_3 units of 'Y'. For next one unit X_3 X_4 of 'X', the consumer would like to give up only Y_3 Y_4 units of 'Y' clearly; the increase in 'X' commodity is uniform, whereas 'Y' commodity is decreasing at a diminishing rate. Symbolically,

$$X_1X_2=X_2X3 = X3X_4, \text{ while, } Y_1Y_2 > Y_2Y_3 > Y_3Y_4$$

Hence, indifference curves are convex to the origin. Concavity of the indifference curves is against the principle of diminishing marginal rate of substitution. Let us consider the following Fig. 7.5 which indicates a concave indifference curve. According to this figure, a consumer is prepared to sacrifice more and more units of commodity 'Y' at each stage to acquire additional units of commodity 'X'.

At point 'A' in the figure, the consumer possesses 1 unit of 'X' and OY, units of 'Y'. To obtain 1 more unit of 'X', he is willing to give up $Y_1 Y_2$ units of 'Y' to acquire further additional units of 'X'; he is ready to part with $Y_2 Y_3$, $Y_3 Y_4$ units of 'Y' and so on.

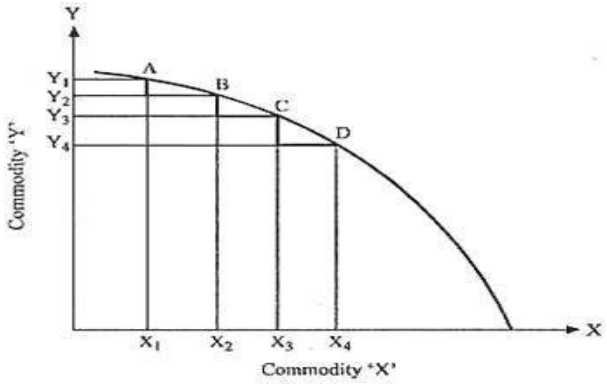

Figure 7.6

Clearly $Y_1 Y_2 < Y_2 Y_3 < Y_3 Y_4$, so a situation of increasing marginal rate of substitution has arisen. Such situation is against general consumer behaviour and implies that as the stock of 'Y' diminishes and that of 'X' increases, the marginal utility of 'Y' should fall. As a result, the consumer would be willing to sacrifice larger and larger units of 'Y' to obtain each additional unit of 'X'. Thus, indifference curves cannot be concave to the origin.

3. Two Indifference Curves cannot Touch or Intersect Each Other:

Intersection of two indifference curves representing different levels of satisfaction is a logical contradication. It would mean that indifference curves representing different levels of satisfaction are showing the same level of satisfaction at the point of intersection or contact (Fig. 7.7).

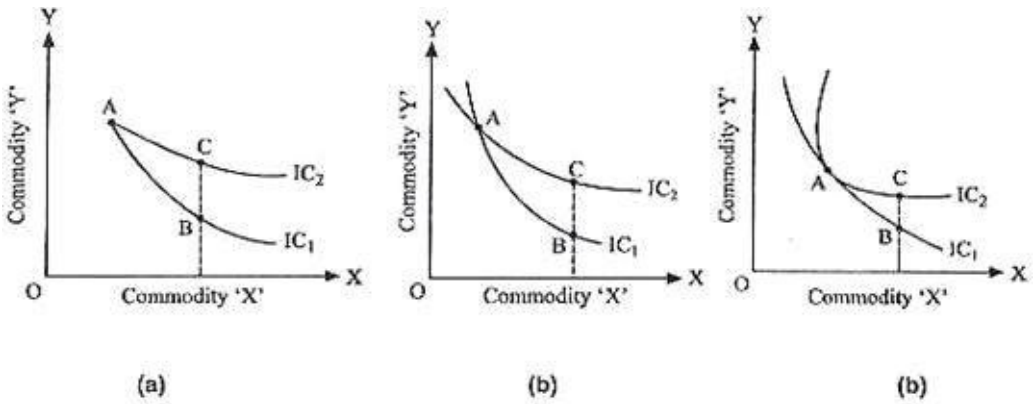

Figure 7.7

We can prove this property of indifference curves through contradiction. Suppose, two indifference curves IC_1 and IC_2 meet (Fig. 7.7 (a), intersect (Fig. 7.7 (b)) or touch (Fig. 7.7 (c)) each other at point 'A' in Fig. 5. Point 'C' is taken just above point 'B', such that it contains same amount of commodity 'X' and more amount of commodity 'Y' Consider points 'B' and 'A' on IC_1 Consumer is indifferent between these points, as both lie on the same indifference curve IC . Further, points 'A' and 'C' lie on the same indifference curve IC implying same level of satisfaction to the consumer.

Now, by the assumption of transitivity, points 'B' and 'C' yield same level of satisfaction to the consumer. But, point 'C' lies on a higher indifference curve having more amount of commodity 'Y'. It must be preferred to point 'B' by the assumption of non-satiety.

Further, intersection of two indifference curves also violates the assumption of positive marginal utilities of the two commodities. In Fig. 7.7, intersection of IC_1 and IC_2 means additional amount of BC has zero utility. Therefore, indifference curves can never intersect or touch each other.

4. Higher Indifference Curves Represent Higher Level of Satisfaction:

An indifference curve, which is nearer to the point of origin represents

smaller combinations of the two commodities, while an indifference curve farther from the point of origin represents larger combinations.

Larger combinations of the two commodities provide greater satisfaction than the smaller combinations of the same commodities. Therefore, greater is the distance of an indifference curve from the point of origin, higher it will be in the consumer's preferential order. In other words, indifference curve that lies above and to the right of another indifference curve denotes preferred combinations of commodities and thus yields higher satisfaction.

In Fig. 7.8, the consumer would prefer to lie on indifference curve IC2 rather than indifference curves IC1 though he is indifferent between all points on IC1 or IC2. Points 'B', 'C' or any point between them on indifference curve IC2 have more of at least one good without having less of the other compared to point 'A' on indifference curve IC1. Therefore, these points on indifference curve IC2 represent higher satisfaction levels. Since all points on an indifference curve represent same level of satisfaction, so all points on IC2 imply higher satisfaction as compared to all points on IC_1. Thus, higher indifference curve suggests higher satisfaction level.

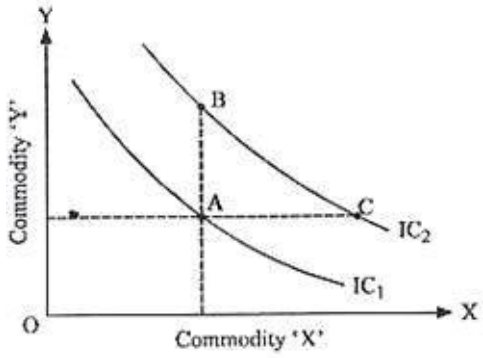

Figure 7.8

5. Indifference Curves need not be parallel to Each Other:

The distance between two indifference curves need not be the same on an indifference map. This is an account of three reasons. First, indifference curves are not based on measurable cardinal utility. Secondly, the marginal rate of substitution for two commodities may not be the same for different indifference curves. Further, the indifference curves have no width and every point in the commodity space has indifference curve through it.

B. CHECK YOUR PROGRESS

Application-Based Questions on Properties of MRS

1. Diminishing MRS:

- **Scenario:** You are consuming two goods: coffee and pastries. You currently have 5 cups of coffee and 2 pastries. As you give up each pastry, you expect to consume more coffee to maintain the same satisfaction.

  Question:

  - Why does the MRS (coffee for pastries) tend to **diminish** with each additional pastry you give up?
  - How does this reflect the property of **diminishing marginal utility**?

2. Convexity of Indifference Curves:

- **Scenario:** Suppose a clothing store offers shirts and jeans as a bundle. A customer initially swaps some jeans for shirts but soon refuses further swaps, preferring more of both goods.

  Question:

  - How does this behavior demonstrate the **convexity** of indifference curves and diminishing MRS?
  - If the MRS remains constant, what shape would the indifference curve take, and what type of goods would it represent?

7.5 **MARGINAL RATE OF SUBSTITUTION**

Marginal Rate of Substitution (MRS) may be defined as the rate at which a consumer will exchange successive units of one commodity for another. Thus the rate at which the consumer is prepared to exchange goods x and y is known as marginal rate of substitution.

In other words, marginal rate of substitution refers to that rate at which, in order to get additional unit of a commodity, the consumer is willing to sacrifice the number of units of another commodity, so that his overall level of satisfaction may remain unchanged.

According to Prof**. Bilas,** "*The marginal rate of substitution of x for y (MRSxy) is defined as the amount of y the consumer is just willing to give up to get one more unit of x and maintain the same level of satisfaction."*

In simple words, marginal rate of substitution of x for y (MRSxy) is the amount of y that will be given up for obtaining each additional unit of x, in order to remain on the same level of satisfaction.

The marginal rate of substitution of x for y (MRSxy) can symbolically be represented as under

$$MRSxy = (-) \Delta Y / \Delta X$$

Here, MRSxy = Marginal rate of substitution of x for y

Δ Y = Chánge in Y commodity

I

Δ X = Chánge in X commodity

MRS is always Negative, because out of the goods, when the quantity of one is increased the quantity of the other is decreased to maintain the same level of satisfaction. But in practice the sign of minus (-) is not taken into consideration.

The Principle of Diminishing Marginal Rate of Substitution has been propounded by Professor Lerner in his book entitled 'Economics of Control';

The law states that as a consumer gets more and more units of commodity 'x', he will be willing to forgo less and less units of commodity 'y in order to remain on the same level of satisfaction. Thereby the marginal rate of substitution of x for y will go on diminishing.

The law can be explained with the help of a schedule and a diagram.

Table 7.2

Combinations	X (Cups of Coffee)	X (Biscuits)	MRS of X for Y
A	1+	12	-
B	2+	8	1x:4y
C	3+	5	1x:3y
D	4+	3	1x:2y
E	5+	2	1x:1y

In this Table 7.2 all the combinations of cups of coffee and biscuits give the same satisfaction to the consumer. If he chooses combination A, he gets 1 cup of coffee and 12 Biscuits. In the combination of B, he gets one more cup of coffee and is prepared to give up five biscuits for it. The marginal rate of substitution (MRS) here is, therefore, 1:5. In the combination of C, he is willing to sacrifice only four biscuits for another cup of Coffee. The MRS falls to 1:4. In combinations of D, E and F the MRS continues to fall to 1:3, 1:2 and 1:1 respectively. This illustrates the diminishing marginal rate of substitution

Diagram: The principle of Diminishing Marginal Rate of Substitution can also be represented in Fig: 7.9

Here, the indifference curve IC slopes downwards from left to right, which indicates that with each successive increase in good 'x' causes 'y' good to diminish less and less. In graphic terms the slope of indifference curve from left to right classifies the law of diminishing marginal rate of substitution. This is shown in Fig. 7.9. When the consumer slides down the curve IC from A to B.

The steps of the staircase are of equi width but of diminishing height from top to bottom. It means, the various points on the curve move to the right by equal distances, but they move down by progressively smaller distances. This is due to the fact that while the number of x good (cups of coffee) increases at the rate of one unit, the number of 'y' good (biscuits) declines at a diminishing rate. The slope of the curve thus represents the law of diminishing marginal rate of substitution.

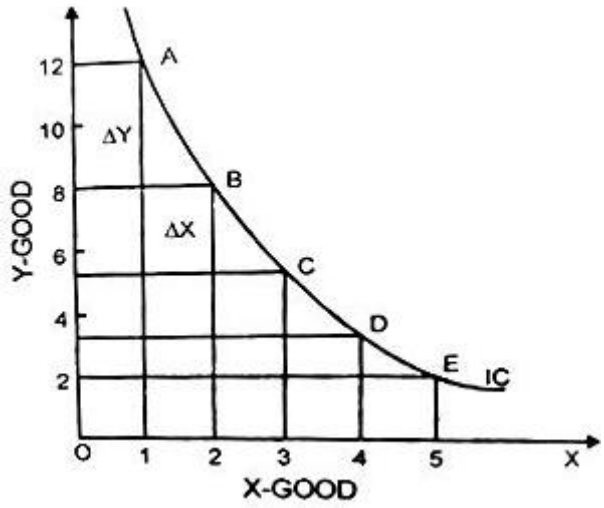

Figure 7.9

C. CHECK YOUR PROGRESS

Situation-Based Questions on Marginal Rate of Substitution (MRS)

Situation 1: Consumer Choice between Streaming Services and Gym Memberships

Scenario:

Ravi has Rs. 2,000 per month to spend on non-essential expenses. His two favorite activities are **watching movies on streaming platforms** (Rs. 500 per subscription) and **going to the gym** (Rs. 1,000 per membership). He tries different combinations to maximize his satisfaction but wants to maintain the same level of happiness.

Questions:

1. **How does MRS change if Ravi reduces one gym membership and adds more streaming subscriptions?**
2. **Explain the concept of diminishing MRS** in the context of Ravi's choice. Why does the utility of each additional streaming service decrease as he gives up more gym sessions?
3. If the price of streaming services increases to Rs. 800, how will Ravi's **optimal consumption bundle** change?

Situation 2: Allocating Time between Studying and Part-Time Work

Scenario:

Priya is a B.Com student who divides her time between **studying for exams** and **working part-time**. For every additional hour of part-time work, she earns Rs. 200, but it reduces her study time, affecting her grades. She needs to strike a balance between both activities to perform well in her exams and earn money.

Questions:

1. **What is Priya's MRS between study time and work hours?** What does this ratio represent?
2. If Priya decides to increase her part-time work by 2 hours, how many study hours would she need to give up to maintain the same academic performance?
3. **At what point will Priya stop substituting study hours with work?** What economic principle applies here?

7.6 LET US SUM UP

The indifference approach in consumer theory revolves around the concept of consumer preferences and the trade-offs they are willing to make between different goods. At the core of this approach are indifference curves, which represent various combinations of two goods that yield the same level of satisfaction or utility to the consumer. An indifference curve schedule is a tabular representation of these combinations, detailing how much of one good a consumer is willing to forego to obtain more of another while remaining equally

satisfied. The graphical representation of this schedule is known as an indifference map, which displays multiple indifference curves, each corresponding to different utility levels.

Indifference curves possess several key properties. Firstly, they are downward sloping, reflecting the trade-off principle; as the quantity of one good increases, the quantity of the other must decrease to maintain the same utility level. Secondly, indifference curves do not intersect, as this would imply contradictory levels of satisfaction. Thirdly, they are convex to the origin, indicating that as a consumer substitutes one good for another, they require increasing amounts of the substituted good to maintain the same level of satisfaction. This is where the concept of the marginal rate of substitution (MRS) comes into play. The MRS represents the rate at which a consumer is willing to exchange one good for another while remaining on the same indifference curve. It is the slope of the indifference curve and diminishes as one moves down the curve, illustrating the principle of diminishing marginal utility; as a consumer has more of one good, they are willing to give up less of the other good for additional units. Overall, the indifference approach provides a comprehensive framework for understanding consumer choices and preferences, illustrating how individuals navigate trade-offs in their consumption behavior.

7.7 GLOSSARY

- **Marginal utility**: The marginal utility of a good or service describes how much pleasure or satisfaction is gained from an increase in consumption.
- **Preference**: Preference is a technical term usually used in relation to choosing between alternatives.
- **Indifference Curve**: An indifference curve is a graphical representation that shows different combinations of two goods that provide the same level of utility or satisfaction to the consumer. Each point on the curve represents a combination of goods between which the consumer is indifferent.

- **Indifference Curve Schedule:** This is a tabular representation of the various combinations of two goods that yield the same utility level. It lists different pairs of quantities of goods, allowing a clearer view of consumer preferences and trade-offs.
- **Diminishing Marginal Utility:** This principle states that as a consumer consumes more units of a good, the additional satisfaction (marginal utility) derived from each additional unit tends to decrease. This concept underlies the shape of the indifference curves and the MRS.

7.8 SELF-ASSESSMENT QUESTIONS

Q1. What is the significance of indifference curves in understanding consumer preferences?

Q2. How do the properties of indifference curves reflect the concept of diminishing marginal utility?

Q3. Provide an example of a real-life situation where a consumer might face trade-offs that can be illustrated using indifference curves.

7.9 LESSON END EXERCISE

Q1. What does the marginal rate of substitution (MRS) represent, and how is it calculated?

Q2. How can businesses use the concepts of indifference curves and MRS to better understand their customers' purchasing decisions?

7.10 SUGGESTED READINGS

- D. N. Dwivedi (2015). Managerial Economics.
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- Maheshwari K. L., Varshney R.L. (2014). Managerial Economics: Text, Problem and Cases. Sultan Chand & Sons.
- Paul, J., Kaushal, L., & Sebastian, V. J. (2012). Managerial Economics. Cengage India.

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M.Com 1st Sem. **UNIT-II (CREDIT: 1)**
Course No. 153 **Lesson No. 8**

REVEALED PREFERENCE THEORY AND THEORY OF CONSUMER CHOICE UNDER RISK

STRUCTURE

8.0 LEARNING OBJECTIVES AND OUTCOMES

Learning Objectives

- To understand the basic concept of revealed preferences and its assumptions.
- To analyse how consumer choices reflect their preferences without the need for utility measurement.
- To understand the concept of risk and uncertainty in consumer decision-making.

Learning Outcomes

After studying this module, you shall be able to

- know the concept of revealed preference theory.
- learn how to the consumers revealed their preference for various goods and services which they consume.
- derive the demand and indifference curves from consumer's revealed preferences.
- evaluate the income and substitution effect of the consumer

8.1 INTRODUCTION

In the previous two chapters the Marshallian utility theory and Hicks-Allen indifference curve theory of demand have been discussed. In both these theories, introspective method has been applied to explain the consumer's behaviour. In other words, both these theories provide psychological explanation of consumer's demand; they derive laws about consumer's demand from how he would react psychologically to certain hypothetical changes in price and incomes. But the Revealed Preference Theory which has been put forward by Paul Samuelson seeks to explain consumer's demand from his actual behaviour in the market in various price-income situations. Thus, in sharp contrast to psychological or introspective explanation Prof. Samuelson's revealed preference theory is behaviouristic explanation of consumer's demand. Besides,

revealed preference theory is based upon the concept of ordinal utility. In other words, revealed preference theory regards utilities to be merely comparable and not quantifiable. Tapas Majumdar has described Samuelson's revealed preference theory as "Behaviourist Ordinalist." The description "Behaviourist Ordinalist" highlights the two basic features of the revealed preference theory: first, it applies behaviouristic method, and secondly it uses the concept of ordinal utility.

Revealed preference theory was propounded by Paul A. Samuelson in 1947 and it was based on the consumer's preferences of different goods and services which are available in the market. He has derived the demand curve of a consumer based on the consumer's budgetary constraints and his preferences revealed in the market without involving any ordinal or cardinal measurement of utility. Let us study this theory in detail.

The revealed preference theory is regarded as "scientific" (meaning behavioristic) explanation of consumer's behaviour as against the psychological explanation provided by Marshallian and Hicks-Allen theories of demand. This shift from psychological to behavioristic explanation of consumer's behaviour is a landmark in the development of the theory of demand. The urge among economists to have scientific explanation led to the emergence of the behaviouristic method which seeks to derive the demand theorem from actually observed consumer's behaviour.

8.2 THE REVEALED PREFERENCE THEORY

Revealed preference theory of consumer behavior is the only theory which has derived the demand curve of the consumer for a commodity from the revealed preference axioms i.e. baskets of different goods which a consumer buys at different prices, without using IC and its restrictive assumptions. Moreover this theory is also capable of establishing the existence of IC and its convexity. Because of its success, it is also known as the "third root of the logical theory of demand".

8.2.1 Assumptions

- **Rationality:** A consumer is always rational i.e. he/she always prefers more of goods and services to derive maximum utility. Thus he always buys the commodity which gives him maximum utility first and then he buys the least utility giving commodity at the end.
- **Transitivity and consistence of choice:** Consumers preferences are always transitive i.e., if a consumer prefers good X over good Y and the same consumer prefers good Y over good Z then according to this assumption of transitivity, he must prefer good X over good Z also.

  If, X>Y

  If, Y>Z

  Therefore, X>Z.

  Whereas as per consistence of choice, if a consumer prefers good X to good Y in one period then he must not prefer good Y to good X in another period or must not treat both the goods as equal. Symbolically,

  If, X>Y in one period

  Then, Y > X or Y ‘“ X in other period.

- **Price inducements:** Given the consumer’s choice for a basket of goods, a consumer can induce to buy a different basket of goods which provide him sufficient price incentives.

A. CHECK YOUR PROGRESS

Multiple Choice Questions

1. Which among them are the assumptions of the Revealed Preference Approach

   a) Constant tastes and preferences b) Strong ordering

   c) Perfect competition d) weak ordering

   Answer: b

2. According to Revealed Preference Theory, if a consumer prefers bundle A over bundle B, what can we infer?

a. The consumer gains more utility from bundle A.

b. Bundle B is more expensive.

c. Bundle A is less costly.

d. Bundle A is chosen even when both bundles are affordable.

Answer: d) Bundle A is chosen even when both bundles are affordable.

True/False:

3. Revealed Preference Theory assumes that consumers always act irrationally.

Answer: False

4. The theory of revealed preference helps economists infer consumer preferences without needing to measure utility.

Answer: True

8.3 REVEALED PREFERENCE AXIOMS

The basic axiom of the revealed preference theory is that "if a consumer chooses one basket of goods, given his budgetary constraints and the alternative baskets of goods of same price, then he reveals his preference. For instance, if there are two baskets A and B, comprising of two goods X and Y and both are equally expensive to the consumer, then if a consumer chooses basket A over B then the consumer is said to reveal his preference for basket A.

He may do so because either he would have a liking for that basket of goods or it is relatively less expensive than the other. But if the consumer chooses one basket over the other because it is cheaper than the other then the consumer is not said to have revealed his preference; he is only said to have revealed his preference for a basket over the other when the price of both the baskets are same and he chooses one basket over the other because he likes that basket over the other. Then only the consumer reveals his preference for one basket over the other.

This can be shown in the following figure 8.1:

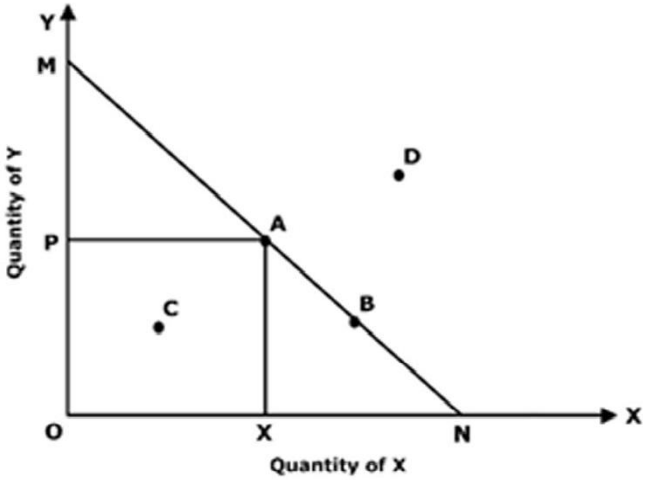

Fig. 8.1

Here in the diagram, the budget line of the consumer is MN where he can choose various baskets of goods (X and Y) given his income and the prices of X and Y. Now if the consumer chooses any basket of good for instance if he chooses basket A which comprises of OX of X and OP of Y then he is said to have revealed his preference for basket A over any other basket which lies on the same budget line. So here the consumer has revealed his preference for A over B. Any basket which lies below the budget line like basket C comprises of cheaper X and Y and the consumer will not revealed his preference for it. Any basket lying above the budget line would be too expensive for the consumer to buy therefore he will also not revealed his preference for that basket (like basket D).

8.4 DECOMPOSITION OF SUBSTITUTION AND INCOME EFFECT AND DERIVATION OF DEMAND CURVE

The price effect and its decomposition into substitution and income effect can also be shown by the revealed preference theory apart from the indifference curve theory. For this lets us assume the budget line as M1N1 on which a consumer chooses bundle A, comprising of AX1 of Y and OX1 of X. Since all

the bundles on this budget line are equally expensive to the consumer but the consumer has revealed his preference for Aover all other bundles lying on this budget line.

Now if the price of X would fall then the budget line will pivot to M1N3 and the consumer shifts to point C. This movement of the consumer from point A to C is known as the price effect. This price effect can now be split into substitution and income effect in the following figure 8.2:

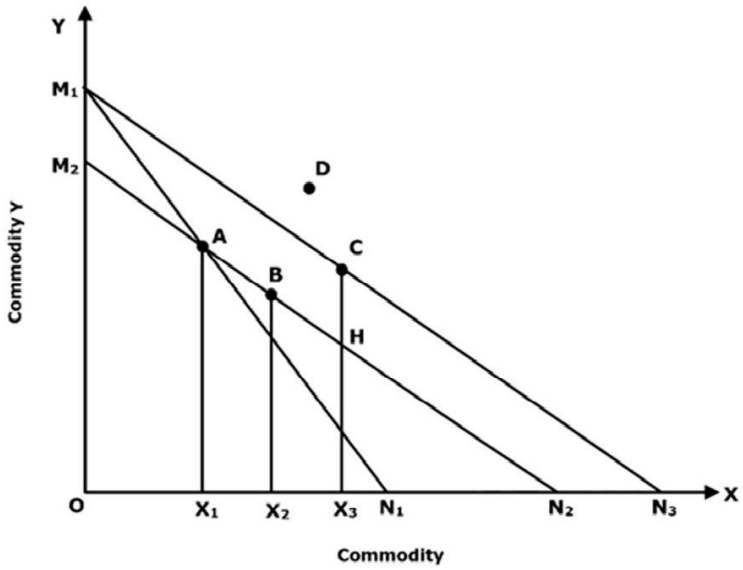

Fig 8.2: Decomposition of Income and substitution effects

This can be done by drawing a budget line M2N2 through point A. note that we are doing the separation based on the Slutskian method. Since the new budget line M2N2 passes through point A so I means that the combination of X and Y are still available to the consumer. Now the consumer response to the change in the price of X could be taken as the bundle which he chooses on this M2N2 budget line.

As it has been seen in the above diagram that the consumer will not choose any bundle lying between M2 A, as all these bundles are inferior to him. He would only choose either A or any bundle lying on the segment A N2

and precisely between point A and H. Now if he would choose basket A, then the substitution effect would be zero and if he chooses basket B then the substitution effect would be X1X2 and the income effect would be X2X3.

Since here the substitution effect is positive thus it implies that when the price of X falls, the demand for X increases, hence the demand curve could be derived from this.

8.5 DERIVATION OF INDIFFERENCE CURVE

As has been explained above that the revealed preference theory is capable of deriving the proofs for the existence of indifference curve and its convexity, it does so using the consumer behavior i.e. a consumer's choice for various goods at various prices. This derivation of the IC is shown in the figure 8.3.

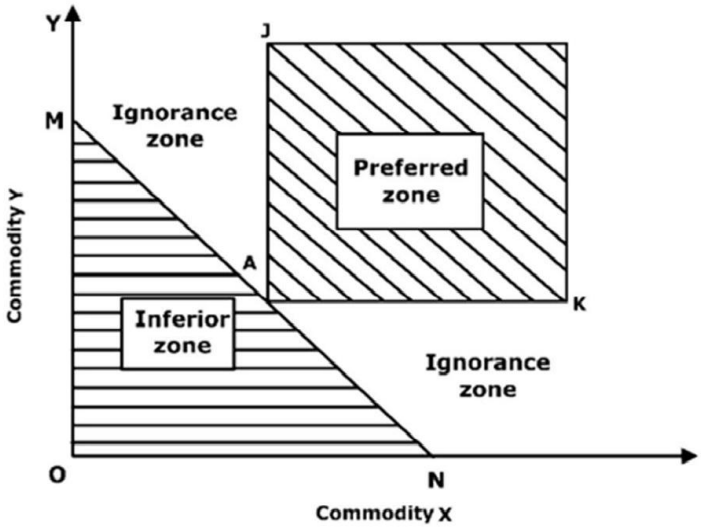

Fig 8.3: Derivation of indifference curve

For this let us assume that the consumer reveals his preference for basket A over the other on the budget line MN. Moreover all the bundles lying below the budget line are inferior to him and thus not preferred by him as they all are

cheaper than A. This is represented as the triangle MON which is marked as inferior zone.

Let us now consider the area above the budget line. This area is divided into three segments namely, JAM, JAK and KAN. The area JAK is the preferred one because any point on JA represents a higher quantity of Y, with the same quantity of X. Similarly any point on AK is preferred as it shows a higher quantity of X, with the same quantity of Y; and area above AK and to the right of AJ represents a basket comprising of more of both the goods X and Y. Therefore, any point on the line AJ, AK and between them is preferred over point A. Hence in the diagram this area is marked as the preferred zone. The areas JAM and KAN are the ignorance zone as any point in these areas represents more of one good and less of the other good as compared to point A. And the consumer's preferences are very difficult to be known in these areas.

Thus it is clear from the above discussion that the consumer's indifference curve will pass through point A, JAM and KAN to retain its convexity.

The course of indifference curve in the ignorance zones can be found out by ranking consumer's choices in these areas. For this let us assume a budget line MN which shifted to PT when the price of X falls and price of Y increases. Now the consumer will either choose B or any bundle on BT segment of this new budget line but since because of the assumption of consistency the consumer cannot choose any point on BP as they all are inferior to him. Now if he chooses B, then any other point on or below PT is inferior B. Thus, any bundle in the area NBT is revealed inferior to B. Hence, the triangle NBT which is a part of the ignorance zone, KAN, is clipped off because the consumer's ranking of this area is now known.

This procedure can be repeated for as many points as we wish to repeat in order to find out the best point and thus the ignorance area can be reduced bit by bit. For instance point C and D. Moreover the same procedure can be done for the upper ignorance zone, JAM, to find points in relation to A in the following Figure 8.4.

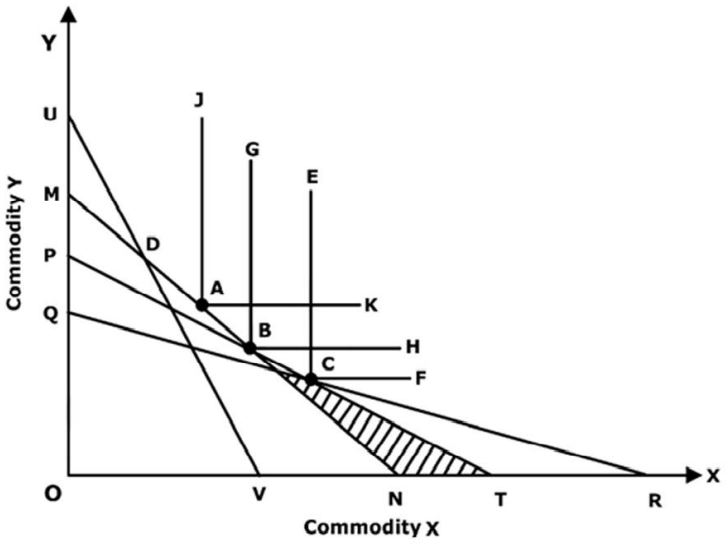

Fig 8.4: Derivation of Indifference Curve

Now if we join all these points, D, A, B, C then we get the offer curve FF' in the following figure 8.5:

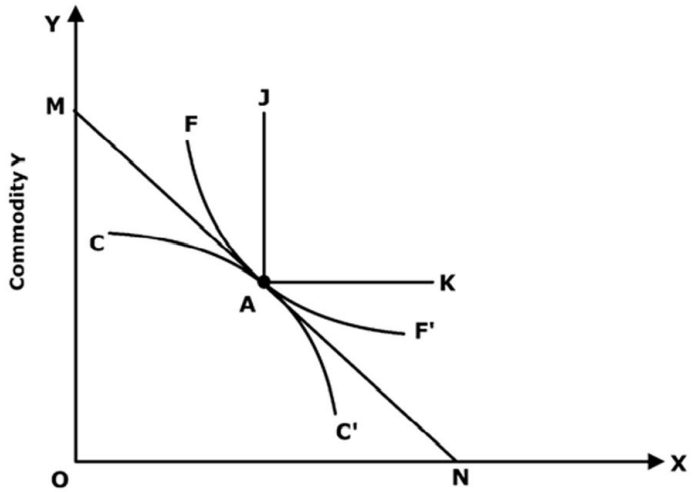

Fig 8.5: Offer Curve

According to Samuelson the position of the offer curve would be the probable position of Indifference curve. He has given the following points in support of this argument.

- The IC cannot be a straight line like MN because when the consumer chooses point A, then it reflects that all other points on MN are inferior to A and hence the consumer cannot be indifferent to point A and to all other points lying on MN.
- All the points below the budget line MN are revealed inferior to A therefore the IC cannot intersects the budget line not it could be concave (as shown in the diagram as CC').
- Since all the points on or above the budget line MN are revealed superior to A, IC cannot pass through the preferred zone JAK. Therefore, the position of the IC would be somewhere between the ignorance zone which pass through A and shown as FF' in the above figure 8.5.

8.6 INDIVIDUAL CHOICE UNDER RISK AND UNCERTAINTY

The modern utility analysis is the outcome of the failure of the indifference curve technique to explain consumer behaviour among risky or uncertain choices. The traditional utility analysis is also concerned with consumer behaviour among riskless choices. Such choices are certain, based as they are on the principle of diminishing marginal utility and on the proportionality rule.

The consumer is certain about his income, tastes and the goods he purchases and maximizes his satisfaction by choosing that combination which gives him the highest total utility. But in reality, many goods and services involve risk or uncertainty, such as investments in shares of stock, insurance and gambling.

It was Neumann and Morgenstem who in their Theory of Games and Economic Behaviour studied the behaviour of an individual in risky situations. Their theory was refined by Friedman and Savage and by Markowitz. The

solution to the problem of risky situations was provided by Daniel Bernoulli who tried to solve St. Petersburg Paradox. We explain these different views on choices involving risk or uncertainty.

8.6.1 The Bernoulli Hypothesis:

The neo-classical theory assumes that the consumer is a rational being who does not indulge in gambling or even in fair bet with 50-50 odds. The reason why people were unwilling to stake even at fair bets was provided by Daniel Bernoulli, the 18th century Swiss mathematician.

Staying in St. Petersburg in 1732 for some time, Bernoulli found that Russians were unwilling to make bets even at better than 50- 50 odds knowing fully that their mathematical expectations of winning money in a particular kind of gamble were greater the more money they bet. This contradiction is known as St. Petersburg Paradox. To explain it, Bernoulli composed the following game.

A coin is tossed and a payment is made to the player, depending upon which toss of the com first comes up 'heads'. If heads occurs on the first toss, the player receives £ 2 and the game stops. If it comes up in the second throw, £22 = £4 is paid and the game stops. If heads appears for the first time after n tosses, £2n is paid to the player. How much would a rational person be willing to pay to take part in this game? Or, what is the expected monetary value of the pay-off to such a game? The expected monetary value of the game is infinite. The probability that heads will occur on the first toss of the coin is 1/2. The probability of obtaining heads for the first time on the nth toss is (1/2)n. Since there is no finite number of throws within which guarantee can be given that a head will occur, the expected pay-off of the game or the expected monetary value of the game,

$$EMV = (1/2)^2 + (1/2)\ ^2 2^2 + (1/2)^3\ 2^3 + \ldots\ldots\ldots\ldots\ldots + (1/2)^{n.2n}$$

Cc

$$= \Sigma\ \text{“}\ n=1\ (1/2)^n\ 2^n = 1+1+1+\quad +1\ldots$$

=infinity.

As the EMV is infinity, a person whose objective is to maximise expected monetary value would be willing to pay everything he has to play the game. Bernoulli resolved the St. Petersburg Paradox by suggesting that the reason why people would not be prepared to pay their entire income to play such a game is that the marginal utility of money diminishes as income rises.

A person who stakes Rs. 100 at even odds of winning or losing Rs. 10 will not play the game if he is a rational being. For if he wins, he will have Rs. 110, which are equal to the gain of utility from Rs. 10 won added to Rs. 100. If he loses, he will have Rs. 90 which is equal to the loss of utility from Rs. 10 lost subtracted from Rs. 100.

Though the monetary gain or loss is equal, the loss in utility is greater than the gain in utility in this game. Thus in Bernoulli's view, rational decisions in the case of risky choices would be made on the basis of expectations of total utility rather than the mathematical expectations of monetary value. This is illustrated in Figure 8.6.

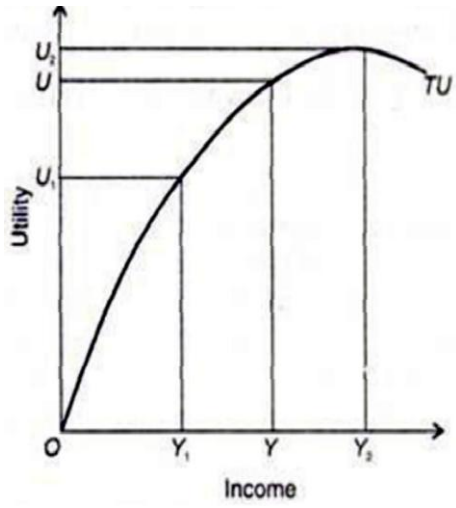

Fig. 8.6

Where TU is the total utility curve which becomes less and less steep at higher levels of income, indicating diminishing marginal utility of income.

Suppose the person is at the income level OY (Rs. 100 in our example) which gives him utility OU. He is considering whether or not to accept a fair bet with a 50-50 probability of either increasing his income to OY2 (Rs. 110) or reducing it to OY1 (Rs. 90) by an equal amount.

He will consider its effect on his utility. If his income increases to OY2 his utility rises to OU2 and if his income decreases to OY1his utility falls to OU1. As is clear from the figure, the loss in utility by UU1 is greater than the gain in utility by UU2 .The loss or gain in total utility refers to marginal utility. Since the expectation of loss in utility is greater than the gain in utility, this person will not accept a fair bet.

Bernoulli's solution to the St. Petersburg Paradox in terms of expected utility instead of expected monetary value of the game led Neumann and Morgenstem to construct their utility index under risky choices.

8.6.2 The Neumann-Morgenstern method of measuring utility

J. Von Neumann and O. Morgenstem in their book Theory' of Games and Economic Behaviour evolved the method of cardinal measurement of expected utility from risky choices which are found in gambling, lottery tickets, etc. For this, they constructed a utility index which is called the N-M utility index.

Assumptions:

The N-M utility index is based on the following assumptions:

1) The individual behaves in risky situations in order tomaximise expected utility.

2) His choices are transitive: if he prefers A prize (win) to Â prize and Â to C, then he prefers A to C.

3) There is probability P which lies between 0 and 1 (0< P< 1) such that the individual is indifferent between prize A which is certain and the lottery tickets offering prizes Ñ and Â with probability P and 1 – P respectively.

4) If two lottery tickets offer the same prizes, the individual prefers the lottery ticket with the higher probability of winning.

5) The individual can completely order probability combinations of uncertain choices.

6) Uncertainty or risk does not possess utility or disutility of its own.

The N-M Utility Index:

Neumann and Morgenstern have suggested the following method of measuring the utility index. "Consider three events, Ñ, A, B, for which the order of individual's preferences is the one stated. Let a be a real number between 0 and 1, such that A is exactly equally desirable with the combined event consisting of a change of probability 1- a for Â and the remaining chance of probability a for C. Then we suggest the use of a as a numerical estimate for the ratio of the preference of A over Â to that of Ñ over B.

Their formula becomes A=B (1- a + aC). Substituting P for a probability, we have A = Â (1 -P) + P.C.

Given the assumptions, it is possible to derive a cardinal utility index based on the above formula.

Suppose there are the three events (lotteries) Ñ, A, B. Out of these, event (lottery) A is certain, Ñ has probability P, and Â probability (1-P), and if their respective utilities are U_a,U_b and U_c then U_a =PU_c (1-P)U_b

Since the consumer is expected to maximize utility, the utility of A with certainty must be equal to some value P, the expected utility of the events (lotteries) Ñ and Â.

In order to construct a utility index based on the N-M equation, we have to assign utility values Ñ and B. These utility values are arbitrary except for the fact that higher value should be assigned to a preferred event (lottery). Suppose we assign the following arbitrary utility values: Uc = 100 utils, Ub =0 util, and P= 4/5 or 0.8, then

$U_a = (4/5)\ 100 + (1-4/5)\ (0)$

$= 80 + (1/5)\ (0) = 80$

Thus the utility index in this situation is

Situation $U_a U_b\ U_c$

1 80 0 100

Proceeding this way, one can derive utility values for Ua, Ub, Uc, etc. and construct a complete N-M utility index for all possible combinations starting from two arbitrary situations involving probabilities of risk.

It's Appraisal:

The N-M utility index provides conceptual measurement of cardinal utility under risky choices. It is meant to be used for making predictions about two or more alternatives relating to gambling, lottery tickets, etc. and out of them which one a person may prefer.

The N-M index is based on the expected values of utilities. It provides a method to measure cardinally the marginal utility of money. But it does not refer to whether the marginal utility of money diminishes or increases. In this sense, this method of measuring utility is incomplete.

But the N-M cardinal utility is different from the neo-classical cardinal utility. It is not like measures of length or weight. Nor does it measure the intensity of introspective satisfaction or pleasure from goods and services, as is the case with the neo-classical utility'. The N-M method of measuring utility analyses the actions of a person making risky choices.

Despite the fact that there is arbitrariness in computing the N-M utility index, it is measurable upto a linear transformation. It does not involve additively but permits ordinal measurement of relative preferences of risky choices.

8.6.3 The Friedman-Savage Hypothesis:

The Neumann-Morgenstern method is based on the expected values of utilities and therefore, does not refer to whether the marginal utility of money

diminishes or increases. In this respect, this method of measuring utility is incomplete. When a person gets an insurance policy, he pays to escape or avoid risk. But when he buys a lottery ticket, he gets a small chance of a large gain.

Thus he assumes risk. Some people indulge both in buying insurance and gambling and thus they both avoid and choose risks. Why'? The answer has been provided by the Freedman Savage Hypothesis as an extension of the N-M method.

It states that marginal utility of money diminishes for incomes below some level, it increases for incomes between that level and some higher level of income, and again diminishes for all incomes above that higher level. This is illustrated in Figure 8.7 in terms of the total utility curve TU where utility is plotted on the vertical axis and income on the horizontal axis.

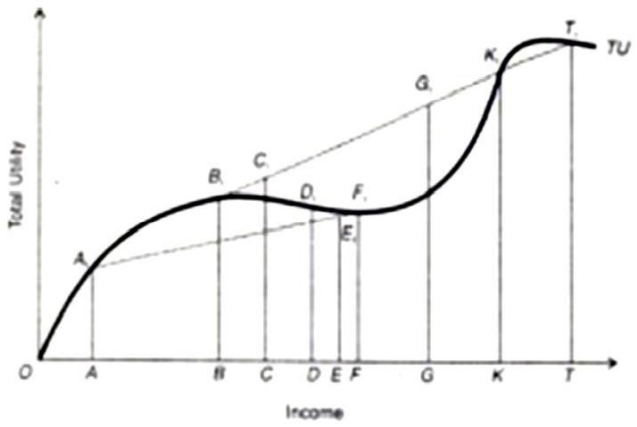

Figure 8.7

Suppose a person buys insurance for his house against the small chance of a heavy loss from fire and also buys a lottery ticket which offers a small chance of a large win. Such a conflicting behaviour of a person who buys insurance and also gambles has been shown by Friedman and Savage with a total utility curve. Such a curve first rises at a diminishing rate so that the marginal utility of money declines and then it rises at an increasing rate so that the marginal utility of income increases.

The curve TU in the figure first rises facing downward up to point F1and then facing upward up to point K1 .Suppose the person's income from his house is OF with FF1 utility without a fire. Now he buys insurance to avoid risk from a fire. If the house is burnt down by fire, his income is reduced to OA with AA utility. By joining points A1 and F1, we get utility points between these two uncertain income situations. If the probability of no fire is P, then the expected income of this person on the basis of the N-M utility index is

$$Y = P\ (OF) + (1 - P)\ (OA).$$

Let the expected income (Y) of the person be OE, then its utility is EE1 on the dashed line At Fr Now assume that the cost of insurance, (insurance premium) is FD. Thus the person's assured income with insurance is OD (= OF-FD) which gives him greater utility DD1 than EE1from expected income OE with probability of no fire. Therefore, the person will buy insurance to avoid risk and have the assured income OD by paying FD premium in case his house is burnt down by fire.

With OD income left with the person after buying insurance of the house against fire, he decides to purchase a lottery ticket which costs DB. If he does not win, his income would fall to OB with utility BB1. If he wins, his income would increase to OK with utility KK1 Thus his expected income with probability P' of not winning the lottery is

$$Y1 = P'(OB) + (1 - P')\ (OK)$$

Let the expected income F, of the person be ÎÑ, then its utility is CC1 on the dashed line B1K1which gives him greater utility (CC1) by purchasing the lottery ticket than DD1 if he had not bought it. Thus the person will also buy the ticket along with insurance for the house against fire.

Let us take OG expected income in the rising portion F1K1 of the TU curve when the marginal utility of income is increasing. In this case, the utility of buying the lottery ticket is GG1which is greater than DD1 if he were not to buy the lottery. Thus he will stake his money on the lottery.

In the last stage when the expected income of the person is more than

OK in the region K1T1of the TU curve, the marginal utility of income is declining and consequently, he is not willing to undertake risks in buying lottery tickets or in other risky investments except at favorable odds. This region explains St. Petersburg Paradox.

Friedman and Savage believe that the TU curve describes the attitudes of people towards risks in different socio-economic groups. However, they recognise many differences between persons even in the same socio-economic group. Some are habitual gamblers while others avoid risks. Still, Friedman and Savage believe that the curve describes the propensities of the main groups.

According to them, people in the middle income group with increasing marginal utility of income are those who are willing to take risks to improve their lot. If they succeed in their efforts in having more money by taking risks, they lift themselves up into the next higher socioeconomic group. They do not want just more consumer goods. Rather, they want to rise in the social scale and to change their patterns of life. That is why, the marginal utility of income increases for them.

8.6.4 The Markowitz Hypothesis:

Prof. Markowitz found the Friedman-Savage hypothesis contrary to common observations. According to him, it is not correct to say that the poor and the rich are unwilling to gamble and take risks except at favourable odds. Rather, both purchase lotteries and gamble on horse races. They also play the games at casinos and gamble alike in the stock market.

Thus Friedman and Savage failed to observe the actual behaviour of the poor and the rich because they assume that the marginal utility of income depends on the absolute level of income. Markowitz has modified it by relating the marginal utility of income to changes in the level of present income.

According to Markowitz, when income increases by a small increment, it leads to increasing marginal utility of income. But large increases in income lead to diminishing marginal utility of income. That is why at higher levels of

income people are reluctant to indulge in gambling even at fair bets and people in slowly rising income groups indulge in gambling to improve their position.

On the other hand, when there are small decreases in income, the marginal utility of income rises. But large decreases in income lead to diminishing marginal utility of income. That is why people insure against small losses but indulge in gambling where large losses are involved.

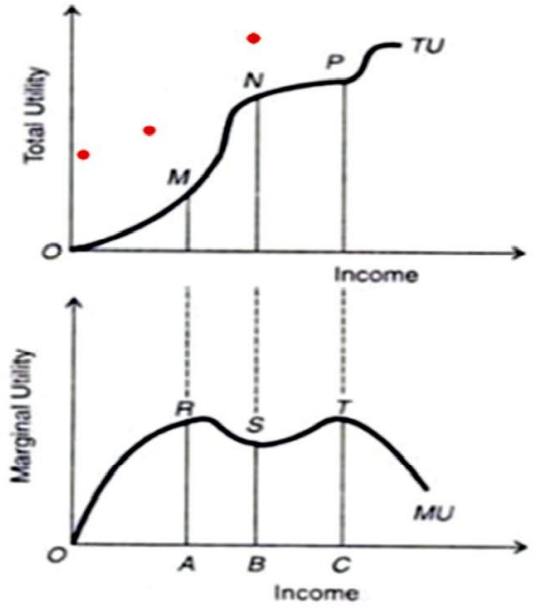

Figure 8.8

This is called the Markowitz hypothesis which is explained in **Figure 8.8** where Markowitz takes three inflexion points M, N and P in the upper portion of the diagram with present income at the middle point N on the TU curve of income.

The marginal utility of income curve MU is derived in the lower portion of the diagram where the present income level is OB. With a small increase in the income of a person from OB to ÎÑ, the marginal utility of income increases from point S to T on the MU curve. But large increases in income beyond ÎÑ lead to diminishing marginal utility of income from point T onwards along the MU curve.

On the other hand, small decreases in income from OB to Î A lead to increasing marginal utility of income from S to R on the MU curve. But large decreases in income to the left of A lead to diminishing marginal utility of income from point R towards Î along the MU curve.

The Markowitz hypothesis is an improvement over the Friedman-Savage hypothesis. Instead of the absolute level of income, it takes the present level of income of a person. It suggests that a person's behaviour towards insurance and gambling is the same whether he is poor or rich. The emphasis is on small or large increases or decreases in the present income of a person that determines his behaviour towards insurance and gambling.

Critical Appraisal of Modern Utility Analysis:

In the modem utility analysis of risk or uncertainty, the Neumann and Morgenstem hypothesis implies measurable utility up to a linear transformation thereby reintroducing diminishing or increasing marginal utility. The Friedman-Savage hypothesis contains an added element.

It attempts to explain the shape of the curve of total utility of income. These hypotheses are thus attempts to rehabilitate the measurement of utility. But the N-M theory of risky choices along with its variants like the Friedman- Savage hypothesis and Markowitz hypothesis ate still a subject of controversy on two counts; firstly, from the practical standpoint, and secondly, whether it is a cardinal or an ordinal method.

Firstly, it is doubtful if risk is measurable when Neumann and Morgenstem assume that the risk does not possess any utility or disutility of its own, they ignore the pleasures or pains of uncertainty- bearing. Secondly, in the majority of individual choices the element of uncertainty is very little. Thirdly, individual choices are of an infinite variety. Guaranteed that they are uncertain, it is possible to measure them with the N-M method? Lastly, it does not measure the 'strength of feelings' of individuals towards goods and services under uncertain choices.

The question whether the N-M method measures utility cardinally or

ordinally, there is great confusion among economists. Robertson in his Utility and All That uses it in the cardinal sense, while Profs. Baumol, Fellner and others are of the view that the ranking of utility makes it ordinal. According to Baumol, the N-M theory has nothing in common with the neo-classical theory regarding cardinality.

In the neo-classical theory the word "cardinal" is used to denote introspective absolute marginal measurement of utility while in this theory it is used operationally. In the N-M theory, utility numbers are assigned to lottery tickets according to a person's ranking of the prizes and the prediction is made numerically as to which of the two tickets will be chosen. Though the NM formula is used to derive the utility index, yet it says nothing about diminishing marginal utility. Thus the N-M utility is not the neoclassical cardinal utility.

The refinements made by Friedman-Savage and Markowitz have tendered to drop the neo-classical assumption that the marginal utility of income diminishes for all ranges of income. Thus the theory of measurement of utility under risky choices is superior to the neo-classical introspective cardinalism of certain choices.

Economists like Dorfman, Samuelson and Solow have derived the Paretian indices of utility from the N-M formula. And when the N-M index based on individual ranking is constructed, it conveys information about his preferences. Baumol uses further the N-M measurement in the ordinal sense when he equates the N-M marginal utility with the marginal rate of substitution. He writes: "The N-M marginal utility X of ends up as no more than the marginal rate of substitution between and the probability of winning the pre-specified prize (E) of the standard lottery ticket. This is surely not cardinal measurement in the classical sense.

B. CHECK YOUR PROGRESS

Multiple Choice Questions

1. Which of the following concepts explains how individuals make choices under risk?

   a) Expected Utility Theory

   b) Revealed Preference Theory

   c) Law of Diminishing Marginal Utility

   d) Pareto Efficiency

   Answer: a) Expected Utility Theory

2. According to the Expected Utility Theory, individuals make decisions based on:

   a) The option that provides the highest possible payoff

   b) The expected value of the payoff, considering probabilities

   c) The outcome that minimizes risk

   d) The option with the lowest cost

   Answer: b) The expected value of the payoff, considering probabilities

3. In the context of risk aversion, which utility function represents a risk-averse individual?

   a) Linear utility function

   b) Convex utility function

   c) Concave utility function

   d) Exponential utility function

   Answer: c) Concave utility function

8.7 LET US SUM UP

The Revealed Preference Theory (RPT) and the Theory of Consumer Choice under Risk are both fundamental frameworks in understanding consumer behavior, each offering unique insights into how individuals make decisions. The Revealed Preference Theory, developed by economist Paul Samuelson, proposes that we can infer consumer preferences by analyzing their actual purchasing decisions. Rather than depending on subjective measures of utility, RPT assumes that when a consumer chooses one bundle of goods over another, they reveal their preference for that bundle, given their budget constraint. This theory avoids direct utility calculations, relying instead on observable choices,

making it more practical for real-world analysis. By examining different choices made under various budget scenarios, RPT helps economists understand the underlying preference structures that guide consumer behavior.

On the other hand, the Theory of Consumer Choice under Risk addresses how consumers make decisions when faced with uncertain outcomes. Unlike RPT, which operates under the assumption of certainty, this theory examines how consumers evaluate alternatives when the results of their choices are unknown and subject to risk. In situations where outcomes are probabilistic, consumers may use models like the Expected Utility Theory, where they assign probabilities to different outcomes and make decisions that maximize their expected utility. Alternatively, Prospect Theory, introduced by Daniel Kahneman and Amos Tversky, suggests that individuals tend to evaluate gains and losses relative to a reference point rather than in absolute terms, often exhibiting loss aversion. This means that consumers may behave differently in risk-laden environments, giving more weight to potential losses than equivalent gains, leading to risk-averse or risk-seeking behavior.

Both theories are essential for understanding different aspects of consumer decision-making. While RPT focuses on choices under certainty and budget constraints, offering a more direct observation-based approach to preference analysis, the Theory of Consumer Choice under Risk explores the psychological and behavioral dimensions of decision-making in uncertain environments. Together, these frameworks provide a comprehensive view of consumer behavior, from rational decisions based on budget constraints to more complex choices influenced by risk and uncertainty.

8.8 GLOSSARY

- **Revealed Preference Theory:** A theory developed by economist Paul Samuelson that analyzes consumer behavior based on their choices. It assumes that consumers reveal their preferences through their purchasing decisions, assuming they prefer the chosen goods over others that were available but not chosen.

- **Consumer Choice:** The decision-making process by which consumers select goods or services from various alternatives based on their preferences, budget, and constraints.
- **Rational Choice Theory:** The assumption that consumers are rational and will always choose the combination of goods that maximizes their utility given their budget constraint.

8.9 SELF-ASSESSMENT QUESTIONS

Q1. Revealed preference theory makes a major advancement in the study of consumer's behaviour. Discuss.

Q2. What is meant by 'revealed preference hypothesis'? Explain Samuelson's revealed preference theory of demand based on it.

Q3. Revealed preference theory makes a major advancement in the study of consumer's behaviour. Discuss.

8.10 LESSON END EXERCISE

Q1. To what extent do consumers always make rational decisions according to their revealed preferences in real life?

Q2. How does Revealed Preference Theory account for changes in consumer preferences over time, and how should businesses adapt to such changes?

Q3. How do consumers balance risk and reward when making financial decisions, and what role does this play in shaping markets?

Q4. How should policymakers regulate financial markets to ensure that consumers are not exposed to unnecessary risks in investment decisions?

8.11 SUGGESTED READINGS

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DEMAND ESTIMATION FOR MAJOR CONSUMER DURABLE AND NON DURABLE PRODUCTS

STRUCTURE

9.0 LEARNING OBJECTIVES AND OUTCOMES

Learning Objectives

- To make understanding about the concept of demand estimation;
- To give an overview about the concept of durable and non-durable goods;
- To make the learners familiar with determinants of durable and non-durable goods; and

- To impart knowledge regarding techniques to estimate durable and non-durable goods.

Learning Outcomes

After the completion of this lesson, the student will be able to:

- conceptualise the demand concept;
- understand the durable and non-durable goods;
- comprehend the determinants of durable and non-durable goods; and
- apprehend the techniques of demand estimation.

9.1 INTRODUCTION

With the continuous inflow of disposable income and the advancement of technology, the consumption is rapidly changing as growing number of people through-out the world strive to acquire the greater number and range of products available. This is because global consumer goods industry and the international retail companies are constantly changing. The consumer goods can be categorized as durable and non-durable goods. The consumer goods refer to those goods which can be used for final consumption. The distinction between durable and non-durable goods is purely arbitrary. Both the terms are pretty much self-explanatory. Durable goods are those which can be used several times, whereas non-durable goods are those typically meant for single use only. This in turn is leading to a strong competition among the different consumer durable brands available in the nation. When a new durable is introduced initially a small fraction of the population will purchase it and gradually its potential buyers will increase. This will continue till all the potential buyers own it. This led to the diffusion of durables. This happens because of the outcome of the interaction of a number of quantitative and qualitative factors. Some durables become outdated which are no longer in demand due to availability of better substitutes. Consumer

durables refer to those consumer goods that do not quickly wear out and yields utility over a long period of time. Some of the popular and common examples of these kinds of items are electronic goods, kitchen appliances, home furnishings and leisure equipment etc. The demand estimation for major consumer durable and non-durable products under managerial economics is that non-durable products are purchased only for current consumption whereas durable products can be stored. However, their price fluctuates and they are dependent on the consumer's expectations, change in technology, and changes in their rates in the future.

9.2 CONCEPT OF DURABLE GOODS

Durable goods are a category of tangible products with long economic life, usually more than three years. One can use or consume them repeatedly and continuously during their economic life. During that period, you can continue to use them with little or no loss of utility or benefit from the product. Manufactured products such as washing machines and cars are great examples of durable goods. Because they have a longer useful life, durable goods are usually expensive. Some consumers buy it not in cash but on credit. Also, durable goods shopping is a secondary type of purchase. When the budget drops, they are the first option for savings. In economics durable goods are defined as those goods that go on yielding services to the consumers over a number of periods in future. Further, because of their durability they can be stored for longer periods of time. It is due to the use of services of durable goods for a relatively long term that consumers' demand for them is more volatile, that is, fluctuates very much. The use of durable goods is not limited to single use only; in fact, they are long-lasting goods that can withstand the test of time without losing their functionality. Durable goods can be used several times, usually more than three years, before they start to lose their utility. Durable goods orders give a better understanding of the supply chain than most indicators. It can be very useful in helping investors understand corporate earnings in industries, such as technology manufacturing, machinery, and

transportation. Investors and analysts usually use several months of data and average it rather than just using data of a single month. As investment prices are a reflection of economic growth, investors use durable goods orders and other indicators to identify trends in the market. Orders for industrial machinery can indicate how busy industries are likely to be in the future. Orders placed in current months can lead to busy industries over the next few months. Durable goods orders give a thorough understanding of the manufacturing sector, which is a major sector of the economy.

Examples of durable goods include:

- Consumer electronics: laptops, cellphones, televisions, and radios.
- Home and office equipment and furniture: tables, chairs, washing machine, rice cooker, refrigerator, and air conditioner.
- Garden tools: shovels, weeds, garden hoe, pruning shears
- Motorized vehicles: cars and motorbikes.
- Photographic equipment: cameras and equipment for taking photos.
- Sports equipment: bicycles, helmets, golf sticks.
- Accessories: handbags, wallets, luggage, jewelry, and watches.

Importance 0f Durable Goods

1. **Economic indicators:** Expenditures on durable goods are an important economic indicator. This is a signal of optimism and pessimism regarding future economic conditions. Households and businesses are more cautious and require careful planning to buy durable goods. Households consider their current and future financial and employment conditions. Businesses consider their current and future profit condition. And, in general, both have to do with the future prospects for the economy.
2. **Economic cycle:** During the initial recession, spending on durable goods fell. That is the main target for savings. Households delay purchases because they see their financial and employment prospects deteriorate.

The businesses will then respond. They are likely to cancel purchases of capital goods considering weak consumer demand.

3. **Stock investment:** Investors often track orders for durable goods to provide guidance on the economic outlook. Purchases of durable goods generally indicate the economy is improving as households and businesses are optimistic about their finances. Investors then start collecting company shares and expect an increase in share prices in the future.

9.3 CONCEPT OF NON-DURABLE GOODS

Non-durable goods are not meant for repeated use and in fact, they start to wear out after the first use itself. Non-durable goods are soft goods that can be used only once and their utility is exhausted after the first use. These are goods that are intended to be used for a very short period of time. According to the United States Bureau of Economic Analysis, non-durable goods are those considered to be used within three years and must be bought again in succession for use. These are also called consumable goods because they cannot be consumed more than once. Examples of these goods are sweets, packaged foods, cosmetics, beverages, office supplies, tobacco, clothing, footwear, light bulbs, detergent, etc. Unlike durable goods, these are generally not rented and can be only bought. And they have a very limited lifespan of less than three years.Non- durable goods are products that should be consumed immediately or that have a short shelf-life. Non-durable goods are products consumers purchase with the plan to use for a short period of time. Also referred to as consumable goods, most non-durable goods are expected to be consumed or used in three years or less. Because of this basic characteristic, non-durable goods can be a wide variety of products. There are essentially three types of non-durable goods. They may be literally consumed, as with food and drinks. They can also be utilized until they are gone, such as deodorant, toothpaste or dish soap. The third type of non-durable good is a product that is used and no longer needed, intended for one use, or wears out from normal use, such as socks, paper plates and light bulbs. the demand for these goods remains constant throughout

economic growth and setback. Consumers normally purchase the same amount of non-durable goods as durable goods, during both recession and growth. Non-durable goods are not meant for repeated use. In fact, they can be used only once and they lose their ability to function after first use. They tend to be useless after first use.

Examples of nondurable goods:

Food: vegetables, fruit, meat, and canned food Beverages: soft drinks and mineral water.

Household and office products: soap, detergent, shampoo, tissue, ink, and paper.

Personal products: cosmetics and perfumes.

Characteristics of Non-Durable Goods

1. The useful life of these goods is short, usually less than three years. In fact, for some products, such as food, they are only a few days old and consumed once. Meanwhile, some others are longer, and they are good nondurable.
2. Consumers regularly buy because non-durable goods have a relatively short life span. So, consumers will buy them more frequently, maybe once a week.
3. Prices are relatively cheap. To buy it, consumers usually pay in cash rather than on credit or rely on loans.
4. Nondurable items such as food and beverages are not rented.
5. Consumers usually buy it to meet primary needs of their lives, such as food and beverages as they are essential for survival.
6. Buying non-durable goods fall into the category of demand for consumption goods. This means that consumers spend money to receive the benefits as soon as possible.
7. Consumers are less planning for spending. In fact, for some items, they

buy them impulsively. I mean, they buy when they see them without any prior intentions or plans. An example is buying candy when you are near the checkout counter.

A. CHECK YOUR PROGRESS

1: **Case Study on Demand Estimation**

Title: Demand Estimation for a New Beverage Product

Background: Fresh Sip Pvt. Ltd., a beverage company, is planning to launch a new flavored water product targeting health-conscious consumers. The product will contain no sugar and be enriched with essential vitamins. Before entering the market, the company needs to estimate the potential demand to avoid underproduction or excess inventory. The company must identify key factors influencing demand and use appropriate estimation methods to predict the sales for the next six months.

Objective: Estimate the demand for the new product and suggest strategies for effective production planning.

Key Variables Affecting Demand:

1. **Price of the product (P):** The price per unit (bottle).
2. **Income level of consumers (Y):** Measured by average monthly household income.
3. **Price of substitutes (Ps):** Price of competitive drinks, such as juice or soda.
4. **Advertisement expenditure (A):** Monthly expenditure on advertisements.
5. **Seasonal factors (S):** Demand may vary with seasons.

Questions Based on the Case Study: Demand Estimation for FreshSip's New Beverage Product

Conceptual Questions

1. What is the role of demand estimation in business decision-making?
2. Why is it important to consider multiple factors (like income, advertisement, and price of substitutes) in demand estimation?
3. Explain the meaning of a normal good and how this concept is reflected in the case study.

4. What is cross-elasticity of demand? How does the case study illustrate this concept?
5. How do seasonal factors influence demand, and how did the company account for this in the model?

9.4 DIFFERENCE BETWEEN DURABLE AND NON-DURABLE GOODS

Durable goods	Non-durable goods
These are tangible products that can withstand the test of time and can be used several times before they start to deteriorate. These are long- lasting products that last for a really long time (more than three years) without losing its ability to function.	These are consumable goods with a limited life span which means they last no longer than three years. These are goods that are intended to be used for a very short period of time.
The use of durable goods is not limited to single use only, in fact, they are long lasting goods that can with stand the test of time without losing their functionality. They can be used several times, usually more than three years, before they start to lose their utility. The demand for durable goods usually during economic and goes down recession.	Non-durable goods can be used only once and they lose their ability to function after first use. They tend to be useless after first use. The demand for non-durable remains constant throughout economic growth and set back.
Examples include cars, furniture, appliances consumer electronics, tools supplies and equipment, sporting goods, jewellery, etc.	Example include packaged foods, cosmetics, beverages, office supplies, tobacco, clothing, footwear, light bulbs, detergent, etc.

9.5 DEMAND ESTIMATION FOR DURABLE GOODS

These goods can be consumed be a number of times or repeatedly used without much loss to their utility. These includes goods like car, air-conditioners, refrigerators, furniture, etc. After their prolonged use, consumers have a choice, either these could be in future consumed after necessary repairs or could be disposed of and replaced by new ones. How a consumer will exercise his choice, depends upon the factors as follows:

a) Whether a consumer will go for the replacement of a durable good or keep on using it after necessary repairs depends upon his social status, level of money income, taste, availability of spares and service centres, maintenance cost, etc. Replacement demand tends to grow with increase in the stock of a commodity with the customers. The firm can estimate the average replacement cost with the help of an life-expectancy tables of the establishment products.

b) Demands for consumer durables depends upon the availability of allied facilities. For example, the use of refrigerator, TV, and air-conditioner needs regular supply of electricity; the use of car needs availability of petrol and roads. While forecasting demand for consumer durables, the availability of allied services and their cost should also be taken into consideration.

c) Most consumer durables are consumed in common by the members of a family. For example, residental house, T.V., refrigerator, etc., are used in common by households. Demand forecasts for goods commonly used should take into account the number of households rather than total size of population. While estimating the numbers of households, the income of household, composition, of family, i.e., number of adults and children, sex composition, etc., should be taken into consideration.

d) Demand for consumer durables is very much influenced by their prices and the credit facilities available to buy them. Consumer durables are very sensitive to price changes. A slight fall in their price may bring

large increase in demand. This, however, is not true of very expensive items.

Sometimes, availability of credit facilities, instalment payment, etc., can offset the effect of a price increase on the demand. For example, easy housing loan and car loan facility to government employees in India has brought a significant increase in the demand for building materials and cars. Several firms dealing, in automobiles, refrigerators, TVs and VCRs have started giving hire-purchase facilities to the consumers with the objective of promoting their sales.

Demand forecasting of consumer durables is not an easy task. Consumer durables are not purchased spontaneously but sporadically after a great deal of deliberation among the members of a household. Any information as regards the introduction of new model or new technology may lead to postponement of their purchases.

Methods of Estimating Demand for Durable Goods

1. **Trend Analysis:** Involves studying past sales data to identify patterns and forecast future demand.
   - **Econometric Models:** Statistical techniques such as regression analysis are used to quantify the relationship between demand and influencing factors like income, prices, or credit availability.
   - **Market Surveys and Consumer Intention Studies:** Surveys help assess consumer willingness to purchase products in the near future. This method is useful for understanding market sentiment and estimating potential sales.
2. **Leading Indicators:** Analyzing economic indicators such as GDP growth, employment levels, and credit conditions to predict the demand for durable goods.
3. **Input-Output Analysis:** Used to estimate the interdependencies between industries. For instance, increased demand for housing might lead to higher demand for home appliances and furniture.

4. **Replacement Demand Analysis:** Estimation based on the average life cycle of the product. If a product has a 5-year lifespan, a wave of replacement demand will emerge at the end of five years.

B. CHECK YOUR PROGRESS

Analytical and Application-Based Questions.

1. How can businesses use time-series analysis to forecast demand for durable goods?
2. What role does regression analysis play in the estimation of demand for non-durable goods?
3. Explain how income elasticity affects the demand for both durable and non-durable goods.
4. What are the key economic indicators that influence the demand for durable goods? How should businesses respond to these changes?

9.6 DEMAND ESTIMATION FOR NON-DURABLE GOODS

In the preceding lessons we have already discussed the determinants of demand in general. Here, we shall discuss the determinants of demand for specific categories of commodities, viz., non-durable consumer goods, durable consumer goods and capital goods.

These are also known as 'single-use consumer goods' or 'perishable consumer goods.' These vanish after a single act of consumption. These include goods like food, milk, medicine, fruits, cigarette, etc. Demand for these goods depends upon households' disposable income, price of the commodity and its related goods and population and its characteristics. Symbolically,

$$D_N = f(Y,S,P)$$

where, D_N, is the demand for commodity N; Y is the households disposable income; S is the population;, and P is the price of commodity N and the price of its related goods.

(i) **Disposable Income**, expressed as DN = f(Y), i.e., other things being equal, demand for commodity N depends upon the disposable income of the household. Disposable income of a household is estimated after the deduction of personal taxes from the personal income. Disposable income gives an idea about the purchasing power of a household. In developing economies data relating to disposable income is generally not available.

(ii) **Price,** expressed as D f(P), i.e., other things being equal, demand (i.e, its complements and substitutes). While the demand for a commodity is inversely related to its own price and the price of its complements, it is positively related to its substitutes. Price elasticities and cross elasticities of non-durable goods help in their demand forecasting.

(iii) **Population**, expressed as D_N f(S), i.e., other things being equal, demand for commodity

N depends upon the size of population and its composition. Besides, population can also be classified on the basis of rural and urban ratio, sex-ratio, literacy, social status, etc. Demand for non-durable consumer goods is influenced by all these factors. For the general demand forecasting as a whole is considered while for specific demand forecasting division of population according to different characteristics proves to be more useful.

Methods of Estimating Demand for Non-Durable Goods

1. **Trend Analysis and Time Series Forecasting:** Trend analysis examines past sales data to identify patterns and seasonal trends. Time series forecasting uses methods such as moving averages or exponential smoothing to predict future demand.

Example: Analyzing monthly sales of milk to forecast future requirements.

2. **Market Surveys and Consumer Surveys:** Surveys gather insights on consumer preferences, intended purchases, and brand loyalty. It is useful for understanding **consumer sentiment** and detecting shifts in demand.

Example: Surveying customers on their preferred detergent brands to forecast market share.

3. **Regression Analysis:** A **statistical technique** used to quantify the relationship between demand and factors such as price, income, or advertising. **Linear regression models** can predict how demand changes with variations in income or price. **Example:** Estimating how a price increase in cooking oil affects demand.

4. **Econometric Models:** These models consider multiple variables simultaneously, such as income levels, inflation rates, and consumer behavior, to predict demand more accurately. **Example:** Using an econometric model to study how inflation and consumer spending affect food purchases.

5. **Point-of-Sale (POS) Data Analysis:** POS data provides real-time sales information from retail stores, helping firms detect immediate demand trends. This data helps businesses adjust inventory and promotional strategies quickly. **Example:** Analyzing supermarket sales data to identify spikes in demand for bottled water.

6. **Leading Indicator Method: It i**nvolves using related economic indicators (e.g., consumer confidence index, disposable income) to predict the demand for non-durable goods. **Example:** Predicting clothing demand based on trends in disposable income and inflation.

C. CHECK YOUR PROGRESS

Case-Based Questions

1. A company selling smartphones observes that demand has dropped due to an economic slowdown. What strategies should it adopt to manage this postponed demand?
2. During festive seasons, retailers experience a spike in sales of non-durable goods like sweets and clothing. How should businesses use demand forecasting techniques to manage inventory during such periods?
3. If the price of butter increases significantly, how will it affect the demand for margarine? What concept explains this shift?

9.7 LET US SUM UP

The estimation of demand for durable and non-durable goods plays a crucial role in business decision-making and economic planning. **Durable goods** are tangible products with a long lifespan, such as cars, furniture, and electronic devices. These goods are not consumed immediately and are sensitive to economic conditions, as consumers can delay purchases during financial uncertainty. In contrast, **non-durable goods** are consumed quickly or within a short period, including food, clothing, and cosmetics. Their demand is more stable and less affected by economic cycles, driven primarily by regular consumption, population growth, and consumer preferences.

The estimation of demand for durable goods is complex due to several factors. Consumers may purchase them for replacement or as first-time buyers, and the availability of financing options and economic stability significantly influence demand. Since purchases can be postponed, interest rates, inflation, and consumer confidence are key determinants. The demand for durable goods is also price-sensitive, making accurate forecasting essential for businesses. Common techniques for estimating their demand include time-series analysis, regression models, consumer surveys, and advanced econometric models that account for economic variables.

On the other hand, estimating the demand for non- durable goods is comparatively straightforward but equally important. Their demand is shaped by factors such as population size, demographics, seasonality, income levels, and the availability of substitutes. For instance, seasonal variations influence the demand for clothing and beverages, while rising income may lead to increased spending on premium products. Techniques like moving averages, exponential smoothing, trend analysis, and market experiments help businesses project future demand. Regression models are also used to explore the relationship between demand and influencing factors like income and prices. Despite these methods, demand estimation faces several challenges. Unpredictable consumer behavior, economic uncertainty, and technological advancements can disrupt forecasts. The accuracy of data is critical, as

incomplete or flawed data can lead to misleading predictions. For durable goods, innovations may shorten product lifecycles, while non-durable goods can experience shifts in consumer preferences due to trends or public awareness. In conclusion, while demand for durable goods requires more sophisticated methods due to their cyclical nature and long life cycles, the estimation for non-durable goods focuses on stable consumption patterns. A careful mix of statistical techniques, market research, and economic modeling ensures businesses can make informed production, pricing, and inventory decisions.

9.8 GLOSSARY

- **Durable Goods:** These are long-lasting products that are used over an extended period, such as cars, furniture, and appliances. Consumers can postpone their purchase of durable goods depending on economic conditions.
- **Non-Durable Goods:** Goods that are consumed quickly or within a short timeframe, like food, clothing, fuel, and toiletries. Their demand remains relatively stable since they are essential for daily use.
- **Demand Estimation:** The process of predicting future demand for a product based on historical data, market trends, and influencing factors like price, income, and consumer behavior. It helps businesses and policymakers plan production and strategies efficiently.
- **Replacement Demand:** Demand generated when consumers replace old or obsolete durable goods. For example, buying a new phone to replace an older model contributes to replacement demand.
- **Economic Indicators:** Factors like inflation, interest rates, and consumer confidence that influence the overall demand, particularly for durable goods. High inflation or economic uncertainty can reduce demand for expensive items.

9.9 SELF-ASSESSMENT QUESTIONS

Q1. What are durable and non-durable goods? How do they differ in terms of consumption and demand patterns?

Q2. Why is the estimation of demand for durable goods more complex than for non-durable goods?

Q3. How do seasonal factors influence the demand for non-durable goods? Provide examples.

9.10 LESSON END EXERCISE

Q1. Differentiate between durable and non-durable goods.

Q2. Why there is a need for estimating demand for durable and non-durable goods?

9.11 SUGGESTED READINGS

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M.Com 1st Sem. **UNIT-II (CREDIT: 1)**
Course No. 153 **Lesson No. 10**

DEMAND FORECASTING TECHNIQUES

STRUCTURE

10.0 INTRODUCTION

Learning Objectives

- To make understanding about the concept of demand forecasting;
- To give an overview about the importance and steps in the process of demand forecasting;

- To make the learners familiar with techniques of demand forecasting; and

Learning Outcomes

After the completion of this lesson, the student will be able to:

- conceptualise the demand forecasting concept;
- understand the importance of demand forecasting;
- comprehend the steps involved in demand forecasting; and
- applied the techniques of demand forecasting.

10.1 LEARNING OBJECTIVES AND LEARNING OUTCOMES

Forecasting provides an estimate of future demand and the basis for planning and sound business decisions. Since all organisations deal with an unknown future, some error between a forecast and actual demand is to be expected. Thus, the goal of a good forecasting technique is to minimise the deviation between actual demand and forecast. Since a forecast is a prediction of the future, factors that influence demand, the impact of these factors, and whether these factors will continue to influence future demands must be considered in developing an accurate forecast. In addition, buyers and sellers should share all relevant information to generate a single consensus forecast so that the correct decision on the supply and demand can be made. The benefits of a better forecast are lower inventories, reduce stock outs, smoother production plans, reduced costs and improved customer service. (Wisner, Tan, & Leong, 2008). The impact of poor communication and inaccurate forecast resonates all along the supply chain and results the bull whip effects causing stock outs, lost sales, high cost of inventory and obsolesce, material shortages, poor responsiveness to market dynamics, and poor profitability.

In order to mitigate risks, it is of paramount importance for organisations to determine the future prospects of their products and services in the market. This knowledge of the future demand for a product or service in the market is gained through the process of demand forecasting. It 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.

10.2 CONCEPT OF DEMAND FORECASTING

Demand forecasting is a combination of two words; the first one is Demand and another forecasting. Demand means outside requirements of a product or service. In general, forecasting means making an estimation in the present for a future occurring event. It is a technique for estimation of probable demand for a product or services in the future and is based on the analysis of past demand for that product or service in the present market condition. Demand can be forecasted by organisations either internally by making estimates called guess estimate or externally through specialized consultants or market research agencies. Demand forecasting should be done on a scientific basis and facts and events related to forecasting should be considered. Therefore, in simple words, we can say that after gathering information about various aspect of the market and demand based on the past, an attempt may be made to estimate future demand. This concept is called forecasting of demand.

For example: Suppose we sold 200, 250, 300 units of product X in the month of January, February, and March respectively. Now we can say that there will be a demand for 250 units approx. of product X in the month of April, if the market condition remains the same. 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 organizations in the market and enables an organisation to arrange for the required inputs as per the predicted demand, without any wastage of materials and time. It also 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.

Definitions

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."

Importance of 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. So, it is very important for every business to forecast their demand. Certain important points of demand forecasting are given below:

1. **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) before-hand so that the desired quantity can be produced without any hindrance.
2. **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.
3. **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.
4. **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.

5. **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.

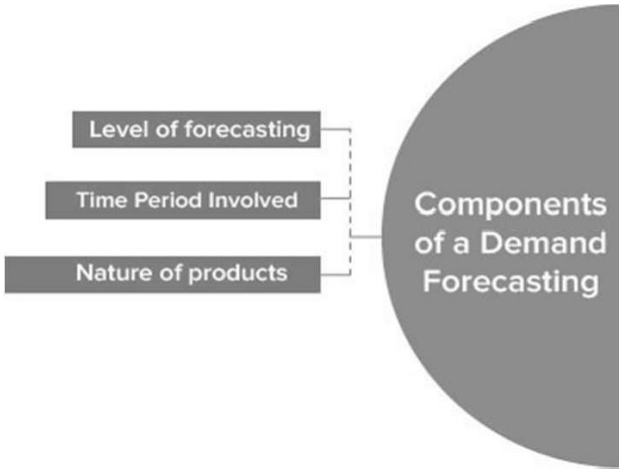
6. **Assessing manpower requirement:** Demand forecasting helps inaccurate estimation of the manpower required to produce the desired output, thereby avoiding the situations of under-employment or over-employment.

7. **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.

8. **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.

Components of Demand Forecasting

The systematic component measures the expected value of demand and consists of what we will call level, the current deseasonalized demand; trend, the rate of growth or decline in demand for the next period; and seasonality, the predictable seasonal fluctuations in demand.



Let us discuss the basic components of demand forecasting in detail:

1. **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.

2. **Time period involved:** On the basis of the duration, demand is forecasted in the short run and long term, which is explained as follows:

   a) **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.

   b) **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.

3. **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:

   a) 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.

   b) 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.

A. CHECK YOUR PROGRESS

Situation-Based Questions on Demand Forecasting Techniques1. New Product Launch

1. **Situation:** A company is launching a new smart wearable device with no historical sales data.

   Question:

   a) Which demand forecasting techniques would be most suitable for predicting sales of the new product? Justify your answer.

   b) If the company uses **Delphi Method** to forecast demand, how can it ensure the accuracy of expert opinions?

2. **Seasonal Demand Patterns**

   Situation: A clothing retailer experiences peak demand during the festive season and lower demand during off-season months.

   Question:

   a) How should the company incorporate **seasonal indices** into its forecasting model?

b) Would a **moving average method** work well for this scenario? Why or why not?

c. Inventory Management Challenges

Situation: A supermarket chain needs to forecast the demand for perishable goods to avoid wastage or stockouts.

Question:

a) Which forecasting technique—**exponential smoothing** or **time series analysis**—would be more appropriate for forecasting perishable goods? Explain your choice.

b) How could forecasting errors impact the company's inventory, and what corrective actions should the company take?

10.3 FACTORS INFLUENCING DEMAND FORECASTING

Demand forecasting has a huge importance in planning. It helps to arrange the various factors of production and helps an entity to estimate the future demand for its products and plan its production. The factors involved in demand forecasting are discussed below:

1. **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.

2. **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.

3. **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.

4. **Prevailing market conditions:** 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 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.

5. **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.

6. **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.

7. **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.

B. CHECK YOUR PROGRESS

Application-Based Questions on Factors Affecting Demand Forecasting

1. **Influence of Pricing on Forecast Accuracy**

   Situation: A company plans to reduce the price of its product to boost sales during a promotional period.

   Question:

   - How should the company incorporate the price change into its demand forecast?
   - If competitors also lower their prices, what adjustments can be made to the forecast to maintain accuracy?

2. **Impact of Consumer Income VariabilitySituation:** A furniture retailer operates in regions where consumer incomes fluctuate due to seasonal employment patterns.

   Question:

   - How can the company use **income data** to improve the accuracy of its demand forecast?
   - Should the company create separate forecasts for high-income and low-income regions? Justify your answer.

10.4 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 given below:

1. **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

2. **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.

3. **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.

4. **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.

5. **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.

10.5 TECHNIQUES OF DEMAND FORECASTING

The main challenge to forecast demand is to select an effective technique. There is no particular technique that enables organisations to anticipate risks and uncertainties in future. 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 technique of demand forecasting

are broadly categorised into two types. The first technique involves forecasting demand by collecting information regarding the buying behavior of consumers from experts or through conducting surveys. On the other hand, the second technique is to forecast demand by using the past data through historical data.

Thus:

1. **Qualitative forecasting technique, is based on opinion**
2. **Quantitative forecasting technique, is based on historical data**

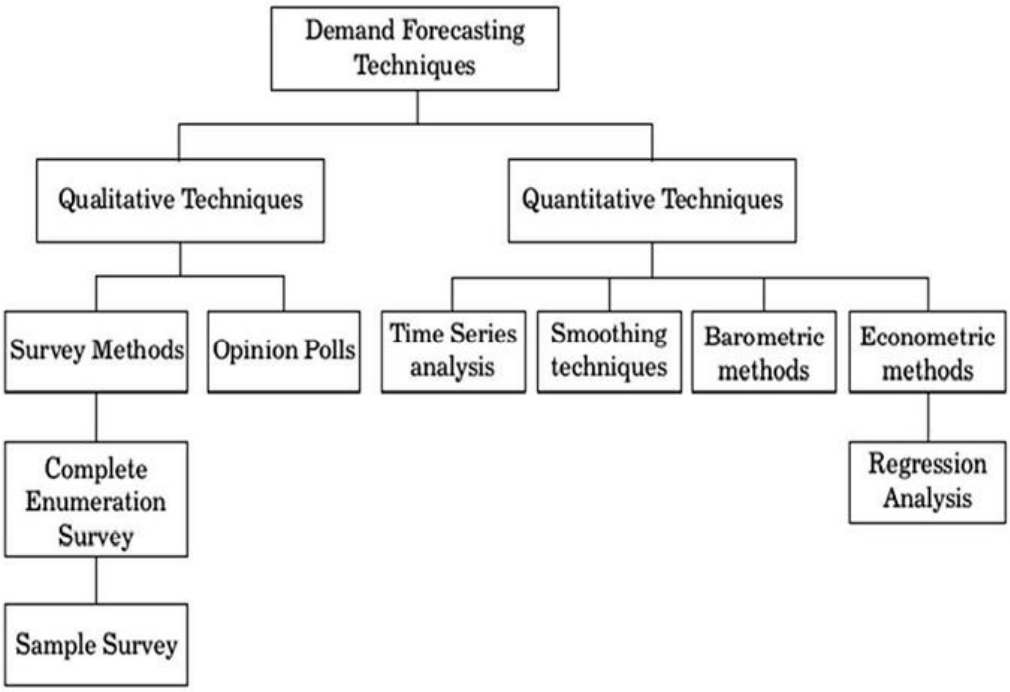


Figure 10.1

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. These 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, immeasurable data such as opinions and intuition. Designed to analyze the human element of sales, market demand, and market trends, qualitative forecasting technique include documenting expert opinion, surveying in-house sales teams, and even performing market research to understand buyer opinions and behavior and how they may shift in the months and years to come. These technique invoke the human element of sales, relying on experts' opinions, gut feelings, and analytical judgment. Qualitative, opinion-driven technique are thought of as the oldest form of forecasting but still provide valuable sales predictions. When a sales rep ends a promising sales call and just knows, without any concrete reason, that the client is ready to move forward, that salesperson is using qualitative forecasting techniques. When a competitor unveils a new product and a business leader calls it a "game changer," that leader is using qualitative forecasting. Expert opinions carry a lot of weight in how invested parties may shift or maneuver within the industry. If a new product set to release next quarter is given that "game changer" label, competing businesses may jump-start product development for their competing product. Qualitative techniques are important for helping executives make decisions for a company. Performing qualitative forecasting can inform decisions like how much inventory to keep, whether a company should hire new staff members and how they can adjust their sales operations. It is also crucial for developing projects like marketing campaigns, as it can provide information about a company's service that can highlight which elements of the business to feature in advertisements. Some benefits of these techniques include the flexibility to use sources other than numerical data, the ability to predict future trends and phenomena in business and the use of information from experts within a company's industry.

Let us discuss different types of qualitative methods:

A) Survey Techniques

Survey technique are the most commonly used technique of forecasting

demand in the short run. This technique relies on the future purchase plans of consumers and their intentions to anticipate demand. Thus, in this method, an organisation conducts surveys with consumers to determine the demand for their existing products and services and anticipate the future demand accordingly. The two types of survey technique are explained as follows:

i) **Complete enumeration survey:** This method is also referred to as the census method of demand forecasting. In this technique, 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 totaling the probable demands of all individual consumers in the market.

ii) **Sample survey:** A survey is a general term that refers to the collection of data by means of interviews, questionnaires, or observations. A sample survey is a study involving a subset (or sample) of individuals selected from a larger population by accepted statistical methods. In this method, only a few potential consumers (called sample) are selected from the market and surveyed. In this technique, the average demand is calculated based on the information gathered from the sample.

B) 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:

i) **Expert opinion technique:** 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. It can also be a treasure trove of qualitative insight useful

in preparing sales forecasts. Industry analysts, academics, and tastemakers with their fingers on the pulse of a company's target market can offer perspectives that internal teams lack on what the competition is up to, how macroeconomic movements may impact buyer behavior, and other short- term trends. Sellers can access these opinions in the public sphere by staying up-to-date with industry publications, or they could invite experts to conduct market research or present their findings to sellers and other leadership within the company.

ii) **Delphi Technique:** In this technique, 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. This method is almost like the Supreme Court of qualitative forecasting; experts work together to make informed predictions about future outcomes. The Delphi technique typically involves multiple rounds: Each round ends with a peer review of the questionnaire results and then an open discussion so the experts can entertain unique considerations and little-known information. The goal for the Delphi technique is to draw consensus among the experts and build a forecast based on that.

iii) **Market studies and experiments:** This technique is also referred to as market experiment technique. In this technique, organisations initially select certain aspects of a market such as population, income levels, cultural and social background, occupational distribution, and consumers' tastes and preferences. When forecasting for customer demand, the opinions of past, present, and prospective clients can tell a business everything it needs to know about what's coming down the pipeline. Collecting data and feedback from those customer touchpoints, such as social media and customer service departments, could produce important insights into the customer experience and their wants and needs.

Among all these aspects, one aspect is selected and its effect on demand

is determined while keeping all other aspects constant.

Quantitative Techniques

Quantitative techniques for demand forecasting usually make use of statistical tools. In these techniques, demand is forecasted based on historical data. These technique are generally used to make long-term forecasts of demand. Unlike survey technique, statistical methods are cost effective and reliable as the element of subjectivity is minimum in these technique. Quantitative techniques focus on hard data instead of focus on group to predict sales for the accounting tool. When looking at quantitative forecasting technique, it is important to make sure that the technique selected is actually based on data, such as historical sales numbers or economic indicators, not human instinct. It includes using simple math, advanced formulas, and statistical analysis to get an idea of future sales. Quantitative techniques must have high reliability so that other researchers have the ability to replicate the studies with the previous data collection or a similar one and check the validity of the results. They must also follow a carefully constructed research design that eliminates the possibility of contamination from outside factors that potentially affect the phenomenon under investigation. Valid results mean that researchers have the ability to see causation or predict future results of the phenomenon.

Let us discuss different types of quantitative technique:

A) Time Series Analysis

Time series analysis or trend projection method is one of the most popular technique 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 t ime intervals. Using t rends, 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:

i) **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.

ii) **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.

iii) **Seasonal component:** The seasonal component in time series analysis accounts for regular patterns of variability within certain time periods, such as a year.

iv) **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.

B) 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 technique used in smoothing techniques of demand forecasting are simple moving average method and weighted moving average technique .

The simple moving average technique 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 technique 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.

C) Barometric Technique

Barometric methods are used to speculate the future trends based on current developments. This method is 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 techniques make use of the following indicators:

i) **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.

ii) **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.

iii) **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.

D) Econometric Techniques

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.

i) **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:

$$\mathbf{Y = a + bX}$$

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.

Significance of Forecasting Techniques

Forecasting helps decision making by informing how many units need to be ordered, preventing companies from spending money on inventory that won't sell. It is a powerful tool for businesses that are expanding into new territories new products and demand fluctuations. There are many reasons why demand forecasting techniques are important for companies:

1. Businesses have information to assist with planning, goal setting, and budgeting. With a good understanding of what your future sales may look like, it's possible to build and informs procurement strategy to

ensure your supply matches customer demand, at the specific product level.

2. Organisations can more effectively optimize their inventory levels, increase inventory turnover rate, and reduse holding costs.

3. Businesses are able to identify and rectify any issues in the sales pipeline ahead of time to keep business performance study throughout the entire period. In terms of inventory management, most e-commerce business owners know that too little or too much inventory can be detrimental to operations.

4. They provide insight into your upcoming cash flow so businesses can more accurately budget payments for suppliers and other operational costs, while still investing in the growth of the business.

5. Helps in knowing when to increased staff and allocate other resources to ensure operations run smoothly during peak activity periods.

10.6 LET US SUM UP

Forecasting attempts to predict the future. There are several methods available for forecasting and they all fall into two general categories. These are called "quantitative" and "qualitative." The choice of technique for a forecast depends on the purpose of the forecast. This lesson helps in understanding various techniques of forecasting that are used in business organisations for the better results how different methods would be used to predict demand for a product, and thus plan production capacity, to those that would be used for setting policies of a political party. Whatever method you use, you will need to base the forecast on source data. One can easily able to know that demand forecasting is a great way to anticipate what customers want from your business in the future so that you can adequately prepare inventory and resources to meet that demand. By improving demand forecasting and optimizing your supply chain, you can effectively increase profits and mitigate unnecessary costs. Establishing this system improve your inventory flow and give you the resources needed to bring your ecommerce business to the next level. Forecasting demand

allows you to cut down on holding costs and other operational expenses when they're not needed while assuring you have everything you need to handle peak periods as they occur. When demand forecasting is correctly implemented, businesses have valuable information about their potential in the current market as well as other markets so managers can make informed decisions about business growth strategies, pricing, and Market potential. Failing to use demand forecasting puts businesses at risk for making poor decisions about their target markets and products. These ill-informed decisions can have far reaching effects on customer satisfaction, supply chain management, inventory holding cost, and ultimately profitability.

10.7 GLOSSARY

- **Regression:** A measure of the relation between the mean value of one variable and corresponding values of other variables.
- **Sample:** It means a small manageable group of individuals (it can be humans, animals, products and industries) which shows full characteristics of whole population.
- **Opinion:** An opinion is a judgement, viewpoint, or statement that is not conclusive, rather than facts, which are true statements.
- **Forecasting:** It is the process of making predictions based on past and present data and most commonly by analysis of trends.
- **Consumer goods:** It is a final product ready for sale that is used by the consumer to satisfy current wants or needs, unlike intermediate goods which is utilized to produce other goods.
- **Capital goods:** A series of heterogeneous commodities, each having specific technical characteristics in the form of a durable good that is used in the production of goods or services.
- **Bull whip effect:** Small level of change in demand at one level, having large change in demand at other circle.

10.8 SELF-ASSESSMENT QUESTIONS

Q1. What is demand forecasting, and why is it important for businesses?

Q2. Explain the difference between quantitative and qualitative forecasting methods. Provide examples of each.

Q3. How would you choose the most appropriate forecasting technique for a new product launch with no historical data?

10.9 LESSON END EXERCISE

Q1. How can demand forecasting help businesses manage their supply chains more effectively?

Q2. In a volatile market with frequent changes, which demand forecasting techniques would be most suitable, and why?

Q3. Write a short note on the concept of demand forecasting?

10.10 SUGGESTED READINGS

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M.Com 1st Sem. **UNIT-III (CREDIT: 1)**
Course No. 153 **Lesson No. 11**

PRODUCTION THEORY AND PRODUCTION FUNCTION STRUCTURE

STRUCTURE

11.0 LEARNING OBJECTIVES AND OUTCOMES

Learning Objectives

- To make understanding about the concept of production function;
- To give an overview about the production theory;
- To make the learners familiar with one variable production function; and
- To impart knowledge regarding two variables production function

Learning Outcomes

After the completion of this lesson, the student will be able to:

- conceptualise the production function concept;
- understand the production theory;
- comprehend the one variable production function; and
- apprehend the two variables production function.

11.1 INTRODUCTION

Let's explore a foundational concept in economics: the **production function**. This concept is crucial in understanding how firms or businesses decide to produce goods and services, given the resources they have.

To start with, what do we mean by 'production'? At its core, production refers to the process of converting inputs, like raw materials and labor, into outputs, such as finished goods or services. Every business or firm aims to use their available resources efficiently to maximize output.

The production function shows the relationship between inputs and outputs in the production process. Think of it as a mathematical expression or a rule that explains how many outputs you get for a given amount of inputs.

Let's say, for example, you own a bakery. Your inputs are flour, sugar, ovens, and the bakers who work there. The output, of course, is bread. The production function would describe how much bread you can produce based on the amount of flour, sugar, and labor you use.

Mathematically, we can express the production function like this: Q=f

(L,K)

Where:

- Q represents the total quantity of output (in our bakery example, the amount of bread produced).
- L stands for labor, which includes workers and their efforts.
- K represents capital, which includes machinery, buildings, and equipment.
- The function f(L,K) describes how labor and capital combine to produce output.

Now, why is this important?

The production function helps firms understand how to use their resources optimally. It shows how changes in inputs affect the total output. For instance, if you hire one more worker or buy one more oven, how much more bread will you be able to produce? The production function provides answers to questions like these.

Next, let's discuss the concept of **returns to scale**. This tells us how output changes when we increase all inputs by the same proportion. There are three possibilities:

- **Increasing returns to scale**: When doubling the inputs results in more than double the output.
- **Constant returns to scale**: When doubling the inputs results in exactly double the output.
- **Decreasing returns to scale**: When doubling the inputs results in less than double the output.

Understanding these different returns to scale is essential for firms when deciding how to expand production. Lastly, keep in mind that the production function is often simplified to make things easier. In reality, many more factors influence production—like technology, human skills, and the availability of resources.

11.2 PRODUCTION THEORY

In economics, production theory explains the principles in which the business has to take decisions on how much of each commodity it sells and how much it produces and also how much of raw material i.e., fixed capital and labor it employs and how much it will use. It defines the relationships between the prices of the commodities and productive factors on one hand and the quantities of these commodities and productive factors that are produced on the other hand.

Production is a process of combining various inputs to produce an output for consumption. It is the act of creating output in the form of a commodity or a service which contributes to the utility of individuals. In other words, it is a process in which the inputs are converted into outputs.

11.3 PRODUCTION FUNCTION

Production function describes the technological relationship between inputs and outputs. It is a tool that analysis the qualitative input - output relationship and also represents the technology of a firm or the economy as a whole. In simple words, production function refers to the functional relationship between the quantity of a good produced (output) and factors of production (inputs). In this way, production function reflects how much output we can expect if we have so much of labour and so much of capital as well as of labour etc. In other words, we can say that production function is an indicator of the physical relationship between the inputs and output of a firm. The reason behind physical relationship is that money prices do not appear in it. However, here one thing that becomes most important to quote is that like demand function a production function is for a definite period.

It shows the flow of inputs resulting into a flow of output during some

time. The production function of a firm depends on the state of technology. With every development in technology the production function of the firm undergoes a change. The new production function brought about by developing technology displays same inputs and more output or the same output with lesser inputs. Sometimes a new production function of the firm may be adverse as it takes more inputs to produce the same output. Mathematically, such a basic relationship between inputs and outputs may be expressed as:

$$Q = f(L, C, N)$$

Where, Q = Quantity of output

L = Labour

C = Capital

N = Land.

Hence, the level of output (Q), depends on the quantities of different inputs (L, C, N) available to the firm. In the simplest case, where there are only two inputs, labour (L) and capital (C) and one output (Q), the production function becomes.

$$Q=f(L, C)$$

Cobb-Douglas Production Function

A specific form of the production function that assumes output is produced using labor and capital, and the output depends on the product of these inputs raised to a constant power. Its general form is

$$Q=AL^{\alpha}K^{\beta}$$

DEFINITIONS:

"The production function is a technical or engineering relation between input and output. As long as the natural laws of technology remain unchanged, the production function remains unchanged**." Prof. L.R. Klein.**

"Production function is the relationship between inputs of productive services per unit of time and outputs of product per unit of time." **Prof. George**

J. Stigler

"The relationship between inputs and outputs is summarized in what is called the production function. This is a technological relation showing for a given state of technological knowledge how much can be produced with given amounts of inputs." **Prof. Richard J. Lipsey**

Koutsoyiannis Defined production function as "the relation between a firm's physical production output and the material factors of production inputs."

Prof. Watson In this way production function reflects how much output we can expect if we have so much of labour and so much of capital as well as of labour, etc.

Thus, from the above definitions, we can conclude that production function shows for a given state of technological knowledge, the relation between physical quantities of inputs and outputs achieved per period of time. To produce these goods the basic inputs are classified into two divisions -

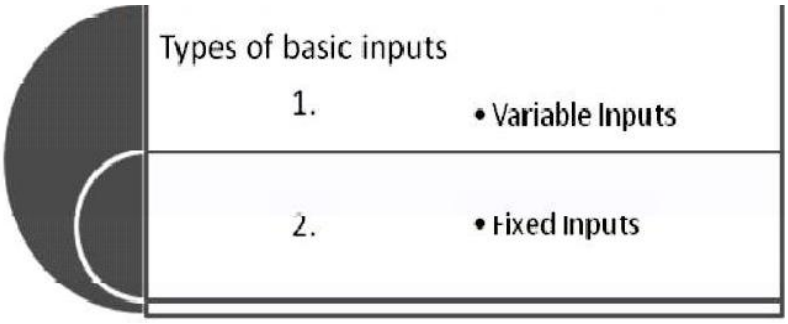


Figure No. 11.1

Variable Inputs: Inputs those change or are variable in the short run or long run are variable inputs.

Fixed Inputs: Inputs that remain constant in the short term are fixed inputs.

Production cost function defined as the relationship between the cost of the product and the output. It is divided into two types:-

a. Short Run Cost

Short run cost is an analysis in which few factors are constant which won't change during the period of analysis. The output can be changed i.e., increased or decreased in the short run by changing the variable factors.

Following are the basic three types of short run cost

Short Run Fixed Cost	Variable Cost	Short Run Total Cost
Fixed cost is a cost which won't change with the changes in the output. For example Building, rent, Insurance, etc	Variable cost is the cost which changes with the change in the output. For example cost of raw material, wages, electricity, telephone charges etc.	The total actual cost that is supposed to be incurred to produce a given output is short run total cost. Total cost= Total Fixed Cost + Total Variable cost

Table 11.1

b. Long Run Cost

Long-run cost is variable and a firm adjusts all its inputs to make sure that its cost of production is as low as possible.

Long run cost = Long run variable cost

In the long run, firms don't have the liberty to reach equilibrium between supply and demand by altering the levels of production. They can only expand or reduce the production capacity as per the profits. In the long run, a firm can choose any amount of fixed costs it wants to make short run decisions. Production is the result of co-operation of four factors of production viz., land, labour, capital and organization. This is evident from the fact that no single commodity can be produced without the help of any one of these four factors of production. Therefore, the producer combines all the four factors of production in a technical proportion. The aim of the producer is to maximize

his profit. For this sake, he decides to maximize the production at minimum cost by means of the best combination of factors of production. The producer secures the best combination by applying the principles of equi-marginal returns and substitution. According to the principle of equi-marginal returns, any producer can have maximum production only when the marginal returns of all the factors of production are equal to one another. For instance, when the marginal product of the land is equal to that of labour, capital and organisation, the production becomes maximum.

A. CHECK YOUR PROGRESS

1. **Basic Understanding**:
   - Define a production function. Why is it important for a business to understand its production function?
2. **Inputs and Outputs**:
   - List and explain the primary inputs involved in the production of a product of your choice (e.g., smartphones, clothing, automobiles).
   - How does a firm's choice of inputs influence the level of output?
3. **Mathematical Representation**:
   - The production function is often expressed as Q=f (L,K)Q. What do the variables L and K represent? How do they affect the output Q ?
4. **Real-Life Application**:
   - Think of a local business (like a bakery, factory, or farm). Identify the key inputs and discuss how a change in one input, say labor, would affect the business's output.

11.4 FEATURES OF PRODUCTION FUNCTION

Following are the main features of production function

a. Substitutability

The factors of production or inputs are substitutes of one another which

make it possible to vary the total output by changing the quantity of one or a few inputs, while the quantities of all other inputs are held constant. It is the substitutability of the factors of production that gives rise to the laws of variable proportions.

1. Complementarily

The factors of production are also complementary to one another, that is, the two or more inputs are to be used together as nothing will be produced if the quantity of either of the inputs used in the production process is zero. The principles of returns to scale is another manifestation of complementarily of inputs as it reveals that the quantity of all inputs are to be increased simultaneously in order to attain a higher scale of total output.

2. Specificity

It reveals that the inputs are specific to the production of a particular product. Machines and equipment's, specialized workers and raw materials are a few examples of the specificity of factors of production. The specificity may not be complete as factors may be used for production of other commodities too. This reveals that in the production process none of the factors can be ignored and in some cases ignorance to even slightest extent is not possible if the factors are perfectly specific. Production involves time hence, the way the inputs are combined is determined to a large extent by the time period under consideration. The greater the time period, the greater the freedom the producer has to vary the quantities of various inputs used in the production process. In the production function, variation in total output by varying the quantities of all inputs is possible only in the long run whereas the variation in total output by varying the quantity of single input may be possible even in the short run.

11.5 TYPES OF PRODUCTION FUNCTION

Different types of productions can be prepared of the relationship between output and inputs where all the inputs are variable or onlu some are variable. Economic Theorists analyse two kinds of input-output relations in production function: First the relation where quantities of some inputs are fixed while quantity of other inputs vary; second where all the inputs are variable and the relationship is between changes in the amount of all inputs and the resulting outputs.

We shall see presently that this difference in input-output relation (production functions) is due to the effect of time we allow in a production process to be organized.

Production Function can be divided into two parts:

a. **Short Run Production Function:** In the short run, it is possible to increase the quantities of one input while keeping the quantities of other inputs constant in order to have more output. This aspect of the production function is known as the law of variable proportions. When a producer brings a change in his production by changing only one factor of production and as a result there is a change in the proportion of combination of factors of production, then this proportional relationship between (output) and factors of production (Inputs) is referred to as Law of Returns to a Factor.

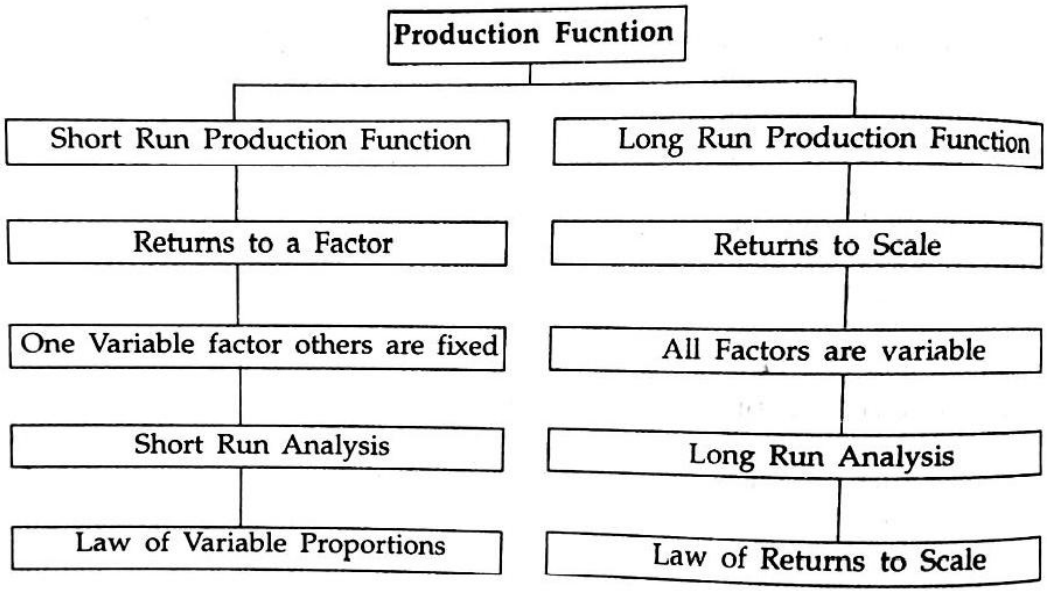
b. **Long Run Production Function**

In the long run, it is possible for a firm to change all inputs up or do When a producer accordance with its scale. This is known as returns to scale. When a producer changes all the factors of production in the same proportion, the relationship between production and factors of production is referred to as Law of Returns of Scale.

In order to increase the output of a commodity, either the amount factors of production is to be increased or the technique of production is to be

improved upon. Presuming that technique of production remains Constant change in the volume of production (output) will depend exclusively on change in the amount of factors of production (inputs).

Two types of Production Function can be shown in the following chart-



11.6 PRODUCTION WITH ONE AND TWO VARIABLE INPUTS

In economic theory, we are concerned with three types of production functions, viz.:-

1. Production Functions with One Variable Input
2. Production Function with Two Variable Inputs
3. Production Function with all Variable Inputs.

But here we are going to discuss the first two only

Type 1: Production Functions with One Variable Input

If one input is variable and all other inputs are fixed, the firm's production

function exhibits **the law of variable proportions.** If the number of units of a variable input is increased, keeping other inputs constant, how output changes is the concern of this law. Suppose land, plant, and equipment are the fixed factors, and labor the variable factor. When the number of laborers is increased successively to have larger output, the proportion between fixed and variable factors is altered and the law of variable proportions sets in.

The law states that as the quantity of a variable input is increased by equal doses, keeping the quantities of other inputs constant, total product will increase, but after a point, at a diminishing rate. This principle can also be defined thus - When more and more units of the variable factor are used, holding the quantities of fixed factors constant, a point is reached beyond which the marginal product, then the average, and finally the total product will diminish.

The law of variable proportions (or the law of non-proportional returns) is also known as the law of diminishing returns. But, as we shall see below, the law of diminishing returns is only one phase of the more comprehensive law of variable proportions. Let us illustrate the law with the help of Table 11.2, where on the fixed input land of 4 acres, units of the variable factor labor are employed and the resultant output is obtained.

Table 11.2 Output of wheat in physical units from 4 acres of land

No. of workers	Total product	Average product	Marginal product	
1	8	8	8	**Stage I**
2	20	10	12	
3	36	12	16	
4	48	12	12	**Stage II**
5	55	11	7	
6	60	10	5	
7	60	8.6	0	**Stage III**
8	56	7	-4	

An analysis of Table 11.2 shows that the total, average, and marginal products increase at first, reach a maximum when seven units of labor are used and then it declines. The average product continues to rise till the fourth unit while the marginal product reaches its maximum at the third unit of labor, then they also fall.

The marginal product starts declining first, then the average product, and finally the total product. It should be noted that the point of falling output is not the same for total, average, and marginal product. This observation points out that the tendency to diminishing returns is ultimately found in the three productivity concepts.

In between Stages I and III is the most important stage of production that of **the law of diminishing returns.** Stage II starts when the average product is at its maximum to the zero point of the marginal product. At the latter point, the total product is the highest. For example land is scarce and is used intensively. More and more workers are employed in order to have a larger output. Thus, the total product increases at a diminishing rate and the average and marginal products decline. Throughout this stage, the marginal product is below the average product. This is the only stage in which production is feasible and profitable.

The law of diminishing returns is based on the following assumptions:

1. It is possible to vary the proportions in which the various productive services (inputs) are combined.
2. Only one input is variable while others are held constant.
3. All units of the variable inputs are homogeneous.
4. There is no change in technology. If the technique of production undergoes a change, the product curves will be shifted accordingly but the law will ultimately operate.
5. It assumes a short-runs situation, for in the long-run all productive services are variable.

6. The product is measured in physical units, i.e., in quintals, tonnes, etc. The use of money in measuring the product may show increasing rather than decreasing returns if the price of the product rises, even though the output may have declined.

Marshall applied the operation of the law to agriculture, mining, forests, fisheries, and the building industry.

The last segment of the theory of production is the problem of determining **the least- cost combination** of factors for a given output. The aim of every producer is to get maximum profits, and to achieve this he combines the various resources in such a proportion that a given output is manufactured at the least cost.

This problem is similar to the problem faced by the consumer who allocates his money income among several commodities for obtaining maximum satisfaction. The consumer is in equilibrium when the marginal utilities and the price ratios of the goods bought become equal.

To achieve this equilibrium position, the consumer acts on the principle of substitution. Similarly, the producer will be in equilibrium when the marginal productivities of the various factor units employed by him are equal to their prices. To achieve the least-cost combination of a given output, he substitutes a cheap input for a costly input.

If he finds that the marginal product of a rupee's worth of factor A is greater than that of factor B, he will spend less on B and more on A. He will continue to spend like this with the consequence that the marginal product of a rupee's worth of factor B will steadily rise, while that of factor A will fall, until the least-cost combination is achieved.

Suppose that a producer uses three inputs A, B, and C in the production of commodity X. The price of A is Rs.3 per unit, of B Rs.2 per unit, and of C Rs.1 per unit. The cost outlay on the three factors is Rs.61 per day. The daily marginal productivities of the different units of these factors resources are shown in Table 11.3.

(1) Factor A (Units)	(2) MP (Units of X)	(3) Factor B (Units)	(4) MP (Units of X)	(5) Factor C (Units)	(6) MP (Units of X)
6	15	8	12	9	10
7	14	9	11	10	9
8	12	10	9	11	7
9	9	11	6	12	3
10	5	12	2	13	1
11	0	13	0	14	0

Table 11.3 Daily Marginal Productivity

The price (P_a) of A being Rs.3 per unit, of B (P_b) Rs.2 per unit, and that of C (P_c) Rs.1 per unit, in equilibrium the marginal product of A (M P_a) should be 1.5 of B (M P_b) and twice that of C (M P_c). When the consumer continues to use more units of factors A, B, and C to produce a fixed quantity of X (columns 1, 3, 5 of the table, their marginal productivities continue to decline (columns 2, 4, 6).

Ultimately, the equilibrium position is reached when the marginal productivity of factor A (M Pb½ = 6) and the marginal productivity of B is twice that of C (M Pc = 3). This position is attained at 9 units of A, 11 units of B, and 12 units of C, where the marginal product per rupee's worth of each input is equalised.

The principle of least-cost combination also implies that each factor unit will be so employed as to equate its marginal product per rupee's worth in every use or occupation. If the marginal product of labor is greater in cotton textile industry than in the jute industry, labor will move from the latter to the former till marginal productivity of labor becomes equal in both the industries. Equality between different units of capital, labor, etc., is also established in a similar manner.

Assumptions:

The analysis given above is based on the following assumptions:

1. There is perfect competition in the factor market.
2. There is perfect mobility of factor units.
3. The prices of factor services are given and constant.
4. The marginal productivity of each factor is independent of the other.

To conclude, the principle of least-cost combination is an important tool in production theory. It points out that the efficient combination of variable factors which the producer should use depends upon the marginal productivities and prices of the respective factors.

B. CHECK YOUR VPROGRESS

Example: Production Function with One Variable (Labor)

Imagine a small sandwich shop where the output (number of sandwiches made) depends solely on the amount of labor (the number of workers). The amount of capital, such as the kitchen equipment (e.g., ovens, counters), remains fixed. The production function can be written as:

$$Q=f(L)$$

Where:

- Q is the total number of sandwiches produced (output).
- L is the amount of labor, which could be measured in terms of the number of workers or hours worked.

Let's assume the production function for the sandwich shop is as follows:

$$Q=10L$$

This means that for every worker added, the shop can produce 10 sandwiches per hour. For example:

- If 1 worker is employed (L=1), the total output Q will be:

$$Q=10\times1=10 \text{ sandwiches per hour}$$

- If 2 workers are employed (L=2), the total output Q will be:

  Q=10×2=20 sandwiches per hour.

- If 3 workers are employed (L=3), the total output Q will be:

  Q=10×3=30 sandwiches per hour.

In this simple example, we see that the number of sandwiches produced depends directly on the number of workers. However, this model assumes **constant returns to labor**, meaning every additional worker contributes the same number of sandwiches (10 sandwiches per hour).

In reality, we might eventually encounter the **law of diminishing marginal returns**. For example, if the kitchen space becomes crowded as more workers are added, each additional worker may not be able to produce as many sandwiches.

Types 2: Production Function with Two Variable Inputs

To understand a production function with two variable inputs, it is necessary to explain what an isoquant is. An isoquant is also known as Iso- product curve or equal-product curve or a production-indifference curve. These curves show the various combinations of two variable inputs resulting in the same level of output. Table 11.4 shows how different pairs of labor and capital result in the same output.

Labor (units)	Capital (units)	Output (units)
1	5	10
2	3	10
3	2	10
4	1	10
5	0	10

Table 11.4 Production function with two variable Inputs

It will be seen that output is the same either by employing 4L + 1C or by

5L + OC (and so on). This relationship, when shown graphically, results in an isoquant.

Thus, by graphing a production function with two variable inputs, one can derive the isoquant tracing all the combinations of the two factors of production that yield the same output. An isoquant is defined as the curve passing through the plotted points representing all the combinations of the two factors of production which will produce a given output.

Substitutability of Input:

An important assumption in the isoquant diagram is that the inputs can be substituted for each other. Let us take a particular combination of X and Y resulting in an output Q 600, one finds other quantities of the inputs resulting in the same output. Let us suppose that X represents labor and Y, machinery. If the quantity of the labor (X) is reduced, the quantity of machinery (Y) must be increased in order to produce the same output.

C. CHECK YOUR PROGRESS

Example: Production Function with Two Variables (Labor and Capital)

Imagine a small **custom furniture workshop** that uses labor (carpenters) and capital machinery, tools) to produce wooden tables. The workshop's total output (number of tables) depends on both the number of carpenters working and the amount of machinery they have to use.

The production function could be written as:

$$Q=f(L,K)$$

Where:

- Q is the total number of wooden tables produced (output).
- L represents labor (the number of carpenters).
- K represents capital (the number of machines or tools available for the carpenters).

Let's assume the production function for this furniture workshop is:

$$Q=5\ L^{0.5}\ K^{0.5}$$

This means the output of tables depends on the square root of both labor and capital, which reflects **diminishing marginal returns** — each additional worker or machine adds less to total output as their quantity increases. The coefficients and exponents are chosen to show how changes in inputs affect output.

Let's calculate the number of tables produced based on different combinations of labor and capital:

Scenario 1:

- Suppose the workshop has 4 carpenters (L=4) and 9 machines (K=9). The total output Q will be:

$$Q=5 \times (4^{0.5}) \times (9^{0.5})$$

$$Q=5\times2\times3=30 \text{ tables per day.}$$

Scenario 2:

- If the workshop adds 1 more worker, making it 5 carpenters (L=5) and keeps the number of machines the same (K=9):

The total output Q will be:

$$Q=5 \times (5^{0.5}) \times (9^{0.5})$$

$$Q=5\times2.236\times3=33.54 \text{ tables per day.}$$

Scenario 3:

- If the workshop increases the number of machines to 16 while keeping 4 carpenters (L=4 and K=16K):

The total output Q will be:

$$Q=5 \times (4^{0.5}) \times (16^{0.5})$$

$$Q=5\times2\times4=40 \text{ tables per day.}$$

Analysis:

- In **Scenario 1**, with 4 carpenters and 9 machines, the workshop produces 30 tables.

- In **Scenario 2**, adding one more carpenter increases production slightly to 33.54 tables (due to diminishing returns to labor).
- In **Scenario 3**, increasing capital (more machines) significantly boosts production to 40 tables.

This example demonstrates how a firm uses both labor and capital as inputs in a production process and how changes in these inputs affect output. The production function shows the interaction between labor and capital and how increasing one input while holding the other constant affects total output

11.7 LET US SUM UP

A production function with one variable examines how output (Q) changes in response to changes in a single input, typically labor (L), while holding other inputs, such as capital (K), constant. For instance, in the function Q=10L, output increases proportionally with each additional unit of labor, assuming other factors remain unchanged. This model offers a straightforward way to understand how changes in labor affect production. However, in real- world scenarios, firms may encounter diminishing returns, where adding more labor results in smaller increases in output as production becomes less efficient due to overcrowding or other constraints.

In contrast, a production function with two variables incorporates both labor (L) and capital (K) as inputs, showing how changes in either or both affect total output. An example is the function $Q=5L^{0.5} K^{0.5}$, where output depends on the square root of both inputs. This means that while increasing either labor or capital will boost production, the gains decrease over time due to diminishing returns to scale. This type of function better represents real-world production processes, where firms must balance labor and capital to achieve optimal efficiency.

In summary, a one- variable production function simplifies the relationship between input and output, making it easier to analyze basic productivity changes, while a two-variable production function provides a more comprehensive view by considering how multiple inputs interact. Both

approaches are useful in understanding how businesses can manage their resources effectively, though real-world production typically involves more complexity and interdependence between inputs.

11.8 GLOSSARY

- **Production Function:** A mathematical relationship that describes how inputs, such as labor and capital, are transformed into output. It shows the maximum output that can be produced from a given set of inputs.
- **Inputs:** The resources used in the production process, typically categorised into labor, capital and raw materials.
- **Output:** The goods or services produced from the inputs used in the production process.
- **Marginal Product:** The additional output produced by using one more unit of an input, holding all other inputs constant.
- **Short Run:** A period in which at least one input (e.g., capital) is fixed, while other inputs (e.g., labor) can vary.
- **Long Run:** A period in which all inputs, including capital and labor, can be varied, and firms can fully adjust all factors of production.

11.9 SELF ASSESSMENT QUESTIONS

Q1. What is a production function, and how is it used in economics to represent the relationship between inputs and outputs?

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_____

_____

Q2. Differentiate between short-run and long-run production functions. How does the role of fixed and variable inputs change over time?

_____

_____

11.10 LESSON END EXERCISE

Q1. In a two-variable production function, what do labor (L) and capital (K) represent, and how do they influence total output?

Q2. What is a production function with two variable inputs? How does it differ from a single-variable production function?

11.11 SUGGESTED READINGS

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STAGES OF PRODUCTION AND ECONOMIES OF SCALE

STRUCTURE

12.0 LEARNING OBJECTIVES AND OUTCOMES

Learning objectives

- To understand the concept of returns of scale
- To make student's familar with the stages
- Low of variable proportions
- To analyse the economics of scale

Learning outcomes

After going through this unit, you will be able to :

- state the concept of total product, average product and marginal product;
- explain the nature and relationship of total, average and marginal product curves;
- analyse the operation of the law of variable proportions; and
- identify the three stages of production.

12.1 LEARNING OBJECTIVES AND OUTCOMES

For the purpose of production, we require a combination of various inputs or factors of productions. It is only with the joint efforts of these inputs (like labour, machines, land, raw materials etc.) that output is produced. Normally, production is carried out under conditions of variable proportions which implies that the rate of input quantities may vary. Fixed proportions production means that there is only one ratio of inputs that can be used to produce a good. For example, only one driver can work one truck. In this case, the ratio of driver and truck is technologically determined and is fixed. It is beyond the capabilities of the producer to change it. However, the ratio of land and labour in agriculture can be changed and is thus regarded as variable. In the short run, not all inputs are variable. In the long run, however, all inputs are variable and the ratio of inputs may also vary. This is the case of technological Progress. In this unit, we shall focus only on short run production. In the short run, for thepurpose of analysis, it is often assumed that only one input is variable and all other inputs are fixed. We shall follow this convention.

12.2 TOTAL, AVERAGE AND MARGINAL PRODUCTS

At the outset we shall explain the concept of total, average and marginal products. The short run production function, whether it is shown as a table, a graph or as a mathematical equation, gives the total output obtainable from different quantities of the variable inputs given a specified amount of the fixed input. Let us now consider the case in which capital is fixed, but labour is variable, so that the firm can produce more output by increasing the labour input. For example, consider a firm manufacturing garments. It has a fixed amount of equipment, but it can hire more or less labour to operate the machines. For decision making, the firm's manager (or owner) must know how the amount of total output or product (Q) increases (if at all) as the labour input (L) increases. Table 12.1 provides this information about the production function.

Table 12.1 shows the output that can be produced with different amounts of labour and with capital fixed at 5 units. The first column shows the fixed amount of capital, the second shows the amounts of labour from zero to 10 units and the third shows total product or output. From the table, it is clear that whenlabour input is zero, output is zero because capital alone cannot produce anything. Then, upto a labour input of seven units output increases first at an increasing rate and then at a decreasing rate in response to increased use of labour. The eighth unit of labour input does not raise output. Whether firm applies 7 or 8 units of labour input to a fixed amount of capital input, total output remains 224 units. Beyond this point using more units of labour input is counter productive because output declines as use of labour is increased.

Amount of Capital (K)	Amount of Labour (L)	Total Product or Output (Q)	Average Product (Q/L)	Marginal Product (ΔQ/ΔL)
5	0	0	--	--
5	1	20	20	20
5	2	60	30	40
5	3	120	40	60
5	4	160	40	40
5	5	190	38	30
5	6	216	36	26
5	7	224	32	8
5	8	224	28	0
5	9	216	24	-8
5	10	200	20	-16

Table 12.1: Production with One Variable Input

Although the figures provided in **Table 12.1** are hypothetical, the general relationship they indicate is common. To examine the relationship further, we introduce the concepts of average product and marginal product of an input.

The average product (or average physical product) of an input can be defined as total output (or total product) divided by the amount of input used to produce that output. For example, 4 units of labour input produce 160 units of output, so the average product of labour is 40 units of output per worker at that level of employment. In a more general way, we may express

$$AP_L = \frac{Q}{L}$$

where, AP_L = average product of labour

Q = total output or total product

L = amount of labour

The fourth column in Table 12.1 shows the average product of labour (APL). The average product for each quantity of labour is derived by dividing total output shown in column 3 by corresponding amount of labour in column 2 that produces each output level. In our illustration, the average product of labour increases initially but when labour input exceeds 4 units, it tends to fall.

Defined as the change in total output due to a unit change in the use of an input while quantities of other inputs are held constant. For example, with capital fixed at 5 units when the amount of labour increase from 3 to 4 units, total output rises from 120 to 160 units or by 40 units. So the marginal product of labour, when fourth unit of labour input is employed, is 40 units of output. We may thus generalise,

$$MP_L = \frac{\Delta Q}{\Delta L}$$

where, MPL = Marginal product of labour "Q

= Change in output

"L = Change in labour input

In Table 12.1, the fifth column shows the marginal product of labour. It may be noted that like the average product, the marginal product increases initially and then falls and finally becomes negative. In the present example, the marginal product of labour becomes negative when labour input exceeds 8 units. This happens when the variable input is used too intensively with the fixed input.This proposition is, in fact, true of all marginal and average relationships.

12.3 TOTAL, AVERAGE & MARGINAL PRODUCT CURVES

Fig. 12.1 plots the information provided in Table 12.1 (it has been assumed in drawing the graphs that both labour input and the product are divisible into smaller units and thus the relationships are smooth curves rather than discrete points). The total product curve shown in Fig. 12.1 indicates how the total product varies with the quantity of labour input used. As indicated in

Table 12.1, Fig. 12.1 a also shows that first the total output increases at an increasing rate upto point E as more labour is used. The point E where total product stops increasing at an increasing rate and begins increasing at a decreasing rate is called the point of inflexion. Total product reaches a maximum at 224 units when 7 units of labour input are used. The use of an additional unit of labour input at this stage does not lead to any increase in total product. Beyond this point, further use of labour input results in a fall in total product.

That portion of total product curve (TP) is shown by dashed segment which indicates a decline in output as a result of increased employment of labour. In Fig. 12.1 a when labour input is expanded beyond eighth unit, output falls which means that production is not technically efficient and is thus not a part of the production function.

Fig. 12.1 shows the average and marginal product curves for labour. (The units of the vertical axis have been changed from output per period of time to output per unit of labour). Hence, average product and marginal product curves measure the output per unit of labour. It may be noted that as the use of labour input increases, initially the marginal product of labour increases, reaches a maximum at 3 units of labour, and then declines. The marginal product of labour in our example becomes zero at 8 units of labour and thereafter turns negative. However, technical efficiency rules out the possibility of negative marginal products and is, therefore, not a part of the production function. The average product of labour also increases initially, reaches a maximum at 4 units of labour input, and then declines.

Relationship between MP and AP Curves:

Let us now consider the relationship between the marginal and average product curves. As is true of all marginal and average curves, there are definite relationships between the marginal and average product curves.

i. When marginal product increases, average product also increases though at a rate lower than that of the marginal product. It is important to note in this context that even when marginal product starts declining but

remains greater than the average product, the latter shows a tendency to increase.

ii. When the average product is maximum, the marginal product is equal to it. This is the reason why the marginal product curve intersects the average product curve at its highest point.

iii. Beyond this point, when the marginal product declines, it also pulls down the average product. However, the rate of decline in the average product is less than that of the marginal product.

Relationship between TP and MP Curves

The relationship between the total product curve and the marginal product curve can be stated as under:

i. As long as marginal product is positive, total product curve will continue to rise.

ii. When marginal product is zero, total product curve reaches its highest point. It may be noted that when eighth unit of labour input is employed, marginal product of labour becomes zero and total product is at the maximum.

iii. Thereafter, marginal product of labour is negative and total product curve has a downward slope which means that total product falls.

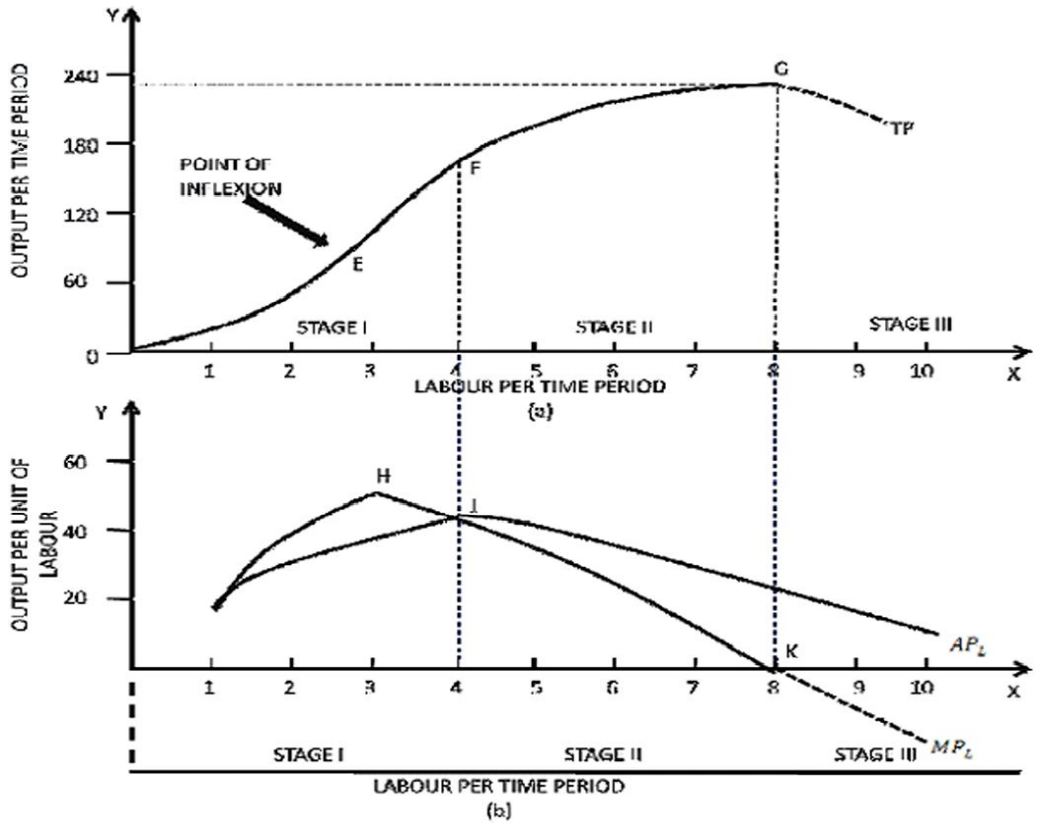

Fig 12.1: Production with one variable input (labour). In the upper part of the figure, the total product curve (TP) of labour is shown. The lower part of the figure shows how average product curve (AP) of labour and marginal product curve (MP) of labour are obtained with the help of information contained in the upper part

A. CHECK YOUR PROGRESS

Indicate the following statement as true (T) or false (F):

1. When marginal product is negative, total product is still increasing.

Answer: False

2. Average product increases as long as the marginal product is greater than the average product.

Answer: True

3. What does the total product (TP) of a firm represent?

a) The output produced by one additional unit of input.

b) The average output per unit of input used.

c) The total output produced by the firm using all units of input.

d) The marginal cost of production.

Answer: c) The total output produced by the firm using all units of input.

4. If the marginal product (MP) of labor is negative, what does this imply?

a) Adding more labor decreases total output.

b) Total product is at its maximum.

c) The average product of labor is increasing.

d) There are increasing returns to scale.

Answer: a) Adding more labor decreases total output

12.4 THE LAW OF VARIABLE PROPORTIONS: RETURNS TO A FACTOR

Knowledge regarding the conditions of production reveals that as more and more of some input is employed, all other input quantities being held constant, normally marginal and average product (of the variable input) increase upto a point. Thereafter, marginal product starts declining and this pulls down the average product also. In the production process generally land, capital equipment and buildings remain fixed in the short run while quantities of labour and raw materials can be conveniently varied. However, we may consider a case where amount of capital is fixed and the quantity of labour is increased.

i. In this case, initially the marginal product of labour will increase as its amount is increased and the marginal product will also pull up average product with it. In this situation, total product increases at an increasing rate.

ii. If the variable input, say, labour is further increased, marginal product

stops increasing after a point. Therefore, the rate of increase of total product also shows a tendency to fall.

iii. Ultimately marginal product turns negative and this causes a fall in total product itself.

Since in the short run, changes in technology are ruled out, the tendency of marginal product to decline after a point is inevitable. This statement of trends in marginal product in response to changes in the quantities of a variable factor applied to a given quantity of a fixed factor is called the law of diminishing returns. It is also called the law of variable proportions because it predicts the consequences of varying the proportions in which factors of production are used. we can sum up the law of variable proportions as follows:

The law of variable proportions can be easily followed with the help of Table 12.1 and Fig. 12.1 which has been drawn on the basis of illustration given in Table 12.1. In Table 12.1, it has been assumed that capital is a fixed factor and its quantity remains unchanged at 5 units. Labour is the variable factor and its quantity increases from 1 to 10. It can be seen from Table 12.1.

i. As the amount of labour employed increases, the total output also increases until the seventh unit of labour is employed. Initially the increase in output takes place at an increasing rate because marginal product rises. This tendency is observed upto the point E where marginal product reaches a maximum. At point E, which is the point of inflexion, the rate of increase in total product switches from increasing to decreasing because marginal product begins to diminish. However, average product continues to increase until it reaches a maximum at point F on total product curve (point J on average product curve).

ii. When the amount of labour is further expanded, total product continues to increase though at a diminishing rate. Both marginal product andaverage product remain positive, but both continue to diminish. Eventually, total product reaches a maximum at point G and the marginal product becomes zero (note point K in Fig. 12.1). The average product,

however, remains positive but continues to diminish.

iii. Any attempt to increase output beyond this point by employing more units of labour will not be fruitful. In fact, it will be counter-productive because marginal product is negative which implies that total product diminishes.

Product curves such as the one shown in Fig. 12.1 are general representations of production function with fixed and variable inputs. To illustrate particular instances, similar product curves could be drawn, though each different from others in some way. The stage of increasing marginal product may be long or brief or can be totally absent. Moreover, when marginal product diminishes, the rate at which it happens may be different in each case. Table 6.2 sums up the law of variable proportions.

Total Product	Marginal Product	Average Product	Figure 6.1
Stage I first increases at increasing rate	Increases	Increases	to point E
then rate of increase changes from increasing to diminishing	reaches a maximum, and then starts diminishing	continues increasing	at points E and H
Stage II continues to increase at diminishing rate	continues diminishing	reaches a maximum where it equals MP and then starts diminishing	at points F and J
reaches a maximum and then starts diminishing	becomes zero	continues diminishing	at points G and K
Stage III diminishes	is negative	continues diminishing	to right of points J and K

Table 12.2: Properties of Product Curves

12.5 THE THREE STAGES OF PRODUCTION

Normally when the amount of a variable input is expanded, the marginal product first rises and then falls and the product curves have the shapes shown in Fig. 12.1. Conventionally, these product curves are partitioned into three regions, shown as Stages I, II and III in Fig. 12.1.

Stage I is characterised particularly by the rising average product. In our example, Stage I occurs when labour is employed from 1 to 4 units. In Stage 1, total product first increases at an increasing rate and thus marginal product rises. It reaches a maximum at labour input of 3 units. When fourth unit of labour input is employed, diminishing returns set in implying that total product increases at a diminishing rate and the marginal product falls.

In Stage II, total product increases at a diminishing rate and thus both marginal product and average product decline. Marginal product being below the average product, pulls the latter down. The right-hand boundary of Stage II is at maximum total product where marginal product reaches zero. In our example, Stage II ranges from 4 to 8 units of labour.

In Stage III, total product falls and marginal product is negative. In our example, stage III occurs when labour is employed in excess of 8 units.

Actual Stage of Operation The rational producer will operate in Stage II. It is not difficult to follow why production will not be done in Stage III. In Stage III, less output is produced by using more of the variable input which means that production costs would be higher in Stage III than they were in Stage II. Obviously, any rational producer will always avoid such inefficiencies in the use of production inputs.

In Stage I, average product of the variable input is increasing. Therefore, if the amount of variable input is doubled, the output more than doubles and the unit cost of producing output decreases. If a firm is operating in a competitive market, it would avoid producing in this stage because by expanding output it reduces the unit costs while the price it receives remains same for each additional

unit sold. This means that total profits increase if production is expanded beyond the region of rising average product.

To sum up we can say: Initially, the variable factor-labour is not able to use all the capacities of the fixed factor, hence MP and AP remain low. For instance, one worker may not be able to make full use of the potential of a one hectare plot of land. But two workers, together are is a better position to work on that field. Hence rise in MP as Labour increases from 1 to 2.

Thus, any rational producer will operate in the second stage only when the law of diminishing marginal return operates. This is why the law of variable proportions is also called the Law of Diminishing Marginal Returns to a factor.

12.5.1 Explanation of Increasing Returns

According to modern economists, when in the initial stage of production quantity of the variable factor is increased, the tendency of increasing returns in production operates. The classical economists had also observed this tendency and had termed it as the Law of Increasing Returns. However, they felt that this law operated only in manufacturing industries. As against this, the modern economists believe that this law can operate in any area of economic activity. Below we give the views of Marshall (representing the former position) and Joan Robinson (representing the latter position) in this regard.

Marshall opined that the tendency of increasing returns operates only in the manufacturing industries. He believed that when the quantity of labour and capital employed in the manufacturing industries is increased, the scale of production expands and this leads to a better organisation of production.

Let us now examine in detail why the tendency of increasing returns operates.

1) **Optimum combination of factors of production:** According to Joan Robinson, full exploitation of some indivisible factors of production is not possible until increased quantities of some other factors of production are employed. Therefore, when the producer engages a small quantity of different factors of production, an optimum proportion among them

is not established and the level of production remains low. When he increases the quantities of those factors of production, which were employed less (in relation to the requirements of optimum production), marginal product increases till the point is reached where the factors are combined in optimum proportion. Naturally, at this point, output level is the maximum.

2) **Large size of fixed factors:** When the size of the fixed factors used for producing a given good is very large while the quantity of the variable factor used is very small, the level of efficiency remains very low. As more and more quantities of the variable factors are employed, marginal productivity increases (since the level of efficiency increases). For example, if only one person is working on a ten hectare plot of land, his productivity will be very low. As the number of workers increases, division of labour and specialisation will lead to increasing returns as marginal product will rise rapidly.

12.5.2 Explanation of Constant Returns

If even on continuously increasing the quantity of variable factors of production in a firm, the marginal product neither increases nor decreases butremains constant, the tendency of constant returns is in operation. In fact, there is no industry in which increase in the quantity of variable factors of production yields constant returns permanently. According to Marshall, "if the actions of the law of increasing and diminishing returns are balanced, we have the law of constant returns."

Marshall feels that the operation of the law of constant returns is very limited. According to him, this law can operate only when there is a balance between the tendencies of increasing returns and diminishing returns. However, modern economists regard the area of operation of constant returns as fairly large. According to them, tendency of constant returns is generally found to operate before the tendency of diminishing returns sets in. In no field of productive activity increasing returns are obtained forever. Whether it is agriculture, manufacturing, industry or any other productive activity, the

tendency of increasing returns can operate only up to a certain limit. After this limit is reached, constant returns operate for some time. From the point of view of the producer, this is an important stage because it exhibits an optimum combination of the factors of production. In this stage, marginal cost is the minimum. This is due to two reasons. First, the stage of constant returns is reached only when the tendency of increasing returns comes to an end so that there is no possibility of a further decline in marginal cost. Second, after the stage of constant returns, the stage of diminishing returns sets in. Therefore, the stage of constant returns is very significant from the point of view of the producers.

12.5.3 Explanation of Diminishing Returns

The diminishing returns stage is the most important of the three stages of the law of variable proportions. In Economics, the explanation of the law of diminishing returns is presented in two ways. The classical economists believed that this law applies only to agriculture. Basically accepting this position of the classical economists, the neo-classical economist Marshall had stated, "We say broadly that while the part which nature plays in production shows a tendency of diminishing returns, that part which man plays shows a tendency of increasing returns."

Modern economists like Joan Robinson, Stigler, etc. constitute the second category of economists. These economists regard the law of diminishing returns of far greater applicability than the classical economists. According to them, this law operates in all areas of productive activity.

Marshall had argued that this law operated only in agriculture. Therefore, he discussed it only in reference to agriculture. The implication is that when land is kept fixed in agriculture while the quantity of labour and capital applied on that land is increased, total production increases but not in the same proportion as the factors of production are increased. It increases by a lesser proportion. For example, if an agriculturist doubles the amount of labour and capital employed on a fixed plot of land, the total production will undoubtedly increase but it will not double itself. Due tothis reason agriculturists do not

consider it profitable to continuously increase the application of other factors of production on their fixed plots of land. They know from their experience that unless there is some improvement in agricultural techniques, increased application of labour and capital on a fixed quantity of land leads to a situation of continuously declining marginal product.

Marshall has accepted two limitations of the law of diminishing returns as applied to agriculture:

1) **The law generally operates in agriculture:** Marshall was aware of the fact that the law of diminishing returns does not always operate in agriculture (hence the qualification that it generally operates in agriculture). In some cases when the agriculturist applies the first unit of labour and capital on his fixed plot of land, the fertility of the soil is not properly exploited. Accordingly, the level of production remains low. When the second unit of labour and capital is applied, output increases in a greater proportion. However, this tendency does not remain for long because the agriculturist soon finds that additional units of labour and capital start yielding a lower and lower marginal product. On account of the above reasons, Marshall was careful in pointing out that the law of diminishing returns operates generally in agriculture. However, in certain exceptional cases, it may not operate.

2) **There should be no improvement in agricultural techniques:** The law of diminishing returns operates only if there is no improvement in agricultural techniques. It is a law of static agriculture. If the agriculturist is able to expand irrigation facilities on his land, or make use of better seeds, better agricultural implements, more fertilisers, etc. or use new scientific methods in production, he can stall the operation of this law. Generally, an improvement in agricultural techniques leads to a more than proportionate increase in output corresponding to an increase in labour and capital.

As against the view of Marshall, modern economists like Joan Robinson, Stigler and Boulding regard the law of diminishing returns as more pervasive

and universal. According to these economists, this law operates in all branches of productive activity. Accordingly, they have presented this law in a general fashion as would be clear from the definition of this law presented by Joan Robinson: "The Law of Diminishing Returns, as it is usually formulated, states that, with fixed amount of any one factor of production, successive increases in the amount of other factors will after a point yield a diminishing increment of the product."

From the above definition of the law by Joan Robinson, it is clear that she regards this law as of universal value and does not restrict its application to agriculture alone. According to her, this law operates in all branches of productive activity and the principal reason behind the operation of this law is that the optimum proportion between different factors of production breaks down sooner or later.

The law of diminishing returns is a logical necessity. When in any productive activity, the quantity of the variable factors of production employed with given quantity of fixed factor of production is increased, the law of diminishing returns sets in after the point of optimum proportion has been reached. Initially, application of variable factors was sub-optional, given the size of fixed factor. Later, the expansion in use of variable factors leads to sub optimality of a different kind: each doze or unit of variable factors have sub optional quantity of fixed factor to work on.

Another important reason for the operation of the law of diminishing returns is that one factor of production (out of the various factors of production) is used in a fixed quantity. Had all the factors of production been available in abundance and had it been possible to increase their use in production to all conceivable limits, the law of diminishing returns would not operate. However, all factors of production land, labour, capital, enterprise, organisation, etc. are scarce and often the supply of one of these is taken to be fixed. It is this factor that results in diminishing returns.

B. CHECK YOUR PROGRESS

1. Which of the following is the correct order of the three stages of production?

   a) Increasing returns, constant returns, diminishing returns

   b) Increasing returns, diminishing returns, negative returns

   c) Diminishing returns, increasing returns, negative returns

   d) Negative returns, increasing returns, diminishing returns

   Answer: b) Increasing returns, diminishing returns, negative returns

2. In which stage of production does the Marginal Product (MP) start to decline but remains positive?

   a) Stage I b) Stage II

   c) Stage III d) Stage IV

   Answer: b) Stage II

3. What is the primary characteristic of Stage III of production?

   a) Increasing marginal returns b) Constant returns to scale

   c) Negative marginal returns d) Zero marginal product

   Answer: c) Negative marginal returns

12.6 ECONOMIES OF SCALE

Production may be carried on a small scale or o a large scale by a firm. When a firm expands its size of production by increasing all the factors, it secures certain advantages known as economies of production. Marshall has classified these economies of large-scale production into internal economies and external economies.

Internal economies are those, which are opened to a single factory or a single firm independently of the action of other firms. They result from an increase in the scale of output of a firm and cannot be achieved unless output increases. Hence internal economies depend solely upon the size of the firm and are different for different firms.

External economies are those benefits, which are shared in by a number of firms or industries when the scale of production in an industry or groups of industries increases. Hence external economies benefit all firms within the industry as the size of the industry expands.

Causes of internal economies:

Internal economies are generally caused by two factors

1. Indivisibilities
2. Specialization

1. Indivisibilities

Many fixed factors of production are indivisible in the sense that they must be used in a fixed minimum size. For instance, if a worker works half the time, he may be paid half the salary. But he cannot be chopped into half and asked to produce half the current output. Thus as output increases the indivisible factors which were being used below capacity can be utilized to their full capacity thereby reducing costs. Such indivisibilities arise in the case of labour, machines, marketing, finance and research.

2. Specialization

Division of labour, which leads to specialization, is another cause of internal economies. Specialization refers to the limitation of activities within a particular field of production. Specialization may be in labour, capital, machinery and place. For example, the production process may be split into four departments relation to manufacturing, assembling, packing and marketing under the charge of separate managers who may work under the overall charge of the general manger and coordinate the activities of the for departments. Thus specialization will lead to greater productive efficiency and to reduction in costs.

12.6.1 Internal Economies:

Internal economies may be of the following types.

a) **Technical Economies:** Technical economies arise to a firm from the use of better machines and superior techniques of production. As a result, production increases and per unit cost of production falls. A large firm, which employs costly and superior plant and equipment, enjoys a technical superiority over a small firm. Another technical economy lies in the mechanical advantage of using large machines. The cost of operating large machines is less than that of operating mall machine. More over a larger firm is able to reduce it's per unit cost of production by linking the various processes of production. Technical economies may also be associated when the large firm is able to utilize all its waste materials for the development of by-products industry. Scope for specialization is also available in a largefirm. This increases the productive capacity of the firm and reduces the unit cost of production.

b) **Managerial Economies:** These economies arise due to better and more elaborate management, which only the large size firms can afford. There may be a separate head for manufacturing, assembling, packing, marketing, general administration etc. Each department is under the charge of an expert. Hence the appointment of experts, division of administration into several departments, functional specialization and scientific co-ordination of various works make the management of the firm most efficient.

c) **Marketing Economies:** The large firm reaps marketing or commercial economies in buying its requirements and in selling its final products. The large firm generally has a separate marketing department. It can buy and sell on behalf of the firm, when the market trends are more favorable. In the matter of buying they could enjoy advantages like preferential treatment, transport concessions, cheap credit, prompt delivery and fine relation with dealers. Similarly it sells its products more effectively for a higher margin of profit.

d) **Financial Economies:** The large firm is able to secure the necessary finances either for block capital purposes or for working capital needs

more easily and cheaply. It can barrow from the public, banks and other financial institutions at relatively cheaper rates. It is in this way that a large firm reaps financial economies.

e) **Risk bearing Economies:** The large firm produces many commodities and serves wider areas. It is, therefore, able to absorb any shock for its existence. For example, during business depression, the prices fall for every firm. There is also a possibility for market fluctuations in a particular product of the firm. Under such circumstances the risk-bearing economies or survival economies help the bigger firm to survive business crisis.

f) **Economies of Research:** A large firm possesses larger resources and can establish it's own research laboratory and employ trained research workers. The firm may even invent new production techniques for increasing its output and reducing cost.

g) **Economies of welfare:** A large firm can provide better working conditions in-and out-side the factory. Facilities like subsidized canteens, crèches for the infants, recreation room, cheap houses, educational and medical facilities tend to increase the productive efficiency of the workers, which helps in raising production and reducing costs.

12.6.2 External Economies

Business firm enjoys a number of external economies, which are discussed below:

a) **Economies of Concentration:** When an industry is concentrated in a particular area, all the member firms reap some common economies like skilled labour, improved means of transport and communications, banking and financial services, supply of power and benefits from subsidiaries. All these facilities tend to lower the unit cost of production of all the firms in the industry.

b) **Economies of Information:** The industry can set up an information centre which may publish a journal and pass on information regarding

the availability of raw materials, modern machines, export potentialities and provide other information needed by the firms. It will benefit all firms and reduction in their costs.

c) **Economies of Welfare:** An industry is in a better position to provide welfare facilities to the workers. It may get land at concessional rates and procure special facilities from the local bodies for setting up housing colonies for the workers. It may also establish public health care units, educational institutions both general and technical so that a continuous supply of skilled labour is available to the industry. This will help the efficiency of the workers.

d) **Economies of Disintegration:** The firms in an industry may also reap the economies of specialization. When an industry expands, it becomes possible to spilt up some of the processes which are taken over by specialist firms. For example, in the cotton textile industry, some firms may specialize in manufacturing thread, others in printing, still others in dyeing, some in long cloth, some in dhotis, some in shirting etc. As a result the efficiency of the firms specializing in different fields increases and the unit cost of production falls.

Thus internal economies depend upon the size of the firm and external economies depend upon the size of the industry.

12.6.3 Diseconomies of large scale production

Internal and external diseconomies are the limits to large-scale production. It is possible that expansion of a firm's output may lead to rise in costs and thus result diseconomies instead of economies. When a firm expands beyond proper limits, it is beyond the capacity of the manager to manage it efficiently. This is an example of an internal diseconomy. In the same manner, the expansion of an industry may result in diseconomies, which may be called external diseconomies. Employment of additional factors of production becomes less efficient and they are obtained at a higher cost. It is in this way that external diseconomies result as an industry expands.

The major diseconomies of large-scale production are discussed below:

Internal Diseconomies:

a) **Financial Diseconomies:** For expanding business, the entrepreneur needs finance. But finance may not be easily available in the required amount at the appropriate time. Lack of finance retards the production plans thereby increasing costs of the firm.

b) **Managerial diseconomies:** There are difficulties of large-scale management. Supervision becomes a difficult job. Workers do not work efficiently, wastages arise, decision- making becomes difficult, coordination between workers and management disappears and production costs increase.

c) **Marketing Diseconomies:** As business is expanded, prices of the factors of production will rise. The cost will therefore rise. Raw materials may not be available in sufficient quantities due to their scarcities. Additional output may depress the price in the market. The demand for the products may fall as a result of changes in tastes and preferences of the people. Hence cost will exceed the revenue.

d) **Technical Diseconomies:** There is a limit to the division of labour and splitting down of production p0rocesses. The firm may fail to operate its plant to its maximum capacity. As a result cost per unit increases. Internal diseconomies follow.

C. CHECK YOUR PROGRESS

Multiple Choice Questions

1. Which of the following best defines economies of scale?

a) A decrease in the average cost of production as the size of the firm increases.

b) A decrease in total production cost as more units are produced.

c) An increase in the average cost as output increases.

d) An increase in profits with constant costs.

Answer: a)

2. Which of the following is an example of internal economies of scale?

   a) Reduced government taxes

   b) Bulk buying of raw materials

   c) An increase in industry output

   d) Improvement in transportation infrastructure

   Answer: b)

3. Diseconomies of scale occur when:

   a) The average cost per unit falls as output increases.

   b) The average cost per unit rises as output increases.

   c) Total revenue exceeds total cost.

   d) The company expands its market share.

   Answer: b)

Diseconomies of Risk-taking: As the scale of production of a firm expands risks also increase with it. Wrong decision by the management may adversely affect production. In large firms are affected by any disaster, natural or human, the economy will be put to strains.

External Diseconomies:

When many firm get located at a particular place, the costs of transportation increases due to congestion. The firms have to face considerable delays in getting raw materials and sending finished products to the marketing centers. The localization of industries may lead to scarcity of raw material, shortage of various factors of production like labour and capital, shortage of power, finance and equipments. All such external diseconomies tend to raise cost per unit.

12.7 LET US SUM UP

The law of variable proportions states: As the quantity of a variable input is increased by an equal amount, keeping the quantities of other inputs

constant, total output will increase, but after a point, at a diminishing rate. Total product rises initially at a rising rate, then at a falling rate as more of a variable input is combined with fixed inputs. The marginal product rises, becomes maximum and then begins to fall until it becomes zero as more of a variable input is used.

There are three stages of production. Stage 1 corresponds to use of the variable input to the left of a point where average product becomes maximum. Stage 2 is a situation where the marginal product of the variable input becomes zero and Stage 3 corresponds to the point where marginal product of the variable input becomes negative. The law of diminishing marginal returns is a special case of the law of variable proportions. The law of diminishing marginal returns operates beyond a point where marginal physical product becomes the maximum with the use of a variable input. This law is based on two important assumptions namely, (1) technology remains unchanged and (2) all units of a variable input are homogeneous.

This law has wide applications ranging from agriculture, fisheries and industry. It has more or less a universal application in all production activities. Its application can be postponed by technology advancements but eventually it does start applying.

12.8 GLOSSARY

- **Intermediate Inputs:** Inputs produced by other domestic producers of an economy or coming from other countries.
- **Marginal Product:** The addition to total physical product by employing one extra unit of a variable input.
- **Macro Theory:** Theory explaining aggregate variables like national income or employment or factor shares in national income, etc.
- **Production Function:** A functional relationship between quantities of inputs and outputs.

- **Primary Inputs:** Inputs provided by the services rendered by land, labour, capital and enterprises.
- **Semi-Finished product:** A product between the stage of raw material and finished product.
- **Short Run:** That period of time in which some inputs of factors of production are fixed and others can be regarded as variable.
- **Variable Inputs:** Those inputs whose quantity changes with simultaneous change in output in which they enter as inputs.

12.9 SELF-ASSESSMENT QUESTIONS

Q1. Explain the law of variable proportions with the help of total, average and marginal product.

Q2. Explain the law of diminishing marginal returns. Also state its assumptions. Does it apply to agriculture alone?

Q3. Distinguish between fixed and variable inputs. What is the importance of this distinction in the theory of production?

12.10 LESSON END EXERCISE

Q1. What types of companies benefit the most from economies of scale?

Q2. What are some examples of economies of scale?

Q3. Why is monopsony power important in economies of scale?

12.11 SUGGESTED READINGS

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M.Com 1st Sem. **UNIT-III (CREDIT: 1)**
Course No. 153 **Lesson No. 13**

ESTIMATION OF PRODUCTION FUNCTION: COST THEORY AND ESTIMATION

STRUCTURE

13.0 LEARNING OBJECTIVES AND OUTCOMES

Learning Objectives

- To make the learners aware about the concept of production function;
- To give an overview about estimation of production function;
- To make the learners familiar with the concept of cost function; and
- To impart knowledge regarding the managerial uses of production function and cost function.

Learning Outcomes

After going through the lesson, you will be able to:

- understand the concepts of the production function;
- familiar with the estimation of production function;
- explain the concepts of cost function; and
- identify the managerial uses of production and cost function

13.1 INTRODUCTION

In this chapter, we delve into the critical concepts of **Production and Cost Functions** in economics. Production refers to the process by which businesses and firms combine various inputs—such as labor, raw materials, and machinery—to create goods and services that fulfill consumer demand. Understanding how this process works is vital for businesses to operate efficiently and effectively.

A core aspect of production is the relationship between input and output, which we will explore through the production function. This function helps to explain how different quantities of inputs lead to varying levels of output, providing valuable insights into productivity and scalability.

On the other hand, the cost function focuses on the expenses involved in production. Firms not only aim to maximize output but also seek to minimize costs to enhance profitability. We'll discuss different types of costs—such as fixed, variable, and marginal costs—and how they impact a firm's decision- making. By

analyzing these cost structures, firms can make informed choices on how much to produce, at what cost, and whether to expand or scale down their operations.

For you, as distance learners, this chapter offers fundamental knowledge to build upon as you continue your studies in economics and business. Take your time to engage with the content and feel free to reach out if you have any questions or need further clarification. Let's embark on this journey of understanding the intricate relationship between production, cost, and profitability.

13.2 THE PRODUCTION FUNCTION

In order to understand the estimation of production function first of all we are required to understand what does production function means, in economics, equation that expresses the relationship between the quantities of productive factors (such as labour and capital) used and the amount of product obtained. It states the amount of product that can be obtained from every combination of factors, assuming that the most efficient available methods of production are used. The production function can thus answer a variety of questions. It can, for example, measure the marginal productivity of a particular factor of production (i.e., the change in output from one additional unit of that factor). It can also be used to determine the cheapest combination of productive factors that can be used to produce a given output.

Production function can be expressed in algebraic formula as under:

$$X = f(a1, a2, \quad , an)$$

Production function formula (equation) tells us the quantity of the product X which can be produced by the given quantities of inputs (lands labor, capital) that are used in the process of production. Here it may be noted that production function shows only the maximum amount of output which can be produced from given inputs. It is because production function includes only efficient production process. The analysis of production function is generally carried

with reference to time period which is called short period and long period.

In the short run, production function is explained with one variable factor and other factors of productions are held constant. We have called this production function as the law of variable proportions or the law of diminishing returns.

In the long run, production function is explained by assuming all the factors of production as variable. There are no fixed inputs in the long run. Here the production function is called the law of returns according to the scale of production. As it is difficult to handle more than two variables in a graph, we therefore, explain the law of returns according to scale of production by assuming only two inputs i.e., capital and labor and study how output responds to their use.

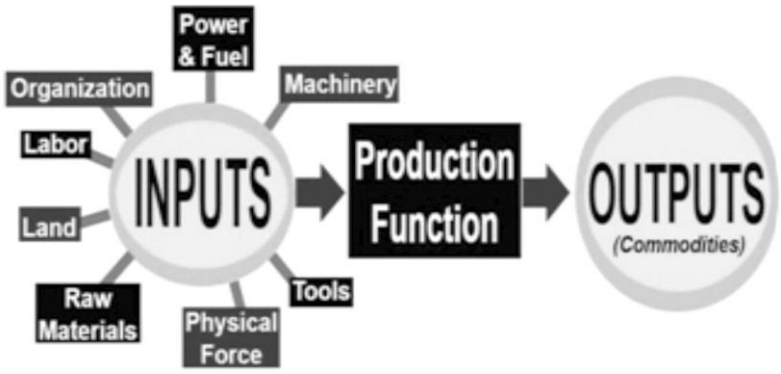

Figure 13.1

A. CHECK YOUR PROGRESS

True/False Statements on Production Function

1. The production function shows the relationship between inputs and the maximum output that can be produced with those inputs. True/False

   Ans: True

2. In the short run, at least one factor of production is variable. True/False

   Ans: False (In the short run, at least one factor of production is fixed.)

3. The law of diminishing marginal returns states that as more of a variable input is added to a fixed input, the additional output produced will eventually decrease. True/False

   Ans: True

4. A production function can be represented by a linear equation only. True/ False

   Ans: False (Production functions can be linear or non-linear, depending on the nature of the relationship between inputs and output.)

5. Increasing returns to scale means that doubling the inputs will more than double the output. True/False

   Ans: True

6. The total product is the same as the average product of labor**.** True/False

   Ans: False (Total product refers to the total output produced, while average product is total output divided by the quantity of the input used.)

7. In the long run, all factors of production can be varied**.** True/False

   Ans: True

8. The production function is only relevant for manufacturing firms and does not apply to service industries. True/False

   Ans: False (The production function applies to both goods and services as it describes how inputs are transformed into outputs in any industry.)

9. Marginal product is the additional output generated by adding one more unit of a specific input, holding all other inputs constant. True/False

   Ans: True

10. If a production function exhibits constant returns to scale, then increasing all inputs by a certain percentage will increase the output by the same percentage. True/False

    Ans: True

13.3 ESTIMATION OF PRODUCTION FUNCTION

A production function shows the relationship between the quantity of inputs used and the quantity of output produced by a firm. It helps firms understand how inputs (such as labor, capital, land, etc.) are converted into outputs (goods or services). The general form of a production function is:

$$Q = f(L, C, N)$$

Where, Q = Quantity of output

L = Labour

C = Capital

N = Land.

Hence, the level of output (Q), depends on the quantities of different inputs (L, C, N) available to the firm. In the simplest case, where there are only two inputs, labour (L) and capital (C) and one output (Q), the production function becomes.

$$Q=f(L, C)$$

Importance of Estimating the Production Function

- **Efficiency:** Estimation helps firms determine the most efficient combination of inputs.
- **Cost minimization**: It assists in determining the input mix that minimizes production costs for a given output.
- **Optimal production**: Provides insights on the levels of input that yield maximum output.
- **Policy formulation**: Governments and firms use the estimated production function to design policies related to taxation, subsidies, and resource allocation.

Steps in Estimating a Production Function

Specify the Functional Form: Choose the form of the production function

(Cobb-Douglas, CES, etc.). The functional form depends on the nature of the production process and data availability.

- **Collect Data:** Data on input quantities (labor, capital) and output quantities are required. This can be cross-sectional, time-series, or panel data.
- **Estimate Parameters Using Regression Analysis:** Use statistical methods such as ordinary least squares (OLS) to estimate the parameters (A, α, β, etc.). This step involves fitting the selected production function to the available data.
- **Test for Goodness of Fit:** Check how well the estimated production function fits the data using measures like R^2 and F-statistics. Higher values indicate a better fit.

  Test for Returns to Scale:

  If $\alpha+\beta=1$, there are constant returns to scale (CRS).

  If $\alpha+\beta>1$, there are increasing returns to scale (IRS).

  If $\alpha+\beta<1$, there are decreasing returns to scale (DRS).
- **Check for Multicollinearity and Heteroscedasticity:** Ensure that the regression assumptions are met, and adjust for issues like multicollinearity (high correlation between inputs) or heteroscedasticity (unequal variance in errors).

Challenges in Estimating Production Function

- **Data Collection**: Reliable data on inputs and outputs are often difficult to obtain.
- **Choice of Functional Form**: Different forms of production functions may give different estimates.
- **Multicollinearity**: High correlation between labor and capital can distort the estimates of parameters.

- **Measurement Errors**: Errors in measuring inputs or outputs can lead to biased estimates.

Techniques for Estimating the Production Function

1. **Ordinary Least Squares (OLS) Method:** The **Ordinary Least Squares (OLS)** method is one of the most widely used techniques for estimating production functions. It is particularly suited for estimating linear or log-linear production functions, such as the Cobb-Douglas production function**.**

   Suppose we have a Cobb-Douglas production function:

   $$Q=A\ L^{\alpha}\ K^{\beta}$$

   Q = Output

   L = Labor input

   K = Capital input

   A, α and β are the parameters to be estimated.

   To make this equation linear for estimation, we take the natural logarithm:

   In Q=In A+α In L+β ln K

   This is now a linear equation that can be estimated using OLS, where:

   - In Q is the dependent variable,
   - In L and In K are the independent variables,
   - In A is the intercept.

- Using available data on Q, L and K, OLS minimizes the sum of the squared differences between the actual and predicted values of In Q.

Advantages:

- **Simplicity**: Easy to implement and interpret.
- **Efficiency**: Provides unbiased and consistent estimates when the assumptions of OLS are satisfied.

Disadvantages:

- **Endogeneity**: If labor or capital is endogenous (correlated with the error term), OLS estimates will be biased.
- **Multicollinearity**: High correlation between labor and capital inputs may lead to unreliable estimates of parameters.

2. Instrumental Variables (IV) Method

The **Instrumental Variables (IV)** technique is used when one or more inputs are endogenous, meaning they are correlated with the error term in the production function. This can occur, for example, when labor or capital is influenced by unobserved factors that also affect output.

In the Cobb-Douglas production function $Q=AL^{\alpha} K^{\beta}$, if labor L is correlated with the error term, we need an instrumental variable Z that:

Is correlated with labor L,

Is uncorrelated with the error term.

The IV method uses Z to replace L in the regression equation. A two-stage process is typically used:

First stage: Regress L on the instrument Z to obtain predicted values of L.

Second stage: Use the predicted values of L in the production function equation to estimate α and β.

Advantages:

- **Corrects Endogeneity**: Provides consistent estimates even when inputs are endogenous.
- **Improves Accuracy**: By using valid instruments, the IV method avoids bias introduced by the correlation between inputs and the error term.

Disadvantages:

- **Finding Valid Instruments**: The success of IV depends on finding instruments that are both relevant and valid. If the instrument is weak (not strongly correlated with the endogenous input), estimates can be imprecise.
- **Complexity**: More difficult to implement and requires strong economic intuition to select appropriate instruments.

3. Stochastic Frontier Analysis (SFA)

Stochastic Frontier Analysis (SFA) is used to estimate production functions when there is a need to account for inefficiency in production. It distinguishes between random noise (uncontrollable factors like weather) and inefficiency in production.

- The production function is modeled as:

$$Q=A\ L^{\alpha}\ K^{\beta}\ e^{(v-u)}$$

represents inefficiency, which is assumed to be non-negative (since inefficiency cannot increase output).

- The error term in the production function is split into two components:
- One part accounts for random factors affecting production (v),
- The other part accounts for inefficiency (u).
- SFA uses maximum likelihood estimation (MLE) to estimate the parameters of the production function, while also estimating the inefficiency term.

Advantages:

- **Separates Noise and Inefficiency**: Unlike OLS, which assumes all deviations from the frontier are random, SFA explicitly accounts for inefficiency.
- **Useful for Efficiency Analysis**: SFA allows firms or industries to be compared based on their relative efficiency.

Disadvantages:

- **Complexity**: The estimation procedure is more complex than OLS, requiring assumptions about the distribution of inefficiency.
- **Strong Assumptions**: The validity of SFA depends on correct assumptions about the distribution of the error terms (e.g., inefficiency is usually assumed to follow a half-normal distribution).

4. Panel Data Techniques (Fixed Effects and Random Effects Models)

Panel data techniques use data that varies across time and entities (e.g., firms or industries) to estimate the production function while controlling for unobserved heterogeneity across firms.

Fixed Effects Model:

- The fixed effects model accounts for unobserved characteristics of firms (e.g., management quality) that do not change over time and may affect output.
- **Procedure**: It estimates the production function while controlling for these unobserved firm-specific characteristics. This helps in isolating the effects of labor and capital on output.

Random Effects Model:

- The random effects model assumes that the unobserved firm-specific characteristics are random and uncorrelated with the inputs.
- **Procedure**: It estimates the production function while accounting for both time and firm-specific variations.

Advantages:

- **Controls for Unobserved Factors**: Both models allow for better estimates of the production function by accounting for firm-specific characteristics.
- **Improved Efficiency**: By using both time-series and cross-sectional data, these models provide more efficient estimates.

Disadvantages:

- **Model Selection**: Choosing between fixed and random effects requires careful consideration (a Hausman test is typically used to decide).
- **Data Requirements**: Requires panel data, which may not always be available.

Other Statistical Techniques

Once a functional form of a production function is chosen the next step is to select the type of statistical analysis to be used in its estimation. Generally, there are three types of statistical analyses used for estimation of a production function. These are: (a) time series analysis, (b) cross-section analysis and (c) engineering analysis.

a) **Time series analysis**: The amount of various inputs used in various periods in the past and the amount of output produced in each period is called time series data. For example, we may obtain data concerning the amount of labour, the amount of capital, and the amount of various raw materials used in the steel industry during each year from 1970 to 2000. On the basis of such data and information concerning the annual output of steel during 1970 to 2000, we may estimate the relationship between the amounts of the inputs and the resulting output, using regression techniques. Analysis of time series data is appropriate for a single firm that has not undergone significant changes in technology during the time span analysed. That is, we cannot use time series data for estimating the production function of a firm that has gone through significant technological changes. There are even more problems associated with the estimation a production function for an industry using time series data. For example, even if all firms have operated over the same time span, changes in capacity, inputs and outputs may have proceeded at a different pace for each firm. Thus, cross section data may be more appropriate.

b) **Cross-section analysis:** The amount of inputs used and output produced

in various firms or sectors of the industry at a given time is called cross section data. For example, we may obtain data concerning the amount of labour, the amount of capital, and the amount of various raw materials used in various firms in the steel industry in the year 2000. On the basis of such data and information concerning the year 2000, output of each firm, we may use regression techniques to estimate the relationship between the amounts of the inputs and the resulting output.

c) **Engineering analysis**: In this analysis we use technical information supplied by the engineer or the agricultural scientist. This analysis is undertaken when the above two types do not suffice. The data in this analysis is collected by experiment or from experience with day-to-day working of the technical process. There are advantages to be gained from approaching the measurement of the production function from this angle because the range of applicability of the data is known, and, unlike time series and cross-section studies, we are not restricted to the narrow range of actual observations.

B. CHECK YOUR PROGRESS

Application-Based Questions on Production Function

1. Short-Run vs. Long-Run Decision Making:

A shoe manufacturing company notices that the demand for its products is rising. In the short run, it can only increase production by hiring more workers, but in the long run, it can invest in new machines and expand the factory.

Question: Explain how the company's production function changes in the short run and the long run. What are the constraints in both cases?

2. Law of Diminishing Returns:

A farmer has 1 hectare of land. Initially, increasing the number of workers increases the crop yield, but after a certain point, additional workers do not contribute significantly to production.

Question: How does the law of diminishing marginal returns apply to this situation? What measures can the farmer take to avoid this?

3. **Returns to Scale:**

   XYZ Ltd. decides to double all its inputs, including labor and capital, and finds that its output more than doubles.

   Question: Is this an example of increasing, constant, or decreasing returns to scale? Explain the concept and how it applies to XYZ Ltd.

4. **Technological Advancement Impact:**

   ABC Manufacturing Company invests in new technology that reduces production time and lowers the cost of manufacturing goods.

   Question: How will this affect the company's production function? Illustrate how technology can shift the production function curve.

5. **Optimal Input Combination:**

   A restaurant is trying to determine the most cost-effective combination of labor and capital. It can either hire more workers or invest in automated kitchen equipment.

   Question: What factors should the restaurant consider when choosing between labor and capital? How can the production function help in this decision?

13.4 MANAGERIAL USES OF PRODUCTION FUNCTION

Managerial Uses of Production Function

The production function describes the relationship between inputs (like labor, capital, and raw materials) and the resulting output. In managerial economics, understanding the production function helps managers make informed decisions related to cost management, efficiency, and optimal production. Here are the key managerial uses of the production function:

1. **Optimal Input Combination:** The main goal is to minimize costs for a given output or maximize output for a given cost. Managers use production functions to determine the most efficient combination of inputs (labor, raw materials, and machinery) to achieve desired production levels. **Example:** Choosing between more labor-intensive or capital-intensive production methods.

2. **Cost Management and Efficiency Improvement:** Fixed and variable costs can be studied through the production function. It helps managers understand the marginal productivity of each input to decide which resource provides the best return. **Example:** If adding more units of labor doesn't result in proportionate output, it indicates decreasing returns to labor. Managers can adjust labor input accordingly.

3. **Understanding Economies of Scale:** It has a significant role in studying the economies of Scale by reducing per-unit production costs as output increases. It helps the managers to use the production function to identify the level of production at which economies of scale occur and plan expansion strategies accordingly. **Example:** If a factory produces more units, fixed costs like rent are spread across a larger output, reducing per-unit costs.

4. **Decision-Making on Capacity Utilization:** The main objective is to achieve maximum output with existing resources. The production function helps determine whether the current level of inputs is being used efficiently or if more inputs need to be added to avoid under utilisation. **Example:** A company might analyze the function to decide whether to hire more workers or run machines for additional shifts.

5. **Substitution between Inputs (Isoquants):** It shows various combinations of inputs that produce the same level of output. It helps the managers to identify if one input (like labor) can be replaced by another (like machinery) without changing the output. **Example:** In a textile company, machines might replace labor to increase productivity.

6. **Forecasting Output Levels:** It helps in predicting how output levels will change with varying levels of input. It is useful for production planning and meeting demand forecasts efficiently. **Example:** If labor is expected to increase by 10%, the production function can estimate the impact on output.

7. **Short-Run vs. Long-Run Decisions:** In the short run, some inputs are fixed (like machinery), while others (like labor) are variable. In the long run, all inputs can be changed. It helps the managers to use production functions to decide whether to increase output by changing variable inputs in the short run or make long-term investments in capital.

8. **Break-Even Analysis and Profit Planning:** The main objective is to determine the level of output at which the business neither makes a profit nor incurs a loss. The production function helps in deciding the minimum production level required to cover fixed and variable costs. **Example:** If the cost per unit exceeds the selling price, managers can revisit the production function to adjust inputs and reduce costs.

9. **Productivity Measurement and Benchmarking:** The production function helps assess productivity by comparing the actual output with the potential output. Managers can compare productivity across plants or firms and set realistic performance targets. **Example:** A manufacturing unit may use the function to determine why one plant is more efficient than another.

10. **Analysing Returns to Scale:** It helps in analyzing the type of return to scale like, Increasing, constant, or decreasing returns to scale. It helps managers understand how increasing all inputs impacts the output. **Example:** If doubling all inputs more than doubles the output, the firm experiences increasing returns to scale, suggesting it can expand efficiently.

13.5 THE COST FUNCTION

The cost function expresses a functional relationship between total cost and factors that deter-mine it. Usually, the factors that determine the total cost of production (C) of a firm are the output (0), the level of technology (T), the prices of factors (Pf) and the fixed factors (F). Symbolically, the cost function becomes

$$C=f(Q, T, Pf, F)$$

Such a comprehensive cost function requires multi-dimensional diagrams which are difficult to draw. In order to simplify the cost analysis, certain assumptions are made. It is assumed that a firm produces a single homogeneous good (q) with the help of certain factors of production. Some of these factors are employed in fixed quantities whatever the level of output of the firm in the short run. So they are assumed to be given. The remaining factors are variable whose supply is assumed to be known and available at fixed market prices. Further, the technology which is used for the production of the good is assumed to be known and fixed. Lastly, it is assumed that the firm adjusts the employment of variable factors in such a manner that a given output Q of the good q is obtained at the minimum total cost, C.

13.6 ESTIMATION OF COST FUNCTION

1. **Accounting Method:** This method, commonly used by cost accountants, involves estimating the cost-output relationship by dividing total costs into fixed, variable, and semi-variable components. Each component is analyzed separately. The average variable cost and semi-variable costs (which remain constant within specific output ranges) are identified based on observation and experience. Fixed costs are also determined through the same approach. Using these estimates, the total, average, and marginal costs for various output levels are calculated through basic arithmetic. Although this method seems straightforward, it can be tedious, as it requires maintaining detailed cost records over time to accurately capture the cost-output relationship. This **method** relies on historical data recorded in the company's financial statements, such as production expenses, labor costs and raw material costs.

   The following steps are used in this process:

   - Collect cost and output data from financial reports.
   - Identify fixed and variable costs based on past trends.

- Calculate average variable cost per unit and fixed cost per period.
- Estimate the total cost function by adding fixed and variable components.

2. Statistical Method (Econometric Techniques)

The **statistical method** involves analyzing the relationship between costs and output using regression analysis. It provides a precise way of estimating the cost function by accounting for multiple variables. This approach, sometimes referred to as the statistical method, is widely utilized for estimating cost functions. It involves using historical data on costs and output to establish the cost-output relationship. Regression analysis forms the core technique employed in this method. The data utilized can include firm-specific time series data, industry-wide time series data, or cross-sectional data across firms for a specific year. The type of data chosen determines whether short-run or long-run cost functions are estimated. For instance, if a firm's time series data with relatively stable output capacity is used, it estimates a short-run cost function. Conversely, using cross-sectional data from firms of varying sizes or industry-wide time series data yields estimates of long-run cost functions. The process of estimating the cost function typically involves three main steps: identifying the cost determinants, specifying the functional form of the cost function, and then applying regression analysis to estimate the chosen functional form.

Linear Regression Model:

- **Formula:** TC=a+bQ
  - TC: Total cost
  - a: Fixed cost
  - b: Variable cost per unit
  - Q: Quantity of output

The following steps are involved in this process:

- Collect data on costs and output over a specific period.
- Use simple or multiple regression to determine how costs vary with output.
- Analyze the coefficients to identify fixed and variable costs.
- Test the model for accuracy and reliability using statistical tools.

Multiple Regression Model:

Used when costs are affected by more than one factor (e.g., labor, capital, raw materials).

- **Formula:**

$TC=a+b_1X_1+b_2X_2+\ldots\ldots+b_nX_n$

$X_1,X_2,\ldots\ldots..,X_n$ are different cost drivers such as labor hours, machine usage, or raw material consumption.

3. Engineering Method

The engineering method estimates costs based on technical relationships between inputs (labor, materials, and equipment) and output. This method does not rely on past data but uses production specifications and engineering expertise to determine cost estimates. The engineering method of cost estimation relies directly on the physical relationship between inputs and output, using the prices of inputs to calculate costs. This approach to estimating real-world cost functions is grounded in the understanding that the shape of any cost function is influenced by two main factors: (a) the production function and (b) the prices of inputs.

As discussed earlier in this unit regarding the estimation of the production function, the optimal combination of inputs for a specific output level can be determined when the production function and input prices are known. The cost curve is then created by multiplying each input in the least-cost combination by its respective price to derive the cost function. This method is termed the engineering method because engineers provide the estimates for the least-cost combinations.

One key assumption of this method is that both technology and input prices remain constant. However, this assumption may not always hold true, as technology and factor prices can change significantly over time, making this method more applicable in the short run. Additionally, the engineering method is particularly useful when reliable historical data is hard to come by. Nonetheless, it requires a solid understanding of engineering principles and a detailed examination of various processes under controlled conditions, which may not always be feasible. **Example:** If producing one unit of output requires 2 hours of labor and 3 kg of raw material, the cost function will reflect these technical requirements.

The following steps are involved in this process:

- Analyze the production process to identify inputs needed for each unit of output.
- Estimate the cost of each input based on technical data and market prices.
- Aggregate input costs to derive the total cost function.

4. **Graphical or Visual Inspection Method:** The **graphical method** involves plotting cost data against output levels and visually inspecting the pattern to derive a cost function. A **scatter plot** of total cost and output is created, and a line of best fit is drawn to estimate the relationship.

The following steps are involved in this process:

- Plot historical cost data on a graph with output on the x-axis and total cost on the y-axis.
- Draw a line of best fit to represent the cost-output relationship.
- Identify the fixed cost (y-intercept) and variable cost per unit (slope of the line).

C. CHECK YOUR PROGRESS

Application-Based Questions on Cost Function

1. **Break-even Analysis:**
   - A company has a fixed cost of Rs 1,00,000 and a variable cost of Rs 50 per unit. If the product sells at Rs 100 per unit, how many units must be sold to break even?
2. **Decision Making – Make or Buy:**
   - A manufacturer produces 1,000 units of a product internally at a variable cost of Rs 300 per unit and a fixed cost of Rs 50,000. A supplier offers the same product at Rs 320 per unit. Should the company continue producing or buy from the supplier? Justify with calculations.
3. **Marginal Costing Application:**
   - A firm is operating at 80% capacity with fixed costs amounting to Rs 2,00,000 and a contribution margin of 40%. What will be the impact on profits if the firm increases production to 100% capacity?
4. **Cost Function Estimation Using Linear Regression:**
   - A manufacturing company observes the following cost pattern:
   - At 1,000 units: Rs 1,20,000
   - At 2,000 units: Rs 2,00,000
   - At 3,000 units: Rs 2,80,000

   Identify the fixed and variable costs using a linear cost function approach.

13.7 MANAGERIAL USES OF COST FUNCTION

The cost function is a fundamental concept in managerial economics, representing the relationship between production output and the associated costs. Understanding and leveraging this function can significantly enhance decision-making in various aspects of management.

1. One of the primary uses of the cost function is in **cost control and management**. Managers can prepare accurate budgets by estimating future costs linked to different production levels. This allows for effective

monitoring of actual costs against budgeted figures, enabling prompt adjustments when discrepancies arise. Moreover, by identifying areas for potential cost reduction, managers can enhance operational efficiency and improve profitability.

2. The cost function also plays a critical role in **pricing decisions**. It provides insights into setting prices by helping managers determine the minimum price required to cover costs while achieving desired profit margins. Break-even analysis, a key aspect of pricing strategy, enables managers to calculate the sales volume needed to cover all costs, thus facilitating informed sales target setting.

3. In terms of **profit maximization**, the cost function aids in marginal analysis, which evaluates the relationship between marginal cost and marginal revenue. This analysis is crucial for identifying the optimal level of production that maximises profits by balancing costs with revenues. By determining the output level at which profits peak, managers can make better production decisions.

4. The cost function is essential for **decision-making on production levels**. It assists managers in evaluating the most cost-effective production levels and ensures that resources are utilised efficiently. Furthermore, by analyzing cost implications and demand forecasts, managers can assess whether to increase or decrease production levels in response to market conditions.

5. The cost function is also instrumental in **investment appraisal**. It aids in cost-benefit analysis by allowing managers to evaluate the financial viability of new projects or investments. By comparing projected costs with anticipated returns, managers can make informed decisions regarding long-term planning and capital budgeting.

6. Understanding the cost function helps in **identifying cost behavior**. By distinguishing between fixed, variable, and semi- variable costs, managers can gain insights into how costs change with varying output

levels. This knowledge enables accurate forecasting of future costs, assisting in better planning and decision-making.

7. Another significant application of the cost function is in **product mix decisions**. It allows managers to evaluate the profitability of different products or services by analysing their respective cost structures. This analysis informs effective resource allocation among various products based on their cost and profitability.

8. The cost function also facilitates the analysis of **economies of scale**. By identifying production levels at which economies of scale can be realized, managers can lower per-unit costs as output increases. This information supports strategic decisions regarding expansion or scaling down operations based on cost behavior and market demand.

9. Furthermore, the cost function is valuable for **forecasting and strategic planning**. It informs production and inventory management by analyzing potential cost changes with expected demand. By understanding cost implications of market trends and competitive dynamics, managers can formulate long-term strategies that align with business objectives.

10. Finally, the cost function enables **sensitivity analysis**, allowing managers to assess how changes in costs—such as fluctuations in input prices—impact overall profitability. This capability is essential for identifying potential risks associated with cost changes and developing strategies to mitigate those risks.

In conclusion, the cost function serves as a vital tool for managers across various decision-making processes. By comprehensively understanding and applying cost functions, managers can control costs, optimize pricing strategies, maximize profits, and make informed production and investment decisions. Ultimately, this understanding enhances a firm's competitiveness and sustainability in the marketplace

13.8 LET US SUM UP

In conclusion, the concepts of production function and cost function are integral to understanding the dynamics of production and cost management within an organisation. The production function illustrates the relationship between inputs and outputs, demonstrating how varying combinations of resources, such as labor and capital, contribute to the production of goods and services. This relationship can be influenced by factors such as technology and efficiency, which shape the overall productivity of a firm. On the other hand, the cost function provides insights into how costs change with different levels of production output. By classifying costs into fixed, variable, and semi-variable categories, the cost function enables managers to analyse cost behavior, control expenses and optimise resource allocation.

Estimating both the production and cost functions is critical for effective managerial decision-making. Various methods exist for estimating these functions, including statistical techniques like regression analysis, accounting methods that rely on historical data, and engineering approaches that focus on the physical relationships between inputs and outputs. Each method has its strengths and weaknesses, and the choice of estimation technique often depends on the availability of data, the nature of the production process, and the specific managerial objectives at hand. Understanding these estimation methods allows managers to derive meaningful insights from data, leading to informed decision-making and strategic planning.

The managerial uses of both production and cost functions are extensive and diverse. From cost control and budgeting to pricing strategies and profit maximisation, these functions provide valuable information that guides managers in optimising operations. By understanding how changes in production levels affect costs, managers can make informed decisions regarding production planning and capacity utilisation. Additionally, the insights gained from analysing production and cost functions can aid in investment appraisal, product mix decisions, and long-term strategic planning. Ultimately, a thorough comprehension of production and cost functions empowers managers to enhance

efficiency, reduce waste, and drive profitability, ensuring that organisations remain competitive in an ever-evolving marketplace.

In essence, the interplay between production and cost functions forms the foundation of effective managerial economics, allowing firms to navigate complex business environments. By mastering these concepts and their applications, managers can strategically position their organisations for sustainable growth and success. Understanding the estimation techniques and managerial implications of these functions not only fosters better decision- making but also cultivates a culture of continuous improvement and operational excellence within the organisation.

13.9 GLOSSARY

- **Production Function:** The production function defines the relationship between inputs (such as labor, capital, and materials) and the resulting output of goods or services. It illustrates how different combinations of resources can produce varying levels of output, highlighting the efficiency of resource use.
- **Cost Function:** The cost function represents the relationship between the level of output and the costs incurred in production. It helps managers understand how costs change with different production levels, enabling effective cost management and pricing strategies.
- **Inputs:** Inputs are the resources used in the production process, including labor, raw materials, machinery, and capital. The choice and combination of inputs directly affect production levels and costs.
- **Outputs:** Outputs refer to the final products or services generated from the production process. Analysing outputs in relation to inputs helps assess productivity and efficiency.
- **Fixed Costs:** Fixed costs are expenses that do not change with the level of production, such as rent, salaries, and insurance. These costs remain constant regardless of output levels, impacting overall cost structure.

- **Variable Costs:** Variable costs fluctuate with production volume, such as raw materials and labor directly involved in production. Understanding variable costs is essential for pricing and profitability analysis.
- **Semi-variable Costs:** Semi-variable costs, or mixed costs, contain both fixed and variable components. For instance, a utility bill may have a fixed base charge plus a variable charge based on usage, making it important to analyze how these costs behave with changes in production.
- **Cost Behaviour:** Cost behaviour examines how costs change in response to changes in production levels. Understanding cost behavior helps managers predict future costs and make informed decisions about scaling operations.

13.10 SELF ASSESSMENT QUESTIONS

Q1. What is the concept of a production function? How does it explain the relationship between inputs and output?

_____

_____

_____

Q2. Define the cost function. How does it relate to production levels?

_____

_____

_____

Q3. How can cost functions assist in investment appraisal and budgeting?

_____

_____

_____

13.11 LESSON END EXERCISE

Q1. What is the difference between the production function in short run and long run?

Q2. How does an estimation of cost of production helps in decision making process?

Q3. What are the different methods used to estimate production functions?

Q4. Explain the engineering method of cost estimation with an example.

13.12 SUGGESTED READINGS

- D. N. Dwivedi (2015). Managerial Economics.
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SHORT RUN AND LONG RUN COST FUNCTION

STRUCTURE

14.0 LEARNING OBJECTIVES AND OUTCOMES

In the previous chapters we studied the nature of production function underlying the production process of goods. The production function, along with the prices of factors, and the state of technology determine to an appreciable degree, the supply of goods. In this chapter we carry further the analysis of the forces determining supply of goods. We shall examine here how the costs of

production of the firm depend on the nature of physical production function. We will be mainly concerned with how the cost of production varies with the increase in the level of output of the firm. In other words, we shall study how the cost and level of output are related to each other. The relation between cost and output is called "cost function". The cost function of the firm depends upon the nature of physical production function, the prices of the factors used for production and the technology used for production. How much cost a firm will incur on production depends on the level of output, given the factor prices and the state of technology. The quantity of a product that will be offered by the firm for supply in the market will depend to a great degree upon the cost of production incurred on the various possible levels of output. Cost of production is the most important factor governing the supply of a product. It should be pointed out here that it is assumed that for each level of output, the firm chooses least-cost combination of factors. We shall explain below the various concepts of costs that are used in modern economic theory and then turn to study the derivation of the short-run and the long-run cost curves.

14.1 LEARNING OBJECTIVES AND OUTCOMES

Learning Objectives

- To understand the concept of cost analysis
- To distinguish between Short-Run and Long-Run costs
- To analyse Short-Run Cost Functions

Learning Outcomes

After going through this unit, you will be able to:

- understand some of the cost concepts that are frequently used in the managerial decision-making process
- understand short run cost function
- understand applications of short run cost function in managerial decision making
- understand long run cost function

14.2 CONCEPTS OF COST

Costs play a very important role in managerial decisions involving a selection between alternative courses of action. It helps in specifying various alternatives in terms of their quantitative values. The term 'cost' has different meaning. Accountants view of cost is different from that of economists. The accountants tend to focus on the explicit and historical costs. On the other hand, economists emphasize that for efficient decision making by the firm it is the opportunity cost rather than explicit and historical cost that must be considered. And, as will be explained below, the opportunity cost concept includes both the explicit and implicit costs. It is therefore necessary that we should explain the meaning of cost as used by economists and which is relevant for decision-making by a producer. The kind of cost to be used in a particular situation depends upon the business decisions to be made. Costs enter into almost every business decision and it is important to use the right analysis of cost. Hence, it is important to understand what these various concepts of costs are, how these can be defined and operationalised. This requires the understanding of the two things, namely, (i) that cost estimates produced by conventional financial accounting are not appropriate for all managerial uses, and (ii) that different business problems call for different kinds of costs.

Actual costs and Opportunity costs

Actual costs are those costs, which a firm incurs while producing or acquiring a good or service like raw materials, labour, rent, etc. Suppose, we pay Rs. 150 per day to a worker whom we employ for 10 days, then the cost of labour is Rs. 1500. The economists called this cost as accounting costs because traditionally accountants have been primarily connected with collection of historical data (that is the costs actually incurred) in reporting a firm's financial position and in calculating its taxes. Sometimes the actual costs are also called **acquisition costs** or **outlay costs.**

On the other hand, **opportunity cost** is defined as the value of a resource in its next best use. For example, Mr. Ram is currently working with a firm and earning Rs. 5 lakhs per year. He decides to quit his job and start his own small

business. Although, the accounting cost of Mr. Ram's labour to hisbusiness is 0, the opportunity cost is Rs. 5 lakhs per year. Therefore, the opportunity cost is the earnings he foregoes by working for his own firm. One may ask you that whether this opportunity cost is really meaningful in the decision-making process. As we see that the opportunity cost is important simply because, if Mr. Ram cannot recover this cost from his new business, then he will probably return to his old job. Opportunity cost can be similarly defined for other factors of production. For example, consider a firm that owns a building and therefore do not pay rent for office space. If the building was rented to others, the firm could have earned rent. The foregone rent is an opportunity cost of utilizing the office space and should be included as part of the cost of doing business. Some times these opportunity costs are called as alternative costs.

Explicit and implicit Costs

Explicit costs are those costs that involve an actual payment to other parties. Therefore, an explicit cost is the monitory payment made by a firm for use of an input owned or controlled by others. Explicit costs are also referred to as accounting costs. For example, a firm pays Rs. 100 per day to a worker and engages 15 workers for 10 days, the explicit cost will be Rs. 15,000 incurred by the firm. Other types of explicit costs include purchase of raw materials, renting a building, amount spent on advertising etc.

On the other hand, **implicit costs** represent the value of foregone opportunities but do not involve an actual cash payment. Implicit costs are just as important as explicit costs but are sometimes neglected because they are not as obvious. For example, a manager who runs his own business foregoes the salary that could have been earned working for someone else as we have seen in our earlier example. This implicit cost generally is not reflected in accounting statements, but rational decision-making requires that it be considered. Therefore, an implicit cost is the opportunity cost of using resources that are owned or controlled by the owners of the firm. The implicit cost is the foregone return, the owner of the firm could have received had they used their own

resources in their best alternative use rather than using the resources for their own firm's production.

Accounting costs and economic costs

For a long time, there has been a considerable disagreement among economists and accountants on how costs should be treated. The reason for the difference of opinion is that the two groups want to use the cost data for dissimilar purposes. Accountants always have been concerned with firms' financial statements. Accountants tend to take a retrospective look at firms finances because they keep trace of assets and liabilities and evaluate past performance. The accounting costs are useful for managing taxation needs as well as to calculate profit or loss of the firm. On the other hand, economists take forward-looking view of the firm. They are concerned with what cost is expected to be in the future and how the firm might be able to rearrange its resources to lower its costs and improve its profitability. They must therefore be concerned with opportunity cost. Since the only cost that matters for business decisions are the future costs, it is the economic costs that are used for decision- making.

Accountants and economists both include explicit costs in their calculations. For accountants, explicit costs are important because they involve directpayments made by a firm. These explicit costs are also important for economists as well because the cost of wages and materials represent money that could be useful elsewhere.

We have already seen, while discussing actual costs and opportunity costs, how economic cost can differ from accounting cost. In that example we have seen how a person who owns business chooses not to consider his/her own salary. Although, no monitory transaction has occurred (and thus would not appear as an accounting cost), the business nonetheless incurs an opportunity cost because the owner could have earned a competitive salary by working elsewhere.

Accountants and economists use the term 'profits' differently. Accounting profits are the firm's total revenue less its explicit costs. But economists define

profits differently. Economic profits are total revenue less all costs (explicit and implicit costs). The economist takes into account the implicit costs (including a normal profit) in addition to explicit costs in order to retain resources in a given line of production. Therefore, when an economist says that a firm is just covering its costs, it is meant that all explicit and implicit costs are being met, and that, the entrepreneur is receiving a return just large enough to retain his/ her talents in the present line of production. If a firm's total receipts exceed all its economic costs, the residual accruing to the entrepreneur is called an economic profit, or pure profit.

Short run and long run costs

The **short run** is defined as a period in which the supply of at least one element of the inputs cannot be changed. To illustrate, certain inputs like machinery, buildings, etc., cannot be changed by the firm whenever it so desires. It takes time to replace, add or dismantle them. Short-run costs are the costs that can vary with the degree of utilization of plant and other fixed factors. In other words, these costs relate to the variation in output, given plant capacity. Short-run costs are, therefore, of two types: fixed costs and variable costs. In the short-run, fixed costs remain unchanged while variable costs fluctuate with output. Short Run Cost Analysis Long run, on the other hand, is defined as a period in which all inputs are changed with changes in output. In other words, it is that time-span in which all adjustments and changes are possible to realize.

Long-run costs are costs that can vary with the size of plant and with other facilities normally regarded as fixed in the short-run. In fact, in the long- run there are no fixed inputs and therefore no fixed costs, i.e., all costs are variable. Thus, in the short run, some inputs are fixed (like installed capacity) while others are variable (like the level of capacity utilization); but in the long run all inputs, including the size of the plant, are variable.

Both short-run and long-run costs are useful in decision-making. Short- run cost is relevant when a firm has to decide whether or not to produce and if a decision is taken to produce then how much more or less to produce with a given plant size. If the firm is considering an increase in plant size, it must

examine the long-run cost of expansion. Long-run cost analysis is useful in investment decisions.

Sunk Costs and Incremental Costs

Sunk costs are expenditures that have been made in the past or must be paid in the future as part of contractual agreement or previous decision. For example, the money already paid for machinery, equipment, inventory and future rental payments on a warehouse that must be paid as part of a long term lease agreement are sunk costs. In general, sunk costs are not relevant to economic decisions. For example, the purchase of specialized equipment designed to order for a plant. We assume that the equipment can be used to do only what it was originally designed for and cannot be converted for alternative use. The expenditure on this equipment is a sunk cost. Also, because this equipment has no alternative use its opportunity cost is zero and, hence, sunk costs are not relevant to economic decisions. Sometimes the sunk costs are also called as non-avoidable or non-escapable costs.

On the other hand, incremental cost refers to total additional cost of implementing a managerial decision. Change in product line, change in output level, adding or replacing a machine, changing distribution channels etc. are examples of incremental costs. Sometimes incremental costs are also called as avoidable or escapable costs. Moreover, since incremental costs may also be regarded as the difference in total costs resulting from a contemplated change, they are also called differential costs.

A. CHECK YOUR PROGRESS

Multiple Choice Questions

1. Which of the following best describes "Total Cost"?

   a) The cost of producing one more unit of output.

   b) The sum of all fixed and variable costs.

   c) The difference between total revenue and total variable cost.

   d) The cost of inputs used for producing goods.

Answer: b)

2. Which cost concept represents the opportunity cost of using resources in one activity over another?

   a) Explicit Cost b) Implicit Cost

   c) Sunk Cost d) Fixed Cost

   Answer: b)

   True/False:

1. Fixed costs remain constant regardless of the level of output.

   Answer: True

2. Marginal cost is always greater than average cost at any output level.

   Answer: False

3. Explicit costs include the opportunity cost of resources owned by the firm and used in production.

   Answer: False

14.3 SHORT RUN COST FUNCTIONS

In above sections, we have distinguished between the short run and the long run. We also distinguished between fixed costs and variable costs. The distinction between fixed and variable costs is of great significance to the business manager. Variable costs are those costs, which the business manager can control or alter in the short run by changing levels of production. On the other hand, fixed costs are clearly beyond business manager's control, such costs are incurred in the short run and must be paid regardless of output.

Total Costs

Three concepts of total cost in the short run must be considered: total fixed cost (TFC), total variable cost (TVC), and total cost (TC).Total fixed costs are the total costs per period of time incurred by the firm for fixed inputs. Since the amount of the fixed inputs is fixed, the total fixed cost will be the same regardless of the firm's output rate. Table 8.1 shows the costs of a firm in the short run. According to this table, the firm's total fixed costs are '100. The firm's total fixed cost function is shown graphically in Figure 14.1.

Q	TFC	TVC	TC	MC	AFC	AVC	ATC
0	100	0	100				
1	100	50	150	50	100.0	50	150
2	100	90	190	40	50.0	45	95.0
3	100	120	220	30	33.3	40	73.3
4	100	140	240	20	25.0	35	60.0
5	100	150	250	10	20.0	30	50.0
6	100	156	256	6	16.7	26	42.7
7	100	175	275	19	14.3	25	39.3
8	100	208	308	33	12.5	26	38.5
9	100	270	370	62	11.1	30	41.1
10	100	350	450	80	10.0	35	45.0

Table 14.1: A Firm's Short Run Costs (in Rs.)

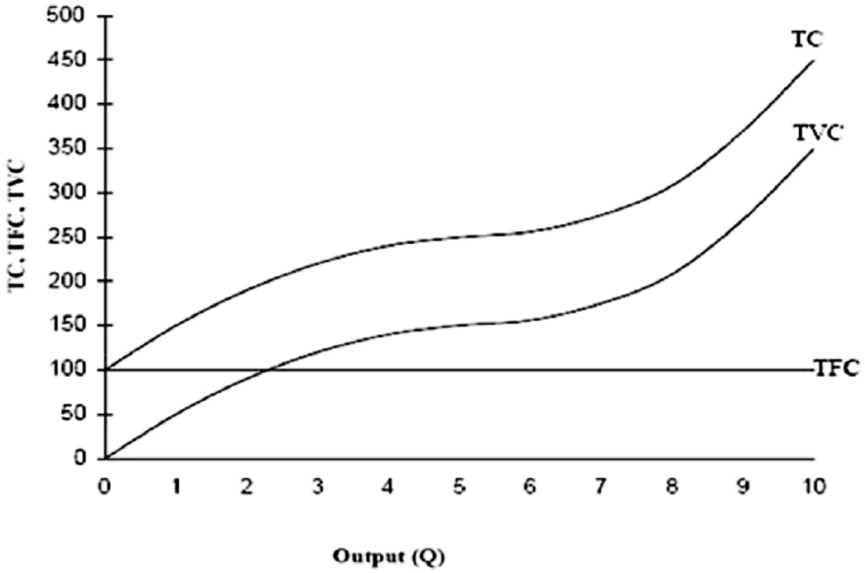

Figure 14.1: Total Cost Curves

Total variable costs are the total costs incurred by the firm for variable inputs. To obtain total variable cost we must know the price of the variable inputs. Suppose if we have two variable inputs viz. labour (V1) and raw material (V2) and the corresponding prices of these inputs are P1 and P2, then the total variable cost (TVC) = P1 × V1 + P2 × V2. They go up as the firm's output rises, since higher output rates require higher variable input rates, which mean bigger variable costs. The firm's total variable cost function corresponding to the data given in Table 14.1 is shown graphically in Figure 14.1.

Finally, total costs are the sum of total fixed costs and total variable costs. To derive the total cost column inTable 8.1, add total fixed cost and total variable cost at each output. The firm's total cost function corresponding to the data given in Table 8.1 is shown graphically in Figure 14.1.Since total fixed costs are constant, the total fixed cost curve is simply a horizontal line at Rs.
100. And because total cost is the sum of total variable costs and total fixed costs, the total cost curve has the same shape as the total variable cost curve but lies above it by a vertical distance of Rs.100.

Corresponding to our discussion above we can define the following for the short run:

TC = TFC + TVC

where,

TC = total cost

TFC = total fixed costs TVC

= total variable costs

Average Fixed Costs Short Run Cost Analysis While the total cost functions are of great importance, managers must be interested as well in the average cost functions and the marginal cost function as well. There are three average cost concepts corresponding to the three total cost concepts. These are average fixed cost (AFC), average variable cost (AVC), and average total cost (ATC). Figure 14.2 shows typical average fixed cost function graphically. Average

fixed cost is the total fixed cost divided by output. Average fixed cost declines as output (Q) increases. Thus, we can write average fixed cost as:

AFC = TFC/Q

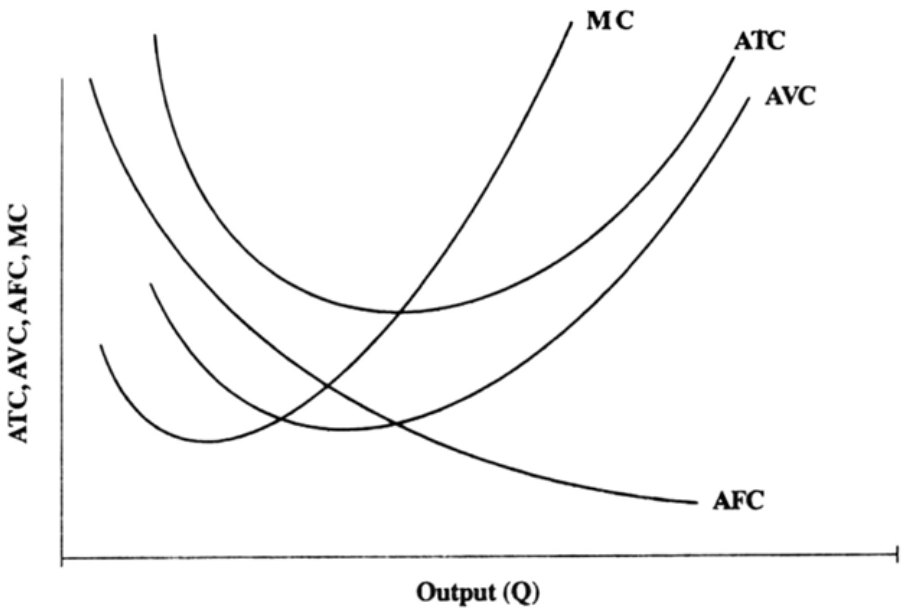

Figure 14.2: Short Run Average and Marginal Cost Curves

Average Variable Costs

Average variable cost is the total variable cost divided by output. **Figure 14.2** shows the average variable cost function graphically. At first, output increases resulting in decrease in average variable cost, but beyond a point, they result in higher average variable cost.

AVC =

Where, $\mathbf{AVC} = \frac{\mathbf{TVC}}{\mathbf{Q}}$

Q = Output

TVC = total variable costs

AVC = average variable costs

Average Total Cost

Average total cost (ATC) is the sum of the average fixed cost and average variable cost. In other words, ATC is total cost divided by output. Thus,

$$\mathbf{AVC} = \frac{\mathbf{TVC}}{\mathbf{Q}} = \boldsymbol{W}\{\frac{\mathbf{L}}{\mathbf{Q}}\}$$

Figure 14.2 shows the average total cost function graphically. Since ATC is sum of the AFC and AVC, ATC curve always exceeds AVC curve. Also, since AFC falls as output increases, AVC and ATC get closer as output rises. Note that ATC curve is nearer the AFC curve at initial levels of output, but is nearer the AVC curve at later levels of output. This indicates that at lower levels of output fixed costs are more important part of the total cost, while at higher levels of output the variable element of cost becomes more important.

Marginal Cost

Marginal cost (MC) is the addition to either total cost or total variable cost resulting from the addition of one unit of output. Thus,

$$\mathbf{MC} = \frac{\Delta\mathbf{TC}}{\mathbf{Q}} = \frac{\Delta\mathbf{TVC}}{\mathbf{Q}}$$

Where,

MC = marginal cost

□Q = change in output

□TC = change in total cost due to change in output

□TVC = change in total variable cost due to change in output

The two definitions are the same because, when output increases, total cost increases by the same amount as the increase in total variable cost (since fixed cost remains constant). Figure 14.2 shows the marginal cost function graphically. At low output levels, marginal cost may decrease with increase in output, but after reaching a minimum, it goes up with further increase in output. The reason for this behavior is found in diminishing marginal returns.

The marginal cost concept is very crucial from the manager's point of view. Marginal cost is a strategic concept because it designates those costs over which the firm has the most direct control. More specifically, MC indicates those costs which are incurred in the production of the last unit of output and therefore, also the cost which can be "saved" by reducing total output by the last unit. Average cost figures do not provide this information. A firm's decisions as to what output level to produce is largely influenced by its marginal cost. When coupled with marginal revenue, which indicates the change in revenue from one more or one less unit of output, marginal cost allows a firm to determine whether it is profitable to expand or contract its level of production.

14.3.1 Relationship between Marginal Cost and Average Costs Short Run Cost

The relationships between the various average and marginal cost curves are illustrated in Figure 14.2. The figure shows typical AFC, AVC, ATC, and MC curves but is not drawn to scale for the data given in Table 8.1. The MC cuts both AVC and ATC at their minimum. When both the MC and AVC are falling, AVC will fall at a slower rate. When both the MC and AVC are rising, MC will rise at a faster rate. As a result, MC will attain its minimum before the AVC. In other words, when MC is less than AVC, the AVC will fall, and when MC exceeds AVC, AVC will rise. This means that as long as MC lies below AVC, the latter will fall and where MC is above AVC, AVC will rise.

Therefore, at the point of intersection where MC = AVC, AVC has just ceased to fall and attained its minimum, but has not yet begun to rise. Similarly, the MC curve cuts the ATC curve at the latter's minimum point. This is because MC can be defined as the addition either to TC or TVC resulting from one more unit of output. However, no such relationship exists between MC and AFC, because the two are not related; MC by definition includes only those costs which change with output, and FC by definition is independent of output.

14.3.2 Relationship between Average Product and Marginal Product, and Average Variable Cost and Marginal Cost

There is a straightforward relationship between factor productivity and output costs. To see this, let us consider a single variable factor L say labour. All other inputs are fixed. AP and MP will denote the average and marginal products of labour, respectively. If W is the wage rate and L is the quantity of labour, then

TVC = W * L

Hence, if Q is the output,

$$\mathbf{AVC} = \frac{\mathbf{TVC}}{\mathbf{Q}} = \boldsymbol{W}\{\frac{\mathbf{L}}{\mathbf{Q}}\}$$

Consequently, since Q/L is the average product (AP), AVC = W/AP

Consequently, since Q/L is the average product (AP), AVC = W/AP

Also, □TVC = W * □L (W does not change and is assumed to be given.).

Dividing by □Q we get

$$\mathbf{MC} = \frac{\Delta\mathbf{TVC}}{\Delta\mathbf{Q}} = \boldsymbol{W}\{\frac{\Delta\mathbf{L}}{\Delta\mathbf{Q}}\}$$

But, marginal product (MP) = □Q/ □L . Hence, MC = W/MP

Figure 14.3 shows the relationship between average product and marginal product, and average variable cost and marginal cost. The relationship AVC = W/AP shows that AVC is at a minimum when AP is at maximum.

Similarly, the relationship MC = W/MP shows that MC is at a minimum when MP is at a maximum. Also, when AP is at a maximum, AP = MP. Hence, when AVC is at a minimum, AVC = MC. It is clearly shown that when MP is rising, MC is falling. And when MP is falling, MC is rising.

The relevant costs to be considered for decision-making will differ from one situation to the other depending on the problem faced by the manager. In general, the TC concept is quite useful in finding out the breakeven quantity of

output. The TC concept is also used to find out whether firm is making profits or not. The AC concept is important for calculating the per unit profit of a business firm. The MC concept is essential to decide whether a firm should expand its production or not.

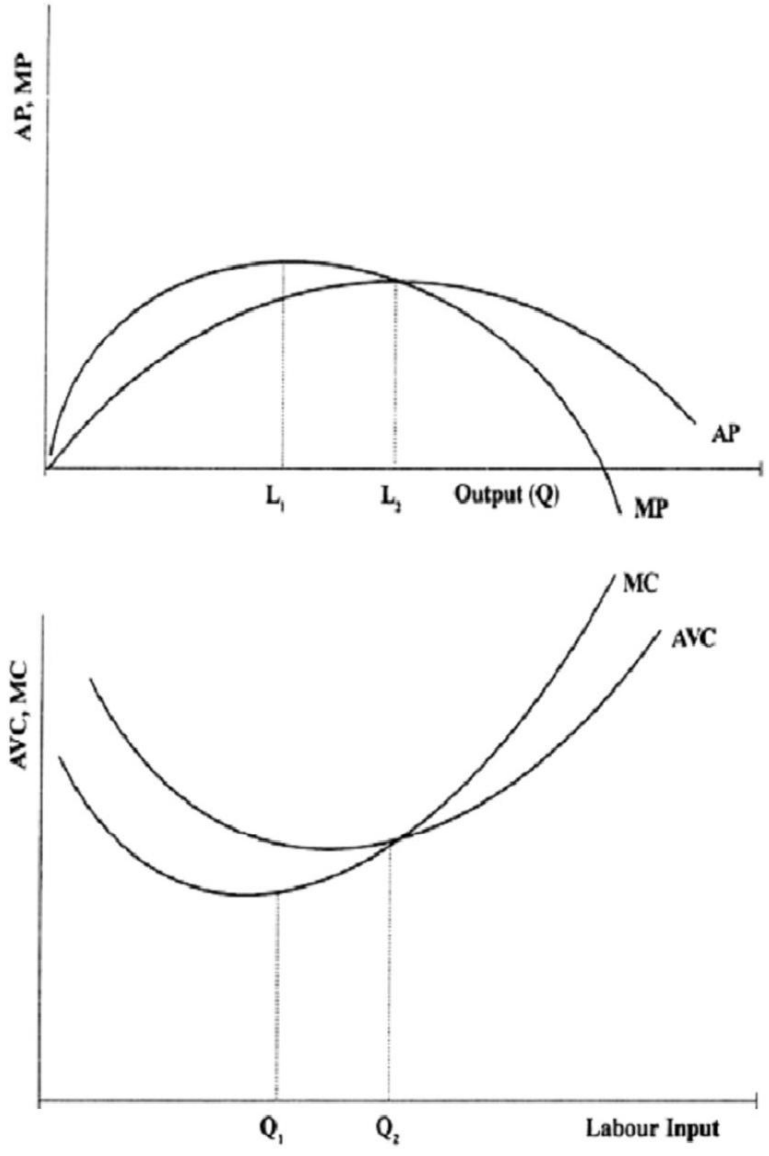

Figure 14.3: Relationship between AP and MP, AVC and MC

B. CHECK YOUR PROGRESS

Multiple Choice Questions

1. Which of the following best defines short-run cost in economics?

a) All inputs are variable.

b) Some inputs are fixed, and others are variable.

c) All inputs are fixed.

d) Only labor input is considered.

Answer: b)

2. In the short run, which cost does not vary with the level of output?

a) Variable cost

b) Total cost

c) Marginal cost

d) Fixed cost

Answer: d)

3. The marginal cost curve in the short run intersects the average total cost curve:

a) At its minimum point

b) At its maximum point

c) At the point where average total cost is zero

d) At the point where fixed cost equals variable cost

Answer: a)

14.4 LONG RUN COST ANALYSIS

In the long run, all inputs are variable, and a firm can have a number of alternative plant sizes and levels of output that it wants. There are no fixed cost functions (total or average) in the long run, since no inputs are fixed. A useful

way of looking at the long run is to consider it a planning horizon. The long run cost curve is also called planning curve because it helps the firm in future decision-making process.

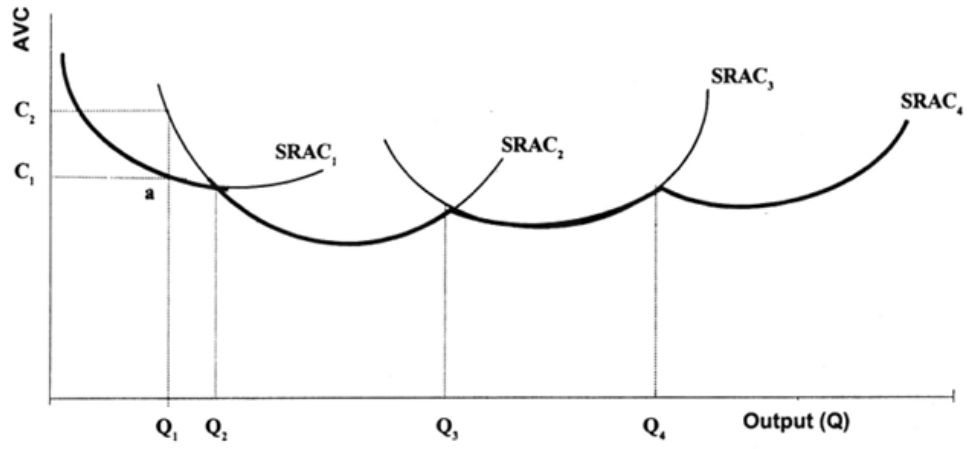

Figure 14.4: Short-Run and Long Run Average Cost Curves

The long run cost output relationship can be shown with the help of a long run cost curve. The long run average cost curve (LRAC) is derived from short run average cost curves (SRAC). Let us illustrate this with the help of a simple example. A firm faces a choice of production with three different plant sizes viz. plant size-1 (small size), plant size-2 (medium size), plant size-3 (large size), and plant size-4 (very large size). The short run average cost functions shown in Figure 9.1 (SRAC1, SRAC2, SRAC3, and SRAC4) are associated with each of these plants discrete scale of operation. The long run average cost function for this firm is defined by the minimum average cost of each level of output. For example, output rate Q1 could be produced by the plant size-1 at an average cost of C1 or by plant size-2 at a cost of C2.

Clearly, the average cost is lower for plant size-1, and thus point a is one point on the long run average cost curve. By repeating this process for various rates of output, the long run average cost is determined. For output rates of 194 zero to Q2 plant size-1is the most efficient and that part of SRAC1 is part of the long run cost function. For output rates of Q2 to Q3 plant size-2 is

the most efficient, and for output rates Q3 to Q4, plant size-3 is the mostefficient. The scallop-shaped curve shown in bold face in Figure 14.4 is the long run average cost curve for this firm. This bold faced curve is called an envelope curve (as it envelopes short run average cost curves). Firms plan to be on this envelope curve in the long run. Consider a firm currently operating plant size- 2 and producing Q1 units at a cost of C2 per unit. If output is expected to remain at Q1, the firm will plan to adjust to plant size-1, thus reducing average cost to C1.

Most firms will have many alternative plant sizes to choose from, and there is a short run average cost curve corresponding to each. A few of the short run average cost curves for these plants are shown in Figure 9.2, although many more may exist. Only one point of a very small arc of each short run cost curve will lie on the long run average cost function. Thus, long run average cost curve can be shown as the smooth U-shaped curve. Corresponding to this long run average cost curve is a long run marginal cost (LRMC) curve, which intersects LRAC at its minimum point a, which is also the minimum point of short run average cost curve 4 (SRAC4). Thus, at a point a and only at a point a, the following unique result occurs:

SRAC = SRMC when LRAC = LRMC

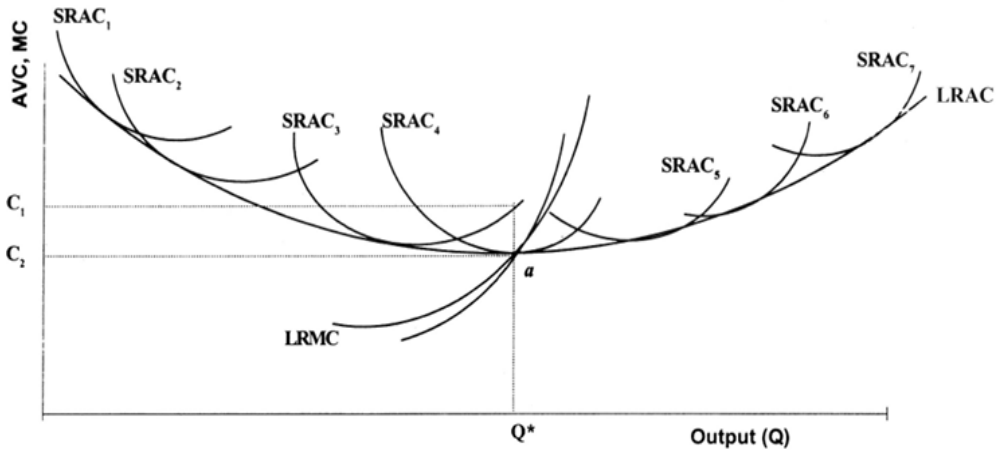

Figure 14.5: Short – Run and Long – Run Average Cost and Marginal Cost Curves

The long run cost curve serves as a long run planning mechanism for the firm. It shows the least per unit cost at any output can be produced after the firm has had time to make all appropriate adjustments in its plant size. For example, suppose that the firm is operating on short run average cost curve SRAC3 and the firm is currently producing an output of Q*. By using SRAC3, it is seen that the firm's average cost is C2. Clearly, if projections of future demand indicate that the firm could expect to continue selling Q* units per period at the market price, profit could be increasedsignificantly by increasing the scale of plant to the size associated with short run average cost curve SRAC4. With this plant, average cost for an output rate of Q* would be C2 and the firm's profit per unit would increase by C2 C1.Thus, total profit would increase by (C2–C1)*Q*.

The U-shape of the LRAC curve reflects the laws of returns to scale. According to these laws, the cost per unit of production decreases as plant size increases due to the economies of scale, which the larger plant sizes make possible. But the economies of scale exist only up to a certain size of plant, known as the optimum plant size where all possible economies of scale are fully exploited. Beyond the optimum plant size, diseconomies of scale arise due to managerial inefficiencies. As plant size increases beyond a limit, the control, the feedback of information at different levels and decision making process becomes less efficient. This makes the LRAC curve turn upwards. Given the LRAC, we can say that there are increasing returns to scale up to Q* and decreasing returns to scale beyond Q*. Therefore, the point Q* is the point of optimum output and the corresponding plant size-4 is the optimum plant size. If you have long run average cost of producing a given output, you can readily derive the long run total cost (LRTC) of the output, since the long run total cost is simply the product of long run average cost and output. Thus, LRTC = LRAC
*Q.

Figure 14.5 shows the relationship between long run total cost and output. Given the long run total cost function you can readily derive the long run marginal cost function, which shows the relationship between output and the

cost resulting from the production of the last unit of output, if the firm has time to make the optimal changes in the quantities of all inputs used.

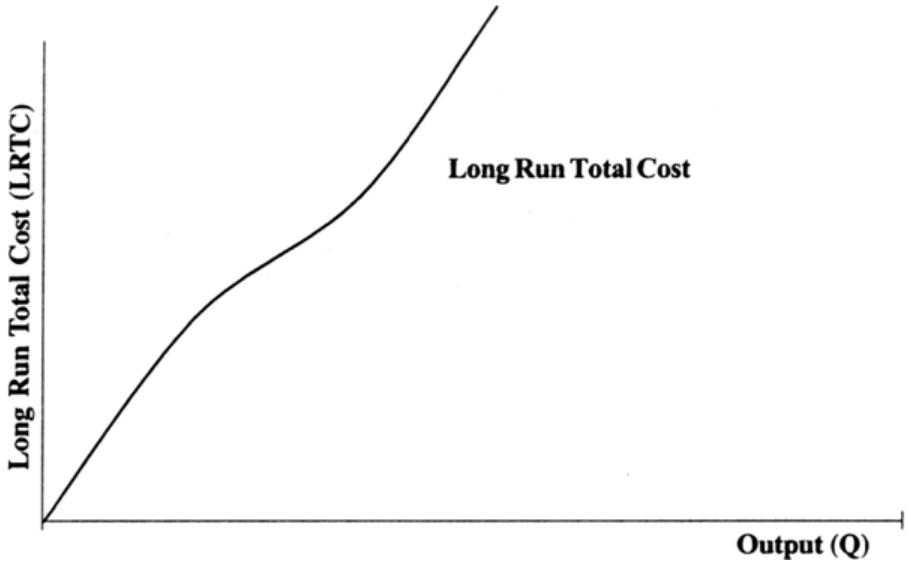

Figure 14.6: Long Run Total Cost Function

C. CHECK YOUR PROGRESS

Multiple Choice Questions

1. In the long run, all inputs are considered:

   a) Fixed b) Variable

   c) Constant d) Indivisible

   Answer: b)

2. The long-run cost curve is typically:

   a) U-shaped b) Downward sloping

   c) L-shaped d) Upward sloping

   Answer: a)

3. The long-run average cost (LRAC) curve represents:

   a) The cost of producing one more unit of output.

b) The lowest possible cost at which each level of output can be produced.

c) The total cost of production divided by the number of inputs.

d) The total fixed cost of production.

Answer: b)

14.5 LET US SUM UP

Cost concepts are important for decision-making but neither the accounting approach nor the economic approach is completely acceptable when decision- making is involved. Costs must be considered in various ways, depending on the decision at hand. Both traditional economists and traditional accountants have tended to be fairly dogmatic in their definitions of costs. On the other hand, managerial economists want a flexible approach. All the cost concepts need to be considered in such a way so as to help make sound decisions. The decision maker should try to discover the "relevant" costs by asking what costs are relevant to a particular decision at hand, and the decision maker is not necessarily bound by traditional concepts constructed for other purposes.

In short run, the total cost consists of fixed and variable costs. A firm's marginal cost is the additional variable cost associated with each additional unit of output. The average variable cost is the total variable cost divided by the number of units of output. When there is a single variable input, the presence of diminishing returns determines the shape of cost curves. In particular, there is an inverse relationship between the marginal product of the variable input and the marginal cost of production. The average variable cost and average total cost curves are U-shaped. The short run marginal cost curve increases beyond a certain point, and cuts both average total cost curve and average variable cost curve from below at their minimum points.

These cost concepts and analysis have a lot of applications in real world decision-making process such as optimum output, break even output, profit contribution, operating leverage, etc.

14.6 GLOSSARY

- **Short Run:** A period in which at least one input (e.g., capital or machinery) is fixed, while others (like labor) can be varied.
- **Long Run:** A period in which all inputs can be varied, and firms can adjust their production capacity or enter and exit industries.
- **Fixed Costs:** Costs that do not change with the level of output in the short run (e.g., rent, salaries).
- **Variable Costs:** Costs that change with the level of production (e.g., raw materials, wages for hourly workers).

14.7 SELF-ASSESSMENT QUESTIONS

Q1. What is short run cost analysis? For what type of decisions is it useful?

_____

_____

_____

Q2. How do fixed and variable costs behave in the short run compared to the long run?

_____

_____

_____

Q3. Illustrate and explain how the marginal cost curve behaves in the short run versus the long run.

_____

_____

_____

14.8 LESSON END EXERCISE

Q1. Explain why short run marginal cost is greater than long run marginal cost beyond the point at which they are equal?

Q2. Economists frequently say that the firm plans in the long run and operates in the short run. Explain.

Q3. Explain why short run marginal cost is greater than long run marginal cost beyond the point at which they are equal?

14.9 SUGGESTED READINGS

- D. N. Dwivedi (2015). Managerial Economics.
- Pushpa Sinha and V. C. Sinha (2023). Managerial Economics (PrabandhakeeyArthashaastr).
- Maheshwari K. L., Varshney R.L. (2014). Managerial Economics: Text, Problem and Cases. Sultan Chand & Sons.
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LAW OF RETURN TO SCALE

STRUCTURE

15.0 LEARNING OBJECTIVES AND OUTCOMES

Learning Objectives

- To understanding the Concept of Returns to Scale
- To analyzing Production Functions
- To graphical Representation of Returns to Scale
- To exploring the Impact of Returns to Scale on Costs

Learning Outcomes

After reading this lesson, you will be able to:

- to explain the concept of law of return to scale

- to describe the three stages of law of returns to scale
- to explain the causes of diminishing and increasing returns to scale

15.1 LEARNING OBJECTIVES AND OUTCOMES

The Law of Returns to Scale examines the relationship between changes in input and the corresponding changes in output in the long run, when all factors of production, such as labor and capital, are variable. This law is crucial for understanding how firms can achieve different levels of efficiency by adjusting their scale of operations. Returns to scale are categorized into three types: increasing returns to scale, constant returns to scale, and decreasing returns to scale. Increasing Returns to Scale occurs when a proportional increase in all inputs leads to a more than proportional increase in output. This often happens when firms benefit from greater efficiency as they expand, due to factors like specialization of labor, technological advancements, or better utilization of resources. Constant Returns to Scale happens when the increase in inputs results in an equal proportional increase in output, suggesting that the firm is operating at an optimal level where increasing the scale doesn't bring any additional advantages or inefficiencies. Decreasing Returns to Scale emerges when an increase in inputs results in a less than proportional increase in output. This can occur due to inefficiencies that arise from managing a larger scale of operations, such as difficulties in coordination or diminishing resource productivity. Understanding the Law of Returns to Scale is vital for firms seeking to optimize production and cost structures. It helps firms identify the most efficient scale of operation, allowing them to achieve long-run profitability and sustainability by effectively managing their inputs and outputs.

15.2 CONCEPT OF RETURN TO SCALE

In the long run, expansion of output can be achieved by variation in the use of all factors as all factors are variable. The laws of returns to scale can be increased by effecting a change in the use of all factors keeping the same proportion or by changes in different proportions. But the concept of returns to scale is concerned with the first case, i.e., the behaviour of output as all inputs are varied by the same proportion.

The responsiveness of output to a given proportionate change in the quantities of all inputs is called returns to scale. Here, we try to find out that in what proportion output changes when there is some proportionate change in the amount of all inputs. There are threepossibilities: viz; (a) constant returns to scale, (b) increasing returns to scale and (c) decreasing return to scale. All these possibilities are shown in table 15.1.

Table 15.1 Varying Returns to Scale

Case I: Increasing return to scale

Labour units		Capital Units	Total Output (Quintals)	Return to scale
1	+	1	10	
2	+	2	40	Increasing
3	+	3	90	

Case II: Constant return to scale

Labour units		Capital Units	Total Output (Quintals)	Return to scale
1	+	1	10	
2	+	2	20	Constant
3	+	3	30	

Case III: Decreasing return to scale

Labour units		Capital Units	Total Output (Quintals)	Return to scale
1	+	1	10	
2	+	2	14	Decreasing
3	+	3	17	

15.3 INCREASING RETURNS TO SCALE

In case of increasing return to scale, when all factors are increased in each proportion, output increases by a greater proportion. For example, if the amount of labour and capital is increased by 10%. If the quantity of labour and capital doubles, output more than variables doubles. This increasing returns to scale is shown in figure 15.1.

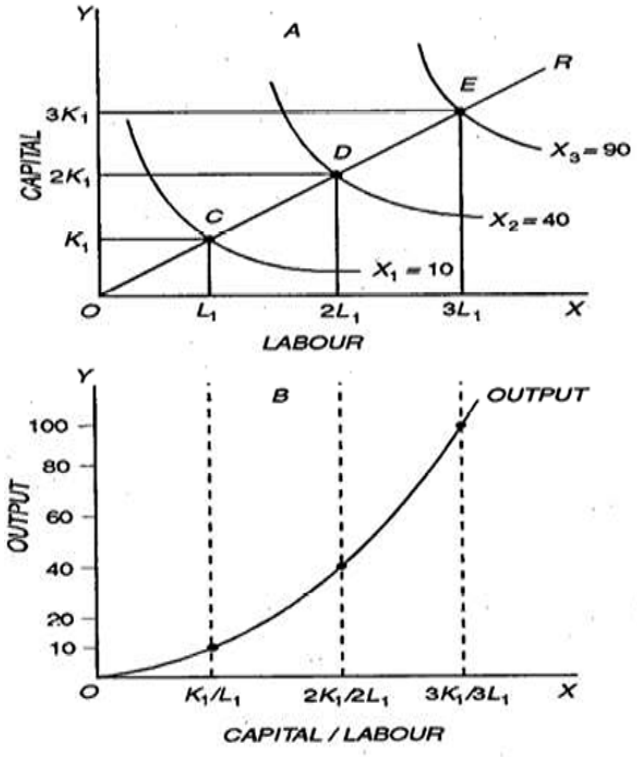

Figure 15.1: Increasing Returns to Scale

Panel A of figure 15.1 shows that a given proportionate increase in the use of labour and capital is attended by more than the proportionate increase in output. When labour and capital are doubled, output increase from 10 units to 40 units, i.e., output more than doubles. Whereas part B of figure 15.1, shows that the output line is concave from above.

It is showing increasing returns to scale. It is evident from the output line that a proportionate increase in the use of labour and capital results in more than a proportionate increase in output.

15.3.1 Causes

The causes of increasing returns to scale are:

1. **Specialisation:** Each worker can acquire specialisation in the performance of simple repetitive task rather than many different tasks. As a result, labour productivity registers a rise.

2. **Use of specialised machinery:** A large scale of operation permits the use of more productive specialised machinery which was not feasible at a smaller scale of operation.

3. **Economies of large scale:** Moreover, as a firm expands its scale of production, it comes to enjoy certain economies- financial, technical, marketing, managerial and so forth.

4. **Indivisibility:** Indivisibility is another source of increasing returns to scale. An inidivisible factor cannot be sub-divided into parts. The whole of it has to be employed to carry on production. for example, capital and entrepreneur.

A. CHECK YOUR PROGRESS

Multiple Choice Questions

1. Which of the following best describes "increasing returns to scale"?

   a) Doubling inputs leads to less than double the output.

   b) Doubling inputs leads to exactly double the output.

c) Doubling inputs leads to more than double the output.

d) Inputs remain constant while output increases.

Answer: c)

2. In which type of industry is increasing returns to scale most commonly observed?

a) Agricultural industries

b) Information technology industries

c) Small-scale retail industries

d) Traditional manufacturing industries

Answer: b)

3. What is the primary cause of increasing returns to scale in production?

a) Higher fixed costs

b) Improved efficiency and specialization with scale

c) Increasing variable costs

d) Diminishing marginal returns

Answer: b)

15.4 CONSTANT RETURN TO SCALE

In case of constant returns to scale, when all factors of production are increased in a given proportion, the output would also increase in the same proportion. For example, if the quantity of labour and capital is increased by 10%, output also increases by 10%. If labour and capital are doubled, output also doubles, similarly, if all inputs are reduced by a given proportion, output is reduced by the same proportion.

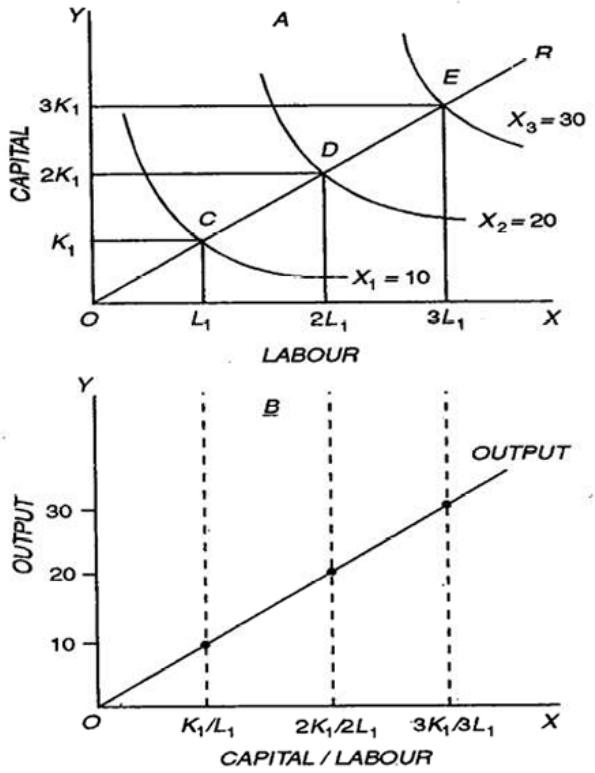

Fig. 15.2 Constant Return to Scale

Figure 15.2: Constant Returns to Scale Figure 15.2 (A), shows that equal increase in inputs is attended by equal increase in output. When the amount of capital (k) and labour (L) is increased two times, output increases from 10 units to 20 units. Similarly, when the quantity of capital and labour is increased by three times, output also goes up by three times. The OR ray is known as scale line. It shows the proportion in which the two inputs are being used. In case of constant returns to scale, the successive intercepts produced along the scale line by different isoquants of the same length. The intercept CD equals DE. Part B of the figure 15.2 shows the output-input relation. Output has been taken along Y-axis and ratio of capital and labour along X-axis. The figure shows that the output line is linear.

15.5 DECREASING RETURN TO SCALE

In decreasing returns to scale, output increases in a smaller proportion than the increase in all inputs, i.e., in this case as inputs are increased by a particular proportion, output increases less than proportionately. For example, if inputs are increased by 10% output increases by less than 10%. If inputs double, output will less than double (figure 15.3).

Part A of the figure shows that a proportionate increase in the use of labour and capital leads to less than proportionate increase in output. When use of labour and capital doubles, output increases from 10 units to 14 units. Similarly where use of labour and capital is increased three times, output goes up from 14 units to 17 units. It means that as inputs increased by equal increments, output increases less than proportionately.

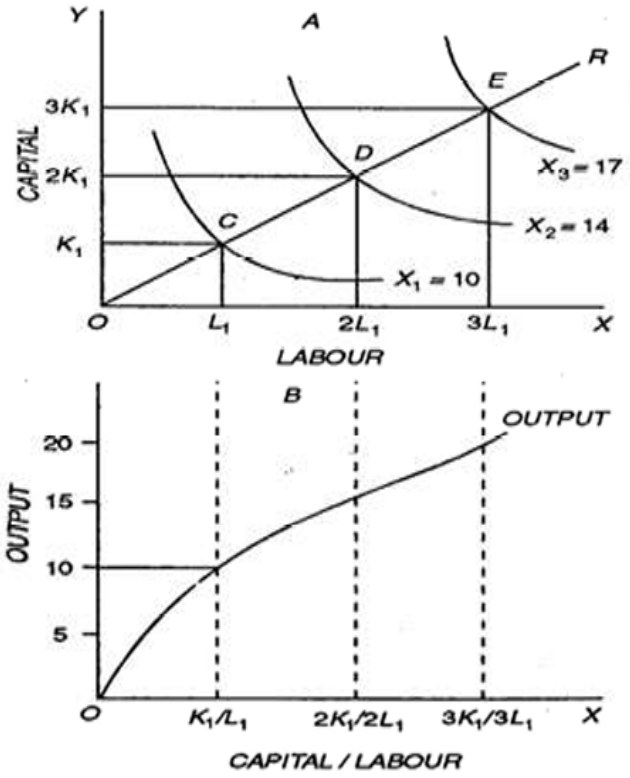

Figure 15.3: Decreasing Returns to Scale

15.5.1 Causes of Decreasing Returns to Scale

Decreasing returns to scale caused due to:

1. **Diseconomies of large scale production-** As a firm expands, it experiences growing diseconomies of large scale production. These diseconomies are mainly the result of increasing managerial difficulties. Co-ordination of the work becomes more and more difficult. In large scale businesses, the entrepreneur has to depend upon a team of managers. Lines of communication increases. Decision making becomes difficult. Thus, as the output grows, management becomes overburdened and less efficient in the discharge of its functions as co-ordinator and ultimate decision maker.

2. **Exhaustible National resources-** Another cause for decreasing returns to scale may be found in the exhaustible natural resources. For example, if more and more fishermen are employed to fish in a certain area, the catch of the fish will not increase in the same proportion. Similarly, if we keep the area of mining operation fixed and increase labour and capital equipment, output will not increase in the same proportion as the number of workers or the quantity of capital increased.

B. CHECK YOUR PROGRESS

Multiple Choice Questions

1. Constant returns to scale typically occur in which part of the production process?

   a) Early stages with small-scale operations

   b) Middle stages where firms are scaling efficiently

   c) Final stages of production with heavy specialization

   d) During periods of high innovation

   Answer: b)

2. What is an example of decreasing returns to scale?

   a) A firm doubles its factory size and output triples

b) A firm hires 10 more workers, and production doubles

c) A factory increases input by 50%, but output only increases by 20%

d) A company introduces more advanced technology, and output skyrockets

Answer: c)

3. Which condition would lead to constant returns to scale in a firm's production?

a) When all factors of production are scaled proportionally

b) When only labor is increased but capital remains the same

c) When capital is doubled but labor is reduced

d) When the firm reaches maximum efficiency and no changes in input affect output

Answer: a)

15.6 LET US SUM UP

In the long run, expansion of output can be achieved by variation in the use of all factors as all factors are variable. The laws of returns to scale can be increased by effecting a change in the use of all factors keeping the same proportion or by changes in different proportions. The responsiveness of output to a given proportionate change in the quantities of all inputs is called returns to scale. Here, we try to find out that in what proportion output changes when there is some proportionate change in the amount of all inputs.

There are three possibilities of returns to scale, viz; (a) constant returns to scale, (b) increasing returns to scale and (c) decreasing return to scale. In case of constant returns to scale, when all factors of production are increased in a given proportion, the output would also increase in the same proportion. In case of increasing return to scale, when all factors are increased in a given proportion, output increases by a greater proportion. For example, if the amount of labour and capital is increased by 10%.

The causes of increasing returns to scale are; Specialisation means each worker can acquire specialisation in the performance of simple repetitive task rather than many different tasks, use of specialised machinery, economies of large scale, indivisibility.

In decreasing returns to scale, output increases in a smaller proportion than the increase in all inputs, i.e., in this case as inputs are increased by a particular proportion, output increases less than proportionately. Decreasing returns to scale is caused due to; Diseconomies of large scale production which shows that as a firm expands, it experiences growing diseconomies of large scale production. These diseconomies are mainly the result of increasing managerial difficulties. Co-ordination of the work becomes more and more difficult. Another cause for decreasing returns to scale may be found in the exhaustible natural resources. For example, if more and more fishermen are employed to fish in a certain area, the catch of the fish will not increase in the same proportion.

To sum up, law of return to scale are a matter of interaction between economies and diseconomies of large scale production. Initially, when a firm expands, it faces increasing returns to scale because of the scale economics. As the scale of operation rises, increasing returns to scale give way to constant returns to scale, because here economies and diseconomies of large scale production balance each other. But if the firm continues to expand its scale of production beyond a point, it experiences diminishing returns to scale. This is due to the fact that eventually the economies of large scale production are swamped by the diseconomies of large scale production and this results in decreasing returns to scale.

15.7 GLOSSARY

- **Increasing Returns to Scale (IRS):**When a proportional increase in all inputs leads to a more than proportional increase in output. For example, doubling inputs results in more than double the output. This often occurs due to factors like improved efficiencies, specialization, and economies of scale.
- **Constant Returns to Scale (CRS):**When a proportional increase in all inputs results in an equal proportional increase in output. For instance, doubling inputs leads to a doubling of output. This situation reflects

optimal efficiency where scaling up does not lead to additional advantages or disadvantages.

- **Decreasing Returns to Scale (DRS):**When a proportional increase in inputs leads to a less than proportional increase in output. For example, doubling inputs results in less than double the output. This could be due to inefficiencies arising from management complexities, overuse of resources, or coordination challenges.

15.8 SELF-ASSESSMENT QUESTIONS

Q1. Explain the concepts of returns to scale. State the reasons for constant return to scale?

Q2. Distinguish between returns to scale and returns to a variable factor. Explain the reasons for increasing returns to scale?

Q3. What causes diminishing returns?

15.9 LESSON END EXERCISE

Q1. In what ways can governments or policymakers use the concept of returns

to scale to create fair economic policies that support both large corporations and small businesses?

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_____

_____

Q2**.** What role do returns to scale play in promoting innovation and technological advancement in industries?

_____

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_____

15.10 SUGGESTED READINGS

- D. N. Dwivedi (2015). Managerial Economics.
- Pushpa Sinha and V. C. Sinha (2023). Managerial Economics (PrabandhakeeyArthashaastr).
- Maheshwari K. L., Varshney R.L. (2014). Managerial Economics: Text, Problem and Cases. Sultan Chand & Sons.
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M.Com 1st Sem. **UNIT-IV (CREDIT: 1)**
Course No. 153 **Lesson No. 16**

CHARACTERISTICS OF DIFFERENT MARKET STRUCTURES

STRUCTURE

16.0 LEARNING OBJECTIVES AND OUTCOMES

Learning Objectives

- To familiarise the students with the Meaning of Market market structure
- To make understanding about the concept of market structure
- The student will be able to understand about the different market structure

Learning Outcomes

After learning this lesson, you will be able to:

- define the concept of market and market structures
- explain the market structure under Perfect market competition
- define what a Monopolistic competition is
- explain the market structure under Oligopoly
- define Monopoly
- explain the market structure under Duopoly

16.1 LEARNING OBJECTIVES AND OUTCOMES

Market is generally understood to mean a particular place or locality where goods are sold and purchased. However, in economics, by the term 'market' we do not mean any particular place or locality in which goods are bought and sold. The idea of a particular locality or geographical place is not necessary to the concept of the market. What is required for the market to exist is the contact between the sellers and buyers so that transaction (i.e., sale and purchase of a commodity) at an agreed price can take place between them. The buyers and sellers may be spread over a whole town, region or a country but if they are in close communication with each other either through personal contact, exchange of letters, telegrams, telephones, etc. so that they can sell and buy a good at an agreed price, the market would be said to exist. Further, it is noteworthy that because in a market, there is close and free communication between various buyers and sellers, price of a homogeneous commodity settled between different sellers and buyers tends to be the same. Thus, in the words of Cournot, a French economist, "Economists

understand by 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". Thus, the essentials of a market are: (a) commodity which is dealt with, (b) the existence of buyers and sellers, (c) a place, be it a certain region, a country or the entire world, and (d) such communication between buyers and sellers that only one price should prevail for the same commodity at the same time.

16.2 MEANING OF MARKET

According to Prof. R. Chapman, "The term market refers not necessarily to a place but always to a commodity and the buyers and sellers who are in direct competition with one another."

The market for a product refers to the whole region where buyers and sellers of that product are spread and there is such free competition that one price for the product prevails in the entire region. The essential features of a market are

1) **An Area:** In economics, a market does not mean a particular place but the whole region where sellers and buyers of a product ate spread. Modem modes of communication and transport have made the market area for a product very wide.

2) **One Commodity:** In economics, a market is not related to a place but to a particular product. Hence, there are separate markets for various commodities. For example, there are separate markets for clothes, grains, jewelry, etc.

3) **Buyers and Sellers:** The presence of buyers and sellers is necessary for the sale and purchase of a product in the market. In the modem age, the presence of buyers and sellers is not necessary in the market because

they can do transactions of goods through letters, telephones, business representatives, internet, etc.

4) **Free Competition:** There should be free competition among buyers and sellers in the market. This competition is in relation to the price determination of a product among buyers and sellers.

5) **One Price:** The price of a product is the same in the market because of free competition among buyers and sellers.

6) **Buyers and Sellers:** The presence of buyers and sellers is necessary for the sale and purchase of a product in the market. In the modem age, the presence of buyers and sellers is not necessary in the market because they can do transactions of goods through letters, telephones, business representatives, internet, etc.

7) **Free Competition:** There should be free competition among buyers and sellers in the market. This competition is in relation to the price determination of a product among buyers and sellers.

8) **One Price:** The price of a product is the same in the market because of free competition among buyers and sellers.

16.3 MEANING OF MARKET STRUCTURE

Market structure refers to the nature and degree of competition in the market for goods and services. The structures of market both for goods market and service (factor) market are determined by the nature of competition prevailing in a particular market. There are a number of determinants of market structure for a particular good.

1) The number and nature of sellers - The market structures are influenced by the number and nature of sellers in the market.

2) The number and nature of buyers - The market structures are also influenced by the number and nature of buyers in the market.

3) The nature of the product - It is the nature of product that determines

the market structure.

4) The conditions of entry into and exit from the market - The conditions for entry and exit of firms in a market depend upon profitability or loss in a particular market

5) Economies of scale - Firms that achieve large economies of scale in production grow large in comparison to others in an industry.

16.4 CLASSIFICATION OF MARKET STRUCTURES

The popular basis of classifying market structures rests on three crucial elements,

1) The number of firms producing a product,

(2) The nature of product produced by the firms, that is, whether it is homogeneous or differentiated, and

(3) The ease with which new firms can enter the industry. The price elasticity of demand for a firm's product depends upon the number of competitive firms producing the same or similar product as well as on the degree of substitution which is possible between the product of a firm and other products produced by rival firms. Therefore, a distinguishing feature of different market categories is the degree of price elasticity of demand faced by an individual firm.

On the basis of competition, a market can be classified in the following ways:

16.5 MEANING AND CHARACTERISTICS PERFECT COMPETITION MARKET

A perfectly competitive market is one in which the number of buyers and sellers is very large, all engaged in buying and selling a homogeneous product without any artificial restrictions and possessing perfect knowledge of market at a time.

According to R.G. Lipsey, "Perfect competition is a market structure in which all firms in an industry are price- takers and in which there is freedom of entry into, and exit from, industry."

In the real world, it is hard to find examples of industries which fit all the criteria of 'perfect knowledge' and 'perfect information'. However, some industries are close.

1. **Foreign exchange markets.** Here currency is all homogeneous. Also, traders will have access to many different buyers and sellers. There will be good information about relative prices. When buying currency it is easy to compare prices
2. **Agricultural markets.** In some cases, there are several farmers selling identical products to the market, and many buyers. At the market, it is easy to compare prices. Therefore, agricultural markets often get close to perfect competition.
3. **Internet related industries.** The internet has made many markets closer to perfect competition because the internet has made it very easy to compare prices, quickly and efficiently (perfect information). Also, the internet has made barriers to entry lower. For example, selling a popular good on the internet through a service like e-bay is close to perfect competition. It is easy to compare the prices of books and buy from the cheapest. The internet has enabled the price of many books to fall in price so that firms selling books on the internet are only making normal profits.

Characteristics of Perfect competition

(1) Large Number of Buyers and Sellers

(2) Freedom of Entry or Exit of Firms

(3) Homogeneous Product

(4) Absence of Artificial Restrictions

(5) Profit Maximisation Goal

(6) Perfect Mobility of Goods and Factors

(7) Perfect Knowledge of Market Conditions

(8) Absence of Transport Costs

(9) Absence of Selling Costs

16.6 MEANING & CHARACTERISTICS MONOPOLISTIC COMPETITION

The first important sub-category of imperfect competition is monopolistic competition on which E.H. Chamberlin laid a great stress in his original thought-provoking work "The Theory of Monopolistic Competition". Monopolistic Competition, as is now understood, is characterised by a large number of firms and product differentiation. That is, in monopolistic competition a large number of firms produce somewhat different products which are close substitutes of each other. As a result, demand curve facing a firm under monopolistic competition is highly elastic and this indicates that a firm working in it enjoys some control over the price. Besides, there is freedom of entry and exit under monopolistic competition. Monopolistic competition refers to a market situation where there are many firms selling a differentiated product. "There is competition which is keen, though not perfect, among many firms making very similar products." Thus monopolistic competition refers to competition among a large number of sellers producing close but not perfect substitutes for each other.

16.6.1 Characteristics of Monopolistic Competition

It is important to understand the important characteristics of monopolistic competition. The knowledge of these features will enable the students to know how this form of market structure is different from perfect competition and oligopoly. We explain below its important features.

1. **A large number of firms.** The first important feature of monopolistic competition is that under it there are a relatively large number of firms each satisfying a small share of the market demand for the product.

Because there is a large number of firms under monopolistic competition, there exists stiff competition between them. Unlike perfect competition these large number of firms do not produce identical products. Instead, they produce and sell differentiated products which are close substitutes of each other. This makes the competition among firms real and tough. Further, the fact that there is a large number of firms under monopolistic competition, size of each firm will be relatively small. This is unlike oligopoly where there are a few firms of big size.

2. **Product differentiation.** The second important feature of monopolistic competition is that the products produced by various firms are not identical but are slightly different from each other. Though different firms make their products slightly different from others, they remain close substitutes of each other. In other words, the products of various firms working under monopolistic competition are not the same but are similar. Therefore, their prices cannot be very much different from each other. It is because of the fact that their products are similar and close substitutes of each other that the various firms under monopolistic competition compete with each other.

3. **Some influence over the price.** Each firm under monopolistic competition produces a product variety which is close substitute of others. Therefore, if a firm lowers the price of its product variety, some customers of other product varieties will switch over to it. This means as it lowers the price of its product variety, quantity demanded of it will increase. On the other hand, if it raises the price of its product, some of its customers will leave it and buy the similar products from its competing firms. This implies that demand curve facing a firm working under monopolistic competition slopes downward and marginal revenue curve lies below it. This means that under monopolistic competition an individual firm is not a price taker but will have some influence over the price of its product. If it fixes a higher price, it will be able to sell a relatively smaller quantity of output. And if it fixes a lower price, it will

be able to sell more. Thus under monopolistic competition, a firm has to choose a price-output combination which will maximise its profits.

4. **Non-price competition:** Expenditure on advertisement and other selling costs. An important feature of monopolistic competition is that firms incur a considerable expenditure on advertisements and other selling costs to promote the sales of their products. Promoting sales of their products through advertisement is an important example of non-price competition. The expenditure incurred on advertisement is prominent among the various types of selling costs. The advertisement and other selling outlays by a firm change the demand for its product as well as its costs. Like the adjustments of price and product, a seller under monopolistic competition will also adjust the amount of his advertisement expenditure so as to maximise his profits. This problem of adjusting one's selling outlay is unique to monopolistic competition, because the firm under perfect competition has not to incur any expenditure on advertisement. The advertisement expenditure by a purely competitive firm will be without purpose since it can sell as much amount as it pleases at the going market price without any advertisement expenditure. The rival firms under monopolistic competition keenly compete with each other through advertisement by which they change the consumers' wants for their products and attract more customers. Thus, a full explanation of the equilibrium under monopolistic competition must also involve equilibrium in regard to the amount of expenditure on advertisement and other sales promotion activities.

5. **Product variation.** Another form of non-price competition which a firm under monopolistic competition has to face is the variation in products by various firms. A firm, under perfect competition, does not confront this problem, for the product is homogeneous under perfect competition. The problem of product variation under monopolistic competition exists because there is differentiation of products of various firms. The firm will try to adjust its product so as to conform more to the wishes of the

buyers. The variation of the product may refer to a change in the quality of the product itself, technical changes, a new design, better materials, and it may mean only a new package or container. It may also mean more prompt or courteous service, and a different way of doing business. The amount of the product which a firm will be able to sell in the market depends in part upon the manner in which its product differs from others. Where the possibility of product differentiation exists, sales depend upon the skill with which a product is distinguished from others and made to appeal to a particular group of buyers. The profit maximisation principle applies to the choice of the nature of the product as to its price. In other words, a firm will choose that nature of the product, given its price, which gives it maximum profits. Therefore, in a full explanation of the firm's equilibrium under monopolistic competition we have also to explain product equilibrium in addition to price equilibrium and selling- costs equilibrium.

6. **Freedom of entry and exit.** This is another important feature of monopolistic competition. In a monopolistically competitive industry it is easy for the new firms to enter and the existing firms to leave it. Free entry means that when in the industry existing firms are making super-normal profits, the new firms enter the industry which leads to the expansion of output. As a result, price of product tends to fall in the long run. However, it may be noted that under monopolistic competition entry may not be as easy or free as under perfect competition. Whereas under perfect competition the new firms which enter the industry can produce identical products, but under monopolistic competition, the new firms can produce only new brands or product varieties which may initially find it difficult to compete with the already well-established brands and product varieties

A. CHECK YOUR PROGRESS

1. Taking a real life example, discuss the features of the perfect competition.

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2. State true or false for the following statements: (a) In a perfect market there are large number of sellers. (b) In a perfect market there is products differentiation.(c) In a perfect market a change in the output of a single firm will affect the market price of the product. (d) In perfect market, market agents are not fully aware of market. (e) In a perfect market there is perfect mobility of resources..3. Explain the meaning and characteristics of monopolistic competition.

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16.7 MEANING AND CHARACTERISTICS OF OLIGOPOLY

The second sub-category of imperfect competition is oligopoly without product differentiation which is also known as pure oligopoly. Under it there is competition among the few firms producing homogeneous or identical product. The fewness of the firms ensures that each of them will have some control over the price of the product and the demand curve facing each firm will be downward sloping which indicates that the price elasticity of demand for each firm will not be infinite. "Oligopoly is an industry structure characterized by a small number of firms producing all or most of the output of some good that may or may not be differentiated". Oligopoly is a market situation in which there are a few firms selling homogeneous or differentiated products. It is difficult to pinpoint the number of firms in 'competition among the few.' With only a few firms in the market, the action of one firm is likely to affect the others. An oligopoly industry produces either a homogeneous product or heterogeneous products.

Characteristics of Oligopoly

In oligopoly some special characteristics are found which are not present in other market structures. We discuss some of these characteristics below:

1. **Interdependence**. The most important feature of oligopoly is the interdependence in decision-making of the few firms which comprise the industry. This is because when the number of competitors is few, any change in price, output, product design etc. by a firm will have a direct effect on the fortune of its rivals, which will then retaliate in changing their own prices, output or products as the case may be. It is, therefore, clear that the oligopolistic firm must consider not only the market demand for the industry's product but also the reactions of the other firms in the industry to any action or decision it may take. Since more than one reaction-pattern is possible from the other firms, we have to make some assumptions about the reaction of the others before we can provide a definite and determinate solution of priceoutput fixation under oligopoly.

2. **Importance of Advertising and Selling Costs**. A direct effect of interdependence of oligopolists is that the various firms have to employ various aggressive and defensive marketing weapons to gain a greater share in the market or to prevent a fall in their market share. For this various firms have to incur a good deal of costs on advertising and on other measures of sales promotion. Therefore, there is a great importance of advertising and selling costs under conditions of market situation characterised by oligopoly. Prof. Baumol rightly says that "it is only under oligopoly that advertising comes fully into its own." Under perfect competition, advertising by an individual firm is unnecessary in view of the fact that it can sell any amount of its product at the going price. A monopolist has also not to make any competitive advertisement since he is the only seller of a product. A monopolist may, perhaps, advertise when he has to inform the public about his introduction of a new model of his product or he may advertise in order to attract potential consumers

who have not yet tried his product. Under monopolistic competition, advertising plays an important role because of the product differentiation that exists under it, but not as much important as under oligopoly. "Under oligopoly, advertising can become a life-and-death matter where a firm which fails to keep up with the advertising budget of its competitors may find its customers drifting off to rival products."

3. **Group Behaviour.** Further, another important feature of oligopoly is that for the proper solution to the problem of determination of price and output under it, analysis of group behaviour is important. Theories of perfect competition, monopoly and monopolistic competition present no difficult problem of making suitable assumption about human behaviour. In cases of perfect competition and monopolistic competition (with a large number of firms), the economists assume that the business firms behave in such a way as to maximise their profits. Assumption of profit maximisation gives overall good results in these situations where mass of people are involved and there is no interdependence of firms. On the other end, the theory of monopoly deals with a sole individual and it is also appropriate to assume profit maximising behaviour on his part. But, the theory of oligopoly is a theory of group behaviour not of mass or individual behaviour, and to assume profit-maximising behaviour on the part of a producer of a group may not be very valid. In oligopoly, there are a few firms in a group which are very much interdependent. Given the present state of our economic and social science, there is no generally accepted theory of group behaviour. Do the members of a group will cooperate with each other in promotion of common interests or will they fight to promote their individual interests? Does the group possess any leader? If so, how does he get the others to follow him? These are some of the questions that need to be answered by the theory of group behaviour.

4. **Indeterminateness of Demand Curve Facing an Oligopolist.** Another important feature is the indeterminateness of the demand curve facing

an oligopolist. The demand curve shows what amounts of its product a firm will be able to sell at various prices. Now, under perfect competition, an individual firm's demand curve is given and definite. Since a perfectly competitive firm is one among a large number of firms producing an identical product, it is incapable of influencing the price of its product by its own individual action. Therefore, a firm under perfect competition faces a perfectly elastic demand curve at the level of the going price in the market.

On the other hand, a monopolist produces a product which has only remote substitutes. Therefore, a monopolist can safely ignore the effects of its own price changes on his distant rivals and, therefore, the monopolist faces a given and definite demand curve depending upon the consumer's demand for his product. Under monopolistic competition, where there is a large number of firms producing products which are close substitutes of each other, changes in price by an individual firm will have a negligible effect on each of its many rivals. Therefore, a firm under monopolistic competition can validly assume the prices of its rivals to remain unchanged when it makes changes in the price of its product. Thus, the demand curve for a firm under monopolistic competition can be taken as definite and is given by the buyers' preferences for its product. But the situation under oligopoly is quite different because of interdependence of the firms in it. Under oligopoly, a firm cannot assume that its rivals will keep their prices unchanged when it makes changes in its own price. As a result of this, the demand curve facing an oligopolistic firm loses its definiteness and determinateness because it goes on constantly shifting as the rivals change their prices in reaction to price changes by a firm.

16.8 MEANING AND CHARACTERISTICS OF MONOPOLY

Monopoly is said to exist when one firm is the sole producer or seller of a product which has no close substitutes. Three points are worth noting in this

definition. First, there must be a single producer or seller of a product if there is to be monopoly. This single producer may be in the form of an individual owner or a single partnership or a joint stock company. If there are many producers producing a product, either perfect competition or monopolistic competition will prevail depending upon whether the product is homogeneous or differentiated. On the other hand, when there are few producers or sellers of a product, oligopoly is said to exist. If then there is to be monopoly, there must be one firm in the field. Even literally monopoly means one seller. 'Mono' means one and 'poly' means seller. Thus monopoly means one seller or one producer. But to say that monopoly means one seller or producer is not enough. A second condition which is essential for a firm to be called monopolist is that no close substitutes for the product of that firm should be available. If there are some other firms which are producing close substitutes for the product in question there will be competition between them. In the presence of this competition a firm cannot be said to have monopoly. Monopoly implies absence of all competition. For instance, there is one firm in India which produces 'Colgate' toothpaste but this firm cannot be called monopolist since there are many other firms which produce close substitutes of Colgate toothpaste such as Binaca, Forhans, etc. These various brands of toothpaste compete with each other in the market and the producer of any one of them cannot be said to have a monopoly. Thus the privilege of being the single seller of a product does not by itself make one a monopolist in the sense of possessing the market power to set the price. As a single seller, he may be a king without a crown. We can express the second condition of monopoly in terms of cross elasticity of demand also. Cross elasticity of demand shows the degree of change in the demand for a good as a result of a change in the price of another good. Therefore, if there is to be monopoly the cross elasticity of demand between the product of the monopolist and the product of any other producer must be very small. The fact that there is one firm under monopoly means that other firms for one reason or another are prohibited to enter the monopolistic industry. In other words, strong barriers to the entry of new firms exist wherever there is one firm having a sole control over the production of a commodity. The barriers which prevent the

firms to enter the industry may be economic in nature or else of institutional and artificial nature. In case of monopoly, barriers are so strong that they prevent entry of all firms except the one which is already in the field. From above it follows that for the monopoly to exist, the following three conditions are necessary

1. There is a single producer or seller of a product.
2. There are no close substitutes for the product.
3. Strong barriers to the entry of new firms in the industry exist.

Characteristics of Monopoly market

The following are the characteristics of the monopoly market:

1. **Single seller of the product:** In a monopoly market, there is only one firm producing or supplying a product. This single firm constitutes the industry and as such there is no distinction between firm and industry in a monopolistic market.
2. **Restrictions to entry:** In a monopolistic market, there are strong barriers to entry. The barriers to entry could be economic, institutional, legal or artificial.
3. **No close substitutes:** The monopolistic generally sells a product which has no close substitutes. In such a case, the cross elasticity of demand for the monopolistic product and any other product is zero or very small. The price elasticity of demand for monopolistic product is also less than one. As, a result, the monopolist faces a steep downward sloping demand curve.

B. CHECK YOUR PROGRESS

Multiple Choice Questions

1. Which of the following statements highlights one of the essential conditions of perfect competition?

a. A perfect competition has a number of sellers and a few buyers.

b. A perfect competition has different levels of pricing for identical products at a particular point of time

c. A perfect competition has the same pricing for identical products at a particular point of time

d. None of the above.

2. Which of the following statements about Duopoly is correct?

a. Duopoly is a special case for the Oligopoly market structure

b. Duopoly is a special case for the Monopsony market structure

c. Duopoly is a special case for the Monopoly market structure

d. Duopoly is a special case for the Imperfect Competition

3. Which of the following statements about Duopoly is correct?

a) Duopoly is a special case for the Oligopoly market structure

b) Duopoly is a special case for the Monopsony market structure

c) Duopoly is a special case for the Monopoly market structure

d) Duopoly is a special case for the Imperfect Competition

16.9 MEANING AND CHARACTERISTICS OF DUOPOLY

Duopoly means it is the market where two monopolists instead of one who share the monopoly power. A duopoly is a market situation that entails two competing companies that share the market. In this market, two brands can collude to set prices or quantities and make customers pay more money.

Characteristics of Duopoly

Duopoly is a market structure similar to oligopoly. However, it still has some distinctive features.

1. It is the market structure where only two companies who share their market themselves.
2. Both businesses that exist within a duopoly market are interdependent. To attract the attention of customers, companies often take strategic actions, such as price reductions. If one company makes its product cheaper, the other will follow. This is necessary to attract consumers and encourage them to purchase.

3. Duopoly with Product Differentiation: It is the simplest market where two monopolists are supposed to be selling an identical goods. If both fixes the prices of their product they may earn maximum profit in the long run. But if there is price-war then both monopolist may earn normal profit in the long run. Curnot Model, Edgeworth Model and Chamberlin Model are the examples of such Duopoly.

4. Duopoly without Product Differentiation: In this market each producer has his own clientele and goodwill. There is no fear of immediate retaliatory measures by rivals. There is less price-war. Since no agreement between them and products are not homogeneous, the monopolists with better products can earn supernormal profits.

It's worth mentioning that players can collude to determine a price or output or maintain a competitive environment for significant profits. Since companies in a duopoly take different measures to develop brand loyalty and implement low-pricing strategies, it's hard for new firms to enter. As a result, sales volume and revenues are good enough because there is only one competitor and the barriers to entry are high.

16.10 LET US SUM UP

The number of firms and product differentiation are crucial determinants of the nature of competition in the market. The level of competition also gets influenced by number of sellers and buyers, buyers' behaviour, characteristics of product and production. The pricing analysis of markets helps to understand how the equilibrium price is determined by the interaction of demand and supply. This forms the basis for analysing the price-output decisions of firms under different competitive situations.

16.11 GLOSSARY

- **Market structure:** Market structure refers to the number and size distribution of buyers and sellers in the market for goods or service.

- **Perfect competition:** Perfect competition is a market structure where a large number of buyers and sellers deal in nearly identical products. Each is individually so small in relation to the total output that all members are 'price takers'.
- **Monopoly**: Monopoly situation is characterised by just one producer of a product or service.
- **Monopolistic:** Monopolistic competition is characterised by many sellers of a differentiated product.
- **Oligopoly**: Oligopoly situations have fewer sellers with or without the existence of product differentiation.
- **Product differentiation:** Product differentiation refers more to the differences in products as perceived by the customers than in real or technical difference in specifications.

16.12 SELF ASSESSMENT QUESTIONS

1. Classify the market structures based on certain factors and support your answer with the help of examples.

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2. Explain the meaning and characteristics of different *market structures.*

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3. Identify the characteristic differences between various market structures, namely, perfectly competitive markets, non-competitive markets, and imperfectly competitive markets, and discuss differences in their operations.

16.13 LESSON END EXERCISE

1. Explain the meaning and characteristics of oligopoly.

2. What perfect competitive market and pure monopoly market have in common?

3. How can a monopoly market be a disadvantage to consumers?

16.14 SUGGESTED READINGS

- Mote, V.L., Samuel Paul and G.S.Gupta, 1977. Managerial Economics- Concepts and Cases, Tata McGraw Hill.
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M.Com 1st Sem. **UNIT-IV (CREDIT: 1)**
Course No. 153 **Lesson No. 17**

PRICE DETERMINATION AND FIRMS EQUILIBRIUM IN SHORT RUN AND LONG RUN UNDER PERFECT COMPETITION

STRUCTURE

17.0 LEARNING OBJECTIVES AND OUTCOMES

Learning Objectives

- To understand the market structure under perfect competition;
- To understand how price and quantity demanded and supplied are determined in perfect competition.
- To derive the price and output determination in such a market.

Learning Outcomes

After going through this lesson, learners will be able to:

- understand short-run equilibrium of the firm
- explain long-run equilibrium of the firm
- derive the price and output determination in such a market.

17.1 INTRODUCTION

A perfectly competitive market is assumed to have the following characteristics:

1) There are numerous buyers and sellers in the market, such that no single agent has the power to affect the market price. Thus, both the parties are price-takers.

2) The products sold in the market are identical.

3) There is perfect information among the buyers regarding price and output.

4) Any firm can enter the industry without incurring a cost. There sources can also freely move across the sectors. In other words, there is no entry barrier.

Each firm in this model is a profit maximiser. As the firms are price takers in the market, their decision variable is executed through output. Being price takers, they face an infinitely elastic market demand curve and can sell unlimited amount of output at that price.

17.2 MEANING OF PERFECT COMPETITION

Perfect competition refers to a market situation in which there are a large number of buyers and sellers of homogeneous products. The price of the product is determined by industry with the forces of demand and supply. For instance if we require a pen there should be several shops selling pens. Under conditions of perfect competition every seller should be selling the same quality of pens at a uniform prevailing price in the market. We may buy a pen from any shop at price rupees 10. If another shopkeeper charges rupees 12 for the same quality of pen, nobody will buy from him but if A shopkeeper charges rupees 9 all will buy pens from that particular shop. But both situations are unrealistic. There must be one price prevailing throughout the market.

17.2.1 Short-run equilibrium of firm

As the firms under perfect competition are all identical, we can consider anyone firm to represent the rest.

Let q = quantity of output produced by the firm

C (q) = cost function

p = price per unit of the product

Π = Profit

Given these variables, the profit function of the firm would be,

$\Pi = TR - TC = pq - C(q)$ and to maximise it we differentiate Π with respect to q and set the derivative equal to zero,

$$\Delta\Pi / \Delta q = p - \Delta C / \Delta q = 0$$

or, p = MC (the marginal cost)

Under perfect competition, a firm would produce up to that level of output where p equals MC. As the marginal revenue (MR) is equal to p, we have P = MC = MR at the profit maximising level of output.

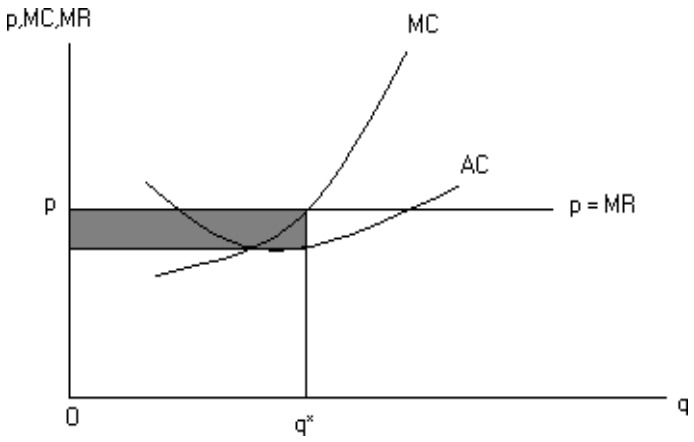

Fig.17.1: Short-run Equilibrium of Firm

In the diagram, AC represents the short-run average cost curve of the firm and MC the marginal cost. MC intersects AC at the latter's minimum point. Given the price, p, MR and AR curves are given by the horizontal price line. The equilibrium point of the firm is the point where the MC curve cuts the price line. Dropping a perpendicular from the intersection point to the horizontal axis, we get the equilibrium output oq*. The shaded region represents the profit accruing to the firm with oq* level of output.This will be true for all the firms, because the firms are all identical.

A. CHECK YOUR PROGRESS

Long Answer Questions

1) Can you imagine in real world the markets akin to a perfectly competitive market, if yes list them with their similarities?

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2) Suppose that firms in the perfectly competitive market enjoy positive economic profit in the short run, what would happen to the long run equilibrium? Show it in the graph and explain your answer.

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3) Why a firm is always a price taker in a perfectly competitive market? Give adequate justification for your answer.

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17.2.2 Supply Curve of firm and Industry

For a given price, the firm will produce only that much of output where MR = MC. Therefore, MC curve lying above the average variable cost (AVC) would give the supply curve of the firm. The portion of MC lying below the AVC would not represent the supply curve because in that region the firm would shut down. The reason for it is shown with the help of the following proof:

Suppose $p<AVC$

- $pq<(AVC)q$
- $TR<TVC$
- $TR<TC–TFC$
- $TC–TR>TFC$
- the loss incurred by the firm is greater than the total fixed cost, so that if the firm shuts down, it will have to incur only the fixed cost.

17.2.2.1 Supply curve of the firm

Diagrammatically, the supply curve of the firm would be given by the rising part of the MC curve lying above the AVC curve. Below the AVC curve the supply curve would coincide with the vertical axis. Therefore, the supply curve would be broken one as shown in Figure 17.1.

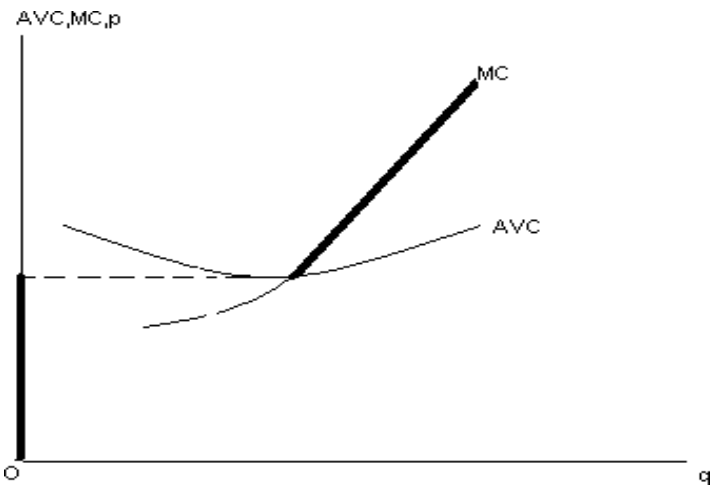

Fig: 17.2 Supply Curve of the Firm

Mathematical Representation

Let the cost function of the ith firm be C = Ci (qi)

The marginal cost, MC = A Ci (qi)/ A qi = C'i (qi)

Given the market price (p) the supply function of the firm is given by,

Si = Si (P) for p ? min AVC

= 0 for p □ min AVC

The aggregate supply function or the supply function of the industry is given by

S = Σ Si (p) = S (p)

A. CHECK YOUR PROGRESS

In 1997, over $700 billion purchases were charged on credit cards, and this total is increasing at a rate of over 10 per cent a year. At first glance, the credit card market would seem to be a rather concentrated industry. Visa, MasterCard and American Express are the most familiar names, and over 60 per cent of all charges are made using one of these three cards. But on closer examination, the industry seems to exhibit most characteristics of perfect competition. Consider first the size and distribution of buyers and sellers. Although Visa, Master card and

American Express are the choices of the majority of consumers, these cards do not originate from just three firms. In fact, there are over six thousand enterprises (primarily banks and credit unions) in the US that offer charge cards to over 90 million credit card holders. One person's Visa card may have been issued by his company's credit union in Los Angeles, while a next door neighbour may have acquired hers from a Miami Bank when she was living in Florida. Credit cards are a relatively homogenous product. Most Visa cards are similar in appearance, and they can all be used for the same purposes. When the charge is made, the merchant is unlikely to notice who it was that actually issued the card. Entry into and exit from the credit card market is easy as evidenced by the 6000 institutions that currently offer cards. Although a new firm might find it difficult to enter the market, a financially sound bank, even one of modest size, could obtain the right to offer a MasterCard or a Visa card from the present companies with little difficulty. If the bank wanted to leave the field, there would be a ready market to sell its accounts to other credit card suppliers. Thus, it would seem that the credit card industry meets most of the characteristics for a perfectly competitive market.

Questions:

1. What are the characteristics of perfect competition that are exhibited by the credit card industry?
2. Discuss the price and output condition of a perfect competition.
3. Do you think the same competitive state is applicable to the Indian scenario

2. What is the long run equilibrium of a competitive firm.

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17.2.2.2 Supply curve of industry

The industry supply can be obtained by summation of the supply of all the firms. Therefore, the industry supply would be,

$S=\sum q_i(p)$ overall N firms, where $i=1,2,\ldots N$

If the firms are all identical then $q_i(p)$ is the same for all .Assuming $q_i=q$, total industry supply would be $S = N.q$

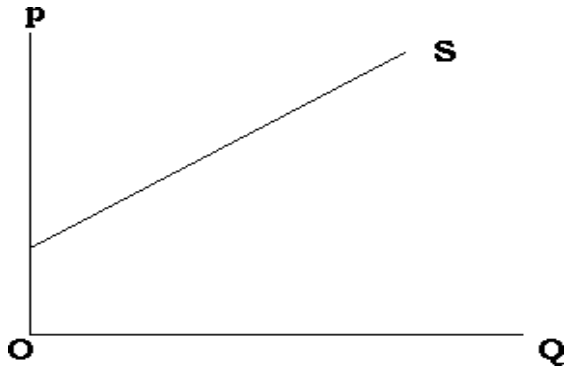


Fig.: 17.3 Supply Curve of the Industry

The industry supply curve S implies the summation of all the individual supply curves of the existing firms in the market.

A Numerical Example

Let the total cost curve be $Ci = 0.1qi\ 3 – 2\ qi\ 2 +15\ q + 10$

Then, $MCi = 0.3qi\ 2 – 4qi +15$

Setting MCi = p, we have,

$p = 0.3qi\ 2 – 4qi +15$

This is a quadratic equation in qi, therefore,

$qi = [4+ (10+1.2p)]/0.6\ [4- (10+1.2\ p]/0.6$

The individual firm's supply function is relevant for all p □ minimum AVC.

The AVC function is $AVCi = 0.1qi\ 2 – 2qi +15$

The minimum point on the AVC is located by taking derivative with respect to qi and setting the derivative equal to zero, as shown below.

$$d\ (AVCi)/dqi = 0.2qi – 2 = 0$$

Therefore, i q = 10.

Substituting qi = 10 in the AVC function we get,

minimum AVC = 5.

Therefore, the firm supply function is

Si = [4 ± (1.2p – 2)]/0.6] for p □ 5

= 0 for p < 5

If the industry consists of 100 identical firms, the aggregate supply function is

S = 100× [4 ± (1.2p – 2)]/0.6 for p □ 5

= 0 for p < 5

At a price of 22.5, the aggregate supply would be 1500 units.

17.2.3 Short-Run Equilibrium of Industry

Given the industry demand and supply curves, the equilibrium price and output in the market will be determined at their point of equality. Assuming the market demand curve to be linear and downward sloping, the equilibrium condition is represented in the following figure.

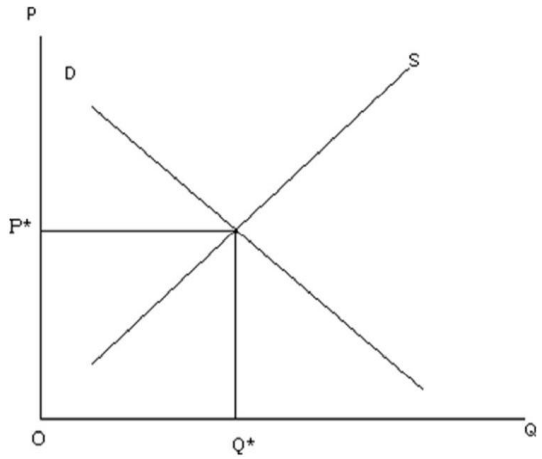


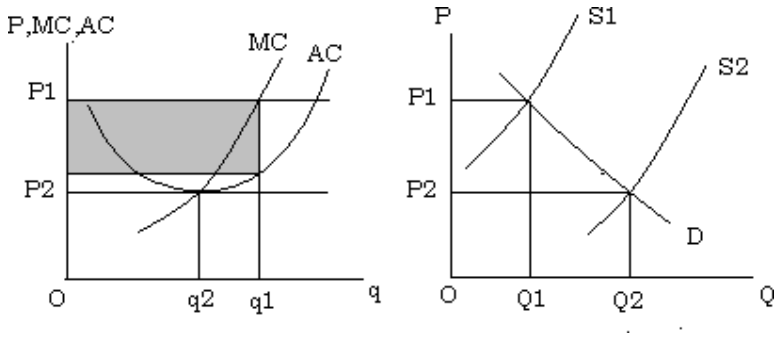
Fig: 17.4 Industry Equilibrium

The equilibrium price and output in the industry are shown as Perfect Competition * op and OQ* respectively.

The equilibrium price and output in the industry are shown as respectively.

17.2.4 Long-Run Equilibrium of Firm And Industry

In the long-run, all the inputs available to the firms are variable, so that the concept of fixed cost is absent and the total cost (TC) equals the total variable cost (TVC). Therefore, we need only to deal with the long-run average cost (LAC=LTC/q).We assume the LAC to be U-shaped exhibiting the fact that at the low levels of output, the cost is falling and beyond a point, it rises. We have stated above that a perfectly competitive market is characterized by free entry and exit of the firms. As in the short-run, the firms are making profits, there will be entry of new firms in the market. As a result, the industry supply would go up and price would fall. This would continue until the profits are driven down to zero. Such a process is described in the following diagram.



Firm Industry

Fig.17.5 Long-run Profit of Competitive Firm

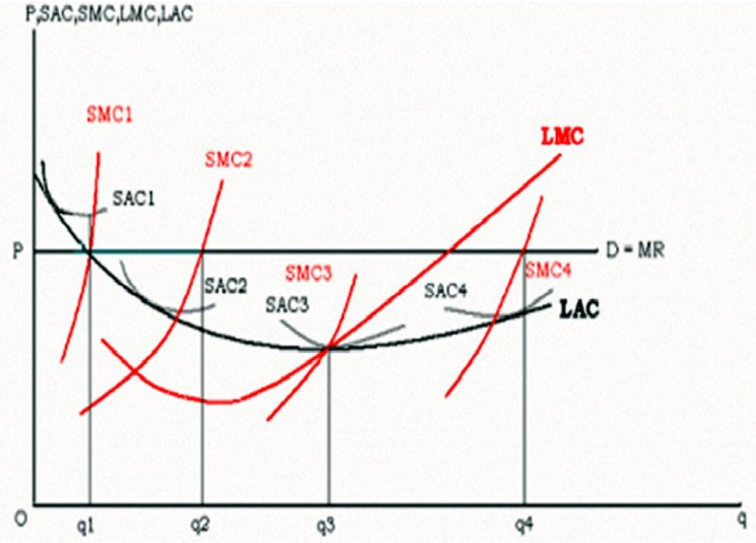
In Figure 17.5, at price. P1, the firm is producing an output q1 whereby it is making a profit shown by the shaded area. At price, P1, the industry output is Q1.As the existing firms are making profit, there will been try into the market. As a result, the total supply in the market would go up and the price in market would fall. If at the new price the firms are still making some profit, then there

will be further entry and market supply would go up. Consequently, the price would go down further level. This process would continue until the price falls to such a level that all profits are eliminated. From the diagram, the shaded area ceases to exist. This price is P2, where P = MC= AC and therefore profit is zero.

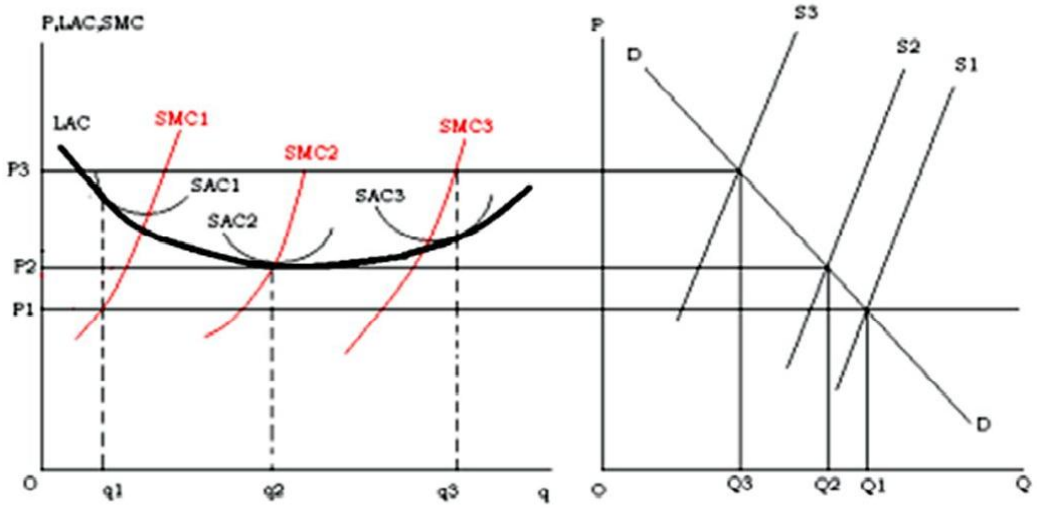
The zero profit scenario faced by the firms means that the economic profit is zero implying that the firms earn no more than they would elsewhere. In other words, the firms are breaking even at price P2.At P2, as the firms are earning zero profit, there is no incentive for other firms to enter the industry. Hence, price P2 would represent an equilibrium price level with Q2 as the equilibrium output. With that the long-run equilibrium is characterised by a situation where the economic profits for the firms are zero

Firm at the Long-run: Choice of Plant and the Adjustment Process

In the long-run, an entrepreneur can adjust the plant size. She has the scope to choose the optimal plant size, which would minimise the cost. The adjustment process is illustrated with the help of the following diagram



Let the market price be OP. The firm has a plant size whose costs are represented by short-run average cost (SAC1) and short-run marginal cost (SMC1). With this plant size, the short-run equilibrium occurs at a point where the firm produces oq1 amount of output. The firm makes a loss because the price line lies below the SAC1 curve. In such a situation, the firm has two options: to go out of business or to construct a plant of more suitable size. In the long-run, the firm has the option of increasing the plant size so that it would construct a larger plant represented by SAC2 and SMC2 in the diagram. At the price OP, the firm with this new plant size would produce Oq2 amount of output, which would give it some profit. With perfect knowledge about the future, the firm would decide to use the plant represented by SAC4 that gives it the most profit. The long-run adjustment process and the choice of plant for the firm are shown in the figure below.



Firm **Industry**

Suppose initially price is OP1 and the firm has only the plant 3 represented by SAC3. Setting P = SMC, it produces Oq3 and earns some profit because OP3 > SAC3. As the firm is earning some profit, new ones would be attracted into the industry. As a result, the supply in it would go up from OQ3

to OQ1 and price would fall from OP3 to OP1. Consequently, the supply curve would shift from S3 to S1. At price OP1, the representative firm is making a loss because OP1 < SAC1. Therefore, the existing firms would start moving out of the industry. As a result, the supply in the market would fall and the supply curve would shift backward from S1. Given the market demand curve DD, as the supply curve shifts, the price would fall. Suppose the price settles at OP2. At this price, P2 = SMC2 = SAC2 so that the representative firm faces neither a loss nor a gain. The new firms neither would have any incentive to enter the market nor would the existing firms want to leave the industry. Hence, this would be the equilibrium situation with OP2 price and OQ2 output in the industry. The corresponding equilibrium output for the firm is Oq2.

17.3 LET US SUM UP

The perfectly competitive market is characterised by the presence of many buyers and many sellers with both the parties being mere price takers, presence of perfect knowledge, homogeneous product and free entry and exit from the market. Under such of a setting a firm faces a horizontal demand curve and decides to sell whatever it can at the given market price. Being a profit maximiser, the firm in the short-run, chooses to sell that amount of output for which the p = MC. As long as p> min AVC, the firm earns supernormal profit by producing and selling in the market. In the long-run due to free entry and exit from the market, the long-run equilibrium for the firm occurs at the minimum point of LAC, whereby p= min LAC and thereby the supernormal profits are swept out. In the long-run, therefore, the firms just break even due to the phenomenon of free entry and exit from the market.

17.4 GLOSSARY

- **Price-takers:** This means that the agents in the market take prices as given. They have no power to influence the market price.
- **Free Entry and Exit**: This implies that any new firm is free to set up production in the market if it wishes to, and any existing firm can stop production and leave the industry.

- **Homogeneous Product**: The product of one seller is identical to that of the other.
- **Perfect Knowledge:** Consumers know the prices, producers know the costs and workers know the wage rate.
- **Zero Profit**: It means that the firms are covering only their total costs. These total costs are economic costs. In other words, firms are just able to cover their full opportunity cost. It implies that all factors of production are earning what they could in their best use.
- **Pure Competition:** A market structure slightly less stringent than perfect competition. Pure competition requires only a large number of traders and a homogeneous commodity.

17.5 SELF ASSESSMENT QUESTIONS

1. Discuss the assumptions of perfectly competitive market.

2 Construct a short-run supply function for an entrepreneur whose short-run cost function is C = 0.04q3 – 0.8q2 +10q +5.

3. Construct an effective supply curve for an industry, which has two sources of supply: domestic production with the supply function S = 20 +8p and an unlimited supply of imports at a fixed price of Rs. 20.

17.6 LESSON END EXCERCISES

1) What is the short-run equilibrium condition for a firm under perfect competition?

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2) What is the long-run equilibrium condition for a firm and Industry under perfect competition?

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17.7 SUGGESTED READINGS

- Ferguson and Gould (1989), Microeconomic Theory, Irwin Publications in Economics; Homewood, IL: Irwin.
- Koutsoyiannis, A. (1979), Modern Microeconomics, Second edition, London: Macmillian.
- Ferguson, C. E. (1969), The Neoclassical Theory of Production and Distribution, Cambridge: Cambridge University Press.

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PRICE DETERMINATION AND FIRMS EQUILIBRIUM IN SHORT-RUN AND LONG- RUN UNDER MONOPOLISTIC COMPETITION AND MONOPOLY

STRUCTURE

18.1 INTRODUCTION

Pure monopoly and perfect competition are two extreme cases of market structure. In reality, there are markets having large number of producers competing with each other in order to sell their product in the market. Thus, there is monopoly on one hand and perfect competition on other hand. Such a mixture of monopoly and perfect competition is called as monopolistic competition; it refers to a market situation in which there are large numbers of firms which sell closely related but **differentiated products**. Markets of products like soap, toothpaste AC, etc. are examples of monopolistic competition.

18.2 OBJECTIVES AND LEARNING OUTCOMES

Learning Objectives

- To make understanding about the concept of monopolistic competition.
- To make the learners familiar with the concept of monopoly
- To impart knowledge regarding equilibrium under monopolistic competition.

Learning Outcomes

After studying this unit, you will be able to:

- explain the demand curve under monopolistic competition;
- state the equilibrium conditions of monopolistic competition;
- state the meaning, causes and characteristics of monopoly;
- explain pricing and output decision under monopoly.

18.3 CONCEPT AND FEATURES OF MONOPOLISTIC COMPETITION

Monopolistic competition is a market in which firms can enter freely each producing its own brand or a differentiated product. Thus, a firm under monopolistic competition

a) Enjoys' monopoly position' as far as a particular brand is concerned.

b) Since the various brands are close substitutes, its monopoly position is influenced by the stiff 'competition' from other firms.

Examples of Monopolistic Competition:

1) When you walk into a departmental store to buy toothpaste, you will find a number of brands, like Pepsodent, Colgate, Neem, Babool, etc.

   i) On one hand, the market for toothpaste seems to be full of competition, with thousands of competing brands and freedom of entry;

   ii) On the other hand, its market seems to be monopolistic, due to uniqueness of each toothpaste and power to charge different price. Such a market for toothpaste is a monopolistic competitive market.

2) A firm supplies branded good 'Lux Soap' in the market. There are many other firms in the market which sell similar soaps (not identical) with different brand names like Rexona, Palm Rose, etc., etc. Sometimes we can find one company manufacturing and selling similar products with several brand names at different prices. Their idea is to place each of their products in 'niches' or slots which capture attention of a different set of consumers. The firm supplying 'Lux Soap' enjoys a monopoly in the sale of its own product. It also faces competition from firms selling similar products. Same is the case with many other firms in the market like plywood manufacturing, jewellery making, wood furniture, bookstores, departmental stores, repair services of all kinds, professionalservicesofdoctors,technicians,etc.Thesefirmsandotherswhichhave an element of monopoly power and also face competition over the sale

of product or service in the market are called monopolistically competitive firm.

The following are the characteristics of monopolistic competition.

1) **Large Number of Sellers:** There are large number of sellers producing differentiated products. So, competition among them is very keen. Since number of sellers is large, each seller produces a very small part of market supply. Every firm is limited in its size. In other words, there are large numbers of firms selling closely related, but not homogeneous products. Each firm acts independently and has a limited share of the market. So, an individual firm has limited control over the market price. Large number of firms leads to competition in the market.

2) **Product Differentiation:** It is one of the most important features of monopolistic competition. In perfect competition, products are homogeneous in nature. On the contrary, here, every producer tries to keep his product dissimilar than his rival's product in order to maintain his separate identity. This boosts up the competition in market and at the same time every firm acquires some monopoly power. Hence, each firm is in a position to exercise some degree of monopoly (in spite of large number of sellers) through product differentiation. Product differentiation refers to differentiating the products on the basis of brand, size, colour, shape, etc. The product of a firm is close, but not perfect substitute for products of other firms. Implication of 'Product differentiation' is that buyers of a product differentiate between the same products produced by different firms. Therefore, they are also willing to pay different prices for the same product produced by different firms. This gives some monopoly power to an individual firm to influence market price of its product. Following points provide insight about the product differentiation:

   a) The product of each individual firm is identified and distinguished from the products of other firms due to product differentiation.

b) To differentiate the products, firms sell their products with different brand names, like Lux, Dove, Lifebuoy, etc.

c) The differentiation among different competing products may be based on either 'real' or 'imaginary' differences.

   i) Real Differences may be due to differences in shape, flavour, colour, packing, after sale service, warranty period, etc.

   ii) Imaginary Differences mean differences which are not really obvious but buyers are made to believe that such differences exist through selling costs (advertising).

d) Product differentiation creates a monopoly position for a firm.

e) Higher degree of product differentiation (i.e. better brand image) makes demand for the product less elastic and enables the firm to charge a price higher than its competitor's products. For example, Pepsodent is costlier than Babool.

f) Some more examples of Product Differentiation:

   i) Toothpaste: Pepsodent, Colgate, Neem, Babool, etc.,

   ii) Cycles: Atlas, Hero, Avon, etc.

   iii) Tea: Brooke Bond, Tata tea, Today tea, etc.

3) **Freedom of Entry and Exit:** This feature leads to stiff competition in market. Free entry into the market enables new firms to come with close substitutes. Free entry or exit maintains normal profit in the market for a longer span of time.

4) **Selling Cost:** It is a unique feature of monopolistic competition. In such type of market, due to product differentiation, every firm has to incur some additional expenditure in the form of selling cost. This cost includes sales promotion expenses, advertisement expenses, salaries of marketing staff, etc.

But on account of homogeneous product in perfect competition and zero competition in monopoly, selling cost does not exist there.

5) **Absence of Interdependence:** Large numbers of firms are different in their size. Each firm has its own production and marketing policy. So no firm is influenced by other firm. All are independent.

6) **Two Dimensional Competition:** Monopolistic competition has two types or aspects of competition aspects viz. Price competition i.e. firms compete with each other on the basis of price. Non- price competition i.e. firms compete on the basis of brand, product quality advertisement.

7) **Concept of Group:** In place of Marshallian concept of industry, Chamberlin introduced the concept of Group under monopolistic competition. An industry means a number of firms producing identical product. A group means a number of firms producing differentiated products which are closely related.

A. CHECK YOUR PROGRESS

1: Let the cost of production of monopoly firm be given as : C =40 + Q2 and demand be P = 20 – Q. Find the profit maximising level of output and price.

Solution:

Since cost is given as: C = 40 + Q2 MC = □Å □ç = 2Q and Since demand is given as: P = 20 – Q Total Revenue = P. Q = (20 – Q) Q = 20 Q – Q2 MR = □Åç □è = 20 - 2Q and Profit maximisation occurs where: MR = MC 20 – 2Q = 2Q Q = 5 Thus profit maximising level of output is 5 units and profit maximising price is P = 20 – Q = 20 – 5 = 15

2. Identify the features that shows the presence of monopolistic competition in market

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2. A market with few entry barriers and with many firms that sell differentiated products is

a. Purely competitive. b. A monopoly.

c. Monopolistically competitive. d. oligopolistic.

18.4 DEMAND CURVE UNDER MONOPOLOSTIC COMPETITION

Under monopolistic competition, large number of firms selling closely related but differentiated products make the demand curve downward sloping. It implies that a firm can sell more output only by reducing the price of its product.

As seen in Fig.18.1, output is measured along the X-axis and price and revenue along the Y-axis. At OP price, a seller can sell OQ quantity. Demand rises to OQ_1, when price is reduced to OP_1. So, demand curve under monopolistic competition is negatively sloped as more quantity can be sold only at a lower price.

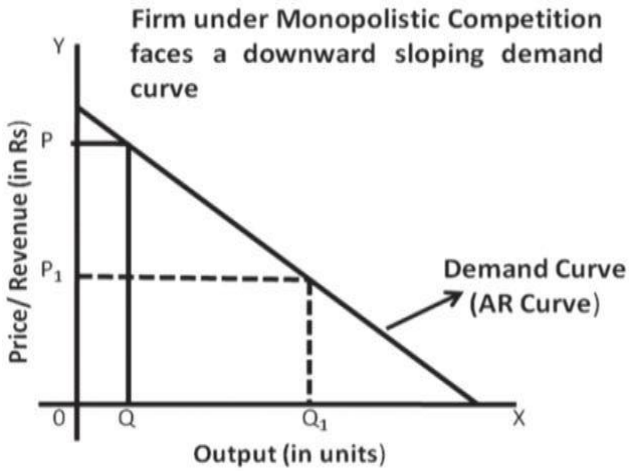


Fig.18.1

MR<AR under Monopolistic Competition: Like monopoly, MR is also less than AR under monopolistic competition due to negatively sloped demand curve.

Demand Curve: Monopolistic Competition Vs. Monopoly:

At first glance, the demand curve of monopolistic competition looks exactly like the demand curve under monopoly as both faces downward sloping demand curves. However, demand curve under monopolistic competition is

more elastic as compared to demand curve under monopoly. This happens because differentiated products under monopolistic competition have close substitutes, whereas there are no close substitutes in case of monopoly.

Let us prove this with the help of Fig.18.2.

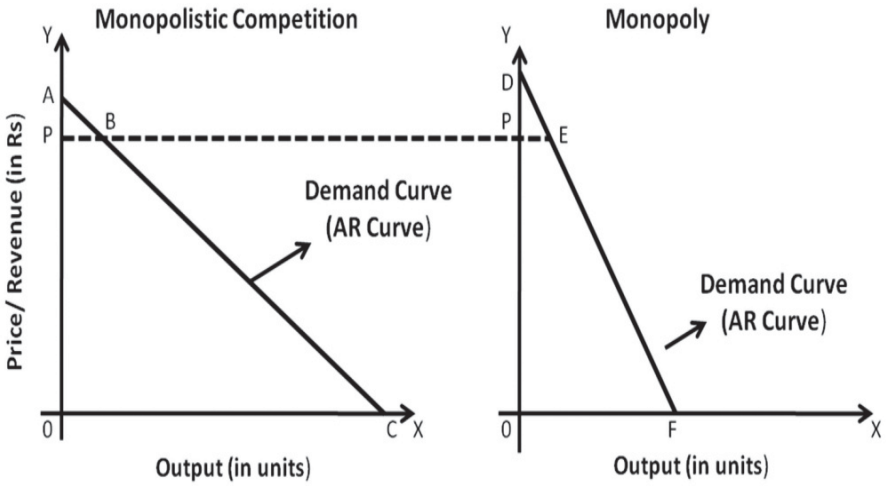


Fig.18.2

We know, price elasticity of demand (by geometric method) at a point on the demand curve is given by: E_d = Lower segment of demand curve / Upper segment of demand curve.

At price 'OP', price elasticity of demand under monopolistic competition is BC/AB and under monopoly is EF/DE.Fig.18.2 reveals that BC>EF and DE

>AB. So, BC/AB>EF/DE.

It means, demand curve in case of monopolistic competition is more elastic as compared to demand curve under monopoly.

We know, price elasticity of demand (by geometric method) at a point on the demand curve is given by: E_d = Lower segment of demand curve / Upper segment of demand curve.

At price 'OP', price elasticity of demand under monopolistic competition is BC/AB and unde r monopoly is EF/DE.Fig.18.2revealsthatBC> EF and DE

>AB. So, BC/AB>EF/DE.

It means, demand curve in case of monopolistic competition is more elastic as compared to demand curve under monopoly.

18.5 EQUILIBRIUM UNDER MONOPOLISTIC COMPETITION

A firm under monopolistic competition has to face various problems which are absent under perfect competition. Since the market of an individual firm under perfect competition is completely merged with the general one, it can sell any amount of the good at the ruling market price.

But, under monopolistic competition, individual firm's market is isolated to a certain degree from those of its rivals with the result that its sales are limited and depend upon:

1) Its price,

2) The nature of its product, and

3) The advertising outlay it makes.

Thus, the firm under monopolistic competition has to confront a more complicated problem than the perfectly competitive firm. Equilibrium of an individual firm under monopolistic competition involves equilibrium in three respects, that is, in regard to the price, the nature of the product, and the amount of advertising outlay it should make.

Equilibrium of the firm in respect of three variables simultaneously – price, nature of product, selling outlay –is difficult to discuss. Therefore, the method of explaining equilibrium in respect of each of them separately is adopted, keeping the other two variables given and constant.

Moreover, as noted above, the equilibrium under monopolistic competition involves "individual equilibrium" of the firms as well as "group equilibrium". We shall discuss these two types of equilibrium first in respect of price and output and then in respects of product and advertising expenditure adjustments.

18.5.1 Individual Firm's Equilibrium in Short-Run Period

The demand curve for the product of an individual firm, as noted above, is downward sloping. Since the various firms under monopolistic competition produce products which are close substitutes to each other, the position and elasticity of the demand curve for the product of any of them depend upon the availability of the competitive substitutes and their prices.

Therefore, the equilibrium adjustment of an individual firm cannot be defined in isolation from the general field of which it is a part. However, for the sake of simplicity in analysis, conditions regarding the availability of substitute products produced by the rival firms and prices charged for them are held constantwhiletheequilibriumadjustmentofanindividualfirmisconsidered in isolation.

Since close substitutes for its product are available in the market, the demand curve for the product of an individual firm working under conditions of monopolistic competition is fairly elastic. Thus, although a firm under monopolistic competition has a monopolistic control over its variety of the product but its control is tempered by the fact that there are close substitutes available in the market and that if it sets too high a price for its product, many of its customers will shift to the rival products

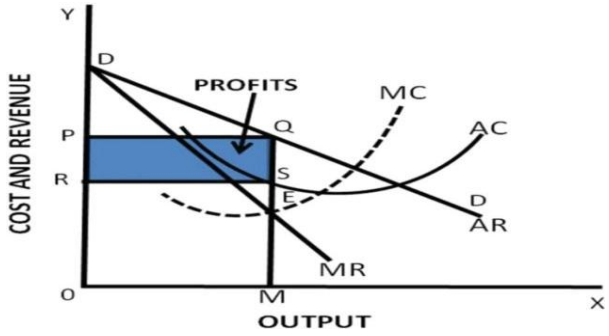


Fig.18.3

Assuming the conditions with respect to all substitutes such as their nature and prices being constant, the demand curve for the product of a firm will be given. We further suppose that only variables are price and output in respect of which equilibrium adjustment is to be made.

The individual equilibrium under monopolistic competition is graphically shown in Fig. 18.3. DD is the demand curve for the product of an individual firm, the nature and prices of all substitutes being given. This demand curve DD is also the average revenue (AR) curve of the firm.

AC represents the average cost curve of the firm, while MC is the marginal cost curve corresponding to it. It may be recalled that average cost curve first falls due to internal economies and then rises due to internal diseconomies.

Given these demand and cost conditions a firm will adjust its price and output, at the level which gives it maximum total profits. Theory of value under monopolistic competition is also based upon the profit maximisation principle, as is the theory of value under perfect competition.

Thus a firm, in order to maximise profits, will equate marginal cost with marginal revenue. In Fig. 11.3, the firm will fix its level of output at OM, for at OM output marginal cost is equal to marginal revenue. The demand curve DD facing the firm in question indicates that output OM can be sold at price MQ = OP. Therefore, the determined price will evidently be MQ or OP.

In this equilibrium position, by fixing its price at OP and output at OM, the firm is making profits equal to the area RSQP which is maximum. It may be recalled that profits RSQP are in excess of normal profits because the normal profits which represent the minimum profits necessary to secure the entrepreneur's services are included in average cost curve AC. Thus, the area RSQP indicates the amount of supernormal or economic profits made by the firm.

In the short-run, the firm, in equilibrium, may make supernormal profits, as shown in Fig. 18.3 above, but it may make losses too if the demand conditions for its product are not so favourable relative to cost conditions.Fig.18.4 depicts the case of a firm whose demand or average revenue curve DD for the product lies below the average cost curve, indicating thereby, that no output of the product can be produced at positive profits.

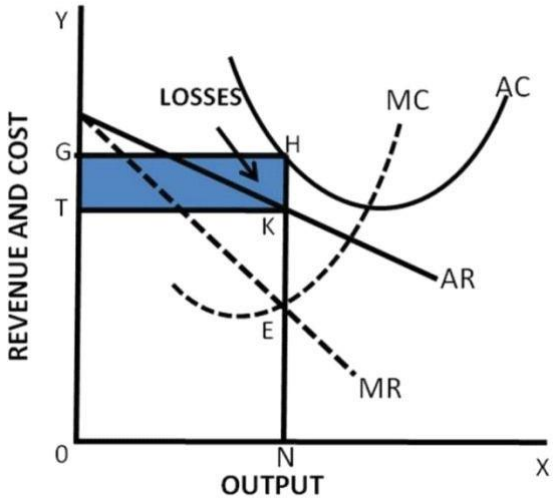


Fig.18.4

However, the firm is in equilibrium at output ON and setting price NK or OT. By adjusting price at OT and output at ON, it is able to minimise its losses. In such an unfavourable situation, there is no alternative for the firm except to make the best of the bad bargain.

We thus see that a firm in equilibrium under monopolistic competition, as under pure or perfect competition, may be making supernormal profits or losses depending upon the position of the demand curve relative to the position of the average cost curve. Further, a firm may be making only normal profits even in the short run if the demand curve happens to be tangent to the average cost curve.

It should be carefully noted that in individual equilibrium of the firm in Fig.18.3 and 18.4, the firm having once adjusted price at OP and (respectively will have no tendency to vary the price any more. If it varies its price upward, the loss due to fall in quantity demanded will be more than possible gain owing to the higher price. If it cuts down its price, the gain due to the increase in quantity demanded will be less than the loss due to the lower price. Hence, price will remain stable at OP and OT in the two cases respectively.

18.5.2 Individual Firm's Equilibrium in Long Run

In the preceding sections, we have discussed that in the short run, firms can earn supernormal profits. However, in the long run, there is a gradual decrease in the profits of the firms. This is because in the long run, several new firms enter the market due to freedom of entry.

When these new firms start production the market supply would increase and the price would fall. This would automatically increase the level of competition in the market. Consequently, AR curve shifts from right to left and super normal profits are eliminated. The firms will be able to earn normal profits only.

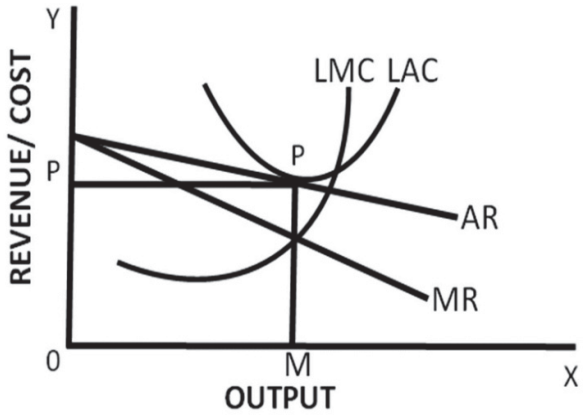


Fig.18.5

In Fig. 18.5, P is the point at which AR curve touches the average cost curve (LAC) as a tangent. P is regarded as the equilibrium point at which the price level is MP (which is also equal to OP') and output is OM.

In the present case average cost is equal to average revenue that is MP. Therefore, in long run, the profit is normal. In the short run, equilibrium is attained when marginal revenue is equal to marginal cost. However, in the long run, both the conditions(MR=MC and AR=AC)must hold to attain equilibrium.

18.5.3 Group Equilibrium in Monopolistic Competition

The concept of group equilibrium was introduced by Chamberlin. The

price- output equilibrium of all firms is known as group equilibrium. Group equilibrium represents the price and output of firms having close substitutes.

However, due to product differentiation, it is difficult to form market demand schedules and supply.

For overcoming the problem Chamberlin gave a concept called product group, which includes products that are technological and economic substitute of each other. Technological substitutes are the products having technical similarity, whileeconomicsubstitutesaretheproductsthathavesamepricesandfulfill the same want of consumers.

A product group refers to a group in which the demand for each product is highly elastic. Here, the demand for a product changes with the changes in the prices of other products within the group, and, the price and cross elasticity of demand for products forming the group is high.

In an industry, different types of groups exist automatically. In automobile industry makers of cars and trucks are two different product groups.

The main competition would be among t hose organisations manufacturing similar products (cars or trucks) which are close substitutes of each other. Due to product differentiation, there is a large variation in the demand and cost curves of firms. Their price, output, and profits also differ.

Therefore, to simplify product group analysis, Chamberlin has given two assumptions, which are as follows:

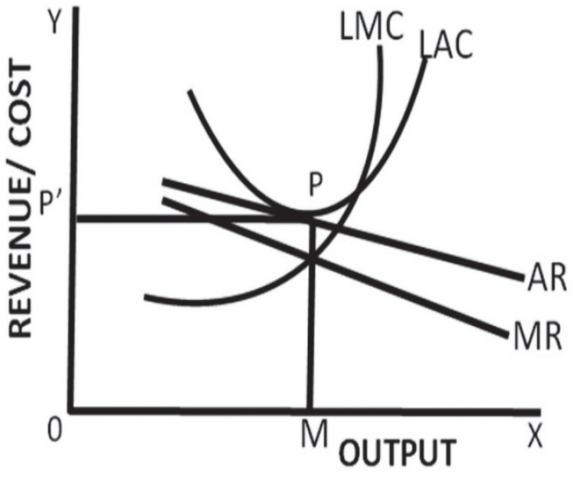
i) The demand and cost curves of all products in the group are the same or uniform. The uniformity assumption. The preferences of consumers are evenly distributed and the difference in preferences does not lead to variation in cost.

ii) In monopolistic competition, a large number of sellers are not able to influence each other's decisions. The changes in prices or level of output, of firm would have insignificant influence on its competitors. This is termed as the symmetry assumption.

These two assumptions form the basis for group equilibrium analysis. If an organisation within the group has established a popular brand, it is more likely to earn supernormal profits. However, in the long run, other organisations would strive to emulate the product design and features. In such a case, supernormal profits would vanish. This is a general case of all monopolistically competitive organisations.

On the other hand, if the entire group is earning supernormal profits, then external organisations would get attracted towards the group, until the legal or economic barriers are imposed.

In Fig. 18.6, P is the equilibrium point at which output is OM, price is MP, and average cost is MT. In such a case, marginal cost is equal to marginal revenue. Therefore, firms are earning supernormal profits (P'PTT'). However, these supernormal profits disappear in the long run.



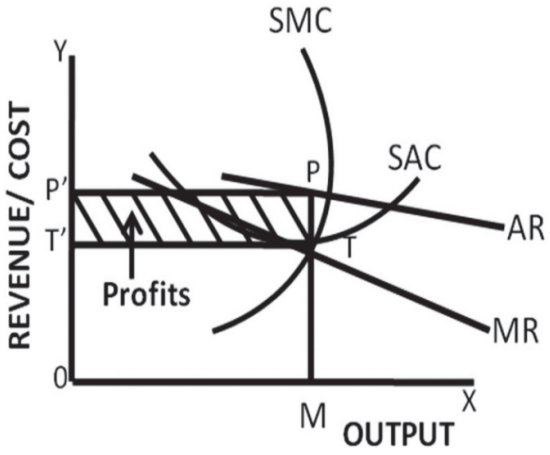


Fig.18.6: The short- run group equilibrium

In Fig.18.7, it can be seen that the super normal profits have disappeared. It also depicts that average revenue (AR) is tangent to LAC, which implies that price is equal to average revenue. Marginal revenue gets equal to marginal cost at the output level of OM. This shows that in the long run, all firms in the industry are making normal profits.

18.5.4 Equilibrium with Selling Costs

Selling Costs: Concept

"Selling costs are costs incurred in order to alter the position or shape of the demand curve for the product." E.H. Chamberlin

Selling costs play the key role in monopolistic competition and oligopoly. Under these market forms, the firms have to compete to promote their sale by spending on advertisements and publicity. Moreover, producer as not to decide about price and output only. He also keeps in view how to maximise the profit.

Thus, cost on advertisement, publicity and salesmanship add to the cost or supply curve of the product while also contributing to rise in its demand. The Selling costs is a broader concept than the advertisement expenditures. Advertisement expenditures are part of selling costs.

In selling costs we include the salaries of sales persons, incentives to retailers to display the products, besides the advertisements. It was Chamberlin who introduced the analysis of selling costs and distinguished it from the production costs. The production costs include all those expenses which are spent on the manufacturing of the commodity, its transportation cost of handling, storing and delivering of the commodity to actual customers because these add utilities to a commodity.

On the other hand, all selling costs include expenditures in order to raise demand for a commodity. In short, selling costs are those which are made to 'create' the demand for the product. Transport costs should not be included in selling costs; rather these should be included in the production costs. Transport costs actually do not increase the demand; it only helps in meeting the demand of the consumers.

In general, "those costs which are made to adopt the product to the demand are costs of production; those made to adopt the demand to product are costs of selling."

The concept of selling cost is based on the following two a any perfect knowledge about the different types of product.

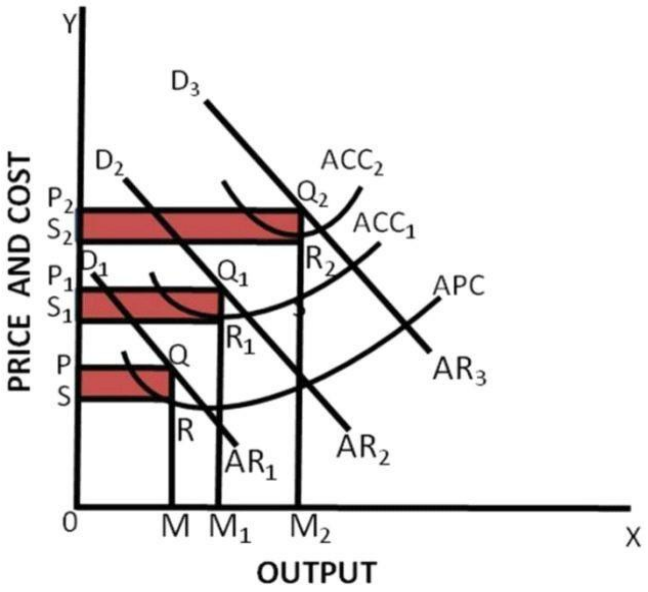
1) Buyers' demand and tastes can be changed.

While production costs include outlays incurred on services engaged in the manufacturing of the product like land, labour and capital etc, the selling costs include all the costs incurred to change the consumer's preference from one product toanother. These raise the demand of a productat any given price.

"Production costs create utilities in order that demands may be satisfied while selling costs create and shift the demand curves themselves."

Selling costs influence equilibrium price-output adjustment of a firm under monopolistic competition. In the Fig.11.8 APC is the initial average production cost. AR_1 is the initial average revenue curve or initial demand curve. The initial price is OP and the firm earns profits shown by the first shaded rectangle PQRS. ACC_1 is the average composite costs curve, which

includes the average selling cost (ASC). Average selling cost is equal to the vertical distance between APC and ACC_1. The new demand curve is AR_2. It is obtained after incurring selling costs or after making advertisements.



It is, obvious, that the demand for the product has increased as a result of selling costs. The profits have also increased as a result of selling costs. The profits after incurring selling costs at OM_1 level of output become equal to the shaded area $P_1Q_1R_1S_1$. Note that these profits are greater than the initial level of profits when no selling cost was incurred, i.e., $P_1\ Q_1\ R_1\ S_1 >$ PQRS.

ACC_2 is the average composite cost when more additional selling cost is incurred, as a result of which the demand for the product further increases. The new demand curve is AR_3 which indicates a higher demand for the product. The profits are also greater than before since the shaded area $P_2Q_2R_2S_2 > P_1Q_1R_1S$.

It is, thus, obvious that the demand for the product is increasing as a result of the selling costs. Since selling costs are included in the cost of production, therefore price of the product is also increasing as a result of selling costs. Profits are also increasing as a result of higher selling costs and increased demand.

Here, question arises, how long a firm may go on incurring expenditure on selling costs? It will continue to make expenditure on selling costs as long as any addition to the revenue is greater than the addition to the selling costs. The firm will stop incurring expenditure on selling costs when the total profits are at the highest possible level.

This would be the point at which the additional revenue due to advertising expenditure equals the extra expenditure on advertisement. It should, however, be noted clearly that the effects of advertisement on prices and output are uncertain. Advertisement by a firm may be considered successful if the elasticity of demand for its product falls.

B. CHECK YOUR PROGRESS

Long Answer Questions

1) If the firms in a monopolistically competitive market are earning economic profits or losses in the short run, would you expect them to continue doing so in the long run? Why ?

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2) On which factors equilibrium of individual firm depend under monopolistic condition ?

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3) Construct the diagram showing long run equilibrium of firm in monopolistic competition.

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18.6 MEANING AND CHARACTERISTICS OF MONOPOLY

The word monopoly has been derived from the combination of two words i.e., 'Mono' and 'Poly'. Mono refers to a single entity and poly to control. In this way, monopoly refers to a market situation in which there is only one seller of a commodity. There are no close substitutes for the commodity that monopoly firm produces and there are barriers to entry. The single producer may be in the form of individual owner or a simple partnership or a joint stock company. In other words, under monopoly there is no difference between firm and industry. Monopolist has full control over the supply of commodity. Having control over the supply of the commodity, it exercises the market power to set the price. Thus, as a single seller/producer monopolist may be a king without a crown. If there is to be an effective monopoly, the cross elasticity of demand between the product of the monopolist and the product of any other seller must be very small.

Definitions

"Pure monopoly is represented by a market situation in which there is a single seller of a product for which there are no substitutes; this single seller is unaffected by and does not affect the prices and outputs of other products sold in the economy." -Bilas "Monopoly is a market situation in which there is a single seller. There are no close substitutes of the commodity it produces, and there are barriers to entry". -Koutsoyiannis "Under pure monopoly there is a single seller in the market. The monopolist's demand is market demand. The monopolist is a price-maker. Pure monopoly suggests no substitute situation".
-A. J. Braff "A pure monopoly exists when there is only one producer in the market. There are no dire competitors." –Ferguson

Characteristics of Monopoly

1) **Single Seller:** There is only one seller; he can control supply of his product. But he cannot control demand for the product, as there are many buyers.

2) **No close Substitutes:** There are no close substitutes for the product. Either they have to buy the product or go without it.

3) **Control over price:** The monopolist has control over the supply and thereby on price. Sometimes he may adopt price discrimination. He may fix different prices for different sets of consumers. A monopolist can either fix the price or quantity of output; but he cannot do both, at the same time.

4) **No Entry:** There is no freedom to other producers to enter the market as the monopolist is enjoying monopoly power. Barriers for new firms to enter are strong. There are legal, technological, economic and natural obstacles, which may block the entry of new producers.

5) **No difference between Firm and Industry:** Under monopoly, there is no difference between a firm and an industry. As there is only one firm, that single firm constitutes the whole industry.

18.7 DEMAND & REVENUE CURVE UNDER MONOPOLY

It is important to understand the nature of the demand curve facing a monopolist. The demand curve facing an industrial firm under perfect competition, is a horizontal straight line, but the demand curve facing the whole industry under perfect competition is sloping downward. This is so because the demand is made by all the consumers and the demand curve of total consumers for a product usually slopes downward. The downward-sloping demand curve of the consumers faces the whole competitive industry. An individual firm under perfect competition does not face a downward-sloping demand curve. But in the case of monopoly one firm constitutes the whole industry. Therefore, the entire demand of the consumers for a product faces the monopolist. Since the demand curve of the consumers for a product slopes downward, the monopolist faces a downward sloping demand curve

A perfectly competitive firm merely adjusts the quantity of output it has to produce, price being a given and constant datum for him. But the monopolist encounters a more complicated problem. He cannot merely adjust quantity at a

given price because each quantity change by him will bring about a change in the price at which the product can be sold. Consider Fig. 18.8. DD is the demand curve facing a monopolist. At price OP the quantity demanded is OM, therefore he would be able to sell OM quantity at price OP. If he wants to sell a greater quantity ON, then he has to price it OL. If he restricts his quantity to OG, the price will rise to OH. Thus, every quantity change by him entails a change in price at which the product can be sold. The problem faced by a monopolist is to choose a price quantity combination which is optimum for him, that is, which yields him maximum possible profits. Demand curve facing the monopolist will be his average revenue curve. Thus, the average revenue curve of the monopolist slopes downward throughout its length. Since average revenue curve slopes downward, marginal revenue curve will lie below it. This follows from usual average-marginal relationship. The implication of marginal revenue curve lying below average revenue curve is that the marginal revenue will be less than the price or average revenue.

18.8 PRICE-OUTPUT EQUILIBRIUM UNDER MONOPOLY

Monopolist, like a perfectly competitive firm, tries to maximize his profits. Profit maximization assumption on which is based the equilibrium analysis of the perfectly competitive firm is also taken to be the most valid assumption about the behavior of the monopolist too. The motive of monopolist is the same as the motive of the perfectly competitive firm, that is, both aim at maximizing money profits. We thus do not attribute any more sinister motive to the monopolist. If the results of monopolist's behaviour on the basis of profit maximization motive are different from those of the firm under perfect competition, it is not due to any more sinister motive of monopolist but due to the circumstances and situation in which he is placed. A firm under perfect competition faces a horizontal straight-line demand curve and marginal revenue is equal to average revenue (or price), but a monopolist faces a downward- sloping demand (or *AR*)curve and his marginal revenue curve lies below the average revenue curve. This difference in the demand conditions facing the monopolist and the perfectly competitive firm makes all the difference in there

sults of their equilibrium, even though both work on the basis of the same profit-maximization motive.

Monopoly equilibrium is depicted in Fig. 18.8. The monopolist will go on producing additional units of output as long as marginal revenue exceeds marginal cost. This is because it is profitable to produce an additional unit if it adds more to revenue than to cost. His profits will be maximum and he will attain equilibrium at the level of output at which marginal revenue equals marginal cost. If he stops short of the level of output at which *MR* equals *MC*, he will be unnecessarily foregoing some profits which otherwise he could make. In Fig.18.8 marginal revenue is equal to marginal cost at *OM* level of output. The firm will be earning maximum profits and will therefore be in equilibrium when it is producing and selling *OM* quantity of the product. If he increases his output beyond *OM*, marginal revenue will be less than marginal cost, that is, additional units beyond *OM* will add more to cost than to revenue. Therefore, the monopolist will be incurring a loss on the additional units beyond *OM* and will thus be reducing his total profits by producing more than *OM*. He is therefore in equilibrium at *OM* level of output at which marginal cost equals marginal revenue.

It will be seen from the *AR* curve in Figure 18.8 that equilibrium output *OM* can be sold at price *MS* or *OP*. It therefore follows that the monopolist will produce output equal to *OM* and fix price of its product equal to *OP*.I t will be further observed from Figure 18.8 that at the level of equilibrium output, average cost of production is equal to *MT*. With equilibrium price equal to *OP* or *MS* the profit per unit is equal to *TS*. Profit per unit *TS* multiplied with output *OM* gives us the total economic profits made by the monopolist being equal to the shaded area *HTSP*.

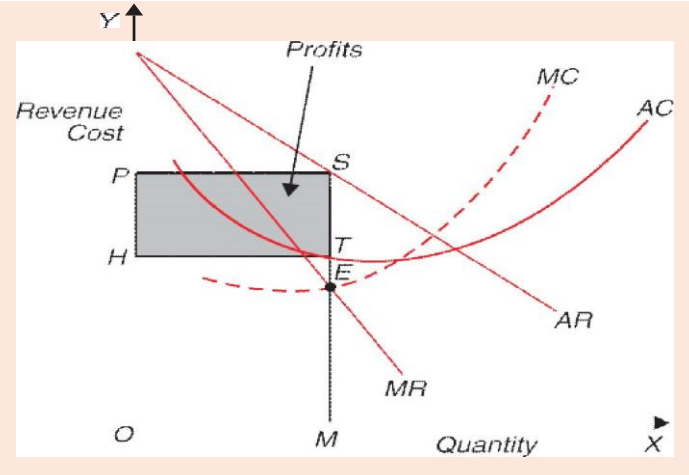

Fig: 18.8 Firm's Equilibrium Under Monopoly: Mamimization of Profits

Cost curve corresponds to a point of some short-run marginal cost curve Long-run equilibrium point *F* at which marginal revenue curve cuts long-run marginal cost curve is also the point on short-run marginal cost curve SMC_2 which corresponds to the short-run average cost curve SAC_2. The plant having short-run cost curves $SAC_2$and SMC_2 is optimal for him in the long run, given the level of demand as shown by *AR* and *MR* curves. It is now clear that the monopolist who was in equilibrium at *E* in the short run with the given plant having cost curves SAC_1 and SMC_1 has shifted to the plant.

C. CHECK YOUR PROGRESS

1. How are price and output determined under monopoly? Show that under monopoly price is higher and output smaller than under perfect competition

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2. What is monopoly? Explain the three conditions necessary for the existence of monopoly.

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3. A market with few entry barriers and with many firms that sell differentiated products is A) purely competitive. B) a monopoly. C) monopolistically competitive. D) oligopolistic.

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18.9 LONG-RUN EQUILIBRIUM UNDER MONOPOLY

In the long run monopolist would make adjustment in the size of his plant. The long-run average cost curve and its corresponding long-run marginal cost curve portray the alternative plants, i.e., various plant sizes from which the firm has to choose for operation in the long run. The monopolist would choose that plant size which is most appropriate for a particular level of demand. In the short run the monopolist adjusts the level of output while working with a given existing plant. His profit-maximizing output in the short run will be where to only the short-run marginal cost curve (i.e., marginal cost curve with the existing plant) is equal to marginal revenue. But in the long run he can further increase his profits by adjusting the size of the plant. So in the long run he will be in equilibrium at the level of output where given marginal revenue curve cuts the long-run marginal cost curve. Fixing output level at which marginal revenue is equal to long-run marginal cost shows that the size of the plant has also been adjusted. That plant size is chosen which is most optimal for a given demand for the product. It should be carefully noted that, in the long run, marginal revenue is also equal to short-run marginal cost curve. But this short-run marginal cost curve is of the plant which as been selected in the long run keeping in view the given demand for the product. Thus while, in the short run, marginal revenue is equal only to the short-run marginal cost of a given existing plant, in the long run marginal revenue is equal to the long-run

marginal cost as well as to the short- run marginal cost of that plant which is appropriate for a given demand for the product in the long run. In the long- run equilibrium, therefore, both the long-run marginal cost curve and the short-run marginal cost curve of the relevant plant intersect the marginal revenue curve at the same point.

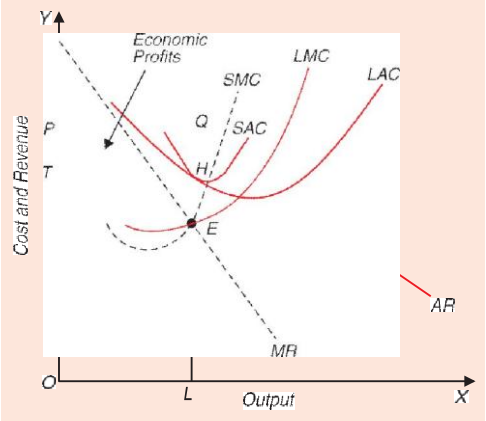

Fig: 18.9 Long-run Equilibrium under Monopoly

Further, it is important to note that, in the long run, the *firm will operate at a point on the long-run average cost curve* (*LAC*) at which the short-run average cost curve is tangent to it. This is because it is only corresponding to the tangency point of short-run average cost curve (*SAC*) with long-run average cost curve (*LAC*) that short- run marginal cost (*SMC*) of the optimal plant equals the long-run marginal cost (*LMC*). Figure 18.9 portrays the long-run equilibrium of the monopolist. He is in equilibrium at output *OL* at which long-run marginal cost curve *LMC* intersects marginal revenue curve *MR*. Given the level of demand as indicated by positions of *AR* and *MR* curves he would choose the plant size whose short-run average and marginal cost curves are *SAC* and *SMC*. He will be charging price equal to *LQ* or *OP* and will be making profits equal to the area of rectangle *THQP*.

It therefore follows that for the monopolist to maximize profits in the long run, the following conditions must be fulfilled

$$MR = LMC = SMC$$

$$SAC = LAC$$

$$P > LAC$$

The last condition implies in *long-run monopoly equilibrium* price of the product should be either greater Than Long-run average cost or at least equal to it. The price cannot fall below long-run average cost because in the long run the monopolist will quit the industry if it is not even able to make normal profits

18.10 LONG-RUN EQUILIBRIUM ADJUSTMENT UNDER MONOPOLY

In order to understand fully the difference between the short-run equilibrium and long run adjustment under monopoly, it is necessary to show short-run equilibrium and long-run equilibrium in one figure. This is done in Fig. 18.10 which shows that for a given level of demand, the monopolist will be in short-run equilibrium at point *E* or at output OQ_1 if he has plant size SAC_1 at that time. But in the long run he would not be in equilibrium at *E* since in the long run he can also change the plant and will employ that plant which is most appropriate for a given level of demand. In the long run he will be in equilibrium at point *F* where marginal revenue curve cuts his long-run marginal cost curve. But every point of the long-run marginal having cost curves SAC_2 and SMC_2 in his long-run adjustment, level of demand being given. It will be noticed that, in the long run, the output has increased from OQ_1 to OQ_2 and price has fallen from *OP* to OJ. Profits have also increased in the long run; area GHKJ is larger than the area TRSP.

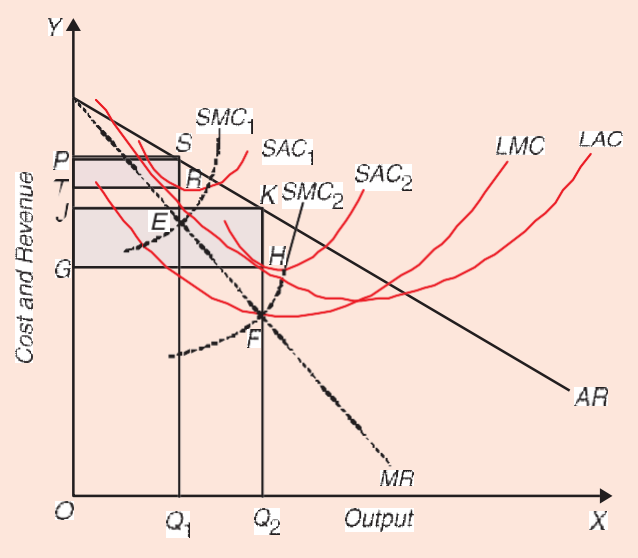

Fig: 18.10 Shift from a Short-Run to Long-run Equilibrium Position under Monopoly

18.11 LET US SUM UP

Monopolistic competition is a market structure in which there are many firms selling closely related commodities. Its assumptions are: Large number of buyers and sellers, Differentiated products, Free entry and exit, aim of the firm is profit maximization. Product differentiation exist which can be real or artificial. Its effect is that the firm has some degree of price-making power.

Under monopolistic competition in the short-run, firm maximises profit where MR=MC and the MC curve intersects MR curve from below. In the long-run, due to free entry and exit of firms, firm earns normal profit. Economic profits are zero.

Excess Capacity Theory states that it is a long-run concept and is the difference between least cost output and profit maximising output. While, under perfect competition, there is no excess capacity and under monopolistic competition, excess capacity always exists.

18.12 GLOSSARY

- **Monopolistic competition**: Monopolistic competition is a market in which firms can enter freely each producing its own brand or a differentiated product.
- **Selling costs:** Selling costs are costs incurred in order to alter the position or shape of the demand curve for the product.
- **Monopoly** : Monopoly is a market situation in which there is a single seller
- **Group – equilibrium**: The price- output equilibrium of all firms is known as group equilibrium.

18.13 SELF ASSESSMENT QUESTIONS

1. What is monopolistic competition? Explain the important features of monopolistic competition.

2. What is group equilibrium? Explain how group equilibrium is achieved under monopolistic competition.

3. What is monopoly? Explain the important features of monopoly.

18.14 LESSON END EXCERCISE

1. Compare price-output equilibrium under monopolistic competition with that under (*a*) perfect competition, (*b*) monopoly.

2. Analyse the short-run and long-run equilibrium of a firm working under monopolistic competition.

18.15 SUGGESTED READINGS

- Dr Deepashree (2016), *Introductory Micro Economics,* Mayur Paperbacks, Chapter on Theory of Market structure. http:// www.economicsdiscussion.net
- Varian, Hal (1999), *Intermediate Microeconomics,* W.W Norton & Co, New York, Chapter 24 & 25, page no. 415-455

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M.Com 1st Sem. **UNIT-IV (CREDIT: 1)**
Course No. 153 **Lesson No. 19**

PRICE DETERMINATION AND FIRMS EQUILIBRIUM IN SHORT-RUN AND LONG- RUN UNDER OLIGOPOLY AND DUOPOLY

STRUCTURE

19.0 LEARNING OBJECTIVES AND OUTCOMES

Learning Objectives

- To familiarise the students with the meaning of oligopoly
- To make understanding about the concept of duopoly
- The student will be able to understand price and output determination under oligopoly

Learning Outcomes

After studying this unit, you shall be able to:

- state the meaning and features of oligopoly
- discuss the causes of existence of oligopoly
- throw light on different models that explain the oligopoly price and output determination

19.1 INTRODUCTION

Oligopoly refers to a market wherein only a few firms account for most or all of total production. Oligopoly is said to prevail when there are few firms or sellers in the market producing or selling a product. In other words, when there are two or more than two, but not many, producers or sellers of a product, oligopoly is said to exist. Oligopoly is also often referred to as "Competition among the Few". The simplest case of oligopoly is duopoly which prevails when there are only two producers or sellers of a product. Analysis of duopoly raises all those basic problems which are confronted while explaining oligopoly with more than two firms. Although there is no borderline between few and many but when the number of sellers of a product are two to ten, oligopoly situation is said to exist. When products of a few sellers are homogeneous, we talk of Oligopoly without Product Differentiation or Pure Oligopoly. On the other hand, when products of the few sellers or firms, instead of being homogeneous, are differentiated but close substitutes of each other, Oligopoly with Product Differentiation or Differentiated Oligopoly is said to prevail.

19.2 MEANING OF OLIGOPOLY

Oligopoly refers to the presence of few sellers in the market selling the homogeneous or differentiated products. In other words, the Oligopoly market structure lies between the pure monopoly and monopolistic competition, where few sellers dominate the market and have control over the price of the product. Under the Oligopoly market, a firm either produces homogeneous or heterogeneous products:

- **Homogeneous Product:** The firms producing the homogeneous products are called as Pure or Perfect Oligopoly. It is found in the case of industrial products such as aluminum, copper, steel, zinc, iron, etc.
- **Heterogeneous Product:** The firms producing the heterogeneous products are called as Imperfect or Differentiated Oligopoly. Such type of Oligopoly is found in the production of consumer goods such as automobiles, soaps, detergents, television, refrigerators, etc.

Features of Oligopoly Market

1) **Few Sellers:** Under the Oligopoly market, the sellers are few, and the customers are many. Few firms dominating the market enjoy a considerable control over the price of the product.

2) **Interdependence:** It is one of the most important features of an Oligopoly market, wherein, the seller has to be cautious with respect to any action taken by the competing firms. Since there are few sellers in the market, if any firm makes a change in the price or promotional scheme, all other firms in the industry have to comply with it to remain in the competition. Thus, every firm remains alert to the actions of others and plan their counterattack beforehand to escape the turmoil. Hence, there is a complete interdependence among the sellers with respect to their price output policies.

3) **Advertising:** Under Oligopoly market, every firm advertises their products on a frequent basis with the intention to reach more and more customers and increase their customer base. This advertising makes the

competition intense. If any firm does a lot of advertisement while the other remained silent, then you will observe that his customers are going to the firm which is continuously promoting its product. Thus, in order to be in the race, each firm spends lots of money on advertisement activities.

4) **Competition:** It is genuine that with a few players in the market, there will be an intense competition among the sellers. Any move by one firm will have a considerable impact on its rivals. Thus, every seller keeps an eye over its rivals and be ready with the counterattack.

5) **Entry and Exit Barriers:** The firms can easily exit the industry whenever they want, but has to face certain barriers to enter into it. These barriers could be Government license, Patent, large firm's economies of scale, high capital requirement, complex technology, etc. Also, sometimes the government regulations favour the existing large firms, thereby acting as a barrier for the new entrants.

6) **Lack of Uniformity:** There is a lack of uniformity among the firms in terms of their size, some are big, and some are small. Since there are less number of firms, any action taken by one firm has a considerable effect on the other. Thus, every firm must keep a close eye on its counterpart and plan the promotional activities accordingly.

A. CHECK YOUR PROGRESS

Long Answer Questions

1) What is Oligopoly? Explain with few examples.

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2. Suppose price function of a monopoly firm is given as P = 405 – 4Q and its total cost (TC) function is given as TC = 40 + 5Q + Q 2 Find the following.

(a) Total revenue function;

(b) Average revenue function;

(c) Profit maximizing monopoly output; and

(d) Profit maximizing price.

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3. Suppose firms under monopolistic competition face a uniform demand function as given below. Q1 = 100 – 0.5P1 And their total cost (TC) function is given as TC = 1562.50 + 5Q – Q 2 + 0.05Q 3 When new firms enter the industry, the demand function for each firm changes to Q2 = 98.75 – P2 Find answers to the following questions.

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4. Suppose firms under monopolistic competition face a uniform demand function as given below. Q1 = 100 – 0.5P1 And their total cost (TC) function is given as TC = 1562.50 + 5Q – Q 2 + 0.05Q 3 When new firms enter the industry, the demand function for each firm changes to Q2 = 98.75 – P2.

(a) What was the motivation for the new firms to enter the industry?

(b) How are the equilibrium price and output of the old firms affected by the entry of the new firms"

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19.3 PRICE AND OUTPUT DETERMINATION UNDER OLIGOPOLY

Unlike other market forms, price and output under oligopoly is never fixed. Interdependence of firms led uncertainty always exists in the market. In

such a situation, it becomes difficult to determine the equilibrium price and output for an oligopolistic firm. An oligopolist cannot assume that its competitors will not change their price and/or output if it changes. Price change by one firm will be followed by other competitors, which will change the demand conditions facing this firm. Therefore, demand curve for any firm is not fixed like other markets. Demand curve for a firm keeps changing as firms change their prices. Therefore, in the absence of a fixed demand (Average Revenue) curve, it is difficult to determine the equilibrium price and output. However, economists have developed some price- output models to explain the behaviour of oligopolistic firms. They are as follows:

I. Some economists ignore the interdependence among the firms when they explain the oligopoly market. In such case the demand will be known and equilibrium price and output can be determined.

II. Another approach is based on collusion. Oligopolists can form a group and maximise their joint output and profit. Best example of such collusion is Cartel (it is a situation when oligopolists agree to work together in the international market). One firm is chosen as a leader. The prices determined by the leader are followed by others in such a case.

Third approach assumes that an oligopolist predicts the reaction of its competitors. Problems regarding prices and output determination are solved by such assumptions. Various models based on different assumptions exist in this category. Few of them are: Chamberlin Model, Cournot's Model, and Paul Sweezy Kinked Demand curve Model etc.

19.4 COURNOT'S MODEL

In 1838, August in Cournot introduced a simple model of duopolies that remains the standard model for oligopolistic competition.

This modal is based on the following assumptions:

1) The two firms produce homogeneous and indistinguishable goods.

2) There are no other firms in the market who produce the same or substitute

goods.

3) No other firms can or will enter the market.

4) Collusive behaviour is prohibited. Firms cannot act together to form a cartel.

5) There exists one market for the produced goods.

In addition to the assumptions stated above, the Cournot duopoly model relies on the following:

1) Each firm chooses a quantity to produce.

2) All firms make this choice simultaneously.

3) The model is restricted to a one-stage game. Firms choose their quantities only once.

4) The cost structures of the firms are public information.

In the Cournot model, the strategic variable is the output quantity. Each firm decides how much of a good to produce. Both firms know the market demand curve, and each firm knows the cost structures of the other firm. The essence of the model is that each firm takes the other firm's choice of output level as fixed and then sets its own production quantities.

Before explaining the model, let us define the reaction curve.

A reaction curve for Firm 1 is a function Q_1that takes input as the quantity produced by Firm 2 and returns the optimal output for Firm 1 given Firm 2's production decisions. In other words, Q_1 (Q_2) is Firm 1's best response to Firm 2'schoiceof Q_2.Likewise, Q_2 (Q_1) is Firm 2'sbestresponsetoFirm 1'schoice of Q_1.

Let's assume that the two firms face a single market demand curve as follows:

$$Q=100–P$$

where P is the single market price and Q is the total quantity of output in the market. For simplicity's sake, let's assume that both firms face cost

structures as follows:

$$MC_1=10$$

$$MC_2=12$$

Given this market demand curve and cost structure, we want to find the reaction curve for Firm 1. In the Cournot model, we assume Q_2 is fixed and proceed.Firm1'sreactioncurvewillsatisfyitsprofitmaximising condition, MR = MC. In order to find Firm 1's marginal revenue, we first determine its total revenue, which can be described as follows:

$$\text{Total Revenue}=PQ_1=(100-Q)Q_1=100Q_1-(Q_1+Q_2)Q_1$$

$$=[100-(Q_1+Q_2)]Q_1=100Q_1-Q_1^2-Q_2Q_1$$

The marginal revenue is simply the first derivative of the total revenue with respect to Q_1 (recall that w marginal revenue for Firm 1 is thus:

$$MR_1=100-2Q_1-Q_2$$

Imposing the profit maximising condition of MR = MC, we conclude that Firm 1's OPEN curve is:

$$100-2Q_1-Q_2=10$$

$$Q1=\frac{90}{2}-\frac{Q2}{2}$$

$$Q_1=45-Q_2$$

That is, for every choice of Q_2, Q_1 is Firm 1's optimal choice of output. We can perform analogous analysis for Firm 2 (which differs only in that its marginal costs are 12 rather than 10) to determine its reaction curve. We find Firm 2's reaction curve to be:

$$Q_2=44-Q_1/2.$$

The solution to the Cournot model lies at the intersection of the two reaction curves. We solve now for Q_1. Note that we substitute $Q_2$for Q_2 because we are looking for a point which lies on Firm 2's reaction curve as well.

$$Q_1=45–Q_2/2=45–(44–Q_1/2)/2$$

$$=45–22+Q_1/4$$

$$=23+Q_1/4$$

$$=>Q_1=92/3$$

By the same logic, we find:

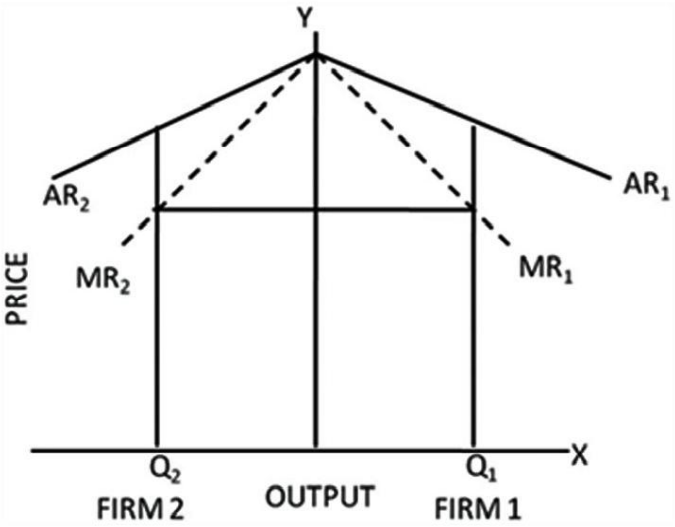
$$Q_2= 86/3$$

Note that Q_1 and Q_2 differ due to the difference in marginal costs. In a perfectly competitive market, only firms with the lowest marginal cost would survive. In this case, however, Firm2 still produces a significant quantity of goods, even though its marginal cost is 20% higher than Firm1's.

An equilibrium cannot occur at a point not at the intersection of the two reaction curves. If such an equilibrium existed, at least one firm would not be on its reaction curve and would therefore not be playing its optimal strategy. It has incentive to move elsewhere, thus invalidating the equilibrium.

The Cournot equilibrium is a best response made in reaction to a best response and, by definition, is therefore a Nash equilibrium. Unfortunately, the Cournot model does not describe the dynamics behind reaching equilibrium from a non- equilibrium state. If the two firms began out of equilibrium, at least one would have an incentive to move, thus violating our assumption that the quantities chosen are fixed. Rest assured that for the examples we have seen, the firms would tend towards equilibrium. However, we would require

more advanced mathematics to adequately model this movement.



19.5 STACKELBERG'S MODEL

The Stackelberg duopoly model of duopolies is very similar to the Cournot model. Like the Cournot model, the firms choose the quantities they produce. However, here the firms do not move simultaneously. One firm holds the privilege to choose production quantities before the other. The assumptions underlying the Stackelberg model are as follows:

1) Each firm chooses a quantity to produce.

2) A firm chooses before the other in an observable manner.

3) The model is restricted to a one-stage game. Firms choose their quantities only once.

To illustrate the Stackelberg model, let's take an example. Assume Firm 1 is the first mover with Firm 2 reacting to Firm 1's decision. We assume a market demand curve of:

$$Q=90–P$$

Furthermore, we assume all marginal costs are zero, that is:

$$MC=MC_1=MC_2=0$$

We calculate Firm2's reaction curve in the same way we did for the Cournot Model. Verify that Firm 2's reaction curve is:

$$Q_2=45–Q_1/2$$

To calculate Firm1's optimal quantity, we look at Firm1's total revenues.

Firm1's Total Revenue $=PQ_1= (90–Q_1–Q_2)Q$

$$=90Q_1–Q^2–Q_2Q_1$$

However, Firm1 is not forced to assume Firm2's quantity is fixed. Infact, Firm1 knows that Firm2 will act along its reaction curve which varies with Q_1.Firm2's quantity very much relies on Firm1's choice of quantity. Firm 1's Total Revenue can thus be rewritten as a function of Q_1:

$$R_1=90Q_1–Q^2–Q_1(45–Q_1/2)$$

Marginal revenue for firm1 is thus:

$$MR_1=90–2*Q_1–45+Q_1$$

$$=45–Q_1$$

When we impose the profit maximizing condition (MR=MC),we find:

$$Q_1=45$$

Solving for Q_2,we find:

$$Q_2= 22.5$$

In the Cournot model, both firms make their choices simultaneously and have no communication before hand. In the Stackelberg model, Firm 1 not only announces first, but Firm2 knows that when Firm1 announces, Firm1's actions are credible and fixed. This demonstrate show as light change in the flow of information can drastically impact the outcome of a market. Note that Firm 1 decided first. Its decision is to meet half of the market demand. The second firm decides to meet half of remaining market demand. Note that firm which decides first will be able to produce and sell larger quantity. It amounts to capturing larger market share. That is why we say that essence of Stackleberg model lies in its **First Movers' Advantage** feature.

B. CHECK YOUR PROGRESS

Long Answer Questions

1. Two firms have marginal costs of 10. They face a market demand curve of P = 100 – 4Q. The government imposes a tax of 10 dollars per unit sold. Determine the Cournot equilibrium quantity.

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2. Assume three firms face identical marginal costs of 20 with fixed costs of 10. They face a market demand curve of P = 200 – 2Q. Find the Cournot equilibrium price and quantity.

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19.6 PAUL SWEEZY MODEL: KINKED DEMAND CURVE ANALYSIS

This model was developed independently by Prof. Paul M. Sweezy on the one hand and Profs. R. C. Hall and C. J. Hitch on the other hand.

The assumptions of this model are:

i) There are only a few firms in an oligopolistic market.

ii) The firms are producing close-substitute products.

iii) The quality of the products remains constant and the firms do not spend on advertising.

iv) A set of prices of the product has already been determined and these prices prevail in the market at present.

v) Each firm believes that if it reduces the price of its product, the rival firms would follow suit, but if it increases the price, the rivals would

not follow it. They would simply keep their prices unchanged. We shall see presently that, because of this asymmetric pattern of reaction of the rivals, the demand curve of each firm would have a kink at the prevailing price of its product.

Why the Kink the Demand Curve?

In the figure we have drawn two negatively sloped straight line demand curves, viz., dd' and DD'. Of the set wo curves, dd' is more flat than DD'. Now, when one particular firm in the industry changes the price of its product, all other firms keeping their prices constant, the firm's demand curve will be relatively flatter liked d', i.e., the magnitude of the change in the demand for its product as its price changes would be relatively larger.

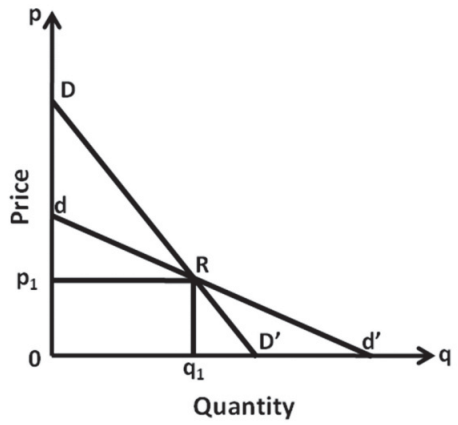

Fig.19.2

This is because, as the firm reduces or increases the price of its product, the prices of the products of other firms remaining constant, the product of the firm becomesrelativelycheaperordearer,respectively,thanthoseoftheother firms. This will make the demand curve flatter for this firm

19.7 LET US SUM UP

Oligopoly is the most prevailing form of markets. It is defined as a market structure in which there are a few sellers of the homogeneous or differentiated products. Oligopoly can be pure or differentiated. Characteristics

of Oligopoly are: Few dominant firms, Mutual interdependence, Barriers to entry, Homogeneous or differentiated products. Factors causing oligopoly are: Huge capital investment, Absolute cost advantage to the existing firm, Product differentiation, Economies of large scale production, Mergers. Price and Output determination in oligopoly is different from other three forms of market structure. Since there are few rival firms and there is mutual interdependence, the price and output policy of a firm will affect the price and quality sold by other firms. There is no general theory under oligopoly. Price and output indeterminateness is an essential feature of oligopoly. Among models of Non- Collusive Oligopoly, Cournot's Duopoly Model states that firms attain Nash equilibrium. In equilibrium each firm is doing the best it can given its competitor's behaviour. It is based on the assumption that each firm is attempting to maximise its total profits assuming that other firm holds its output constant. Stackelberg's Duopoly Model is 'First Mover Advantage' Model as an alternative explanation of oligopolistic behaviour. In this model, one firm sets its output before other firms do. In this model, neither firm has an opportunity to react. The leader firm produces more output and earns more profit than the other firm. Sweezy's 'Kinked demand' Curve Model explains price rigidity in an oligopoly market by postulating that oligopolist's will match price decrease but not price increases.

19.8 GLOSSARY

- **Collusive Behaviour:** In collusive oligopoly industry contains few producers wherein producers agree among one another as to pricing of output and allocation of output among themselves. Cartels, such as OPEC, are collusive oligopolies.
- **Cournot Model:** The Cournot model of oligopoly assumes that rival firms produce a homogenous product, and each attempts to maximise profits by choosing how much to produce. All firms choose output (quantity) simultaneously.
- **Cartel :** An association of manufacturers or suppliers with the purpose

of maintaining prices at a high level and restricting competition.

- **Common Resources:** These are resources where there are many users but no owner.
- **Demand:** The amount of goods which the buyers are ready to buy, per period of time, at a given price per unit.
- **Dependent Variable:** A variable which changes only with the change in the independent variable. Decrease in Supply : The decrease in quantity supplied at a given price of the commodity

19.9 SELF ASSESSMENT QUESTIONS

1. Explain the prisoner's Dilemma in oligopoly market.

2. State the types of Non-cooperative behaviour under oligopoly.

3. What do you mean by Cartel?

19.10 LESSON END EXERCISE

1. Explain the prisoner's Dilemma in oligopoly market.

2. State the types of Non-cooperative behaviour under oligopoly.

3. What do you mean by Cartel?

19.11 SUGGESTED READINGS

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PRICING PRACTICES: METHODS OF PRICE DETERMINATION IN PRACTICE, PRICING OF MULTIPLE PRODUCTS, PRICE DISCRIMINATION

STRUCTURE

20.0 LEARNING OBJECTIVES AND OUTCOMES

Learning Objectives

- To understand Pricing Practices
- To familarise the students with the concept of multiple products
- To analyse various factor affecting prices

Learning Outcomes

After studying this lesson, you shall be able to understand the concept of the following:

- meaning of price determination
- methods of price discrimination
- example of Price Discriminatory Strategies

20.1 INTRODUCTION

Now a days, the subject of pricing in economic theory is an very important issue. It has both theoretical and applied aspects. Traditional theory of pricing emphasizes on the marginal principal of pricing, i.e. where marginal cost equals marginal revenue (MC = MR), the price and output of a firm, in every kind of market is determined. This is called marginal principle or marginality rule. But in actual practices, it is found that marginal principle of pricing does not operate. Evidences shown that firms, while fixing the prices of their products do not follows the marginality rule. They determine prices according to their business motives and prevailing market conditions. Firms are operating in market not only with the objective of profit maximization but also with the objectives of sales maximization, revenue maximization, retaining in market, etc. The firms are aware about their demand and cost conditions. Their price and output decisions are based on probabilities. Hence the marginal principle of equalising MC and MR is found to be absent, in price-output decisions. Empirical studies shown that marginal rule of pricing doesn't found true in actual practice. 'Hall and Hitch' in their empirical study shown that marginal rule fails to be applicable in pricing process of 38 firms. While fixing the prices, firms may consider average cost

principle instead of marginal principle. 'Gordon' is also, of same opinion that in real business life, firms are not aware of their MC and MR, and hence the average cost principle of pricing is widely used by them. Many other empirical studies support this view. Thus, there is a little link between pricing theory and pricing practices. Therefore it is necessary to understand the various forms of pricing techniques followed by the firms in actual practices.

20.2 PRICING PRACTICE

Every businessperson starts a business with a motive and intention of earning profits. This ambition can be acquired by the pricing method of a firm. While fixing the cost of a product and services the following point should be considered:

The identity of the goods and services

- The cost of similar goods and services in the market
- The target audience for whom the goods and services are produces
- The total cost of production (raw material, labour cost, machinery cost,
- Transit, inventory cost etc). External elements like government rules and regulations, policies, economy, etc.,

20.2.1 Objectives of Pricing

The following are the objectives of pricing:

1. **Survival-** The objective of pricing for any company is to fix a price that is reasonable for the consumers and also for the producer to survive in the market. Every company is in danger of getting ruled out from the market because of rigorous competition, change in customer's preferences and taste. Therefore, while determining the cost of a product all the variables and fixed cost should be taken into consideration. Once the survival phase is over the company can strive for extra profits.

2. **Expansion of current profits-** Most of the company tries to enlarge their profit margin by evaluating the demand and supply of services and goods in the market. So the pricing is fixed according to the product's demand and the substitute for that product. If the demand is high, the price will also be high.

3. **Ruling the market-** Firm's impose low figure for the goods and services to get hold of large market size. The technique helps to increase the sale by increasing the demand and leading to low production cost.

4. **A market for an innovative idea-** Here, the company charge a high price for their product and services that are highly innovative and use cutting-edge technology. The price is high because of high production cost. Mobile phone, electronic gadgets are a few examples.

A. CHECK YOUR PROGRESS

1. How do you define the pricing practices?

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2. What are the methods of pricing practices?

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3. Explain the different types of pricing method.

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20.3 METHODS OF PRICE DETERMINATION IN PRACTICE

The methods are: Cost-plus or Full-cost pricing Pricing for a rate of return, also called target pricing Marginal cost pricing Going rate pricing, and Customary prices. The first three methods are cost-oriented as the prices are determined on the basis of costs. The last two methods are competition-oriented as the prices here are set on the basis of what competitors are charging.

1. **Cost-plus or Full-cost Pricing** This is most common method used in pricing. Under this method, the price is set to cover costs (materials, labour and overhead) and a predetermined percentage for profit. The percentage differs strikingly among industries, among members-firms and even among products of the same firm. This may reflect differences in competitive intensity, differences in cost base and differences in the rate of turnover and risk. In fact, it denotes some vague notion of a just profit. What determines the normal profit? Ordinarily margins charged are highly sensitive to the market situation. They may, however, tend to be inflexible in the following cases: (i) they may become merely a matter of common practice, (ii) mark-ups may be determined by trade associations either by means of advisory price lists or by actual lists of mark-ups distributed to members, (iii) profits sanctioned under price control as the maximum profit margins remain the same even after the price control is discontinued. These margins are considered ethical as well as reasonable. Its inadequacies are:

1. It ignores demand-there is no necessary relationship between cost and what people will pay for a product.
2. It fails to reflect the forces of competition adequately. Regardless of the margin of profit added, no profit is made unless what is produced is actually sold.
3. Any method of allocating overheads is arbitrary and may be unrealistic. Insofar as different prices would give rise to different sales volumes,

unit costs are a function of price, and therefore, cannot provide a suitable basis for fixing prices. The situation becomes more difficult in multi-product firms.

4. It may be based on a concept of cost which may not be relevant for the pricing decision.

2. Pricing for a Rate of Return: An important problem that a firm might have to face is one of adjusting the prices to changes in costs. For this purpose the popular policies that are often followed are as under:

1. Revise prices to maintain a constant percentage mark-up over costs.
2. Revise prices to maintain profits as a constant percentage of total sales
3. Revise prices to maintain a constant return on invested capital.

3. Marginal Cost Pricing: Both under full-cost pricing and the rate-of- return pricing, prices are based on total costs comprising fixed and variable costs. Under marginal cost pricing, fixed costs are ignored and prices are determined on the basis of marginal cost. The firm uses only those costs that are directly attributable to the output of a specific product. With marginal cost pricing, the firm seeks to fix its prices so as to maximise its total contribution to fixed costs and profit. Unless the manufacturer's products are in direct competition with each other, this objective is achieved by considering each product in isolation and fixing its price at a level which is calculated to maximise its total contribution.

Advantages

1. With marginal cost pricing, prices are never rendered uncompetitive merely because of a higher fixed over-head structure. The firm's prices will only be rendered uncompetitive by higher variable costs, and these are controllable in the short-run while certain fixed costs are not.
2. Marginal cost pricing permits a manufacturer to develop a far more aggressive pricing policy than does full-cost pricing. An aggressive pricing policy should lead to higher sales and possibly reduced marginal

costs through increased marginal physical productivity and lower input factor prices.

3. Marginal cost pricing is more useful for pricing over the life-cycle of a product, which requires short-run marginal cost and separable fixed cost data relevant to each particular state of the cycle, not long-run full-cost data. Marginal cost pricing is more effective than full-cost pricing because of two characteristics of modern business:

   a) The prevalence of multi-product, multi-process and multi-market concerns makes the absorption of fixed costs into product costs absurd. The total costs of separate products can never be estimated satisfactorily, and the optimal relationships between costs and prices will vary substantially both among different products and between different markets.

   b) In many businesses, the dominant force is innovation combined with constant scientific and technological development, and the long-run situation is often highly unpredictable. There is a series of short-runs of production and one must aim at maximising contribution in each short- run. When rapid developments are taking place, fixed costs and demand conditions may change from one short-run to another, and only by maximising contribution in each short-run will profit be maximised in the long-run.

4. **Going-rate Pricing** Instead of the cost, the emphasis here is on the market. The firm adjusts it own price policy to the general pricing structure in the industry. Where costs are particularly difficult to measure, this may seem to be the logical first step in a rational pricing policy. Many cases of this type are situations of price leadership. Where price leadership is well established, charging according to what competitors are charging may be the only safe policy. It must be noted that 'going- rate pricing' is not quite the same as accepting a price impersonally set by a near perfect market. Rather it would seem that the firm has some power to set its own price and could be a price maker if it chooses to face all the consequences. It prefers, however, to take the safe course and conform to the policy of others.

5. **Customary Pricing** Prices of certain goods become more or less fixed, not by deliberate action on the sellers' part but as a result of their having prevailed for a considerable period of time. For such goods, changes in costs are usually reflected in changes in quality or quantity. Only when the costs change significantly the customary prices of these goods are changed. Customary prices may be maintained even when products are changed. For example, the new model of an electric fan may be priced at the same level as the discontinued model. This is usually so even in the face of lower costs. A lower price may cause an adverse reaction on the competitors leading to a price war so also on the consumers who may think that the quality of the new model is inferior. Perhaps, going along with the old price is the easiest thing to do. Whatever be the reasons, the maintenance of existing prices as long as possible is a factor in the pricing of many products. It a change in customary prices is intended, the pricing executive must study the pricing policies and practices of competing firms and the behavior and emotional make-up of his opposite number in those firms. Another possible way out, especially when an upward move is sought, is to test the new prices in a limited market to determine the consumer reaction.

B. CHECK YOUR PROGRESS

1. What do you mean by customary pricing?

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2. Explain going rate pricing.

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3. What do you understand by marginal cost pricing?

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20.4 PRICING OF MULTIPLE PRODUCTS

The firm bases its prices largely on the competitors' prices with less attention paid to its own costs or demand. Therefore, the firm may charge the same, more or less than the major competitor or competitors. Going rate pricing is the method of setting the prices in relation to the prices of competitors. Generally, in industries where oligopoly prevails such as steel, paper, fertilisers, aluminium, copper and the like, the firms charge the same price as their competitors. It is natural that the firm charges the prices when the competitor or competitors change not bothering about their costs and demand changes. Some firms may charge not higher or lower prices than their competitor.

20.5 CONCEPT OF PRICE DISCRIMINATION

The Definition of Price discrimination says: a firm discriminates price when the ratio of prices is different from the ratio of marginal costs for same two goods offered by a similar firm. Such a definition certainly requires that one is cautious in calculating marginal costs to include all significant shadow costs. This is predominantly true where costly capacity and aggregate demand uncertainty play vital roles. Price discrimination is every now and then defined as the practice of a firm selling a homogeneous commodity at the same time to different purchasers at different prices. Almost every word of this definition requires being qualified.

1. **"Selling to different purchasers":** We have to include "buying from multiple sources of supply" (since there is price discrimination in buying as well as in selling) and "leasing and hiring."

2. **"Commodity":** This should include both services and goods, productive factors as well as products.

3. **"At the same time":** This means "under given conditions." The transactions certainly need not be simultaneous; indeed, there is temporal discrimination, such as between Sunday rates and week-day rates, matinee and evening prices, peak rates and off-peak rates, season and off-season prices

4. **"Homogeneous":** The commodities need not be homogeneous; they may be differentiated in many ways and, definitely, in numerous types of price discrimination, differentiation is the fundamental nature.

5. **"At different prices":** To sell different qualities or products with different marginal cost at the identical price, or to buy different qualities or factors of different efficiency at the same price, is also discriminatory. And despite the fact that there may be price discrimination without price differences, there may be differential pricing that is not discriminatory.

6. **"Firm":** We may have to take a cluster of firms, perhaps an entire industry, into account to establish the existence of price discrimination. For example, a single firm may participate in a discriminatory scheme by serving different consumer groups through different (subsidiary) distributor firms to whom it sells at a uniform price but whom it induces to resell with different markups. Or several railroads may lay down 'combined through-rates' which are discriminatory in contrast with other rates charged by the same or other lines. To simplify we define Price discrimination as the practice of charging different prices to different consumers for similar goods. Thus, price discrimination exists when the same product is sold at different prices to different buyers. The vital point to observe is that cost of production is either the same or it differs but not as much as the differences in charges prices. The product is basically the same but it may have slight variation. Examples include seats of an airplane that are booked at different time periods, summers and winter bookings of rooms of a hotel based in a hill station.

20.5.1 Assumptions of Price Discrimination

Price discrimination can only transpire if certain circumstances are met.

1. The firm must be able to recognize different market segments, such as household users and industrial users.
2. Different segments must have different price elasticities.
3. Markets must be kept isolated from each other, either by time, physical distance and nature of use, such as Microsoft Office 'Schools' version which is only available to educational institutions, at a lower price.
4. There must be no seepage between the two markets, which means that a consumer cannot purchase at the low price in the elastic sub-market, and then re-sell to other consumers in the inelastic sub-market, at a higher price.
5. The firm be required to have some extent of monopoly power

20.5.2 Methods of Price Discrimination

Companies use various pricing strategies to generate profit by selling the same product. Price discrimination is popularly used pricing strategy by companies to generate profit. In a price discrimination strategy, a firm sells identical goods and services to customers at different prices. The seller makes this possible by adopting various methods such as superior packaging to persuade customers to buy identical products at a higher price. Companies divide customers into different groups based on various attributes and charge different prices from each group. Companies identify different market segments and ask them to pay less or more depending on their willingness to pay. For example, the entry fee of the Taj Mahal is Rs. 50 per person for domestic tourists, whereas the entry fee for foreigners is Rs. 1300 per person. In this example, it is considered that foreign tourists are willing to pay more prices. It is one of the best methods to earn a profit. Companies are not required to make separate efforts to generate profit. They can earn more profits just by dividing the market into different segments. The willingness of consumers to pay for higher price depends on the relative elasticity of demand. For example, consumer's part of relatively elastic sub-market

pays lower prices, whereas consumers part of relatively inelastic sub-market pay higher rates. In the article ahead, you will learn about the definition, types, examples, objectives, and necessary conditions for price discrimination. Price discrimination can be defined as a pricing strategy that is used by sellers to sell identical goods and services at different prices to a diverse group of customers based on various conditions such as demand of the product, the willingness of customers to pay. The followings are the main types of strategies.

1. **First Degree Price Discrimination** There are two conditions for exercising first-degree price discrimination, such as Monopoly in the market and the knowledge of absolute maximum price. The absolute maximum price can also be known as reservation price. The goods and services can be sold to a consumer at the highest price that he is willing to pay. In this profit earned by selling each individual is added to the total revenue generated by the company. The total revenue generated by a company by selling goods at different prices is equal to the total of consumer surplus and producer surplus. First-degree price discrimination is challenging to implement than other types of price discrimination. Because while using first-degree, the seller needs to determine the right price that a customer will be willing to pay to buy a particular product or service. In hospitality, airline, and motorcar industry, first-degree is easy to implement. Because in these industries, the transaction taking place between a consumer and seller is private. The seller can pitch price to the buyer based on the information obtained from records, or it can be predicted by the looks and status of the customer. Moreover, e- commerce companies make the use of data mining techniques to obtain information about their various customers and thus giving them offers accordingly. Even though first-degree is challenging to implement but when implemented rightly, it allows the seller to generate good profits.

2. **Second Degree Price Discrimination** Second-degree price

discrimination is one of the most commonly used pricing. The price of goods and services varies according to the demand for quantity. That means large quantity orders will be sold at discounted prices. For example, when a consumer buys several units of a product, the average price charged for one product will be less as compared to the cost of the product when purchased separately. It is difficult for a seller to determine the exact highest price that a consumer will be ready to pay. Therefore, the seller provides benefits to customers who buy products in vast quantities. In this way, different pricing is decided for different consumers group, and thus a large portion of the market can be captured. For example, airlines provide lower air-ticket prices to customers who are frequent travelers. Similarly, big retail stores take the benefits to sell products at high discounts to their customers. They buy products in bulk from the manufacturers and sell those products at lower prices as compared to their competitors. In this way, they not only generate high profits but also keep their customer loyal. However, seconddegree price discrimination can be applied to quality as well as the quantity of the products. For example, an air traveler traveling in business class will be provided better services than the air traveler traveling in economy class. By doing this, airlines differentiate their customers based on their preferences and capture high consumer surplus.

3. **Third Degree Price Discrimination** Third-degree price discrimination is when sellers divide their consumers into different consumers group. In this price discrimination, the pricing of products and services is done based on the different groups of consumers. The grouping of consumers is done because it is easy for companies to determine the overall preference of the whole group rather than deciding the unique choice of all customers separately. For example, the ticket price of students and senior citizens is lesser than the cost of the tickets of an adult, or differentiation in the price of tickets can be made based on the regular and casual traveler. Third-degree price discrimination exists in the real world.

20.6 LET US SUM UP

Companies identify different market segments and ask them to pay less or more depending on their willingness to pay. The willingness of consumers to pay for higher prices depends on the relative elasticity's of demand. For example, consumer's part of relatively elastic sub-market pays lower prices, whereas consumers part of relatively inelastic sub-market pay higher rates. Companies divide customers into different groups based on various attributes and charge different prices from each group. Companies identify different market segments and ask them to pay less or more depending on their willingness to pay

20.7 GLOSSARY

- **Price discrimination**: The action of selling the same product at different prices to different buyers, in order to maximize sales and profits.
- **Mark-up:** Add a certain amount to the cost of goods to cover overhead and profit
- **Perceived**: Become aware or conscious of (something)
- **Utility**: The state of being useful, profitable, or beneficial.

20.8 SELF ASSESSMENT QUESTIONS

1. What is target returns pricing?

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2. What is cost based pricing methods?

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20.9 LESSON END EXCERCISE

1. Explain in detail the merits and demerits of cost based methods.

2. What do you mean by price discrimination?

20.10 SUGGESTED READINGS

- Ahuja, H.L Managerial economics, S Chand Company, Delhi
- Dwivedi D.N Managerial Economics, Vikas Publishing House, Delhi
- Chopra O.P Managerial Economics, Tata McGraw Hill, Delhi

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