

Managerial Economics

COURSE CODE: B23NE05DC

Undergraduate Programme in Nano Entrepreneurship
Discipline Core Course
Self Learning Material



SREENARAYANAGURU
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The State University for Education, Training and Research in Blended Format, Kerala

SREENARAYANAGURU OPEN UNIVERSITY

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To increase access of potential learners of all categories to higher education, research and training, and ensure equity through delivery of high quality processes and outcomes fostering inclusive educational empowerment for social advancement.

Mission

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Access and Quality define Equity.

Managerial Economics
Course Code: B23NE05DC
Semester - V

Discipline Core Course
Undergraduate Programme in
Nano Entrepreneurship
Self Learning Material
(With Model Question Paper Sets)



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MANAGERIAL ECONOMICS

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Semester- V

Discipline Core Course

Undergraduate Programme in

Nano Entrepreneurship

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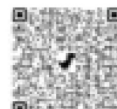
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Dear learner,

I extend my heartfelt greetings and profound enthusiasm as I warmly welcome you to Sreenarayanaguru Open University. Established in September 2020 as a state-led endeavour to promote higher education through open and distance learning modes, our institution was shaped by the guiding principle that access and quality are the cornerstones of equity. We have firmly resolved to uphold the highest standards of education, setting the benchmark and charting the course.

The courses offered by the Sreenarayanaguru Open University aim to strike a quality balance, ensuring students are equipped for both personal growth and professional excellence. The University embraces the widely acclaimed “blended format,” a practical framework that harmoniously integrates Self-Learning Materials, Classroom Counseling, and Virtual modes, fostering a dynamic and enriching experience for both learners and instructors.

The University aims to offer you an engaging and thought-provoking educational journey. The BA Nano Entrepreneurship program is structured to address the growing demand for innovative entrepreneurs, particularly focused on nano businesses. The program’s curriculum is crafted with a balanced blend of theoretical insights and practical exposure, ensuring that learners are equipped to navigate the challenges and opportunities of this dynamic sector. Special attention has been given to the inclusion of real-world examples and case studies, enhancing learners’ understanding of nano entrepreneurship’s unique landscape. Moreover, the curriculum fosters a holistic approach to entrepreneurship that nurtures creativity, innovation, and strategic thinking. Through practical application and industry-driven examples, learner’s will develop the skills necessary to succeed in this cutting-edge field. The Self-Learning Material has been meticulously crafted, incorporating relevant examples to facilitate better comprehension.

Rest assured, the university’s student support services will be at your disposal throughout your academic journey, readily available to address any concerns or grievances you may encounter. We encourage you to reach out to us freely regarding any matter about your academic programme. It is our sincere wish that you achieve the utmost success.



Regards,
Dr. Jagathy Raj V.P.

01-07-2026

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BLOCK

1

Significance and Scope of Managerial Economics

Unit 1

Introduction to Managerial Economics

Learning Outcomes

After completing this unit, the learner will be able to:

- ◇ define managerial economics and explain its significance
- ◇ comprehend the scope of managerial economics, including internal and external issues
- ◇ identify the roles and responsibilities of managers in decision-making

Prerequisite

After completing your degree, you have decided to start an entrepreneurial venture in web development. Luckily, you secured a managerial position in your company. During this period, you will face various issues and challenges that require effective management. These problems can be solved using the principles of managerial economics. You can efficiently allocate scarce resources like labour, capital, and technology to maximise output and minimise waste. By analysing costs, revenues, and pricing, you can develop strategies to maximise profit and drive business growth. Managerial economics also helps to develop analytical skills, enabling you to identify problems, evaluate alternatives, and select the best course of action. Moreover, it guides you in managing uncertainty and preparing contingency plans for unexpected situations. Applying these concepts provides a solid foundation for making rational, efficient, and strategic decisions in your business.

Keywords

Scarce Resources, Human Behaviour, Managerial Economics, Operational Issues, Environmental Issues, Strategic Decision-Making

Discussion

1.1.1 Meaning of Managerial Economics

The term 'economics' derives from the Greek word *Oikonomia*, which means 'household'. Economics is a branch of the social sciences that studies how individuals and societies make choices when resources are limited. It concerns human behaviour, human wants, and the use of scarce resources. Thus, economics is viewed as a science that explains how wants are satisfied using limited means. Over time, economics has been defined in different ways. Adam Smith introduced the definition of wealth, explaining economics as the study of the production and distribution of wealth. Later, Alfred Marshall shifted the focus from wealth to human welfare. In his book *Principles of Economics* (1890), Marshall stated that wealth is only a means to an end, namely human welfare. According to him, economics is, on the one hand, a study of wealth and, on the more important side, a study of humans.

Economics, according to Marshall, is partly a study of wealth and, more importantly, a study of humans. Prof. A.C. Pigou also supported Marshall's view and emphasised that economics should analyse economic activities in a way that promotes human welfare. Another major contribution was made by Lionel Robbins, who introduced the definition of scarcity. According to him, economics studies human behaviour as the relationship between unlimited wants and scarce resources with alternative uses. This definition highlighted the central economic problem of choice-making. Modern economists like Paul Samuelson further developed the subject by presenting a growth-oriented definition, stating that economics is the study of how societies choose to use scarce productive resources over time to produce and distribute goods and services. All these definitions indicate that economics is fundamentally concerned with choice, scarcity, and the efficient use of limited resources.

Economics has wide applications in many areas of life, and here the focus is on its role in the managerial field. When we engage in business activities, we deal with decision-making authority and face various practical situations. In such contexts, knowledge of concepts like cost, demand, profit, competition, and other basic economic ideas becomes very important. These concepts can be applied to business problems, managerial decisions, and real-life situations, helping managers make better decisions, plan for the future, and use resources efficiently. To achieve these goals, managerial economics is highly useful, serving as a bridge between traditional economic theory and actual business practice.

Managerial Economics, as a subject, gained popularity in the U.S.A. after the publication of Joel Dean's book *Managerial Economics* in 1951. Joel Dean pointed out that managerial economics explains how economic analysis can be used in policy formulation.

Managerial economics bridges the gap between traditional economic theory and real business practice in two ways. First, it provides various tools and techniques



that enable managers to make better decisions in real and practical situations. Second, it serves as an integrating subject that highlights the interactions among the different functional areas in which a firm operates.

According to Prof. Evan J. Douglas, managerial economics deals with the application of business principles and methods to the decision-making process within a firm or organisation under conditions of uncertainty. It aims to develop rules and principles that help management achieve its desired economic objectives. These objectives generally relate to costs, revenues, and profits, which are important for both business and non-business institutions.

Spencer and Siegelman defined managerial economics as 'the integration of economic theory with business practice for the purpose of facilitating decision-making and forward planning by management.' Managerial economics helps managers analyse problems faced by a business unit and take crucial decisions. Managers must choose among several alternatives and select the option that uses available resources most efficiently. Cristopor I. Savage and John R. Small stated that 'managerial economics is concerned with business efficiency.'

According to Michael Baye, 'Managerial economics is the study of how to direct scarce resources in a way that most effectively achieves a managerial goal.'

1.1.2 Scope of Managerial Economics

We know that the scope of a subject refers to the area it covers in its study. The scope of managerial economics is quite wide because it addresses the decision-making problems of both for-profit and non-profit organisations. It provides solutions to practical issues faced by firms, schools, hospitals, and other institutions, helping them use resources efficiently and achieve their objectives. The scope of managerial economics mainly covers two broad areas of decision-making:

- A. Operational or Internal issues and
- B. Environmental or External issues.

A. Operational or Internal Issues

Operational or internal issues are those that arise within the organisation and are under the control of management. These issues relate to basic questions such as *what to produce, when to produce, how much to produce, and for which category of consumers*. The key aspects of internal issues include:

- ◇ **Demand Analysis and Forecasting:** The demand for a firm's products changes in response to factors like price, consumer income, tastes, and preferences. Studying these determinants is essential to forecasting future demand. Accurate demand forecasting helps managers plan production, inventory, and sales more effectively.

- ◇ **Cost Analysis:** Estimating costs is a fundamental part of managerial decision-making. Managers must identify the factors that cause cost variations and account for them when calculating cost estimates. Proper cost analysis aids in effective planning and sound pricing decisions.
- ◇ **Pricing Decisions:** Pricing directly affects a firm's profit. Managerial economics provides theories and methods for determining the correct price of products. Correct pricing decisions help the firm achieve profit goals and remain competitive.
- ◇ **Profit Analysis:** Profit is a key measure of business success. Since firms often operate under uncertainty, profit planning is essential. Analysing and planning profits helps firms make informed decisions to maximise financial performance.
- ◇ **Capital Budgeting:** Managers must make critical decisions regarding capital investment. They need to evaluate the profitability of projects and allocate capital efficiently. The success of the firm depends on selecting the best investment options based on proper analysis.
- ◇ **Production and Supply Analysis:** Production analysis focuses on the physical aspects of output, while cost analysis deals with monetary aspects. Supply analysis includes studying supply schedules, supply curves, the law of supply, elasticity of supply, and factors affecting supply. Understanding production and supply helps managers make decisions about output levels and resource allocation.

B. Environmental / External Issues

Environmental or external issues refer to the general business environment in which a firm operates. These are factors beyond the control of the management but significantly influence business decisions. A study of the economic environment should include the following aspects:

1. **Types of Economic Systems in the Country:** Different countries follow different economic systems, such as capitalism, socialism, or mixed economy. The type of economic system affects business operations, ownership, and regulation. Managers must understand the economic system to align their strategies with national policies and legal frameworks.
2. **General Trends in Production, Employment, Income, Prices, Savings, and Investment:** Economic trends in production and employment indicate the overall health of the economy. Changes in income, prices, savings, and investment patterns affect consumer demand and business profitability. Managers study these trends to forecast market opportunities and make informed strategic decisions.
3. **Trends in the Work of Financial Institutions:** Banks, financial corporations, and insurance companies play a crucial role in providing capital, credit, and risk coverage. Trends in interest rates, lending policies, and availability of credit



influence investment and expansion decisions of firms. Managers monitor financial institutions to ensure access to funds and manage financial risks.

4. **Magnitude and Trends in Foreign Trade:** Export and import activities influence the availability of raw materials, pricing, and competition. Changes in trade policies, tariffs, and exchange rates affect business costs and profitability. Managers must study foreign trade trends to identify new markets and plan for global competition.
5. **Trends in Labour and Capital Markets:** Labour market trends include wage levels, availability of skilled workers, and labour laws, while capital market trends relate to the supply of funds for investment. Both affect the cost of production and operational efficiency. Managers need to understand these trends to hire effectively, allocate resources, and control costs.
6. **Government Economic Policies:** Policies such as industrial policy, monetary policy, fiscal policy, and price control regulations have a direct impact on business decisions. Changes in taxes, subsidies, or regulations can affect profits and investment plans. Managers study government policies to remain compliant and to take advantage of incentives and support schemes.

1.1.3 Role and Significance of Managerial Economics

Managerial Economics acts as a bridge between economic theory and practical business problems; ensuring that decisions are rational, efficient, and aligned with the goals of the organisation. Therefore, managerial economics help managers make better decisions by applying economic concepts, tools, and analytical techniques. The key roles of managerial economics include:

1. **Decision-Making Support:** Managerial economics provides a structured approach to decision-making. Analysing data, costs, and market conditions helps managers make rational and informed choices rather than relying on intuition or guesswork. This ensures that business decisions are more accurate and effective.
2. **Efficient Resource Allocation:** Resources like labour, capital, and raw materials are limited, so optimal allocation is critical. Managerial economics helps identify the best use of these scarce resources to maximise output and minimise waste, ensuring that every unit of resource contributes effectively to the firm's goals.
3. **Profit Maximisation:** A primary aim of most businesses is to earn profit. Managerial economics provides techniques for cost control, revenue analysis, and pricing strategies that help firms increase profitability. It also helps identify areas where expenses can be reduced without affecting output or quality.
4. **Forecasting and Planning:** Future demand, costs, and market trends are often uncertain. Managerial economics uses statistical and economic methods to forecast sales, production needs, and market behaviour. This allows managers

to plan production schedules, inventory, and marketing strategies effectively, reducing surprises and losses.

5. **Policy Formulation:** Effective business policies in production, pricing, marketing, and investment are essential for smooth operations. Managerial economics guides managers in formulating data-driven, practical policies aligned with organisational objectives, helping firms respond efficiently to internal and external challenges.
6. **Risk and Uncertainty Management:** Businesses operate under conditions of uncertainty, such as fluctuating market demand, changing prices, or new regulations. Managerial economics helps managers anticipate potential risks, evaluate alternatives, and select strategies that minimise negative impacts. This improves the firm's stability and resilience.
7. **Integration of Business Functions:** A business involves multiple functions like production, finance, marketing, and human resources. Managerial economics ensures coordinated decision-making across departments, promoting synergy and smooth functioning. This integrated approach prevents conflicts and improves overall efficiency.
8. **Strategic Decision-Making:** Managerial economics supports long-term strategic decisions such as expansion, diversification, mergers, and investments. Analysing market trends, competition, and financial viability helps managers choose strategies that ensure growth and sustainability.
9. **Improving Organisational Efficiency:** By applying economic principles, managerial economics helps identify inefficiencies in operations. Managers can optimise processes, reduce costs, and improve productivity, leading to better performance and competitiveness in the market.
10. **Supporting Innovation and Development:** Managerial economics encourages managers to adopt innovative approaches in production, marketing, and operations. By studying market trends, consumer behaviour, and resource allocation, managers can develop new products, services, and processes that enhance firm growth.

1.1.4 Significance of Managerial Economics

Managerial Economics is significant because it applies economic principles to real-life business situations and helps managers make effective decisions. Its importance can be understood from the following points:

1. **Provides Tools and Techniques:** Managerial Economics offers tools such as cost-benefit analysis, marginal analysis, and demand forecasting, which assist managers in analysing problems and making decisions.
2. **Solves Managerial Problems:** It helps managers address issues related to production, pricing, investment, and resource allocation, ensuring smooth business operations.



3. **Supports Profit Planning and Growth:** By analysing costs, revenues, and market trends, managerial economics helps in maximising profits and planning for business growth.
4. **Assists in Policy and Strategy Formulation:** It guides managers in developing effective business policies and strategies that align with organisational goals.
5. **Analyses Internal and External Factors:** Managerial Economics helps managers understand the internal factors (like costs and production) and external factors (like market conditions and government policies) that affect the business.
6. **Reduces Risk and Uncertainty:** Evaluating alternatives and predicting outcomes helps in managing risks and making informed decisions under uncertain conditions.
7. **Improves Resource Allocation and Efficiency:** It ensures the optimal use of scarce resources, leading to cost reduction, increased productivity, and better overall efficiency.

1.1.5 Role and Responsibilities of Managers in Decision Making

Decision-making is one of the most important functions of management. Here, the manager's role is very important. Managers must analyse problems, evaluate alternatives, and choose the best course of action to achieve organisational goals. Their roles and responsibilities in decision-making can be explained as follows:

1. **Identifying the Problem:** The first and most crucial step in decision-making is identifying the problem. A manager must recognise when a situation requires attention, whether it is a challenge or an opportunity. Clearly defining the issue helps avoid misunderstandings and prevents wrong decisions. If the problem is not properly identified at the beginning, the entire decision-making process can become ineffective. For example, problems such as a decline in sales, excess inventory, or a shortage of staff must be recognised early so that appropriate corrective measures can be taken.
2. **Collecting and Analysing Information:** Once the problem is identified, the next step is to collect and analyse relevant information. Managers gather data from both internal sources, such as company records and employee feedback, and external sources, such as market reports, competitor analysis, and government publications. This information is carefully examined to understand trends, risks, and constraints that may affect the decision. Accurate and reliable data is essential because it helps managers make rational and informed decisions, reducing uncertainty and improving the chances of achieving the desired outcome.

3. **Developing Alternatives:** After collecting and analysing information, the manager must develop a range of possible alternatives to address the problem. A good manager identifies all feasible courses of action rather than relying on a single solution. Having multiple alternatives increases the chances of selecting the most effective and efficient option. These alternatives may include strategies such as reducing prices, introducing new products, increasing promotional activities, or improving customer service. By exploring different possibilities, managers ensure that the final decision is well thought out and aligned with organisational objectives.
4. **Evaluating Alternatives:** Once the possible alternatives are identified, the manager must carefully evaluate each option before making a final decision. This involves comparing the pros and cons of every alternative by considering key factors such as cost, expected benefits, associated risks, feasibility, and the time required for implementation. A systematic evaluation helps managers understand which option will provide the best outcome with minimum risk. Various tools such as cost–benefit analysis, forecasting techniques, and sensitivity analysis are commonly used to support this assessment. Through a thorough evaluation, managers can identify the most suitable and effective alternative for achieving organisational goals.
5. **Choosing the Best Alternative:** Choosing the best alternative is the core of the decision-making process. After evaluating all possible options, managers select the one that is most effective in achieving organisational objectives such as profit, efficiency, and growth. The selected alternative should be rational, practical, and feasible, considering the available resources and organisational constraints. It must also align with the organisation's values, policies, and long-term goals. By choosing the most appropriate alternative, managers ensure that the decision contributes positively to the overall performance of the organisation.
6. **Implementing the Decision:** A decision, no matter how good, will fail if it is not implemented effectively. Once the best alternative is selected, managers must take steps to put the decision into action. This involves allocating the necessary resources, assigning responsibilities to the appropriate employees, and preparing a clear and practical action plan. Effective communication with staff is essential so that everyone understands their roles and the expected outcomes. Proper implementation ensures that the decision is executed smoothly and achieves the intended organisational goals.
7. **Monitoring and Evaluating Results:** After a decision is implemented, managers must check whether it is working as expected. They regularly review the results and compare the actual performance with the planned or expected outcomes. If they find that the results are not satisfactory, they need to take corrective action to improve the situation. This step helps the organisation learn from mistakes and ensure that future decisions are more effective.

8. **Ensuring Participation and Teamwork:** Modern managers encourage participation and teamwork in the decision-making process. They involve employees at different levels to share their ideas and suggestions. When employees participate, it improves their morale and makes them feel valued. It also increases the accuracy of decisions because more viewpoints are considered. Participation creates a sense of ownership among employees and promotes better cooperation, which helps the organisation achieve its goals more effectively.
9. **Managing Risks and Uncertainty:** Managers need to consider the possible risks and uncertainties before making a decision. They assess what could go wrong and how it might affect the organisation. To handle unexpected situations, managers prepare contingency plans, which are backup strategies in case the original plan does not work. For example, if market demand turns out to be lower than expected, the manager may reduce production or launch a promotional campaign to boost sales. Managing risks helps the organisation stay prepared and reduces potential losses.
10. **Ethical and Social Responsibility in Decision-Making:** Managers must ensure that their decisions are ethical and uphold moral principles. Decisions should also be environment-friendly, comply with the law, and be socially responsible. Considering these aspects helps the organisation build trust and maintain a good reputation among employees, customers, and the public. Ethical and responsible decision-making ensures long-term success and avoids harm to society or the environment.
11. **Coordination with Different Departments:** Managers need to work closely with different departments like finance, marketing, human resources, and operations when making decisions. By gathering inputs from all relevant areas, managers can understand the impact of their decisions on the entire organisation. Coordinated decision-making helps to reduce conflicts between departments and ensures that resources are used efficiently. It also makes the implementation of decisions smoother and more effective.

Decision-making is a key function of management that affects the success of an organisation. Managers play an important role by identifying problems, evaluating alternatives, and choosing the best course of action. Effective decision-making requires participation, coordination, ethical consideration, and the use of accurate information and technology. When done properly, it helps organisations achieve their goals efficiently and responsibly.

Recap

- ◇ Economics is the study of how individuals and societies make choices to use scarce resources efficiently
- ◇ Managerial economics bridges the gap between traditional economic theory and practical business decision-making
- ◇ Managerial economics helps managers apply concepts like cost, demand, profit, and competition to solve business problems
- ◇ The scope of managerial economics includes internal issues like demand analysis, cost estimation, pricing, profit planning, capital budgeting, and production decisions
- ◇ Managerial economics covers external issues such as economic systems, market trends, financial institutions, foreign trade, labour and capital markets, and government policies
- ◇ Effective decision-making requires proper implementation, monitoring results, and taking corrective actions when necessary
- ◇ Participation and teamwork improve decision accuracy, employee morale, and ownership in an organisation
- ◇ Managers must manage risks and uncertainties by preparing contingency plans
- ◇ Ethical and socially responsible decisions protect the organisation's reputation and ensure long-term sustainability
- ◇ Use of technology and data, such as MIS and forecasting tools, makes decision-making faster and more accurate
- ◇ Coordination among departments ensures efficient resource use, reduces conflicts, and supports smooth implementation of decisions
- ◇ Managerial economics supports resource allocation, profit maximisation, forecasting, policy formulation, risk management, and strategic planning

Objective Questions

1. What does managerial economics primarily bridge between?
2. Who introduced the concept of managerial economics in 1951?
3. Which economist defined economics as the study of human behaviour in relation to scarce resources?



4. Pricing decisions are part of which type of issues in managerial economics?
5. Name one tool used by managers to evaluate alternatives?
6. What does participation and teamwork in decision-making improve among employees?
7. What kind of plans do managers prepare to handle unexpected situations?
8. Forecasting future demand and market trends is a part of managerial economics for what purpose?
9. What does coordination among departments help to reduce?

Answers

1. Business practice
2. Joel Dean
3. Lionel Robbins
4. Internal/Operational
5. Cost-benefit analysis
6. Morale
7. Contingency plans
8. Decision-making
9. Conflicts

Assignments

1. Explain the meaning, nature, and significance of managerial economics.
2. Discuss the scope of managerial economics with examples of internal and external issues.
3. Describe the roles and responsibilities of managers in the decision-making process.
4. How does managerial economics support decision-making and efficient resource allocation in a firm?
5. Explain the importance of ethical, social, and coordinated decision-making in modern management.

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Suggested Reading

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Unit 2

Demand Determinants

Learning Outcomes

After completing this unit, the learner will be able to:

- ◇ understand importance of factors of production in economic activity
- ◇ explain the meaning, determinants, and types of demand and supply
- ◇ analyse different cost concepts and their relevance in production decisions
- ◇ explain the concept of profit
- ◇ comprehend the concept of elasticity of demand and supply
- ◇ use elasticity concepts in managerial and policy decision-making

Prerequisite

In managerial economics, we learn the basic concepts of economics that help us understand how business and managerial decisions are made. The subject introduces the factors of production such as land, labour, capital, and entrepreneurship, and explains how each factor contributes to the production process and economic growth. We also study the concepts of demand and supply to understand consumer behaviour, market conditions, and producer decisions. The topic of elasticity of demand and supply helps us analyse how changes in price, income, and related goods influence demand and supply, which is essential for pricing and output decisions. Managerial economics also covers cost and profit concepts, enabling us to understand production costs, pricing strategies, break-even analysis, and profit measurement.

During the process of learning this subject, we also experience self-development. It improves our logical thinking, analytical ability, and decision-making skills by encouraging us to apply economic reasoning to real-life business situations. The subject helps us develop a rational approach to problem-solving, better financial awareness, and a deeper understanding of market behaviour. Thus, managerial economics not only builds our economic knowledge but also enhances our managerial competence and personal intellectual growth.

Keywords

Factors of Production, Profit, Demand, Supply, Shift in Demand, Cost, Elasticity of Demand, Elasticity of Supply

Discussion

1.2.1 Factors of Production

Factors of production are the fundamental resources used to produce goods and services. They form the backbone of any economic activity. Traditionally, economists classify these factors as land, labour, capital, and entrepreneurship. Each factor contributes uniquely to the production process and is rewarded accordingly, rent for land, wages for labour, interest for capital, profit for entrepreneurship.

1. **Land:** Land refers to all natural resources provided by nature that are used in the process of production. It includes not only physical soil but also forests, minerals, water, and other naturally occurring resources. Land is considered a passive factor of production because it does not create output by itself but provides essential raw materials for production. Its supply is fixed in the short run and it varies in quality and location. However, its productivity and economic value can be enhanced through improvements such as irrigation, fencing, or paving. Examples of land include agricultural land, forests, rivers, lakes, mineral deposits and other natural resources provided by nature.. The reward for the use of land is rent, which is paid by the user to the owner of the land.
2. **Labour:** Labour refers to all human efforts, both physical and mental, that are applied in the process of production. It includes unskilled, skilled, professional, and intellectual work. Labour is an active factor of production because it requires motivation, training, and effective management. The quality of labour depends on education, skill, experience, and health. Economic theory highlights the substitution effect, where machines replace labour, and the income effect, where higher wages may influence the number of hours worked. Examples of labour include farmers harvesting cacao seeds, factory workers processing and packaging chocolate, and scientists, engineers, and artists contributing intellectual services. The reward for labour is wages or salaries.
3. **Capital:** Capital refers to man-made resources that are used to produce other goods and services. It includes machinery, tools, factories, vehicles, and software systems. Economists distinguish between physical capital and human capital, the latter referring to skills, knowledge, and abilities that enhance labour productivity. Capital is a produced means of production, and investment in capital increases output and efficiency. Human capital improves



productivity through education, training, and experience. Examples of capital include machines, presses, and assembly lines used in chocolate manufacturing, delivery trucks, and computer systems for production management. The reward for capital is interest or returns on invested capital.

4. **Entrepreneurship:** Entrepreneurship is the function of organising and combining land, labour, and capital to produce goods and services. Entrepreneurs identify opportunities, introduce innovations, take risks, and manage the production process efficiently. Entrepreneurship plays a crucial role in economic growth by creating new products and improving production methods. Entrepreneurs act as decision-makers, coordinators, and risk-bearers. It is often regarded as the fourth factor of production or as a managerial function integrating the traditional factors. Examples include owners of lemonade stands creating new local markets and chocolatiers designing unique products and managing factories. The reward for entrepreneurship is profit, which depends on successful organisation and risk-taking.

Interconnection: Circular Flow of Factors

The factors of production are interconnected through the circular flow of economic activity, which links households and firms. Households own the factors of production and supply land, labour, and capital to firms in the factor market in exchange for rent, wages, and interest or dividends. Firms use these factors to produce goods and services, which are sold to households in the product market. The income earned by households is spent on goods and services, completing the cycle. Prices of factors and commodities are determined by supply and demand, leading to market equilibrium. For example, a chocolate industry, land includes cacao farms and water, labour includes farmers and factory workers, capital includes machinery and processing plants, and entrepreneurship is reflected in factory owners and innovators managing production and introducing new products.

1.2.2 Demand

In simple terms, demand means the desire for a good or service, but in economics, desire alone is not enough. A person must also have the willingness and ability to pay. For example, many people may wish to own a luxury car like a Benz, but only a few can actually afford it. Therefore, demand has three essential elements: desire for the commodity, purchasing power, and willingness to buy. Economists define demand as more than just a desire; it refers to the quantity of goods or services that a person is both willing and able to purchase at a given price using available money. According to Prof. Hidbon, demand is “the various quantities of a good that would be purchased per time period at different prices in a given market.” Demand is influenced by several factors, called determinants of demand. They are:

- ◇ **Price of the commodity:** The cost of the good itself directly affects the quantity demanded. Generally, when the price rises, the quantity demanded falls, and

when the price falls, the quantity demanded increases. This relationship is the basis of the law of demand.

- ◇ **Nature or utility of the commodity:** How useful or necessary the product is to consumers affects demand. Essential goods like food and medicine have relatively stable demand, while luxury items may see more fluctuation.
- ◇ **Consumer income and wealth:** Higher income generally increases demand as people can afford more goods, while lower income reduces it. Changes in income can shift demand for normal goods upward and for inferior goods downward.
- ◇ **Tastes and preferences:** Consumer likes, dislikes, and trends influence demand. Changes in fashion, lifestyle, or cultural factors can increase or decrease demand for certain products over time.
- ◇ **Prices of Related Goods**
 - **Substitutes:** Goods that can replace each other, such as tea and coffee. If the price of one rises, consumers may switch to the other, increasing its demand.
 - **Complements:** Goods used together, such as cars and fuel. If the price of one rises, the demand for both may decrease.
- ◇ **Consumer Expectations:** Expectations about future prices, availability, or income can change current demand. For instance, if prices are expected to rise, consumers may buy more now, increasing current demand.
- ◇ **Advertisement and Promotion:** Marketing and promotions can increase consumer interest and demand. Effective advertising creates awareness, persuades potential buyers, and can make a product more desirable.
- ◇ **Population and Demographic Changes:** More consumers or changes in age, occupation, or lifestyle affect demand. Growing populations or urbanisation can significantly increase demand for certain goods and services.
- ◇ **Seasonal Factors:** Certain goods have higher demand in particular seasons or festivals. For example, winter clothing, ice creams, or gifts see fluctuating demand depending on the time of year.
- ◇ **Government Policies or Taxes :** Taxes, subsidies, price controls, and regulations can increase or decrease demand. For instance, a subsidy on solar panels may increase their demand, while higher taxes on cigarettes may reduce consumption.

1.2.2.1 Types of Demand

1. **Joint Demand:** Joint demand occurs when two or more goods are demanded together to satisfy a particular need. For example, tea, sugar, and milk are usually

consumed together. If the price of one of these items rises, the demand for the others may fall, showing a complementary effect.

2. **Composite Demand:** Composite demand refers to a good that is demanded for multiple uses. For instance, electricity is used for lighting, heating, and running machines. If one use of electricity increases, it may reduce the availability for other uses, thereby affecting the overall demand.
3. **Direct Demand:** Direct demand is the demand for a commodity intended for direct consumption. Examples include food, clothing, and personal care items. It reflects the immediate wants and needs of consumers, showing their direct purchasing behaviour.
4. **Derived Demand:** Derived demand arises when the demand for a commodity depends on the demand for another good. For example, tyres are demanded because of the demand for vehicles. This type of demand is often seen in factors of production such as labor, raw materials, or machinery.

1.2.2.2 Extension / Expansion and Contraction of Demand

Extension and contraction of demand refer to changes in the quantity demanded of a commodity due to changes in its price, while all other factors remain constant. Extension of demand occurs when the quantity demanded increases as the price falls. For example, if the price of apples decreases, consumers are likely to buy more apples. On the other hand, contraction of demand happens when the quantity demanded decreases due to a rise in price. For instance, if the price of apples rises, consumers may reduce their purchases. Let us explain with the help of figure.

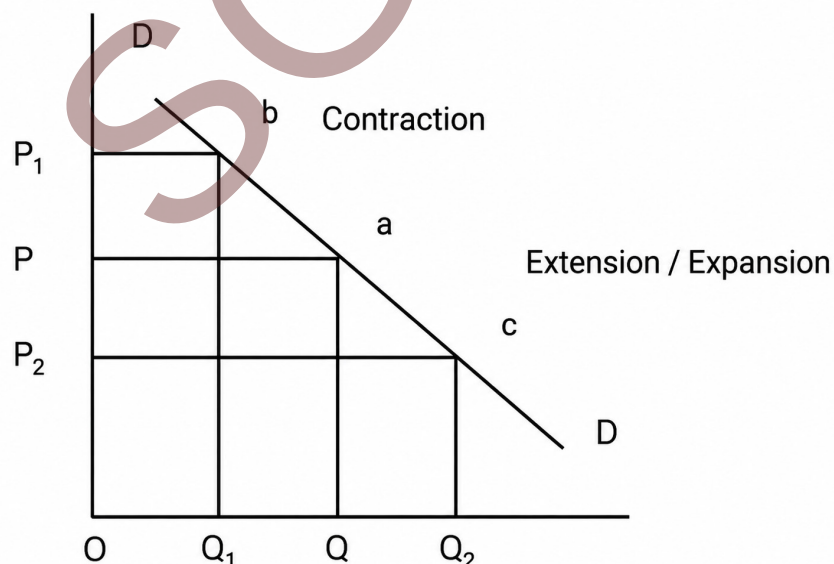


Fig. 1.2.1 Extension and Contraction of Demand

On a demand curve, the x-axis represents the quantity demanded and the y-axis represents the price of the commodity. Let OP be the original price and OQ the corresponding quantity demanded. If the price falls to P_2 , the quantity demanded rises to OQ_2 , indicating an extension of demand. Conversely, if the price rises to P_1 , the quantity demanded falls to OQ_1 , representing a contraction of demand. On the demand curve, the area from a to c shows the extension / expansion of demand, while the area from a to b shows the contraction. These changes occur as a movement along the same demand curve, reflecting the inverse relationship between price and quantity demanded.

1.2.2.3 Shift in Demand

Extension and contraction of demand occur along the same demand curve as a result of changes in the price of a commodity. In contrast, a shift in demand happens when factors other than price, such as consumer income, tastes and preferences, or the prices of related goods, change. An increase in demand is represented by an upward or rightward shift of the demand curve, indicating that consumers want to buy more at the same price, while a decrease in demand is shown by a downward or leftward shift, meaning consumers want to buy less at the same price. Let us explain with the help of figure:

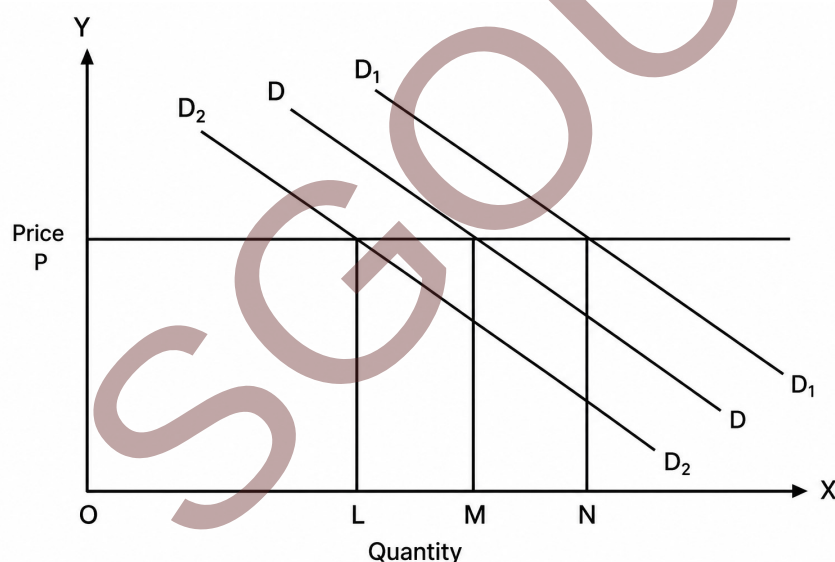


Fig. 1.2.2 Shift in Demand Curves

The original demand curve is represented by DD . When factors such as consumer income, tastes, and preferences change, the demand curve shifts while the price remains the same. In the diagram, the curve D_1 - D_1 represents an upward shift, indicating an increase in demand, whereas D_2 - D_2 represents a downward shift, indicating a decrease in demand.

1.2.3 Supply

Supply refers to the quantity of a good or service that producers are willing and able to sell during a given period under specific conditions. These conditions include the price of the good, prices of related goods, technology, input costs, weather, and other factors, all of which influence the quantity supplied. The market supply function expresses this relationship, showing how the quantity supplied depends on these factors. Mathematically, it can be written as

$$Q = f(\text{Price of X, Prices of Related Goods, Technology, Input Prices, Weather, etc.})$$

where Q represents the quantity supplied and f indicates the function describing how supply varies with the influencing factors.

1.2.3.1 Determinants of Supply

The supply of a commodity is influenced by several factors:

1. **Price of the Commodity:** This is one of the major factors affecting supply. Higher prices encourage producers to supply more, while lower prices reduce supply. This direct relationship between price and quantity supplied explains why the supply curve slopes upward.
2. **Price of Related Goods:** If the price of a substitute good rises, producers may shift production to that good, reducing the supply of the original commodity.
3. **State of Technology:** Improvements in production technology reduce costs, making production more efficient and increasing supply.
4. **Cost of Production:** Higher input costs, such as wages or raw materials, increase production expenses and reduce supply, while lower costs can boost supply.
5. **Government Policy:** Taxes, subsidies, and regulations influence supply. Taxes tend to reduce supply, whereas subsidies and supportive policies increase it.
6. **Other Factors:** Supply can also be affected by weather conditions, expectations about future prices, and the availability of resources.

1.2.3.2 Supply Curve

The supply curve represents the relationship between the price of a commodity and the quantity supplied, while holding all other influencing factors constant. The supply function specifies how quantity supplied depends on various variables, but when drawing a supply curve, all factors except the price of the product are assumed to be fixed. For example, in the case of automobiles, the prices of inputs like labour, steel, and energy are held constant to examine how changes in the price of cars affect the quantity supplied. Let us see the curve.

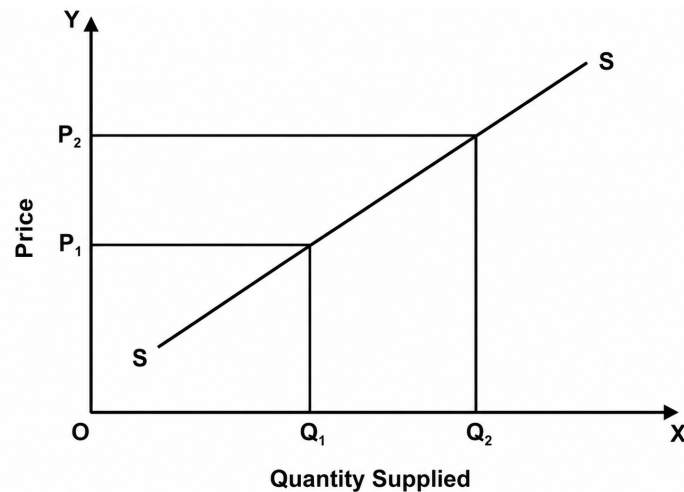


Fig. 1.2.3 Supply Curve

1.2.3.3 Change in Supply and Shift in Supply Curve

A movement along the supply curve occurs when the quantity supplied changes due to a change in the price of the product. A shift in the supply curve happens when supply changes because of factors other than price, such as changes in technology, input costs, or government policies. If these factors increase supply, the curve shifts to the right; if they decrease supply, the curve shifts to the left.

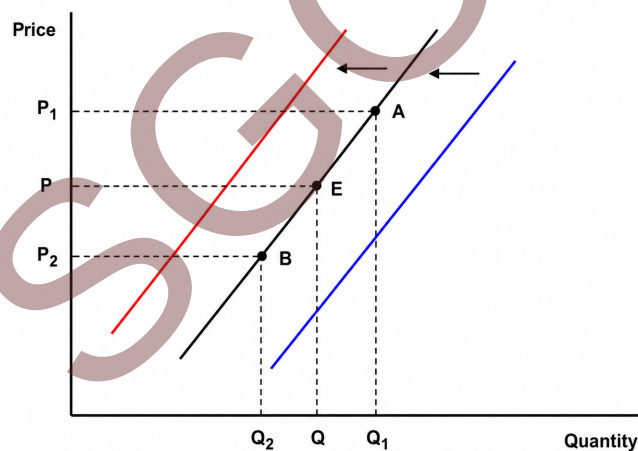


Fig. 1.2.4 Change in Supply and Shift in Supply Curve

The x-axis represents the quantity and the y-axis represents the price of the commodity. When the price of a commodity rises from P to P_1 , the quantity supplied increases from Q to Q_1 , and when the price falls from P to P_2 , the quantity supplied decreases from Q to Q_2 . This represents a movement along the supply curve, which occurs due to a change in price. On the other hand, a shift in the supply curve happens when factors other than price, such as technology, input costs, or government policies, change. If these factors increase supply, the supply curve shifts rightward (upward), and if they decrease supply, the curve shifts leftward (downward).

1.2.4 Elasticity of Demand and Supply

Elasticity of demand and supply is an important concept in economics that measures the responsiveness of quantity demanded or supplied to changes in price, income, or related factors. It helps in understanding how consumers and producers react to market changes. Price elasticity, income elasticity, and cross elasticity are key measures of demand, while price elasticity of supply measures producers' responsiveness. This concept is essential for making pricing, production, and policy decisions in business and economics.

Elasticity of Demand

The concept of elasticity of demand was introduced by Alfred Marshall. It explains how quantity demanded responds to changes in various determining factors. In simple terms, it shows how sensitive demand is to changes in these factors.

Elasticity of demand may be defined as the measure of responsiveness of quantity demanded to changes in factors such as price, income, or the prices of related goods. It indicates the extent and speed with which demand adjusts when such changes occur. There are mainly three types of elasticity of demand:

1. Price Elasticity of Demand
2. Income Elasticity of Demand
3. Cross Elasticity of Demand

Price Elasticity of Demand: Price elasticity of demand refers to the extent to which quantity demanded responds to a change in price. It measures the degree of sensitivity of demand to price changes. In other words, it explains how much the quantity demanded changes when the price of a commodity changes. Price elasticity of demand is defined as the ratio of the percentage change in quantity demanded to the percentage change in price. It is expressed by the following formula:

Price Elasticity of Demand = Proportionate change in price / Proportionate change in quantity demanded

Or,

$$E_p = \frac{\Delta Q/Q}{\Delta P/P}$$

Or,

$$E_p = \frac{(Q_2 - Q_1)/Q_1}{(P_2 - P_1)/P_1}$$

Where:

- Q_1 = Quantity demanded before the price change
- Q_2 = Quantity demanded after the price change
- P_1 = Price before the price change
- P_2 = Price after the price change

1.2.4.1 Types (Degrees) of Price Elasticity of Demand

Based on the degree of responsiveness, price elasticity of demand is classified into five types:

1. Perfectly Elastic Demand
2. Perfectly Inelastic Demand
3. Relatively Elastic Demand
4. Relatively Inelastic Demand
5. Unitary Elastic Demand

- 1. Perfectly Elastic Demand (Infinitely Elastic Demand):** Perfectly elastic demand refers to a situation in which an extremely small change in price results in an infinite change in quantity demanded. In this case, demand is highly sensitive to price changes. The value of the price elasticity of demand is infinite.

$$Ep = \infty$$

The demand curve under perfectly elastic demand is represented by a horizontal straight line, indicating that the price remains constant regardless of the quantity demanded. This type of demand is generally considered a theoretical concept and is rarely encountered in practice, but it is useful for analytical purposes.

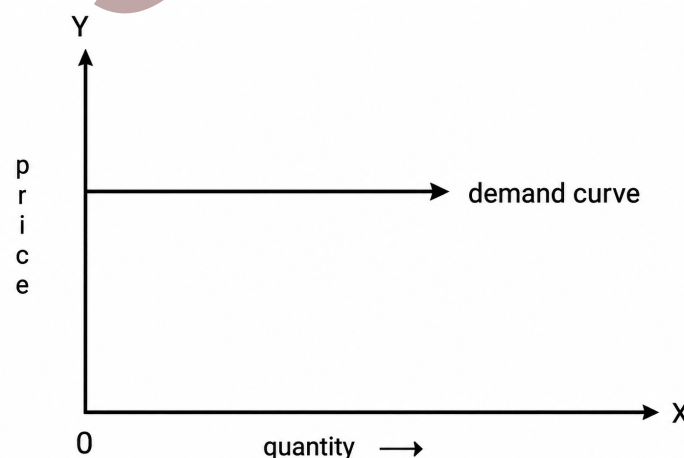


Fig. 1.2.5 Perfectly Elastic Demand



2. **Perfectly Inelastic Demand:** Perfectly inelastic demand refers to a situation in which a price change has no effect on demand, and the quantity demanded remains constant regardless of whether the price rises or falls. In this case, demand is said to be completely unresponsive to price changes. This type of demand is usually associated with essential goods where consumption cannot be easily altered. The value of price elasticity of demand is zero.

$$Ep = 0$$

The demand curve under perfectly inelastic demand is represented by a vertical straight line, showing that the quantity demanded remains fixed at all price levels.

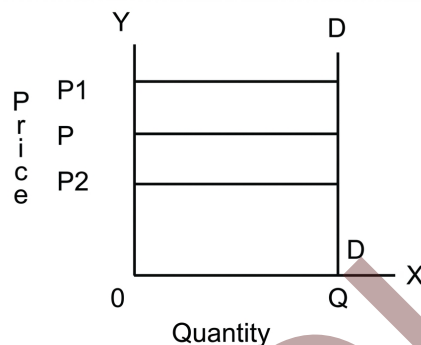


Fig. 1.2.6 Perfectly Inelastic Demand

3. **Relatively Elastic Demand:** Relatively elastic demand refers to a situation in which a small price change brings about a relatively large change in quantity demanded. This indicates that demand is highly responsive to price changes. In this case, consumers react strongly to even minor price variations, resulting in a significant increase or decrease in quantity demanded. The value of price elasticity of demand is greater than one.

$$Ep > 1.$$

The demand curve under relatively elastic demand is flatter (less steep), showing a high degree of sensitivity of quantity demanded to price changes.

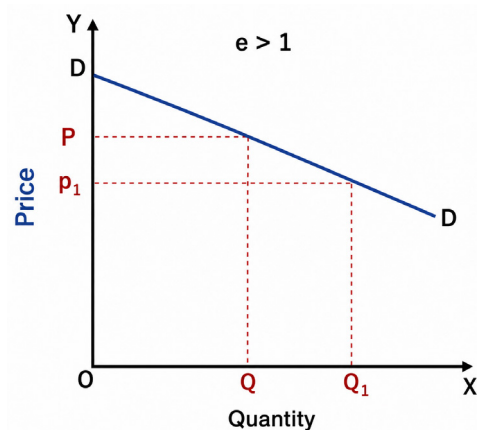


Fig. 1.2.7 Relatively Elastic Demand

4. **Relatively Inelastic Demand:** Relatively inelastic demand refers to a situation in which the change in quantity demanded is less than proportionate to the change in price. In other words, a large change in price results in only a small change in quantity demanded. In this case, demand is said to be less responsive to price changes. The price elasticity of demand is less than 1.

$$E_p < 1$$

The demand curve under relatively inelastic demand is steeper, indicating limited responsiveness of quantity demanded to price changes. This type of demand is commonly associated with necessities or goods with fewer substitutes.

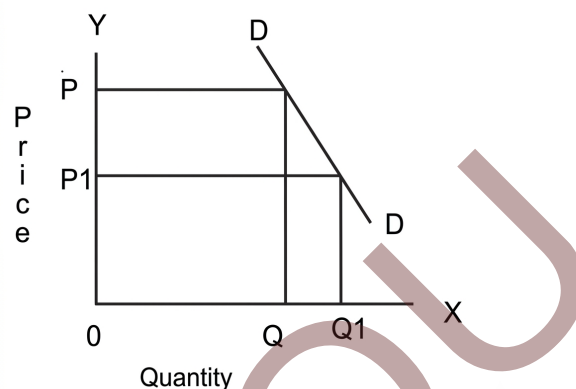


Fig. 1.2.8 Relatively Inelastic Demand

5. **Unitary Elasticity of Demand (Unit Elastic Demand):** Unitary elasticity of demand refers to a situation in which the percentage change in quantity demanded is exactly equal to the percentage change in price. As a result, the proportionate change in demand is the same as the proportionate change in price. Therefore, the value of price elasticity of demand is equal to one.

$$E_p = 1$$

The demand curve under unitary elastic demand takes the shape of a rectangular hyperbola, indicating that quantity demanded is equally responsive to changes in price.

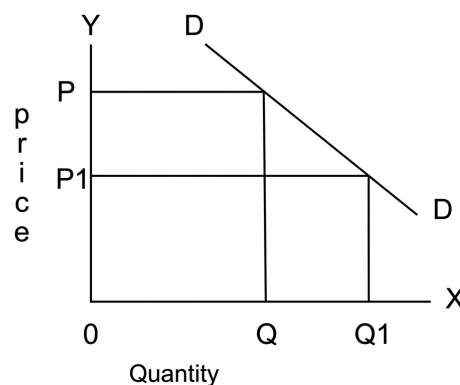


Fig. 1.2.9 Unitary Elasticity of Demand

Income Elasticity of Demand: Income elasticity of demand refers to the degree of responsiveness of quantity demanded to a change in consumers' income. It explains how demand for a commodity changes when consumers' income levels increase or decrease. Income elasticity of demand is expressed by the following formula:

$$E_y = \frac{\text{Proportionate change in quantity demanded}}{\text{Proportionate change in income}}$$

Income elasticity of demand is mainly classified into three types:

1. **Zero Income Elasticity:** Zero income elasticity occurs when quantity demanded remains unchanged despite a change in income. In this case, variations in income do not influence demand. For examples: salt, sugar, necessities
 $E_y = 0$
2. **Negative Income Elasticity:** Negative income elasticity exists when an increase in income leads to a fall in quantity demanded. Such goods are known as inferior goods. Examples are coarse grains, low-quality substitutes
 $E_y < 0$
3. **Positive Income Elasticity:** Positive income elasticity occurs when quantity demanded increases with an increase in income. In other words, demand rises as income rises $E_y > 0$

Positive income elasticity can be further classified into three categories:

- a. **Unitary Income Elasticity:** Quantity demanded changes in the same proportion as income. The value of unitary income elasticity is $E_y = 1$
- b. **Income Elasticity Greater than Unity:** Quantity demanded increases more than proportionately in response to an increase in income. This is usually observed with luxury goods. The value of income elasticity is greater than unity, $E_y > 1$
- c. **Income Elasticity Less than Unity:** Quantity demanded increases with income but less than proportionately. This is common for necessities. The value of income elasticity is $E_y < 1$

Cross Elasticity of Demand: Cross elasticity of demand refers to the degree of responsiveness of the quantity demanded of one commodity to a change in the price of another related commodity. The related commodities may be substitutes or complements. Substitute goods are those that can be used in place of each other, such as tea and coffee. Complementary goods are those which are used together, such as a car and petrol. Cross elasticity of demand is expressed by the following formula:

$$\text{Cross Elasticity of Demand} = \frac{\text{Proportionate change in quantity demanded of a commodity}}{\text{Proportionate change in the price of a related commodity}}$$

When the cross elasticity is positive, the commodities are said to be substitutes. For example, an increase in the price of tea leads to an increase in the demand for coffee, as consumers shift from tea to coffee. On the other hand, when the cross elasticity is negative, the commodities are said to be complements. For example, an increase in car prices reduces demand for petrol, since both goods are jointly consumed.

Elasticity of supply: Elasticity of supply measures the responsiveness of the quantity supplied of a commodity to a change in its price. It indicates how much the quantity supplied changes in response to a change in price. The formula for price elasticity of supply should be:

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

1.2.4.2 Types of Elasticity of Supply

1. **Perfectly Elastic Supply:** Perfectly elastic supply occurs when suppliers are willing to supply any quantity at a particular price, but not at a slightly lower price. The price elasticity of supply is infinite ($E_s = \infty$), and the supply curve is represented by a horizontal line.

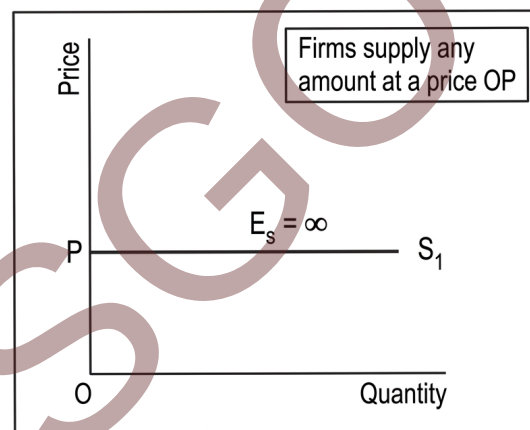


Fig. 1.2.10 Perfectly Elastic Supply

2. **Perfectly Inelastic Supply:** Perfectly inelastic supply occurs when the quantity supplied remains constant regardless of price changes. In other words, suppliers are unable or unwilling to change the quantity supplied even if the price rises or falls. Here, the price elasticity of supply is zero ($E_s = 0$), and the supply curve is a vertical line.

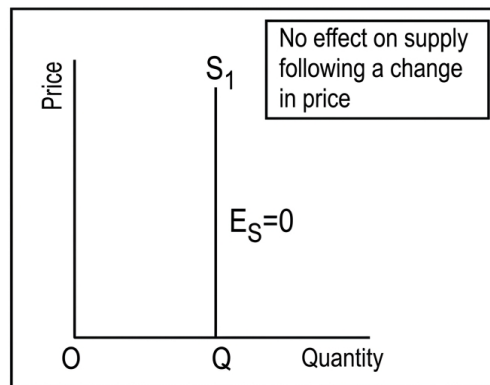


Fig. 1.2.11 Perfectly Inelastic Supply

3. **Relatively Elastic Supply:** Relatively elastic supply exists when the quantity supplied changes more than proportionately to a change in price. This means that suppliers respond strongly to price changes by increasing or decreasing the quantity supplied significantly. The elasticity of supply is greater than one ($E_s > 1$), and the supply curve appears flatter.

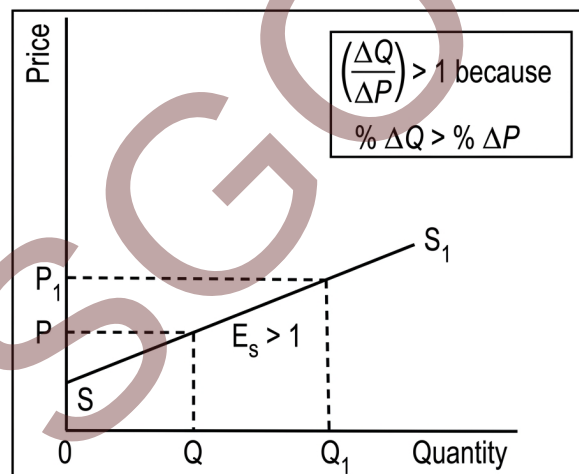


Fig. 1.2.12 Relatively Elastic Supply

4. **Relatively Inelastic Supply :** Relatively inelastic supply occurs when the quantity supplied changes by a smaller percentage than the change in price. In this case, even large price changes lead to only small changes in the quantity supplied. The price elasticity of supply is less than one ($E_s < 1$), and the supply curve is steeper.

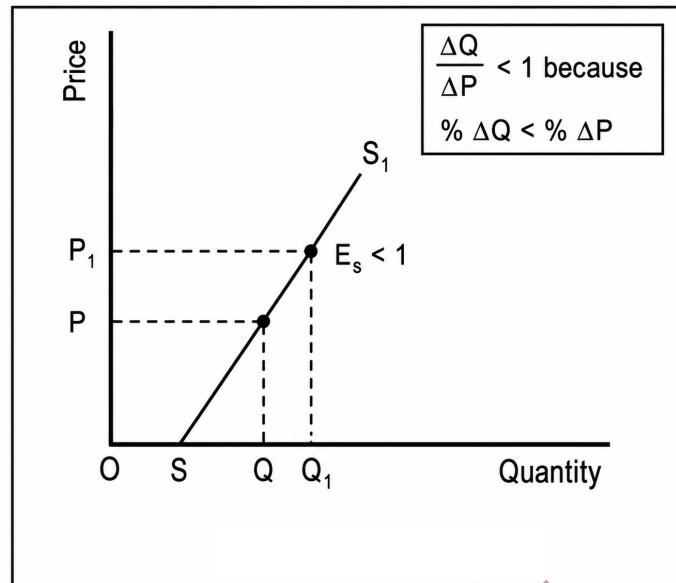


Fig. 1.2.13 Relatively Inelastic Supply

5. **Unitary Elastic Supply:** Unitary elastic supply exists when the quantity supplied changes exactly in proportion to a change in price. Here, the price elasticity of supply equals one ($E_s = 1$), and the supply curve is represented by a rectangular hyperbola, showing a balanced response of quantity supplied to price changes.

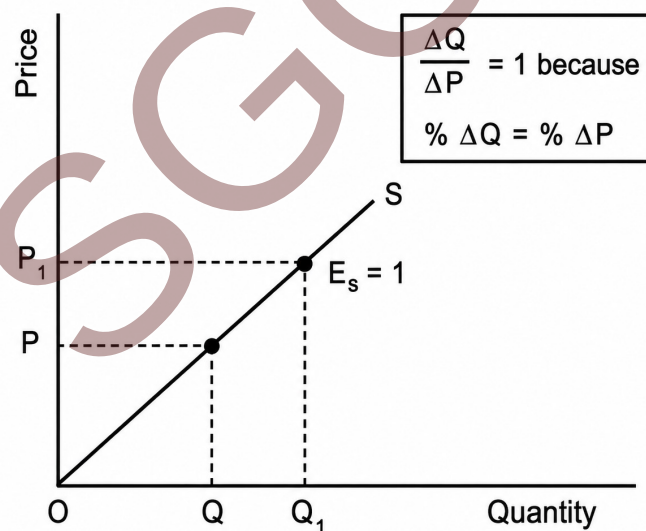


Fig. 1.2.14 Unitary Elastic Supply

1.2.5 Managerial Applications and the Importance of Elasticity of Demand

Elasticity of demand is a crucial concept in economics and managerial decision-making, as it helps producers, governments, and managers make informed choices

regarding production, pricing, taxation, and trade. Its importance can be explained in detail as follows:

- 1. Production Decisions:** Elasticity of demand helps producers decide the appropriate level of output for their products. When demand is elastic, a small reduction in price can lead to a large increase in quantity demanded, indicating that increasing production can be profitable. On the other hand, for goods with inelastic demand, even large price changes may not significantly affect sales, helping managers avoid overproduction and allocate resources efficiently.
- 2. Price Fixation:** Managers must consider elasticity while setting prices under monopoly or imperfect competition. For products with inelastic demand, firms can charge higher prices without losing many customers, thereby increasing total revenue. Conversely, for products with elastic demand, high prices may drastically reduce demand, so pricing must be carefully balanced to maximise sales and revenue.
- 3. Distribution and Factor Rewards:** Elasticity of demand influences the determination of wages and factor rewards. For instance, if the demand for labor is inelastic, trade unions can negotiate higher wages without significantly reducing employment. Similarly, firms can use knowledge of demand elasticity to plan factor payments while maintaining profitability and production efficiency.
- 4. International Trade:** Elasticity plays an important role in international trade, especially in determining the terms of trade between countries. Products with inelastic foreign demand can generate higher export revenue, while goods with elastic demand may see large changes in export volumes due to price fluctuations. Understanding elasticity helps policymakers and trade managers make strategic decisions about exports, imports, and trade agreements.
- 5. Public Finance and Tax Policy:** Governments rely on the elasticity of demand to design effective tax policies. Taxes on goods with inelastic demand, such as petrol or cigarettes, generate substantial revenue without greatly reducing consumption. In contrast, taxing goods with elastic demand may lead to a significant drop in consumption, reducing the intended revenue. Hence, elasticity helps the government optimise tax collection and policy planning.
- 6. Nationalisation Decisions:** Elasticity helps governments decide which industries to nationalise. Essential goods with inelastic demand, such as electricity and water, can be nationalised to ensure a stable supply and generate government revenue. In contrast, goods with elastic demand are usually left in private hands, allowing competition and efficiency to guide production and pricing.

7. **Price Discrimination:** Elasticity of demand enables firms to implement price discrimination strategies. Products with inelastic demand can be sold at higher prices to maximise revenue, while products with elastic demand may be offered at lower prices or discounts to attract more buyers. This helps firms increase overall revenue by charging prices according to consumer responsiveness.
8. **Other Managerial Decisions:** Elasticity of demand is also useful for various strategic decisions. It helps managers determine the price of joint products, plan mergers and takeovers, and design advertising campaigns. Understanding how consumers respond to price changes enables firms to make profitable and efficient decisions in competitive markets.

Elasticity of demand is not only a theoretical concept but also a practical tool for managers, policymakers, and governments. It enables informed decisions on production, pricing, wages, taxation, trade, and market strategies. By analysing how demand reacts to price, income, or related goods, managers can maximise revenue, optimise resource allocation, and achieve a competitive advantage.

1.2.6 Cost

Cost refers to the expenses incurred in producing goods or services. It is the total money spent by a firm, from purchasing raw materials to delivering the finished product to the market. Cost includes all expenditures related to production and is essential for managerial decision-making. The cost function can take different forms depending on the nature of variables. In the short run, some factors are fixed, and only variable factors such as labor and raw materials can be changed. In the long run, all factors are variable. Let us now look at the different types of costs.

- ◇ **Money cost:** Money cost, also called nominal cost, refers to the total money expenses incurred in producing a good, including wages, raw materials, power, insurance, transportation, advertising, and machinery.
- ◇ **Real cost:** Real cost represents the actual efforts or sacrifices of owners and workers in producing a good and also reflects the next best alternative that is forgone.
- ◇ **Opportunity cost:** Opportunity cost is the cost of foregoing the next best alternative, such as using a building for business instead of renting it out, and is important for managerial decisions, pricing, and resource allocation.
- ◇ **Sunk Costs:** Sunk Costs are expenses that have already been incurred and cannot be recovered, for example, past investment in machinery.
- ◇ **Incremental Cost:** Incremental cost refers to additional costs arising from a change in the level of production or activity, while differential cost measures the difference in cost between two alternative production methods.



- ◇ **Explicit costs:** Explicit costs are actual cash payments made to others, such as wages, rent, and raw materials, whereas implicit costs are non-cash costs like rent of owned premises, salary of the entrepreneur, or interest on owned capital, also called imputed or hypothetical costs.
- ◇ **Accounting Costs:** Accounting costs include all explicit costs recorded in the books of accounts and are used for financial reporting and tax purposes, while economic costs combine both explicit and implicit costs and are used for managerial decision-making and efficient allocation of resources.
- ◇ **Private Costs:** Private costs are the costs incurred by a firm in producing goods or services, including both explicit and implicit costs, whereas social costs represent the total cost borne by society, encompassing private costs as well as external costs, such as pollution or public expenses.
- ◇ **Fixed Costs:** Fixed costs are the expenses that do not change with the level of production. They remain constant up to a certain level, and even if output is zero, the firm must still pay them. Examples include rent, interest, depreciation, insurance, and salaries. Because these costs remain the same regardless of output, they are also known as supplementary costs, capacity costs, period costs, or overhead costs.
- ◇ **Average fixed cost (AFC) :** Average fixed cost (AFC) refers to fixed cost per unit and changes when the quantity of production changes. As output increases, average fixed cost decreases because the same total fixed cost is spread over more units. Similarly, when output decreases, average fixed cost increases. Thus, there is an inverse relationship between average fixed cost and the volume of production. AFC is calculated by dividing total fixed cost by total output.
- ◇ **Variable Costs:** Variable costs are the expenses that change directly with the level of production. When output increases, variable costs also increase, and when output decreases, variable costs fall. This means there is a direct relationship between variable cost and the volume of production. These costs are also called prime costs or direct costs because they vary with each unit produced. Common examples include the cost of raw materials, wages of workers directly involved in production, power, and other direct expenses.
- ◇ **Average Cost:** Average Cost (AC) refers to the cost of production per unit and is calculated by dividing the total cost by the number of units produced. It is also called Average Total Cost because it includes both Average Fixed Cost (AFC) and Average Variable Cost (AVC). For example, if the total cost of producing 60 units is ₹2400, then the average cost is found using the formula:

$$\text{Average Cost} = \text{Total Cost} \div \text{Units of Output.}$$

$$\text{So, AC} = 2400 \div 60 = ₹40 \text{ per unit.}$$

This shows how average cost helps producers understand the cost of producing each unit of output.

- ◇ **Marginal Cost:** Marginal cost refers to the extra cost a firm incurs when it produces one more unit of a product. It shows how much the total cost increases with a small increase in output. In simple terms, it is the cost of the next unit produced and helps firms decide whether producing additional units is profitable.
- ◇ **Total Cost:** Total Cost is made up of both the fixed cost and the variable cost. Opportunity Cost

1.2.7 Profit

Profit is the reward earned by an entrepreneur for organising, managing, and taking risks in a business. Economists view profit as a residual income, meaning it is what remains after all costs, both explicit and implicit, of production are deducted from total revenue. Profit is uncertain and may be positive or negative; it is not a fixed or contractual payment, and it represents the surplus remaining after all costs have been accounted for. In the words of J.A. Schumpeter, “Profit is the reward for innovation and successful entrepreneurial activity.” Knight also defined profit as the reward for bearing uncertainty and risk in business, emphasising that profit is a compensation for the entrepreneur’s willingness to face unpredictable outcomes and make decisions under conditions of uncertainty.

Profit is a broad concept, and no single theory fully explains its origin. Different economists have explained profit in different ways. According to the Risk-Bearing Theory of Profit put forward by Prof. Hawley, entrepreneurs earn profit as a reward for taking risks in starting and managing a business, such as choosing the line of business and managing unexpected changes in demand, supply, and prices. Similarly, F.H. Knight’s Uncertainty-Bearing Theory emphasises that profit is a reward for bearing non-insurable uncertainties, encouraging careful management of business unpredictability. Both theories recognise the role of risk and uncertainty, but critics point out that innovation, monopoly power, and individual ability also contribute to profit.

The Rent Theory of Profit introduced by Francis A. Walker, views profit as a form of 'rent' arising from an entrepreneur’s skill and efficiency. While marginal entrepreneurs may earn zero profit, more capable entrepreneurs earn positive profit as a surplus. In contrast, Karl Marx’s Labour Exploitation Theory explains profit as arising from surplus value created by labour, where workers are paid less than the value they produce. Capitalists gain profit by exploiting labour, and reinvestment increases productivity and surplus. Critics argue that both theories have limitations: the rent theory cannot account for chance or windfall profits, and Marx’s approach ignores the contributions of land and capital and does not consider risk or uncertainty.

The Marginal Productivity Theory of Profit states that profit is determined by the value of the marginal product of entrepreneurial services, meaning entrepreneurs earn profit equal to the additional value created by an extra unit of their efforts. This theory explains the demand for entrepreneurial services and how profits are determined under perfect competition. However, it assumes ideal conditions, overlooks differences among entrepreneurs, and cannot fully explain elements such as windfall gains. Overall,



these theories together highlight that profit arises from a combination of risk-bearing, uncertainty, skill, innovation, and labour dynamics.

1.2.7.1 Types of Profit

1. **Normal Profit:** Normal profit is the minimum level of profit required to keep an entrepreneur engaged in a business. It is considered part of the cost of production because, without earning at least this amount, the entrepreneur would withdraw from the industry. Normal profit ensures that the business is sustainable in the long run and that resources remain employed in their current use rather than being diverted to alternative opportunities.
2. **Supernormal (Excess) Profit:** Supernormal profit, also called excess profit, is the profit earned over and above the normal profit. It is the reward for exceptional entrepreneurial ability, innovation, or successful business strategies. Unlike normal profit, supernormal profit is not guaranteed and is achieved only by more efficient or successful entrepreneurs who outperform their competitors.
3. **Monopoly Profit:** Monopoly profit arises when a firm possesses market power, allowing it to restrict output or control prices. Such profits are not the result of special skill or efficiency but come from the firm's ability to limit competition and maintain scarcity in the market. Monopoly profit exists only in imperfect markets and may attract government regulation to protect consumers.
4. **Windfall Profit:** Windfall profit refers to unexpected or accidental gains earned by a firm due to unforeseen circumstances, such as sudden price increases, market booms, or favourable economic changes. These profits are not related to the entrepreneur's skill, risk-bearing, or innovation; they occur purely by chance. While rare, windfall profits can significantly increase the earnings of a business in the short term.

Recap

- ◇ Land is the factor of production whose supply is fixed in the short run
- ◇ Rent is the reward paid for the use of land
- ◇ Land is considered a passive factor of production
- ◇ Wages are the reward paid for labour services
- ◇ Interest is the reward for the use of capital
- ◇ Entrepreneurship is the factor of production that organises and combines other factors
- ◇ Profit is considered the reward for entrepreneurship and risk-bearing
- ◇ The factor market is the market where factors of production are bought and sold

- ◇ In economics, demand requires the ability to pay in addition to desire and willingness
- ◇ The inverse relationship between price and quantity demanded is known as the law of demand
- ◇ A change in quantity demanded due to a price change is called a movement along the demand curve
- ◇ A rightward shift of the demand curve indicates an increase in demand
- ◇ A change in income causes a shift in the demand curve
- ◇ Supply refers to the quantity of a good that producers are willing and able to sell
- ◇ The supply curve generally slopes upward
- ◇ A perfectly inelastic supply exists when the supply remains constant irrespective of price
- ◇ Sunk costs are expenses that have already been incurred and cannot be recovered
- ◇ Opportunity cost is the cost of the next best alternative foregone
- ◇ Fixed costs are costs that remain unchanged with changes in output
- ◇ Variable costs include expenses such as raw materials that change with output
- ◇ Average cost is calculated by dividing the total cost by the total output
- ◇ Marginal cost is the additional cost of producing one more unit of output
- ◇ Accounting costs include only explicit costs recorded in the books of accounts
- ◇ Economic cost includes both explicit and implicit costs
- ◇ Social cost includes private cost as well as external cost
- ◇ Profit remaining after deducting all explicit and implicit costs is called residual income
- ◇ Normal profit is treated as a part of the cost of production
- ◇ Supernormal profit is the profit earned above normal profit
- ◇ Windfall profit refers to unexpected profit earned due to unforeseen circumstances
- ◇ Hawley explained profit as a reward for risk-bearing
- ◇ Knight related profit to uncertainty-bearing
- ◇ Schumpeter associated profit with innovation
- ◇ Alfred Marshall introduced the concept of elasticity of demand
- ◇ Price elasticity of demand measures the responsiveness of quantity demanded to changes in price



- ◇ Perfectly elastic demand has an elasticity value of infinity
- ◇ Under unitary elasticity, the demand curve takes the shape of a rectangular hyperbola
- ◇ Inferior goods show negative income elasticity of demand
- ◇ Luxury goods generally have income elasticity greater than one
- ◇ Cross elasticity of demand is positive for substitute goods
- ◇ Cross elasticity of demand is negative for complementary goods
- ◇ Elasticity of supply measures responsiveness to changes in price
- ◇ A perfectly elastic supply curve is represented by a horizontal straight line
- ◇ A perfectly inelastic supply curve is represented by a vertical straight line
- ◇ Normal profit is the minimum profit necessary to keep a firm in business
- ◇ Marginal cost measures the additional cost of producing one more unit
- ◇ Perfectly inelastic demand refers to demand that does not change with price
- ◇ Complementary goods are goods that show negative cross elasticity of demand

Objective Questions

1. Which factor of production has a fixed supply in the short run?
2. What is the reward paid for the use of land?
3. What is the reward for labour services?
4. What is the reward for entrepreneurship and risk-bearing?
5. Which two sectors are connected by the circular flow of income?
6. What is the market called where factors of production are bought and sold?
7. What is required for demand in economics besides desire and willingness?
8. What is the inverse relationship between the price of a commodity and the quantity demanded called?
9. What type of demand arises for tyres due to the demand for vehicles?
10. What type of demand is illustrated by tea and sugar?
11. What kind of change in the demand curve is caused by income variation?

12. What does supply refer to in economics?
13. What is a price-based change in quantity supplied called?
14. What type of elasticity exists when supply remains constant irrespective of price?
15. What are unrecoverable past expenses called?
16. What is the cost of the next best alternative foregone called?
17. What costs remain unchanged with output?
18. What type of cost includes raw material expenses?
19. What is the cost of producing one additional unit called?
20. What type of costs are recorded in accounting books?
21. What type of costs are added to explicit costs to obtain economic cost?
22. What additional cost component is included in social cost?
23. What is profit called after deducting all explicit and implicit costs?
24. What type of profit is treated as part of the cost of production?
25. What profit is earned above normal profit?
26. What profit arises due to monopoly power?
27. Who explained profit as a reward for risk-bearing?
28. Who related profit to uncertainty-bearing?
29. Who associated profit with innovation?
30. Who introduced the concept of elasticity of demand?
31. What does price elasticity of demand measure?
32. What is the value of perfectly inelastic demand?
33. What is the shape of the demand curve under unitary elasticity?
34. What type of income elasticity is shown by inferior goods?
35. What level of income elasticity do luxury goods usually have?
36. What is the sign of cross elasticity for substitute goods?
37. What is the sign of cross elasticity for complementary goods?



38. Elasticity of supply measures responsiveness to changes in what variable?
39. What is the shape of the perfectly elastic supply curve?
40. What is the shape of the perfectly inelastic supply curve?

Answers

1. Land
2. Rent
3. Wages
4. Profit
5. Households and firms
6. Factor market
7. Ability to pay
8. Law of demand
9. Derived demand
10. Joint demand
11. Shift in demand
12. Quantity producers are willing and able to sell
13. Movement along the supply curve
14. Perfectly inelastic supply
15. Sunk costs
16. Opportunity cost
17. Fixed costs
18. Variable costs
19. Marginal cost
20. Explicit costs
21. Implicit costs
22. External cost
23. Residual income
24. Normal profit
25. Supernormal profit
26. Monopoly profit

27. Hawley
28. Knight
29. Schumpeter
30. Alfred Marshall
31. Responsiveness of quantity demanded to price change
32. Zero
33. Rectangular hyperbola
34. Negative income elasticity
35. Greater than one
36. Positive
37. Negative
38. Price
39. Horizontal line
40. Vertical line

Assignments

1. Explain the factors of production and their rewards.
2. Define demand and explain its determinants.
3. Distinguish between the extension of demand and the shift in demand.
4. Explain different cost concepts used in economic analysis.
5. Discuss the theories of profit.
6. Explain price elasticity of demand and its types.
7. Explain the concept of elasticity of demand and discuss its managerial applications.
8. Analyse the determinants of supply and explain the supply curve.
9. Examine income and cross elasticity of demand with suitable examples.

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BLOCK

2

**Demand
Forecasting
and Pricing**

Unit 1

Demand Forecasting

Learning Outcomes

After completing this unit, the learner will be able to:

- ◇ discuss demand forecasting in managerial decision-making
- ◇ identify different methods of demand forecasting
- ◇ know the process of demand forecasting for a new product

Prerequisite

When people try to plan for the future, they rarely do it blindly. Imagine a student preparing for an important examination. He does not simply open his books on the morning of the exam. Instead, he reviews his performance on earlier tests, listens to his teacher's guidance, and assesses how much time he needs to revise each subject. All these observations help him decide how to study in the days ahead.

Similarly, picture a small tea stall owner near a bus stop. She notices that some days are busier than others. On rainy evenings, more travellers stop by for a hot drink, while on holidays, the crowd is smaller. Over time, she begins to understand these patterns and uses them to decide how much tea to prepare each day. Her decisions are not guesses; they are choices shaped by experience.

Even in our everyday life, we constantly look for signs that help us prepare for what may happen tomorrow. We check the weather before planning a trip, notice traffic before leaving for work, and observe our monthly expenses before buying something new. All these small acts show how people naturally try to understand the future using what they already know.

In the world of business, this habit of preparing for what lies ahead becomes even more important. Firms cannot afford to run short of goods or produce too much without purpose. They need a clearer picture of what the coming days may look like. This is where the concepts of demand forecasting become useful; they help organisations understand what tomorrow might demand from them.

Keywords

Demand Forecasting, Market Experiments, Time Series Analysis, Barometric Forecasting, Production Planning, Managerial Decision-Making, Consumer Behaviour

Discussion

2.1.1 Demand Forecasting

Demand forecasting refers to the careful estimation of how much of a product or service consumers are likely to purchase in the future. In managerial economics, this process helps a firm look beyond the present moment and prepare for the period ahead. Businesses rarely operate on guesswork; they need a reasonable idea of future demand so that decisions on production, pricing, staffing, raw materials, finance, and expansion can be taken responsibly. Forecasting does not claim to predict the future with absolute certainty. Rather, it provides a guided estimate based on available information, past patterns, and market conditions. When managed effectively it enhances operational stability and reduces unnecessary costs arising from shortages or surpluses.

To understand this idea more clearly, consider a simple situation. A bakery in a town notices that its bread sales rise during the early winter months, when people prefer eating hot meals at home. In the summer, bread sales fall slightly as families eat out more often. Over the years, the bakery has observed these movements and realised that they are not random. They reflect changes in weather, household routines, and local demand. The owner uses this understanding to plan how much flour to buy, how many staff members to keep on different days, and how much stock to maintain. This act of studying earlier demand patterns and preparing for the next season is the essence of demand forecasting. Even though this example is simple, the same principle guides large firms in manufacturing, retail, transport, hospitality, health care, and virtually every sector.

Demand forecasting becomes necessary because firms operate in an environment where demand shifts continuously. Customers change their preferences, new competitors arrive, income levels rise or fall, festivals alter consumption patterns, technology introduces new habits, and government policies influence spending. Managers need to read these signals carefully and plan accordingly. Forecasting provides an organised way to bring together these signals and turn them into usable estimates. When managers understand possible future demand, they can maintain the right output levels, avoid wastage, schedule workers properly, manage inventories, and plan investments without fear of sudden shocks.

In practical terms, demand forecasting helps a business answer an important question: Will demand increase next month or next year? By how much? Should the



firm expand its capacity or wait? How much raw material will be required to meet the expected demand? What price should be charged to balance demand and profitability? If a new product is to be introduced, how will the market respond initially? These questions are central to day-to-day business planning and cannot be addressed without some foresight. That is why forecasting is treated as an essential managerial function across industries.

Demand forecasting connects present decisions with future needs. Managers do not look at the future unthinkingly. They rely on organised information, previous trends, simple or advanced forecasting methods, and a structured understanding of the market. Through these efforts, they reduce uncertainty and create a smoother flow of business activities. In short, demand forecasting gives a business the confidence to prepare for tomorrow while working in the realities of today.

2.1.1.1 Methods of Demand Forecasting

Firms use several methods to estimate future demand, and each method is chosen based on the nature of the product, the availability of data, the size of the market, and the time available for decision-making. These methods range from simple judgement-based techniques to more systematic and data-oriented approaches. While no method is perfect, each provides useful guidance to managers planning ahead. The most commonly used approaches include expert opinion, surveys and market experiments, time series analysis, trend projection, and barometric forecasting. Together, these methods help a firm understand how demand may behave in the short and long run, allowing smoother production planning, pricing, and investment decisions. The various methods of demand forecasting are as follows:

1. **Expert Opinion Method:** The expert opinion method relies on the knowledge and experience of people who understand the market well. These experts may be senior managers, sales executives, distributors, retailers, consultants, or industry specialists. They observe customer reactions, competition, seasonal shifts, and market conditions in their daily work, which gives them practical insights that may not always be captured in numerical data. For example, a company planning to introduce a new smartphone model may consult experienced dealers who can provide a realistic sense of how many units customers are likely to buy in the first few months. The strength of this method lies in its speed and its dependence on informed judgement when data are scarce. However, because the estimates are subjective, they may differ across experts. Firms often combine multiple expert views to arrive at a balanced estimate.
2. **Surveys:** Surveys and market experiments are more structured methods of collecting information directly from consumers. In a survey, potential buyers are asked about their likely purchase plans, preferred quantity, expected price, and reasons for choosing or avoiding a product. Surveys can be conducted through questionnaires, personal interviews, telephone interviews, or online forms. They

are particularly helpful when a business is launching a new product and there is no past sales data. For instance, a firm producing organic snacks may survey health-conscious customers in different locations to understand their willingness to try a new product variant.

3. **Market Experiments:** Market experiments take this idea one step further. Instead of asking people what they might do, the firm observes their real behaviour in a controlled setting. A company may introduce a product in a limited area, offer different prices in different test markets, or vary promotional activities to see how customers respond. If sales rise in one area and not in another, the firm can identify the factors influencing demand. These experiments help managers understand the market before making large-scale production or investment commitments.
4. **Time Series Analysis:** Time series analysis is widely used when a firm has reliable historical data on sales. This method assumes that demand is influenced by patterns that repeat over time, such as seasonal changes, long-term growth, or periodic fluctuations. Managers study these patterns to understand how demand has behaved in the past and to estimate future demand. For example, sales of ceiling fans may rise during the summer months each year, decline slightly during monsoons, and stabilise in winter. By observing these recurring movements, a business can prepare production and inventory schedules for the coming season. Time series analysis is systematic and data-driven, making it a preferred method in industries that maintain detailed records.

For example, a firm has recorded sales of ready-mix masala packets for three months:

Month	Sales (units)
January	300
February	330
March	360

To forecast April using a three-month moving average:

$$\text{Forecast for April} = \frac{300 + 330 + 360}{3} = \frac{990}{3} = 330$$

The simple moving average predicts sales around 330 units for April, smoothing out small month-to-month fluctuations.

5. **Trend Projection Method:** Trend projection is one of the simplest and most commonly used forecasting techniques, especially when the main objective is to trace the general direction of sales. This method extends past sales trends into the future by fitting a line to historical data. If sales have been rising steadily over the last five years, the firm may project that the rise will continue at a similar pace



unless major changes occur in the market. This method is effective when past behaviour is stable and when the firm expects no dramatic changes in technology, competition, or consumer preferences. It provides a quick, straightforward estimate of future demand and is useful for short-term planning.

Suppose quarterly sales of a product follow this pattern:

Quarter	Sales (units)
Q1	200
Q2	240
Q3	280
Q4	320

Sales appear to rise by roughly the same amount each quarter.

Identify the trend increase: Each quarter, sales rise by 40 units (240–200, 280–240, 320–280).

Forecast next period: *Forecast for Q5* = $320 + 40 = 360$

Trend projection suggests that if conditions remain similar, sales in the next quarter are expected to reach 360 units.

- 6. Barometric Forecasting:** Barometric forecasting makes use of economic indicators (Leading, Coincident and Lagging Indicators) often called barometers, to judge how demand is likely to change in future. These indicators may include changes in income levels, industrial production, wholesale prices, building activity, credit conditions or government policies. Some indicators lead economic activity, others move together with it, and some follow it with a delay. Managers track these indicators to understand broader economic conditions and their likely impact on demand. For instance, if consumer income rises steadily, the demand for household appliances may increase. If interest rates rise sharply, demand for housing or automobiles may slow down. Barometric forecasting helps firms prepare for these wider economic movements, especially when their products are sensitive to the business cycle. Leading indicators change before the economy shifts and offer early signals of future demand—for example, new business orders, stock market trends or building permits. Coincident indicators move in line with current economic activity, such as industrial production, employment levels or retail sales, helping firms understand the present state of the market. Lagging indicators, including interest rates, inflation or consumer debt, change only after economic conditions have already shifted and therefore confirm patterns that have occurred. Together, these indicators help firms interpret economic movements and prepare for likely changes in demand.

These forecasting methods complement one another. Firms rarely rely on just one approach; instead, they use a blend of judgement, consumer feedback, historical data, and economic indicators. Each method adds a piece to the larger picture. By using these tools thoughtfully, firms reduce uncertainty and plan their operations with greater confidence.

2.1.1.2 Characteristics of a Good Forecasting Method

A good forecasting method should help a firm make decisions with confidence, especially when the future is highly uncertain. A suitable forecasting technique must be practical, realistic, and dependable, so that managers can trust the results while planning production, pricing, and resource allocation. While no method can fully eliminate uncertainty, a well-designed forecasting approach reduces confusion and brings clarity to planning. Below are the important features that make a forecasting method truly useful for a business.

1. **Reasonable Accuracy:** A forecasting method should produce estimates that are fairly close to actual outcomes. Absolute accuracy is impossible, but the method should not deviate wildly from real results. A reliable forecast allows a firm to plan inventory, labour, and finances without unnecessary surprises.
2. **Simplicity and Ease of Use:** A good forecasting method should be simple enough for managers to understand and apply. If a method is too complex, involves too many calculations or requires specialised software, it may confuse users and reduce its practical value, especially in small or medium-sized firms.
3. **Economy and Low Cost:** Forecasting should not become an expensive exercise. A good method requires reasonable time, effort and money. Techniques that require large datasets or frequent surveys may not suit all firms. The best methods balance cost and usefulness.
4. **Flexibility and Adaptability:** Market conditions change constantly. A forecasting method must be adaptable enough to incorporate fresh information quickly. If a sudden shift occurs, such as a new competitor, a price change, or a seasonal surprise, the forecast should be updated without difficulty.
5. **Timeliness:** Decisions must be made before the opportunity passes. A good forecasting technique should produce results in time for managers to act. A forecast that arrives too late will not help in planning production or making stock decisions.
6. **Consistency Over Time:** A forecasting method should produce stable results when used repeatedly under similar conditions. If the method gives highly inconsistent or unpredictable outputs, it becomes difficult to rely on it for decision-making.

2.1.1.3 Limitations of Forecasting

Forecasting is useful, but it cannot eliminate uncertainty. Every method depends on assumptions, past data, and market stability. Below are common limitations that learners should understand:

1. **Dependence on the Past:** Most forecasting techniques assume that past patterns will continue. Sudden changes, such as new competitors, technological shifts, and unexpected shocks, can make earlier patterns unreliable.
2. **Quality of Data:** Forecasts are only as good as the data used. Inaccurate records, missing information, or biased surveys can distort results.
3. **Unpredictable External Events:** Events like price shocks, natural disasters, pandemics, or abrupt policy changes can alter market behaviour in ways no forecast can predict.
4. **Limited Accuracy:** Every forecast contains some error. Even the most advanced models cannot fully capture human behaviour, changing preferences or unexpected interactions in the market.
5. **Cost and Time Factors:** Some methods require large datasets, specialised tools or expert involvement. Small firms may find these methods costly or difficult to implement regularly.
6. **Over-Reliance on Forecasts:** Managers may sometimes trust forecasts too much and ignore emerging real-world signals. Forecasts should guide decisions—not replace judgement.

2.1.2 Case Study: Demand Forecasting For a New Product

When a firm introduces a new product, it faces a situation where past sales records do not exist. Without historical demand data, the firm must rely on a thoughtful mixture of judgement, market understanding, and controlled testing to decide how much to produce and how widely to distribute the product. This case study explains how a small consumer-goods company used demand forecasting techniques to estimate the likely demand for a new ready-to-drink herbal beverage. It demonstrates how expert opinion, surveys, market experiments, and basic data interpretation can guide a firm before committing resources to full-scale production.

A local food-processing company had experience producing fruit-based drinks. Over the years, the firm observed an increase in interest in healthier lifestyles and natural beverages. To respond to this shift, the company decided to develop a herbal drink made from locally grown ingredients. While the idea seemed promising, the management wanted a clear picture of the likely demand before investing in machinery, packaging material, and marketing. They began the forecasting exercise by consulting experts who were close to the market. Retailers, nutritionists, supermarket managers, and distributors were asked for their opinion. Many believed the drink would attract young adults and health-conscious families, but they also warned that the market was

competitive. These views helped the firm develop an initial sense of expected demand and identify the potential target group.

The company then carried out a small consumer survey across three towns. The survey aimed to understand how likely customers were to buy such a drink, what flavours they preferred, what price they found acceptable, and how often they might consume it. Respondents were also asked about their current beverage choices and reasons for shifting towards healthier options. The survey results showed moderate but promising interest. Many respondents said they would try the drink if it tasted good and was reasonably priced. This information helped the firm set a tentative price range and identify popular flavours.

To complement the survey, the company conducted a small market experiment. They produced a limited batch of the herbal drink and stocked it in selected retail shops for a four-week trial. Each shop displayed the drink at different price points, allowing the firm to observe how customers reacted to price changes. One area had a slightly higher price, another had a moderate price, and the third offered introductory discounts. Sales data showed that demand was strongest in the second area, where the price matched consumer expectations. The experiment also revealed that repeat purchases were influenced by taste and packaging. Such findings helped the firm refine the product before launching it on a larger scale.

While the product was being tested, the firm also reviewed general demand trends from similar categories such as fruit juices, energy drinks, and natural beverages. These categories have shown steady growth over the past five years. The company used this industry trend to project how demand for their herbal drink might grow over the next few months. Seasonal effects were also considered. Demand for beverages typically rises during summer, so the firm expected higher sales in warm months and more moderate sales during monsoon and winter.

Finally, the company looked at broader economic indicators. Household income in the region had been rising, and local surveys showed increasing awareness of wellness-oriented products. These signals supported the possibility of stable, expanding demand for the new drink. After combining expert opinions, survey responses, test-market results, trend observations, and economic indicators, the firm estimated that monthly demand in the first three months after launch would range from 8,000 to 10,000 bottles. With this estimate, the firm planned production, packaging, staffing, and promotional strategies.

This case shows how demand forecasting becomes a thoughtful process when a new product enters the market. A business may not have past sales data, but it can still make meaningful estimates by listening to experts, observing consumers directly, studying limited market behaviour, and analysing trends in related sectors. By blending these methods, a firm reduces uncertainty and makes informed decisions about investment, pricing, and distribution.

Recap

- ◇ Demand forecasting is the estimation of future demand using information, past patterns, and market conditions
- ◇ Helps firms plan production, pricing, staffing, inventories, raw materials, and investment
- ◇ Demand forecasting reduces uncertainty and prevents shortages and surpluses
- ◇ Expert opinion uses experienced managers, dealers, and specialists to provide judgement-based estimates
- ◇ Surveys collect direct information from consumers about their purchase intentions and preferences
- ◇ Market experiments observe actual consumer behaviour in controlled test markets
- ◇ Time series analysis uses historical sales data to identify recurring patterns and predict future demand
- ◇ Trend projection extends past sales patterns into the future to estimate the general direction of demand
- ◇ Barometric forecasting uses economic indicators to understand how wider economic changes influence demand
- ◇ Firms combine multiple forecasting methods to improve accuracy and reduce uncertainty

Objective Questions

1. What is the process of estimating future demand called?
2. Which method relies on the judgement of experienced individuals?
3. Which method gathers information directly from consumers?
4. What type of forecasting uses controlled test markets?
5. Which method uses historical sales data to identify patterns?
6. Which method extends past sales movements into the future?
7. Which forecasting technique uses economic indicators?
8. What do seasonal changes in sales represent in time series analysis?

9. What do firms try to reduce through forecasting?
10. Which method is useful when launching a new product without past data?

Answers

1. Forecasting
2. Expert
3. Survey
4. Experiment
5. Time-series
6. Trend
7. Barometric
8. Patterns
9. Uncertainty
10. Surveys

Assignments

1. Explain the meaning and importance of demand forecasting in managerial economics.
2. Distinguish between surveys and market experiments as methods of demand forecasting.
3. Explain how small firms apply forecasting principles in everyday decision-making.
4. Discuss various methods of demand forecasting.

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Unit 2

Pricing Decisions

Learning Outcomes

After completing this unit, the learner will be able to:

- ◇ explain the major factors that influence pricing decisions in business
- ◇ describe the key components that make up the final price of a product
- ◇ discuss different pricing methods
- ◇ get an insight into the importance of profit management

Prerequisite

When we visit a shop or browse online, every product we see carries a price. We rarely stop to think about how that number is decided, yet behind it lies a long chain of decisions. Imagine a young entrepreneur opening a small workshop. She makes a good product, but soon realises that selling it requires more than skill. She must decide how much to charge, how to meet her expenses, and how to attract customers without losing money.

One day, a customer walks in, likes her product, but feels the price is too high. Another customer visits later and happily pays the same price. This difference makes her wonder why people value the same item differently. She also begins to notice that her expenses rise and fall, her sales change with the season, and competitors influence what she can charge. Slowly, she learns that pricing is not a guess but a careful process.

As her business grows, she discovers new challenges. She must deliver products to nearby shops, spend money on small advertisements, and handle unexpected costs. She also realises that not every product brings the same return, and she must plan if she wants her business to remain steady. These experiences teach her that managing profit is as important as producing a good product.

Over time, she becomes more confident. She starts observing customer behaviour, tracking market trends, and studying price movements. She learns that every business, big or small, uses different methods to set prices depending on its goals and resources. Slowly, she comes to understand that pricing is a blend of cost, value, competition, and strategy.



Keywords

Pricing, Demand, Market Structure, Production, Marginal Cost, Revenue

Discussion

2.2.1 Pricing

Pricing is more than just setting the amount customers pay for a product. It is a strategic decision that shapes sales, market position, and profitability. Different businesses set their prices depending on what they hope to achieve in the market. Because pricing influences both revenue and demand, managers must be clear about the objectives guiding their pricing decisions. These objectives help the firm choose a pricing approach that aligns with its long-term plans, competitive conditions, and financial needs.

2.2.1.1 Objectives of Pricing

The major objectives of pricing are as follows:

1. **Profit Maximisation:** Many firms set prices with the intention of earning the highest possible profit. When this is the main objective, the firm sets a price that balances demand and cost to maximise the difference between revenue and production expenses. A higher price may increase per-unit profit but could reduce total demand. A lower price may attract more buyers but reduce the margin. Profit maximisation aims to find the right balance between these two forces.
2. **Market Share Expansion:** Some firms place greater importance on expanding their presence in the market rather than earning the highest immediate profit. Their pricing objective is to increase customer count and secure a larger market share. For example, a new firm may set a lower price to encourage customers to try its product. Once the firm gains a strong foothold, it may gradually adjust the price. This approach is often seen in highly competitive industries.
3. **Survival:** In difficult economic conditions or when facing strong competition, a firm may focus on survival as its primary objective. The goal here is not to maximise profit but to ensure the firm stays in business. In such situations, pricing may be set low enough to maintain sales and cover essential costs, even if the profit is small. This objective is common during downturns, supply disruptions, or when a firm is facing aggressive price competition.

4. **Achieving Target Return:** Some businesses set prices to achieve a specific return on their investment. They calculate the desired profit or rate of return and then set the price to meet this target. This objective is often used by firms with stable demand and predictable costs. It provides a steady and controlled approach to pricing that supports financial planning.
5. **Market Stability:** Firms sometimes avoid frequent price changes because unstable prices can confuse customers, disrupt relationships with distributors and provoke reactions from competitors. In such cases, the pricing objective is to maintain stability. Firms try to keep prices steady over time, adjusting them only when necessary, such as during cost increases or major market changes.
6. **Product Quality and Brand Image:** Pricing also plays an important role in shaping the perception of the product. A premium price can signal high quality, exclusivity or specialised features, while a lower price may communicate affordability. Firms choose prices that match the image they want to convey. For example, products positioned as premium or artisanal often carry higher prices to reinforce the brand's identity.

These pricing objectives are not mutually exclusive. A firm may aim for profit maximisation in the long run while focusing on survival or market share in the short run. Understanding these objectives helps managers choose pricing strategies that better reflect their goals and competitive environment.

2.2.1.2 Factors Affecting Pricing Decisions

Pricing is one of the most important decisions a firm makes because it directly influences revenue, profitability, market position, and customer perception. A price set too high may reduce sales, while a price set too low may harm profits or raise doubts about product quality. Managers must therefore consider several factors before deciding on the final price. These factors come from within the firm as well as from the external environment. Understanding these influences helps businesses adopt pricing strategies that are realistic, competitive, and appropriate for their long-term goals. The major factors affecting price decisions are as follows:

1. **Cost of Production:** The cost of producing a good or service forms the basic foundation of pricing decisions. Firms need to recover their costs to remain financially viable. Costs may include raw materials, labour, energy, transportation, taxes, overheads, and other operating expenses. If the cost of production rises, the firm may need to increase prices to maintain profitability. On the other hand, if technology or improved efficiency reduces production costs, prices may be kept stable or even lowered to attract more customers. Because cost is central to all business operations, managers usually begin pricing discussions by closely examining the cost structure of the product.
2. **Nature of Demand:** Demand plays an important role in determining the price of a product. If demand is strong and customers are willing to pay more, a firm has greater flexibility in setting higher prices. When demand is weak or sensitive



to price changes, the firm may need to keep prices modest to maintain sales. Products with inelastic demand, such as essential medicines, electricity, or basic food items, allow less price flexibility. In contrast, products with elastic demand, such as luxury goods or entertainment services, require careful pricing because even a small price change can influence purchase decisions. Understanding customer behaviour is therefore essential for meaningful pricing.

3. **Market Structure and Competition:** The level of competition in the market shapes how much control a firm has over its pricing decisions. In a market with many sellers offering similar products, companies must consider competitor's prices to avoid losing customers. In highly competitive markets, firms often have little freedom to set prices independently. However, in markets with fewer competitors or where firms offer differentiated products, managers enjoy more room to decide prices. For instance, branded goods, specialised equipment, and niche services often command higher prices because competition is limited or the product has unique features.
4. **Customer Behaviour and Perceived Value:** Prices must reflect not only costs and competition, but also how customers view the product. Two products may cost the same to produce, yet customers may be willing to pay more for one because they believe it offers better quality, reliability, or status. The value customers attach to a product often depends on its features, design, brand reputation, and overall experience. Firms therefore study customer expectations and willingness to pay before finalising a price. A well-established brand may command a premium, while new products may require lower introductory prices to attract buyers.
5. **Government Policies and Regulations:** The government plays a significant role in pricing, especially in sectors that affect public welfare. Some industries are subject to price controls, taxation rules, or restrictions on how much companies can charge. For example, the prices of essential medicines, public utilities, sugar, and fuel are often regulated. Indirect taxes such as GST also influence the final price paid by consumers. Managers must therefore comply with legal requirements and consider the impact of tax policies, subsidies, and regulatory norms before deciding on a product's price.
6. **Distribution Channels:** The method through which goods reach customers affects the final price. When a product passes through several intermediaries such as wholesalers, distributors, and retailers, each level adds its own margin. This increases the final selling price. In contrast, direct distribution channels, such as online selling or factory outlets, reduce intermediary costs and allow firms to price more competitively. The firm must consider transportation costs, storage, handling, and distributor's margin requirements when determining the price.
7. **Business Objectives and Strategy:** Firms set prices according to their overall goals and strategic direction. If the aim is to penetrate a new market, prices may

be kept low initially to encourage customers to try the product. If the goal is to maintain a premium image, prices may be set higher to reflect exclusivity. Some companies set prices to maximise short-term profits, while others adopt stable pricing to build long-term customer loyalty. Strategic objectives such as discouraging competitors, clearing excess inventory, or supporting a product line also influence pricing decisions.

- 8. Economic Conditions:** Broader economic factors such as inflation, interest rates, employment levels, and income growth influence purchasing power and overall demand. During periods of inflation, production costs rise, forcing firms to revise prices. When incomes fall or economic uncertainty increases, customers tend to reduce spending, prompting firms to adopt more cautious pricing. Managers, therefore, monitor the economic environment closely to ensure that the price remains suitable for current market conditions.

Pricing decisions require a balanced understanding of cost, demand, competition, customer expectations, and external influences. No factor works in isolation; managers evaluate all of them together before arriving at a price that aligns with business objectives and market realities. This makes pricing a thoughtful and strategic process rather than a simple numerical decision.

2.2.2 Components in Pricing of the Product

When a firm decides the price of a product, it does not simply think of a single number. The final price is built from several components, each representing a part of the cost or value involved in producing and selling the product. These components help the firm understand how much must be recovered to stay financially healthy and how much can be added to support profitability. Pricing, therefore, becomes a structured exercise where each element contributes to the final selling price. Understanding these components helps learners see how businesses decide the price printed on a product's label. The major components in the pricing of the product are as follows:

- 1. Cost of Production:** The cost of production forms the foundation of any pricing decision. This includes the cost of raw materials, labour, energy, packaging, machinery use, repairs, and other necessary inputs. Firms also incur indirect costs such as factory rent, support staff salaries, and administrative expenses. These are often grouped under overhead costs. A firm must ensure that the selling price covers all these production-related costs; otherwise, it will not be able to sustain operations in the long run. For most products, the largest share of the final price comes from these basic costs.
- 2. Cost of Distribution :** Once the product is manufactured, it has to reach consumers through various channels. This involves transportation, storage, handling, and insurance. Firms may rely on wholesalers, distributors, and retailers, each of whom adds a margin for the service they provide. These margins increase the final price. In industries with extensive distribution networks, this component becomes particularly significant. Efficient distribution can help keep prices



reasonable, while inefficient distribution may force the firm to charge higher prices.

3. **Marketing and Promotion Costs:** To make customers aware of the product and encourage purchase, firms spend on advertising, sales promotion, packaging design, and public relations. These costs vary depending on market competition and the nature of the product. A new product may require heavy promotional spending in the early stages to gain attention. These marketing expenses are added to the price so that the firm can recover the costs of building the product's market presence.
4. **Taxes and Government Levies:** Taxes form a compulsory part of the price. Goods and Services Tax (GST), excise duties (where applicable), and other statutory charges directly increase the cost of the product. Since these taxes must be paid by the firm to the government, they are included in the final selling price. Any change in tax rates, therefore, influences the price consumers pay.
5. **Profit Margin:** A product's price must include a reasonable profit margin for the firm. Profit acts as a reward for the risks taken and the resources invested. The margin must be high enough to support the firm's financial goals, expansion plans, and long-term stability. However, it must also be realistic so that customers continue to find the product attractive. Profit margin is one of the most flexible components in pricing, as firms adjust it based on demand conditions, competition, and strategic objectives.
6. **Competitive Adjustments:** Even after adding all necessary costs and the desired profit margin, firms must consider the prices charged by competitors. If a similar product is available at a lower price, customers may switch unless the firm offers a strong reason to stay. Competitive adjustments may include reducing the margin slightly or redesigning the product to offer better value. These adjustments ensure that the price remains relevant in a competitive market.
7. **Customer Service and After-Sales Support:** Some products require installation, maintenance, warranties, or customer service. These services add value to the product but also involve expenditure for the firm. For instance, durable goods such as home appliances and electronic items often include after-sales support. The cost of providing these services is built into the price so the firm can continue offering reliable service throughout the product's life.

The final price of a product is therefore not a random figure. It is built step by step, beginning with production costs and adding distribution, marketing, taxes, and service components, and ending with a suitable profit margin. By understanding these elements, learners can see how pricing becomes a careful, balanced process in which each component has a meaningful place.

2.2.2.1 Types of Product Pricing

Firms use different pricing methods depending on their objectives, the nature of the product, the level of competition, and customer behaviour. No single method suits all situations, so managers choose the approach that best supports their strategy. The following pricing methods are commonly used in business: marginal cost pricing, mark-up pricing, transfer pricing, product line pricing, price skimming, and penetration pricing. Each method has a distinct purpose and helps firms make decisions more effectively.

- 1. Marginal Cost Pricing:** Marginal cost pricing is based on the additional cost incurred to produce one more unit of output. Instead of focusing on the total cost, this method examines how much additional cost is incurred by the last unit produced. The firm sets the price close to this marginal cost when it wishes to increase sales or make use of unused capacity. For example, a manufacturing unit may already have most of its fixed costs covered. Producing extra units adds only a small additional cost for materials and labour. By pricing slightly above this marginal cost, the firm can sell more units without raising its overhead burden. This method is often used during competitive periods or when firms want to utilise spare production capacity.
- 2. Mark-up Pricing:** Mark-up pricing is one of the simplest and most widely used methods, especially in retail and consumer goods. The firm calculates the total cost of producing or purchasing the product and then adds a fixed percentage as its margin. This percentage is the 'mark-up,' which becomes the profit component. For instance, if a retailer buys a product for ₹100 and adds a 20 percent mark-up, the selling price becomes ₹120. This method is easy to apply and provides price stability. It also helps maintain consistent margins across different products. Many small businesses prefer this approach because it does not require complex calculations or detailed forecasting.
- 3. Transfer Pricing:** Transfer pricing applies to firms that produce goods or services in different divisions or branches within the same organisation. When one division transfers its output to another division, a price must be assigned to that transfer. This is known as the transfer price. The purpose is to accurately measure the performance of each division and ensure that internal exchanges are fairly valued. Transfer pricing becomes important in large firms with multiple production stages or regional units. Setting the right transfer price helps allocate profits properly and encourages each division to operate efficiently. Firms may use cost-based, market-based, or negotiated prices for internal transfers depending on their organisational structure.
- 4. Product Line Pricing:** Product line pricing is used when a firm offers a group of related products rather than a single item. Each product in the line must be priced to reflect its features, quality, and appeal while maintaining a logical relationship with the rest of the line. For example, a company selling three models of a home appliance may price the basic model lower, the mid-range model moderately, and

the advanced model higher. The price differences help customers choose based on their needs and budget. The aim is not only to cover costs but also to guide customers through the product range in a well-structured manner. This method helps strengthen the firm's brand image and avoids confusing price gaps between models.

5. **Price Skimming:** Price skimming is a strategy used when a firm introduces a new or innovative product. At the beginning, the price is set high to attract customers willing to pay more for early access or unique features. Over time, as competitors enter the market or as demand becomes more price-sensitive, the firm gradually reduces the price. This method allows the firm to recover its research and development costs quickly and benefit from the enthusiasm of early buyers. High-tech products, such as new gadgets, electronics, and premium lifestyle items, often employ price skimming. As the market matures, prices move toward more accessible levels to reach a wider customer base.
6. **Penetration Pricing:** Penetration pricing is the opposite of skimming. Here, the firm sets a low initial price to encourage rapid customer acceptance and gain a larger market share. By offering the product at an attractive price from the beginning, the firm hopes to build a strong customer base before competitors react. This approach suits markets where customers are highly price-sensitive and where the firm aims for high sales volume. Once the product becomes well established, the firm may gradually adjust the price upwards. Penetration pricing is commonly used for fast-moving consumer goods, household items, streaming services, and subscription-based products.

Each pricing method serves a distinct purpose. While some approaches focus on covering costs and maintaining stability, others aim to shape customer behaviour or respond to competition. Understanding these methods helps learners appreciate how firms approach pricing in a practical, structured manner.

2.2.3 Profit Management

Profit management is the process through which a firm plans, measures, controls, and improves its profit levels. While profit may appear to be a simple difference between revenue and cost, managing it is a thoughtful activity that requires continuous attention. Firms must decide how much to produce, what price to charge, how to control costs, and how to make full use of their resources. Profit management helps a business remain stable in the present and grow steadily in the future. It guides managers in making decisions that maintain financial health and reduce unnecessary risks. Because profit influences the survival and expansion of a business, it becomes one of the most important areas of managerial responsibility.

1. **Sources of Profit:** Profit arises when the revenue earned from selling goods or services is greater than the total cost of producing them. Firms need a clear understanding of their revenue flow and cost structure to manage profit effectively. Revenue depends on factors such as price, quantity sold, customer acceptance,

and market conditions. Costs arise from raw materials, labour, overheads, marketing, distribution, taxes, and administrative expenses. When managers know which parts of the business generate more revenue and which parts incur higher costs, they can make better decisions. For instance, if a particular product generates high revenue but also has high production costs, the firm may explore ways to reduce costs without affecting quality.

2. **Cost Control and Efficiency:** One of the central elements of profit management is cost control. Even small increases in costs can significantly reduce profits, especially in competitive markets. Firms focus on improving operational efficiency, reducing waste, and using resources carefully. This may include better inventory management, improved production processes, or the use of technology to save time and reduce manual effort. Cost control does not mean cutting corners; it means ensuring that resources are used sensibly and that unnecessary expenses are avoided. When a firm manages its costs well, even modest sales can create comfortable profits.
3. **Pricing Decisions and Profitability:** Pricing plays a major role in determining profit. A well-chosen price helps the firm cover its costs and earn a suitable return. If the price is set too low, the firm may struggle to recover its costs. If it is set too high, customers may look for alternatives. Profit management involves examining how different prices influence demand and how changes in demand affect profit. This connection between price, quantity sold, and cost gives managers a clearer view of how profit behaves. When pricing and production decisions are aligned, the firm can strengthen its profit position even during periods of uncertainty.
4. **Product Mix and Resource Allocation:** Most firms sell more than one product. Profit management helps managers decide which products deserve more attention, more marketing effort, or more production capacity. A product that earns high profits may be prioritised, while a low-profit product may be improved or discontinued. Managers also examine how limited resources such as labour, machinery, and capital can be distributed among different products. By selecting the right product mix and allocating resources wisely, firms can maximise overall profit. This approach is especially important for firms with multiple product lines or seasonal goods.
5. **Planning for Long-Term Profit:** Short-term profit may rise or fall due to temporary changes in cost or demand. Long-term profit, however, depends on deeper factors such as innovation, investment decisions, market expansion, product development, and customer relationships. Profit management, therefore, involves a forward-looking view. Firms plan for future demand, estimate required capacity, and invest in new technologies. They also review market trends, competitor actions, and economic conditions. By preparing for the long term, firms strengthen their ability to earn consistent profits and remain competitive even in changing markets.

- 6. Monitoring and Reviewing Performance:** Profit management is not a one-time activity. Firms regularly monitor their performance by comparing actual results with planned targets. This helps managers identify areas where the firm is performing well and areas that require adjustment. If profits fall short of expectations, the firm may revisit pricing, production, marketing, or distribution decisions. Regular reviews also create a culture of accountability, where managers remain alert to market behaviour and respond quickly to problems.

Profit management is the backbone of business decision making. It brings together cost control, pricing strategies, production planning, and long-term vision. By understanding how different factors influence profit, managers make decisions that keep the firm stable today and help it grow tomorrow. For learners, the key takeaway is that profit is not accidental; it is the result of disciplined planning and thoughtful management.

2.2.3.1 Profit Management Tools

Profit management refers to the methods firms use to monitor, plan, and improve profitability. Since profit is affected by revenue, costs, demand, and operational decisions, managers rely on a set of tools to analyse performance, make informed decisions, and adjust strategies when necessary. These tools offer insights into the financial health of the business and guide managers in shaping the firm's future direction. They are as follows;

- 1. Break-Even Analysis:** Break-even analysis is one of the most widely used tools in profit planning. It helps the firm identify the output level at which total revenue equals total cost. At this point, the business neither earns a profit nor incurs a loss. Knowing the break-even point allows managers to estimate the sales needed to achieve profit targets, understand how changes in cost affect profitability and evaluate the impact of pricing decisions. It also helps firms plan expansions and new product launches by assessing the required sales volumes.

$$\text{Break - Even Output} = \frac{\text{Fixed Costs}}{\text{Price Per Unit} - \text{Variable Cost per unit}}$$

- 2. Cost - Volume - Profit (CVP) Analysis:** CVP analysis goes beyond break-even calculations by examining how changes in output, price and cost influence the firm's profit. It explores the relationship between revenue, costs, and volume to show how profits shift under different scenarios. CVP analysis is helpful when managers want to evaluate alternative strategies, such as entering new markets, changing production levels, or adjusting prices. By understanding how profit responds to variation in key factors, managers can make more confident decisions that improve financial performance.
- 3. Budgetary Control:** Budgetary control is a planning tool that sets financial targets for various activities in the firm and then compares actual performance

with the planned figures. It helps managers track progress, identify areas where performance deviates from expectations and adjust operations accordingly. Budgets guide spending, production, purchasing and sales efforts. By monitoring variances, firms can detect inefficiencies early and take corrective steps. Budgetary control supports disciplined financial management and ensures resources are used effectively.

4. **Standard Costing and Variance Analysis:** Standard costing involves setting expected costs for materials, labour, and overheads. These standards serve as benchmarks against which actual costs are compared. Variance analysis helps managers understand why differences arise, whether due to price changes, inefficiency, or external factors. Positive variances may indicate savings, while negative variances signal problems that need attention. This tool helps firms maintain cost discipline and improve operational efficiency.
5. **Target Return Pricing Tools:** When firms aim to earn a specific return on investment, they use pricing methods that align closely with cost and expected demand. Managers calculate the required price based on desired profit and expected sales volume. This approach is particularly useful in manufacturing industries with stable demand. It ensures that pricing supports long-term financial objectives rather than short-term market fluctuations.
6. **Profit Forecasting Tools:** Profit forecasting combines demand estimates, cost projections, and pricing decisions to predict future profitability. Managers use historical trends, expected market conditions and business plans to estimate future revenue and cost levels. This helps firms prepare for upcoming challenges, set financial goals, and evaluate the profitability of proposed decisions. Profit forecasting is essential for strategic planning, resource allocation, and capital budgeting.

Recap

- ◇ Pricing decisions are shaped by cost, demand, competition, customer perception, government rules, distribution channels, business objectives, and economic conditions
- ◇ The components of price include production cost, distribution cost, marketing cost, taxes, profit margin, competitive adjustments, and service support
- ◇ Pricing methods include marginal cost pricing, mark-up pricing, transfer pricing, product line pricing, price skimming, and penetration pricing



- ◇ Profit management involves understanding revenue and cost, controlling expenses, aligning pricing with profitability, choosing the right product mix, planning for long-term returns, and reviewing performance

Objective Questions

1. What forms the foundation of any pricing decision?
2. What type of demand allows less price flexibility?
3. Which tax directly influences the final price paid by consumers?
4. What is the additional cost incurred to produce one more unit called?
5. Which pricing method sets a high initial price for a new product?
6. What do firms add as a reward for risk taken?
7. What type of pricing uses a low initial price to gain market share?
8. What arises when revenue exceeds total cost?
9. Which component of distribution includes margins added by intermediaries?
10. What helps firms measure the performance of internal divisions?

Answers

1. Cost
2. Inelastic
3. GST
4. Marginal cost
5. Skimming
6. Profit
7. Penetration
8. Profit
9. Distribution
10. Transfer pricing

Assignments

1. Explain the factors affecting pricing decisions.
2. Elaborate on the components in the pricing of the product.
3. What are the major types of product pricing?
4. Discuss in detail profit management.

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BLOCK

3

**Production,
Cost and
Revenue
Analysis**

Unit 1

Production Analysis

Learning Outcomes

After completing this unit, the learner will be able to:

- ◇ explain the meaning of production
- ◇ distinguish between short-run and long-run production decisions
- ◇ discuss Total Product, Average Product, and Marginal Product
- ◇ interpret isoquants and their properties
- ◇ describe the concept of isocost lines
- ◇ determine least-cost combinations using isoquants and isocost lines

Prerequisite

Ravi often enjoyed spending quiet evenings on the terrace of his home. One day, as he watched people returning from work and small shops closing for the night, he began to think about how many activities must come together to make everyday life run smoothly. A bakery preparing fresh bread, a tailor stitching school uniforms, or a mechanic fixing a scooter, all seemed simple, yet depended on many unseen efforts.

He remembered visiting his uncle's workshop as a child. The noise of machines, the movement of workers, and the smell of raw materials fascinated him. At the time, he did not realise that every action in that workshop, cutting, shaping, assembling, was part of a larger system that turned basic materials into something useful. The transformation looked effortless, but behind it was planning, choice, and coordination.

As he grew older, he started to understand that nothing is created without combining different resources. Some tasks needed skilled hands, some needed machines, and some required careful organisation. Even small changes, like adding one more worker or rearranging a workspace, could influence how much the workshop produced in a day.

Thinking back to those early observations, Ravi realised how important it is to understand how inputs can be arranged, substituted, or expanded to meet different goals. Whether it is a family business or a large factory, every production activity follows certain patterns.



Keywords

Production, Fixed Input, Variable Input, Total Product (TP), Average Product (AP), Marginal Product (MP), Isoquant, Isocost Line, Input Prices, Least-Cost Combination

Discussion

3.1.1 Production

Every business exists because it can create something useful. This may be a physical item such as clothing, steel, or food. It may also be a service such as transport, education, delivery, cleaning, or medical care. The process through which a firm converts available resources into a useful output is called production.

Production is not restricted to manufacturing activities alone. When a hospital uses doctors, nurses, equipment, and medicine to provide healthcare, it is also producing. When a teacher uses knowledge, classroom space, and books to create learning, this too is production. In simple words, production means creating value by converting inputs into outputs.

Production refers to all economic activities that bring goods or services into existence or add value to existing goods. It involves using inputs such as land, labour, capital, machinery, tools, raw materials, and managerial skills to produce outputs that satisfy human wants.

The essential feature of production is value addition, not just physical transformation. A wholesaler who sorts, stores, and transports goods does not change the physical form of a product, yet adds value by making the product available at the right time and place. Similarly, a restaurant adds value by preparing meals from ingredients. Thus, production is best viewed as a purposeful activity that combines inputs in a meaningful way so that the resulting output is more useful than the inputs taken separately.

3.1.1.1 Objectives of Production

Businesses undertake production for several purposes, such as:

1. **To Meet Consumer Demand:** Firms produce goods and services to satisfy the needs and preferences of consumers. Without production, no market exchange can occur.
2. **To Earn Profit:** By producing efficiently and selling in competitive markets, firms can generate profits, which are essential for survival and growth.

3. **To Utilise Resources Efficiently:** Production encourages firms to use their resources in the most efficient combination. Better production methods reduce wastage and improve productivity.
4. **To Promote Growth and Innovation:** Production activities lead firms to develop new technologies, improve processes, experiment with new designs, and innovate. This contributes to the overall progress of the economy.

For managers, production is not merely about making goods. It is about:

- ◇ choosing the best mix of inputs,
- ◇ organising the workplace efficiently,
- ◇ understanding the relationship between inputs and outputs,
- ◇ studying how output changes as more units of an input are used,
- ◇ and selecting the scale of operation that minimises cost.

Production decisions influence pricing, cost control, investment planning, employment, and overall profitability. A clear understanding of production concepts helps managers decide how much to produce, which methods to adopt, and how to respond to changes in demand, costs, and technology.

3.1.2 Short-run and Long-run Production

Production decisions vary with the time available to a firm to adjust its inputs. Some decisions can be made quickly, while others require planning, investment, and long-term commitment. To understand these differences, economists use two important time frames: the short run and the long run. These concepts help explain how firms organise resources and how output changes when different inputs are varied.

3.1.2.1 Short-run Production

The short run refers to a period during which a firm can change only a few of its inputs, but at least one major input remains fixed. This fixed input could be factory space, heavy machinery, or production capacity that cannot be altered immediately. Because these inputs require time and a large investment to change, firms operate with a certain level of constraint in the short-run period.

Inputs such as land, buildings, and specialised machines cannot be expanded or reduced overnight. They need planning approvals, installation time, or major capital expenditure. Therefore, they remain fixed in the short run. On the other hand, inputs such as labour, electricity, fuel, and raw materials can be changed quickly, allowing the firm to adjust its output to some extent.

Since firms can vary only some inputs, additional units of a variable input eventually yield smaller and smaller increases in output. In this stage, the fixed input becomes a limiting factor. This behaviour is studied using concepts such as Total Product



(TP), Average Product (AP), and Marginal Product (MP). These ideas help managers understand how output responds when additional labour or raw materials are added while machinery or space remains fixed.

3.1.2.2 Long-run Production

The long run is a period long enough for a firm to change all its inputs. No factor remains fixed during this period. A firm may expand or reduce its plant size, install new machinery, adopt new technology, or shift to a different location. Because all inputs are flexible, the firm has the freedom to design its production system in the most efficient way.

In the long run, firms can reassess their entire production structure. They can redesign the plant layout, choose between labour-intensive or capital-intensive methods, adopt modern techniques, and increase or decrease overall production capacity. This flexibility allows businesses to plan for future growth and adjust to expected market conditions.

When all inputs are adjustable, firms study how output responds when inputs are increased or decreased in the same proportion. This leads to concepts such as increasing, constant, and decreasing returns to scale. These ideas help managers understand whether expanding production will reduce per-unit costs or lead to operational difficulties.

In the long run, all inputs are variable, and firms can adjust plant size. Returns to scale explain how output changes when all inputs increase in the same proportion.

1. **Increasing Returns to Scale (IRS):** When inputs are doubled and output increases by more than double.
2. **Constant Returns to Scale (CRS):** When inputs and outputs increase in the same proportion.
3. **Decreasing Returns to Scale (DRS):** When inputs double but output increases by less than double, often due to managerial difficulties or coordination problems.

Table 3.1.1 Key Differences Between Shortrun Production and Longrun Production

Aspect	Short Run	Long Run
Nature of Inputs	At least one input is fixed	All inputs are variable
Flexibility	Limited flexibility	Full flexibility
Decision Type	Operational decisions (e.g., hiring more workers)	Strategic decisions (e.g., new plant, new technology)
Output Capacity	Restricted by fixed inputs	Can be expanded freely
Relevant Concepts	TP, AP, MP; Law of variable proportions	Returns to scale; scale economies
Time Required	Relatively short adjustment period	Longer period with planning and investment

Understanding the distinction between short-run and long-run production helps managers balance present needs with future possibilities. In the short run, managers must work within the limits of existing capacity and avoid overusing fixed resources. In the long run, they must decide whether to expand the plant, adopt new technology, or change the scale of operation. These decisions affect cost, efficiency, competitiveness, and long-term sustainability. A clear understanding of these time frames allows firms to plan more effectively, reduce costs, and respond more effectively to changes in demand and technology.

3.1.3 Production Function

Every firm uses different inputs, such as labour, machinery, land, materials, and technology, to produce output. The relationship between these inputs and the resulting output is described through a production function. A production function shows the maximum output a firm can achieve from different combinations of inputs, given the current level of technology. It answers a simple but important question: *How much can the firm produce if it uses its inputs efficiently?*

The production function does not describe waste, inefficiency, or poor organisation. Instead, it reflects the most efficient use of resources under existing conditions. Even small firms follow a production function, though they may not express it mathematically. When a manager hires more workers, buys another machine, or reorganises the workspace, they are effectively moving along their production function.

A common way to express a production function is: $Q = f(L, K)$

Where, Q = output, L = labour, and K = capital

This expression means that output depends on the amounts of labour and capital the firm uses. Production functions can take many forms, including linear, Cobb–Douglas, and fixed-coefficient types, depending on how easily inputs can substitute for one another.

Understanding the production function helps managers assess how output changes with changes in inputs, whether the firm should expand capacity, and how to plan future investments. It provides the foundation for studying TP, AP, and MP.

The relationship between inputs and outputs is central to production analysis. When a firm increases one input while keeping other inputs unchanged, output changes in a predictable pattern. Economists study this behaviour using three fundamental measures: Total Product, Average Product, and Marginal Product. These concepts help firms understand how efficiently they are using their resources and guide managers in making day-to-day production decisions.

3.1.3.1 Total Product (TP)

Total Product refers to the total quantity of output produced by a firm using a given amount of a variable input while keeping other inputs fixed. It represents the firm's



overall output level at different stages of input use. For example, in a small workshop with fixed machinery, the total number of finished units produced per day is its Total Product. As the firm employs more workers or uses more raw materials, TP generally rises because more hands or materials are available to work with the fixed facilities.

The behaviour of TP is not uniform. In the initial stages, TP increases rapidly because the available machinery and workspace are used more effectively when a few workers are added. After some point, the rate at which TP increases becomes slower because the fixed input becomes fully utilised. If too many workers are employed, they may interfere with each other's work, and TP may rise very slowly or even start to decline. This pattern reflects the practical limits placed by fixed resources in the short run.

3.1.3.2 Average Product (AP)

Average Product refers to the output produced per unit of the variable input. It is calculated by dividing Total Product by the number of units of the variable input employed. AP helps indicate how effectively each unit of input, such as a worker, contributes to total output.

AP is an indicator of efficiency. When AP rises as more workers are employed, it shows that workers are cooperating well and the production process is becoming more efficient. This often happens when division of labour and better coordination are possible. After a certain point, AP begins to fall because the fixed input restricts the ability of each worker to perform efficiently. Managers monitor AP to assess whether the workforce is being used effectively and to determine how many workers the firm should maintain to ensure smooth operations.

3.1.3.3 Marginal Product (MP)

Marginal Product refers to the additional output generated when one more unit of the variable input is employed, while keeping all other inputs constant. It captures the contribution made by the last worker or the last unit of raw material added to the production process.

MP is a vital measure because managers are often concerned with knowing whether hiring an additional worker or purchasing one more unit of input will increase output sufficiently. If MP is high, adding more input is beneficial. When MP falls sharply, it signals that the fixed input is becoming a constraint. If MP reaches zero or becomes negative, it indicates that the production system is overloaded, and additional input is reducing overall efficiency.

3.1.3.4 Relationship Between TP, AP, and MP

These three measures are closely linked. When TP increases at a faster rate, MP also rises. When TP increases more slowly, MP declines. AP rises when MP is above AP and falls when MP is below AP. TP reaches its maximum at the point where MP becomes zero. If MP becomes negative, TP begins to fall. This relationship gives a structured way of understanding how output responds to changes in a single variable input.

Table 3.1.2 Relationship Between TP, AP, and MP

Concept	Definition	Behaviour as Input Increases	Relationship With Other Measures
Total Product (TP)	Total output produced with a given quantity of variable input	Rises initially at an increasing rate, then at a decreasing rate, and may eventually decline	TP reaches its maximum when MP becomes zero
Average Product (AP)	Output per unit of the variable input	Rises at first, reaches a maximum, then falls	AP rises when MP is above AP; AP falls when MP is below AP
Marginal Product (MP)	Additional output from one more unit of variable input	Rises initially, then falls, and may become negative	MP intersects AP at AP's maximum point

Relationship between TP, AP, MP

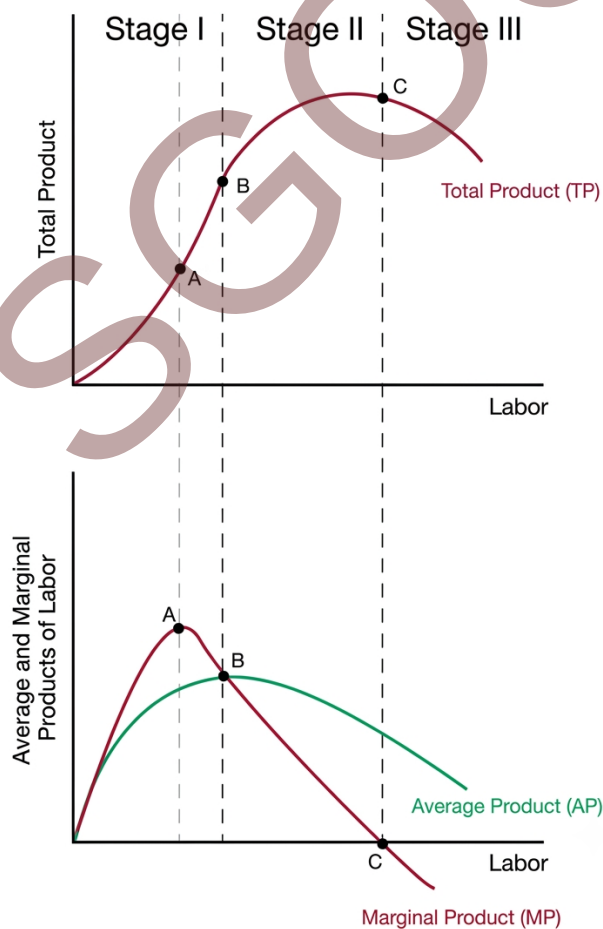


Fig. 3.1.1 Relationship Between TP, AP, and MP

The law of variable proportions, also known as the short-run production law, explains how output changes when one input varies while all other inputs remain fixed. This law is crucial for understanding why TP, AP and MP rise at first, reach a peak and eventually decline. The law states that, when additional units of a variable input are combined with fixed inputs, the output initially increases at an increasing rate, then increases at a diminishing rate, and eventually declines.

The Three Stages of Production

- ◇ **Stage I: The Stage of Increasing Returns.** This stage begins at the origin and ends at the point where the Average Product (AP) is at its maximum. Initially, as more units of the variable factor (labor) are applied to the fixed factor (land/capital), the Total Product (TP) increases at an increasing rate. This creates a steep upward slope in the TP curve. Near the end of this stage, TP continues to rise but increases at a decreasing rate (after the 'point of inflection'). Throughout this stage, the Marginal Product (MP) is always greater than the Average Product (AP), thereby pulling the average up. This stage typically occurs because the fixed factor is initially underutilised, and adding labour allows for better specialisation and efficiency.
- ◇ **Stage II: The Stage of Diminishing Returns** This stage begins where AP is at its maximum (where $AP = MP$) and ends where the Total Product (TP) is at its highest point (where $MP = 0$). During this phase, the Total Product continues to rise but at a diminishing rate. Both the Average Product and Marginal Product fall during this stage, but they remain positive. Crucially, the Marginal Product falls faster than the Average Product, meaning MP is less than AP throughout this stage. This is considered the only rational stage of production, as the producer is maximising the use of the fixed factor without causing total output to decline.
- ◇ **Stage III: The Stage of Negative Returns.** This stage begins after the Total Product has reached its maximum level. In this stage, adding more units of labour actually causes the Total Product to fall. Consequently, the Marginal Product becomes negative. This happens because the variable factor has become too abundant relative to the fixed factor, leading to overcrowding and inefficiency (e.g., too many workers in a small factory getting in each other's way). No rational producer operates in this stage because they could increase total output simply by employing fewer workers.

The Relationships Between the Variables

- ◇ **The Relationship Between TP and MP:** The relationship between Total Product and Marginal Product is direct because MP is essentially the slope of the TP curve. When TP increases at an increasing rate, MP is rising. When TP transitions to increasing at a decreasing rate, MP begins to fall but remains positive. The critical pivot point occurs when TP reaches its absolute maximum; at this precise moment, MP touches the X-axis (becomes zero). Once TP begins to decline, MP drops below the X-axis and becomes negative.

- ◇ **The Relationship Between AP and MP:** The relationship between Average Product and Marginal Product is mathematical. When the Marginal Product is higher than the Average Product, it pulls the average up (AP rises). Conversely, when the Marginal Product is lower than the Average Product, it pulls the average down (AP falls). The intersection of these two curves is mathematically significant: the Marginal Product curve always cuts the Average Product curve at the Average Product's maximum point. This means that when AP is at its highest, AP is exactly equal to MP.

Understanding these linkages helps managers find the most efficient level of production. Firms prefer to operate in stages where MP is positive and AP is reasonably high, because this indicates productive use of resources. When MP becomes very low, the firm knows that the fixed input has reached its limit and further additions of variable input will not be useful.

These concepts provide a practical framework for production planning. Managers rely on TP, AP, and MP to determine how many workers to employ, whether to introduce additional shifts, and when machinery or workspace needs expansion. They also help firms avoid overcrowding, reduce inefficiency, and plan future capacity investments. By understanding how output responds to extra inputs, firms can make informed, cost-effective production decisions.

3.1.4 Isoquant

An isoquant is an essential tool in production analysis because it helps us understand how different combinations of inputs can produce the same level of output. Firms rarely depend on a single method of production. They usually have several possible ways to mix labour and capital. The isoquant provides a clear visual way to study these options and helps managers decide which combination best suits their operations.

An isoquant is a curve that represents all the possible combinations of two inputs, commonly labour and capital, that can produce the same level of output. The term itself reflects this idea: 'iso' means equal, and 'quant' refers to quantity. Each point on the curve shows one such combination. For instance, a firm may produce 100 units of output with more workers and fewer machines, or it may rely more on machines and fewer workers. Although the input mix changes, the output remains constant along the isoquant. Firms often adjust their use of inputs depending on cost conditions, availability, skill levels, and technology. An isoquant shows that production is not tied to a single rigid method. If wages rise, the firm may prefer machinery. If machinery becomes costly to maintain, the firm may depend more on labour. In this way, isoquants highlight the flexibility that business firms have in choosing input combinations while maintaining the same level of output.



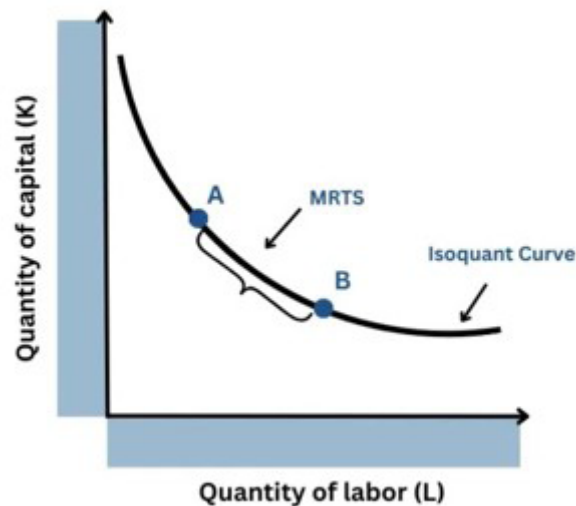


Fig. 3.1.2 Isoquant Curve

Isoquants generally slope downward from left to right. This downward slope reflects a simple idea: when a firm uses less of one input, it must use more of the other to keep producing the same output. They are also drawn as convex to the origin. The convex shape indicates that inputs cannot be replaced in a fixed, one-to-one manner. When the firm already uses a large amount of labour, reducing machinery becomes more difficult because additional labour cannot perfectly substitute for the lost capital. This makes the curve bend inward and captures the practical limitations of input substitution.

The slope of an isoquant is captured through the Marginal Rate of Technical Substitution (MRTS). MRTS indicates how much extra labour is required when one unit of capital is reduced while output is held constant. Although the term may sound technical, the underlying idea is straightforward: when machinery is reduced, the firm needs more workers to maintain the same level of production. However, the additional number of workers required keeps increasing, which is why the isoquant becomes flatter as one moves downward along the curve.

Isoquants exist in groups, and each curve represents a different level of output. Curves that lie farther from the origin correspond to higher output, while those closer to the origin show lower output levels. This helps firms understand how different input combinations support different production targets. By comparing isoquants, managers can evaluate how input use needs to change when the firm wants to increase output.

Key Properties of Isoquants

1. **Downward Sloping Nature:** Isoquants slope downward because reducing one input requires increasing the other to maintain the same output level. This reflects the substitutability between inputs.
2. **Convexity to the Origin:** Isoquants are convex, indicating that substituting one input for another becomes increasingly difficult as substitution continues. The ease of replacement is not constant.

3. **No Intersection Between Isoquants:** Isoquants never intersect, as one level of output cannot pass through the same combination of inputs as another. This ensures consistency in production analysis.
4. **Higher Isoquants Represent Higher Output:** Isoquants located farther from the origin represent larger levels of production. This helps firms identify how input combinations change with different output goals.

Isoquants are useful because they allow managers to compare different production methods and choose the most efficient mix of labour and capital. They help firms adjust to changing labour costs, machinery prices, technological improvements, and supply conditions. Managers can plan how to modify their production process to achieve both efficiency and cost reduction. By understanding isoquants, firms gain clarity on how to balance input use while maintaining output.

3.1.5 Isocost Line

The isocost line is a companion concept to the isoquant. While the isoquant shows different combinations of inputs that produce a fixed level of output, the isocost line shows the combinations of inputs a firm can afford given its budget. Together, the isoquant and isocost line help managers decide the most suitable mix of labour and capital for production. Every firm has a spending limit, and the isocost line represents all input combinations that fall within that limit.

An isocost line shows all possible combinations of two inputs, commonly labour and capital, that a firm can purchase with a given total cost. Each point on the line represents one such combination. As long as the firm spends its entire budget, any point on the isocost line is financially feasible. For example, if a firm has a fixed amount of money to spend on labour and machinery, it can choose between hiring more workers and fewer machines, or hiring fewer workers and more machines. All these affordable combinations together form the isocost line.

The isocost line works like a production version of a budget line. Firms cannot buy unlimited inputs; they must work within their financial capacity. When the prices of labour and capital are given, the isocost line shows the complete range of input bundles the firm can choose from without exceeding its spending limit. It is an essential tool for comparing various feasible input combinations and identifying those that offer the best cost efficiency.



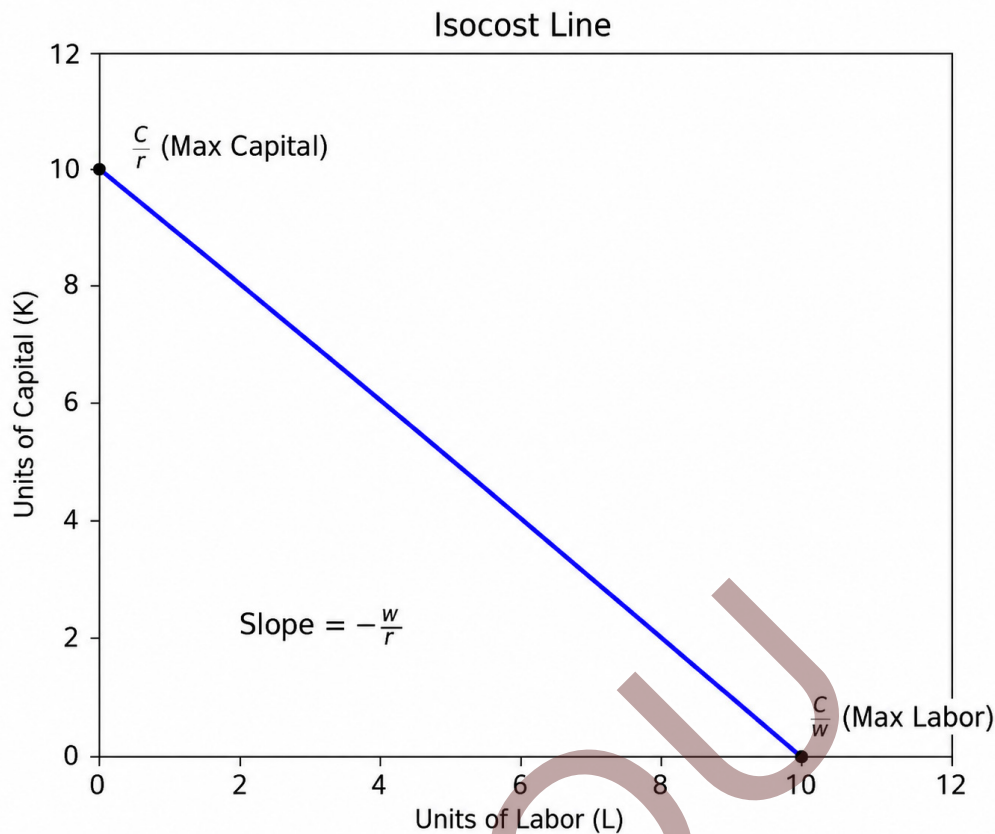


Fig. 3.1.3 Isocost Line

The isocost line is drawn as a straight line. This straight-line shape comes from the assumption that the price of each input remains constant. Because these prices do not change with the quantity purchased, the firm can substitute one input for another at a constant rate.

The slope of the isocost line reflects the ratio of the input prices. If labour is cheaper relative to capital, the line becomes flatter, showing that the firm can hire more labour for every unit of capital given up. If capital is relatively cheaper, the line becomes steeper. This slope helps firms see how the choice between labour and capital depends on the relative prices of labour and capital.

Shifts in the Isocost Line

1. **Change in Total Budget :** When the firm increases its total spending, the isocost line shifts outward, showing that more combinations of labour and capital become affordable. If the budget decreases, the line shifts inward.
2. **Change in Input Prices:** If the price of labour or capital changes, the slope of the isocost line changes.
 - A fall in the price of labour makes labour more affordable, rotating the line outward along the labour axis.
 - A fall in the price of capital has a similar effect along the capital axis.

These shifts highlight how input prices influence production decisions and input choices.

Isocost lines help managers understand the financial limits within which they must choose input combinations. By comparing isocost lines with isoquants, firms can identify the input combination that produces a given level of output at the lowest possible cost. This approach allows firms to plan efficiently, reduce waste, and respond smartly to changes in labour and capital prices. It also helps them understand how much of each input they should use to remain competitive.

3.1.6 Least-Cost Combination

The least-cost combination refers to the particular mix of labour and capital that enables a firm to produce a fixed quantity of output at the minimum possible cost. Even though a firm may have several ways of combining inputs to produce the same output, not every combination is cost-effective. The least-cost point is the one where the firm achieves its desired output while spending no more than necessary. In practical terms, it is the input combination that lies at the point of contact between a given isoquant and the lowest possible isocost line. This point reflects the most economical use of both labour and capital.

To understand how firms arrive at the least-cost combination, it is important to examine the roles of both isoquants and isocost lines. The isoquant displays all combinations of labour and capital that can produce a particular level of output. Every point on the curve shows a technically feasible mixture of inputs. In contrast, the isocost line shows the combinations of labour and capital that the firm can afford with a fixed budget. Every point on the isocost line, therefore, represents a financially feasible input bundle. When these two are plotted on the same graph, the firm can visually identify which technically feasible combinations also fall within its financial limits. The point where the isoquant just touches the lowest isocost line represents the least-cost combination.

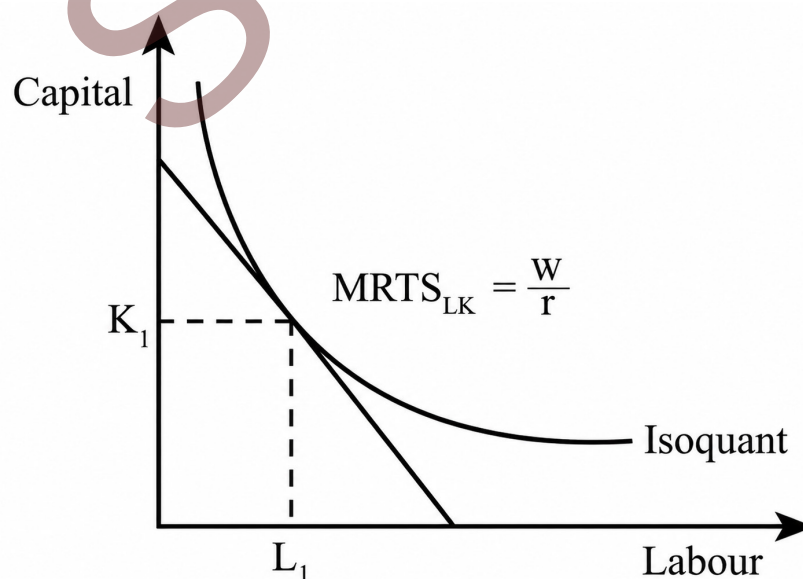


Fig. 3.1.4 Least-Cost Combination

The figure above shows the relationship between labour and capital in a production process using an isoquant and a straight isocost line. The curved line represents the isoquant, which shows all the combinations of labour and capital that produce the same level of output. The straight line represents the isocost line, which contains all the input combinations the firm can purchase with its budget. The point where these two lines intersect is extremely important in production analysis because it indicates the firm's least-cost combination of inputs.

In this diagram, the firm is operating at the point of tangency, the point at which the isocost line just touches the isoquant. At this point, the amount of labour used is L_1 and the amount of capital used is K_1 . This means that the firm can produce the chosen level of output using exactly this combination of labour and capital while spending the minimum possible amount. If the firm moves away from this point either by employing more labour and less capital, or more capital and less labour it will either increase its total cost or fail to maintain the same level of output. Therefore, the tangency point represents a condition of productive efficiency.

The slope of the isoquant at the tangency point measures the marginal rate of technical substitution (MRTS). This value tells us how much labour the firm needs to add when it reduces one unit of capital, while keeping output unchanged. In the diagram, the MRTS at the tangency point equals the ratio of input prices, $\frac{w}{r}$, where w is the wage rate and r is the price of capital. When these two slopes are equal, the firm is substituting labour and capital in a way that is both technically possible and financially sensible. This is the exact condition for achieving the least-cost input combination.

The least-cost combination plays a central role in ensuring that production remains economical and sustainable. When firms choose the correct mix of labour and capital, they avoid unnecessary spending on inputs and reduce wastage. This improves productivity and helps firms maintain competitive pricing. The idea is especially important when input prices change. If wages rise, firms may shift toward capital-intensive production. If machinery becomes expensive, they may rely more on labour. The least-cost approach also guides long-term planning, such as deciding on plant expansion and adopting new technologies. By understanding the relationship between input flexibility and cost efficiency, managers can make better decisions for both short-term operations and long-term growth.

Recap

- ◇ Production means converting inputs into outputs with value addition for satisfying human wants
- ◇ Production aims to meet consumer demand, earn profit, utilise resources efficiently, and promote growth
- ◇ The short run has at least one fixed input, while the long run allows all inputs to vary

- ◇ TP rises at first, slows later, and may decline; AP shows output per unit; MP shows extra output from one more input
- ◇ Stage I has increasing returns, Stage II has diminishing returns, and Stage III has negative returns
- ◇ MP is zero when TP is maximum, and MP intersects AP at AP's maximum
- ◇ Isoquants show combinations of labour and capital that yield the same output and are downward sloping and convex
- ◇ MRTS shows how much labour replaces capital while keeping output unchanged
- ◇ Isocost lines show affordable input combinations at a given budget and depend on input prices
- ◇ Least-cost combination occurs where an isoquant is tangent to the lowest possible isocost line

Objective Questions

1. What term refers to the total output produced by a firm?
2. Which product concept measures output per unit of input?
3. What is the extra output from one more unit of input called?
4. In which stage of production does TP begin to decline?
5. What curve shows different input combinations giving the same output?
6. What indicates the rate at which labour replaces capital?
7. What line shows all input combinations a firm can buy at a given budget?
8. What condition identifies the least-cost combination?
9. What type of input remains unchanged in the short run?
10. Which measure becomes zero when TP is maximum?

Answers

1. Total Product (TP)
2. Average Product (AP)
3. Marginal Product (MP)
4. Stage III



5. Isoquant
6. MRTS
7. Isocost line
8. Tangency of isocost line and isoquants
9. Fixed input
10. Marginal Product (MP)

Assignments

1. Distinguish between short-run and long-run production with suitable examples.
2. Explain TP, AP, and MP and describe their behaviour as input use increases.
3. Describe the three stages of production.
4. Explain the relationship between TP and MP.
5. Describe the concept of an isoquant and explain its key properties.
6. Explain the isocost line and discuss how changes in input prices shift it.
7. Describe the least-cost combination and explain its tangency condition.

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SGOU

Unit 2

Cost and Revenue Analysis

Learning Outcomes

After completing this unit, the learner will be able to:

- ◇ explain the concept of cost
- ◇ describe the concepts of total revenue, average revenue, and marginal revenue
- ◇ evaluate the relationship among TR, AR, and MR
- ◇ discuss break-even analysis

Prerequisite

Maya enjoyed watching people build things, small shops, quiet studios, or even tiny stalls by the roadside. One evening, while walking home, she noticed a young woman carefully arranging handmade soaps on a wooden shelf. The shop was new, modest, and filled with gentle fragrances that drifted into the street.

Over the next few days, Maya observed how the shop slowly attracted visitors. Some came out of curiosity, others returned because they liked what they found. She noticed the shopkeeper greeting each person warmly, rearranging shelves, and making little changes every day. Those small changes caught Maya's attention because each of them seemed to shape how people responded.

One morning, Maya saw the shop closed earlier than usual. A small note said, "Back soon, restocking!" It made her wonder how many quiet decisions take place behind the scenes of any business. Decisions that customers never see, but decisions that guide what is offered, how much effort is needed, and how the shop continues to stand.

As she continued her daily walks, Maya realised that every enterprise, big or small, relies on a series of thoughtful choices. Some are visible, while many remain unnoticed. Yet together they influence whether a business grows, sustains itself, or struggles.

Keywords

Cost, Fixed Cost, Variable Cost, Average Cost (AC), Marginal Cost (MC), Accounting Cost, Economic Cost, Explicit Cost, Implicit Cost, Private Cost, Social Cost, Incremental Cost, Sunk Cost, Total Revenue (TR), Average Revenue (AR), Marginal Revenue (MR), Break-Even Point

Discussion

3.2.1 Cost

Cost is a central concept in managerial economics because every business decision ultimately involves some expenditure. Whether a firm is purchasing raw materials, hiring workers, installing machinery, transporting goods, or even using its own resources, there is a cost involved. Understanding costs helps managers decide how much to produce, how many workers to employ, which technologies to adopt, and how to set prices. Cost is therefore not just an accounting number; it is a guide for productive and strategic decisions.

In simple terms, cost refers to the expenditure a firm incurs to produce goods or services. This includes payments for labour, materials, machinery, electricity, transportation, rent, and many other items needed to run a business. Cost also includes the value of resources that belong to the firm but could have been used elsewhere. A business, therefore, faces cost whenever it uses its resources, whether it pays money to outsiders or uses something it already owns.

Cost in economics is broader than the cost used in accounting. Accounting cost focuses mainly on explicit expenses recorded in a firm's books, such as wages, fuel bills, and maintenance charges. Economic cost, however, also considers what the firm sacrifices by choosing one option over another. For example, when a business owner uses his own building for production rather than renting it out, the rent he has foregone is an economic cost, even though no money was paid out. Understanding cost in this broader sense helps firms make better decisions.

In today's competitive environment, understanding cost is more important than ever. Firms operate with tight margins and face intense competition. Efficient cost management allows firms to offer competitive prices, attract customers and gain market share. Cost awareness also encourages innovation. When firms understand which areas drive cost, they can find new ways to reduce wastage, adopt better technology, and improve organisational efficiency.

3.2.1.1 Types of Cost

Understanding the different types of costs is essential for analysing how firms make production and pricing decisions. Cost does not arise from a single source; it

takes many forms depending on how resources are used, how output changes and how decisions are made. By studying the various types of costs, managers can identify the expenses that remain unavoidable, those that vary with production levels, and those that require careful planning. The following sections explain the most important cost categories used in managerial economics.

Fixed Cost and Variable Cost

1. **Fixed Cost:** Fixed cost refers to expenses that do not change with the level of output. These costs remain constant even when the firm produces nothing. Examples include rent for buildings, the cost of machinery, salaries of permanent staff and insurance payments. Such costs arise because firms must maintain a minimum level of facilities to stay in business. Even if production temporarily falls, these commitments cannot be avoided. Fixed cost is important because it influences the firm's minimum operating requirement and shapes short run production decisions, since these costs must be incurred regardless of the quantity produced.
2. **Variable Cost:** Variable cost changes directly with the level of production. When output increases, variable cost rises; when output decreases, variable cost falls. This includes expenses for raw materials, power consumption, packaging, wages for casual labour, and transport services. Variable cost reflects the day-to-day expenses the firm incurs as it produces additional units. Since firms can adjust variable costs more easily than fixed costs, variable costs play a central role in determining how much a firm should produce in the short run.

Average Cost and Marginal Cost

1. **Average Cost:** Average cost refers to the cost per unit of output. It is derived by dividing the total cost by the total output. Average cost helps managers understand how much it costs, on average, to produce each unit. When production increases, and fixed cost is spread over more units, the average cost may fall. After a point, however, rising variable cost may push average cost upward. Studying average cost helps firms identify the output level at which per-unit cost is lowest.

$$\diamond \text{ Total Cost (TC) = Total Fixed Cost (TFC) + Total Variable Cost (TVC)}$$

$$\diamond \text{ Average Fixed Cost (AFC) = } \frac{TFC}{Q}$$

$$\diamond \text{ Average Variable Cost (AVC) = } \frac{TVC}{Q}$$

$$\diamond \text{ Average Cost / Average Total Cost (AC or ATC) = } \frac{TC}{Q} = AFC + AVC$$

2. **Marginal Cost:** Marginal cost is the additional cost incurred to produce one more unit of output. It reflects how the total cost changes when output increases slightly. Marginal cost rises as the firm approaches the limits of its production

capacity. Because pricing and output decisions often depend on whether producing an additional unit is profitable, marginal cost is one of the most important cost measures in managerial economics. Firms compare the marginal cost of each unit to the price they receive for that unit to decide whether expansion is worthwhile.

$$\text{Marginal Cost (MC)} = \frac{\Delta TC}{\Delta Q}$$

Economic Cost and Accounting Cost

1. **Accounting Cost:** Accounting cost includes all actual, recorded expenses for which a firm makes payments. These costs appear in financial statements and include wages, electricity bills, purchase of materials and maintenance charges. Accounting cost forms the basis for preparing profit and loss statements, tax calculations, and financial reporting.
2. **Economic Cost:** Economic cost includes both accounting cost and the value of resources that the firm owns and uses without paying cash. These foregone values are known as implicit costs. For example, if a business owner uses his own building for production, the rent he could have earned by renting it out becomes an economic cost. Economic cost is broader than accounting cost because it considers what the firm gives up when choosing one option over another. This wider view helps managers make better decisions by highlighting the true cost of using resources.

Private Cost and Social Cost

1. **Private Cost:** Private cost refers to the expenses borne directly by the firm during production. These costs arise from the firm's own activities and affect its profitability. Examples include wages, fuel, maintenance and raw materials. Private cost reflects the firm's internal financial burden.
2. **Social Cost:** Social cost includes private cost as well as any external costs imposed on society. For instance, pollution from a factory affects people who are not part of the production process. Such external costs may not be paid by the firm unless regulations require it, yet they form part of the total cost to society. Understanding social cost helps policymakers frame rules that protect public welfare, and helps firms recognise the broader impact of their activities.

Explicit Cost and Implicit Cost

1. **Explicit Cost:** Explicit cost involves direct monetary payments made to outsiders. These include payments for materials, electricity, salaries, rent, and loan interest. Explicit costs are easy to identify because they involve clear transactions and appear in the firm's books.



2. **Implicit Cost:** Implicit cost refers to the value of resources the firm owns and uses without paying cash. For example, when an entrepreneur works full-time in his own firm, the salary he forgoes elsewhere is an implicit cost. These costs are important for measuring the true profitability of a business, even though they are not recorded in accounting statements.

Incremental Cost and Sunk Cost

1. **Incremental Cost:** Incremental cost represents the additional cost that arises when a firm undertakes a new project, expands production or introduces a new product. This cost helps managers evaluate whether a new decision will be financially beneficial. If the extra revenue from the new activity exceeds the incremental cost, the firm may proceed with the plan.
2. **Sunk Cost:** Sunk cost refers to expenses that have already been incurred and cannot be recovered, regardless of future decisions. Investments in machinery that cannot be resold or past advertising expenses are examples of sunk costs. Because sunk costs cannot be changed, managers should avoid letting them influence new decisions. Focusing on future costs and benefits leads to better economic choices.

3.2.1.2 Relationship between Average Cost and Marginal Cost

The relationship between Average Cost (AC) and Marginal Cost (MC) is a fundamental concept in production economics. It describes how the cost of producing additional units of output impacts the overall cost structure of a firm. Average cost is the total cost of production (fixed and variable costs) divided by the number of units produced. It reflects the per-unit cost of production. Marginal cost is the additional cost incurred from producing one more unit of output. It reflects how total cost changes as output changes.

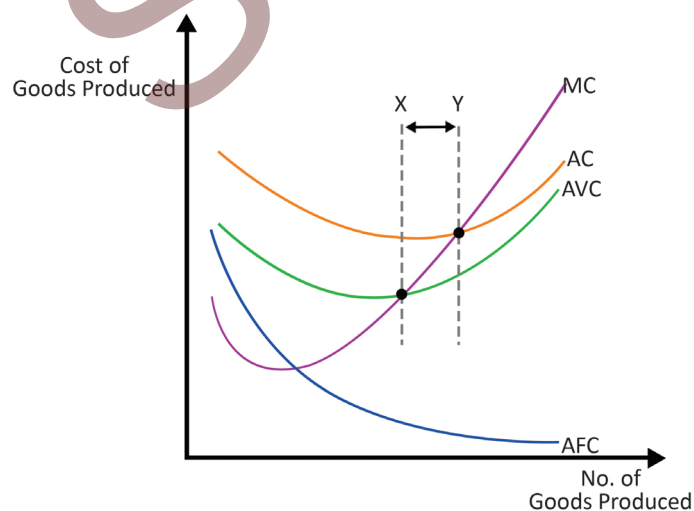


Fig. 3.2.1 Cost Curves

The relationship between AC and MC can be understood by analysing how the addition of each unit of output influences the average cost.

- a. **Marginal Cost is Less than Average Cost ($MC < AC$)** : When the marginal cost of producing an additional unit is lower than the average cost, the average cost decreases. This occurs because the additional unit produced is less costly than the existing average, thus pulling the overall average down. Imagine the scenario where your current exam average is 85%, and then you score 90% on the next exam. Your new average will increase (move closer to 90%). The average cost curve slopes downward as production increases because each additional unit is produced at a lower average cost. This is typically the phase in which a firm benefits from economies of scale, meaning it becomes more efficient in production as output increases.
- b. **Marginal Cost Equals Average Cost ($MC = AC$)** : When the marginal cost equals the average cost, it indicates the minimum point on the average cost curve. This is the point of optimal efficiency, where the firm's average cost is as low as it can be at the level of output produced. This is similar to a scenario in which your exam score exactly matches your average score, meaning your average does not change. At this point, the firm is producing at the most efficient level where the cost per unit of output is minimised. This is also the turning point, beyond which the firm may face diseconomies of scale, meaning increasing output leads to higher costs.
- c. **Marginal Cost is Greater than Average Cost ($MC > AC$)** : When the marginal cost exceeds the average cost, the average cost begins to increase. This is similar to a situation where your exam score falls below your average, thus dragging your overall average down. In production, if the firm produces an additional unit at a higher cost than the average, the overall cost per unit will rise. The average cost curve slopes upwards as production increases. This typically happens after the firm has reached the optimal scale of production and is now experiencing diseconomies of scale, where producing more output leads to inefficiencies and higher per-unit costs. The AC curve is typically U-shaped because it initially decreases as the firm benefits from economies of scale (increased production efficiency), but later increases due to the law of diminishing returns (where additional units become more costly to produce). The MC curve typically slopes upwards after a certain point because, as production expands, it becomes more expensive to produce additional units due to diminishing returns. The intersection of the MC curve and the AC curve marks the minimum point of the AC curve, which is the point of optimal efficiency for the firm.

The Marginal Cost (MC) curve plays a key role in determining the most cost-effective level of output. When MC is below AC, increasing production can lower average cost, whereas if MC exceeds AC, increasing production raises average cost. The MC curve typically rises steeply as firms encounter diminishing returns to scale.

d. Relationship between MC and AVC

- ◇ When $MC < AVC$, the AVC is falling, as producing an additional unit costs less than the average variable cost. MC will be below AVC



- ◇ When $MC = AVC$, the AVC reaches its minimum point.
- ◇ When $MC > AVC$, the AVC starts rising, as each additional unit of production adds more to variable cost than the average. MC will be above AVC

The relationship between Average Cost (AC) and Marginal Cost (MC) is key for understanding how costs behave as production levels change. A firm aims to operate at the level where $MC = AC$, as this minimises cost per unit produced.

- ◇ When $MC < AC$, the AC curve is falling, indicating that production is becoming more efficient.
- ◇ When $MC = AC$, the firm is operating at optimal efficiency, and the average cost is at its minimum.
- ◇ When $MC > AC$, the AC curve begins to rise, reflecting inefficiencies in production.

Understanding the interaction between AC, MC, AVC, and ATC is key for businesses to determine efficient production levels and pricing strategies.

3.2.2 Revenue Concepts

Revenue forms the income side of a firm's operations. While cost tells us what a firm spends to produce goods and services, revenue tells us what the firm earns by selling them. Understanding revenue is essential because it helps managers decide how much to produce, what price to charge and how to assess the financial health of the business. Revenue concepts also play a central role in pricing strategies, profit planning and market analysis. The basic revenue measures used in managerial economics are Total Revenue, Average Revenue, and Marginal Revenue.

1. **Total Revenue (TR):** Total Revenue refers to the total income a firm earns by selling its output. It is calculated by multiplying the price of the product by the quantity sold. TR helps firms understand how their total revenue changes as they produce and sell different levels of output. When more units are sold at the same price, total revenue naturally increases. However, in many markets, increasing the quantity sold may require lowering the price, which affects total revenue in different ways.

In real business situations, TR provides a broad picture of how successful a firm is in generating income. Firms monitor their total revenue closely to identify whether changes in output, price, or market conditions are improving or weakening their earnings. Whether the firm sells physical goods or services, total revenue forms the starting point for financial analysis.

$$\text{Total Revenue (TR)} = P \times Q$$

2. **Average Revenue (AR):** Average Revenue refers to the revenue earned per unit of output sold. It is calculated by dividing total revenue by the number of units sold. For most firms operating in competitive markets, average revenue is simply the market price, because each unit is sold at the same price. In such cases, average revenue remains constant across different output levels.

$$\text{Average Revenue (AR)} = \frac{TR}{Q}$$

Understanding AR helps managers assess how much the firm earns per unit relative to its cost. If average revenue exceeds average cost, the firm makes a profit on each unit. If average revenue falls below average cost, the firm incurs a loss. AR, therefore, serves as a useful indicator of financial performance at the per-unit level.

3. **Marginal Revenue (MR):** Marginal Revenue refers to the additional revenue earned by selling one more unit of output. It shows how total revenue changes with a slight increase in sales. In perfectly competitive markets, marginal revenue is equal to the price because selling one more unit does not affect the market price. In other markets, firms may have to reduce the price to sell an additional unit, causing marginal revenue to fall.

$$\text{Marginal Revenue (MR)} = \frac{\Delta TR}{\Delta Q}$$

In perfect competition, $MR = AR = P$

MR is extremely important in production and pricing decisions. Firms compare marginal revenue with marginal cost to decide the level of output that maximises profit. If marginal revenue exceeds marginal cost, increasing output is beneficial. Once marginal revenue falls below marginal cost, producing extra units becomes unprofitable.

3.2.2.1 Relationship Between Total Revenue, Average Revenue, and Marginal Revenue

The relationship between Total Revenue (TR), Average Revenue (AR), and Marginal Revenue (MR) is key to understanding how firms generate revenue and how these change as output varies, especially across different market structures. Total Revenue refers to the total income earned by a firm from the sale of its goods or services, calculated as the product of price and quantity sold. Average Revenue is the revenue earned per unit of output, often equivalent to the price of the good under perfect competition. Marginal Revenue, on the other hand, measures the additional revenue generated from selling one more unit of a good.



Fig. 3.2.2 Revenue in Perfect Competition

For a firm in a competitive market, the price remains constant as output increases. In perfectly competitive markets, AR and MR are constant and equal to the market price.

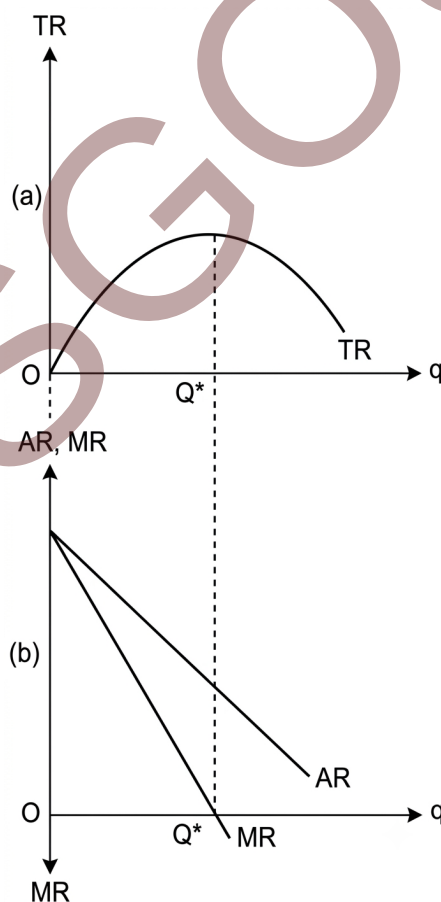


Fig. 3.2.3 Revenue in Imperfect Competition

The TR curve increases with output, but after a certain point it starts to flatten (indicating maximum total revenue). The MR curve initially rises, then declines and can even become negative after TR is maximised. The AR curve is downward sloping in imperfect competition, but it is always above the MR curve (except when $MR = AR$).

1. Relationship Between TR and AR

Since AR is the price per unit, and TR is the total amount earned from selling all units, AR essentially determines TR. If AR increases, TR increases as long as the quantity also increases. In a perfectly competitive market, AR is constant, so the TR curve is a straight line that rises linearly with quantity. Example: If AR is constant at ₹10 per unit, TR will increase by ₹10 for each additional unit sold. In imperfect markets, AR decreases as output increases. The firm lowers the price to sell more units, so the TR curve initially becomes steeper and then flattens as it reaches a maximum.

2. Relationship Between TR and MR

- ◇ **MR is the rate of change of TR:** MR shows how TR changes as output increases. If MR is positive, TR increases as more units are sold. If MR is negative, TR starts to decrease as additional output is sold.
- ◇ **TR increases when MR is positive:** As long as MR is greater than zero, the total revenue is increasing. This is because each additional unit sold increases revenue.
- ◇ **TR reaches its maximum when MR is zero:** TR is at its peak when MR is zero. At this point, any additional output does not change the total revenue. This is the point of revenue maximisation.
- ◇ **TR decreases when MR is negative:** If MR becomes negative, selling additional units decreases the total revenue. This usually happens when the firm lowers its price so much that it cannot offset the reduced per-unit price with additional units sold.

3. Relationship Between AR and MR

AR and MR are related but have different behaviours as output increases, particularly in imperfect markets. In perfectly competitive markets, $AR = MR$ because the price remains constant. The firm can sell any quantity at the same price, so both AR and MR are constant and equal to the price level. The TR curve is a straight line, and the MR curve is also a straight line (horizontal). In imperfect markets, MR falls faster than AR because the firm must lower the price to sell more units. As output increases:

- ◇ **MR declines faster:** Each additional unit of output contributes less to TR because the price must be lowered.
- ◇ **AR falls at a slower rate:** The price reduction required to sell an additional unit is reflected in the AR curve, but at a slower rate than the MR curve.



Firms use this relationship to decide the optimal level of output to maximise revenue or profit. For instance, they aim to produce at the level where $MR = 0$ if revenue maximisation is the goal. The downward-sloping AR and MR curves reflect imperfect competition's pricing and demand dynamics, helping firms' strategies regarding their pricing policies.

Revenue concepts are essential tools for planning and evaluating business activity. They help managers decide how much to produce, how to price their products and when to expand or reduce production. Understanding revenue helps firms set targets, assess demand conditions and adjust strategies in response to market changes. When combined with cost information, revenue measures allow firms to estimate profit and make informed economic decisions.

3.2.3 Break-Even Analysis

Break-even analysis is a practical tool that helps firms understand the level of output or sales at which they can cover all their costs. It highlights the point where the firm neither makes a profit nor incurs a loss. This idea is useful for almost every type of business, from small shops to large factories, because it helps in planning, pricing, production decisions, and financial forecasting. Break-even analysis also allows managers to visualise how changes in costs and prices affect the minimum output required for the firm to operate safely without incurring losses. The break-even point is the level of output at which total revenue equals total cost. At this point, the firm's income just covers its expenses. The business does not earn any profit, but it does not suffer any loss either. Once the firm crosses this point and sells more units, it begins to earn profit. If it sells fewer units, it incurs losses. In simple terms, the break-even point answers one fundamental question: *"How much do we need to produce and sell before we start making money?"*

Break-even analysis is built on three central ideas: fixed cost, variable cost, and selling price. Fixed cost remains unchanged regardless of output, while variable cost changes with production. The selling price determines how much revenue the firm earns from each unit sold. These three factors together influence the point at which the firm breaks even. When fixed costs are high, the break-even point is higher because the firm needs to sell more units to cover its initial expenses. When variable cost per unit decreases or selling price increases, the break-even point falls, making it easier for the firm to reach profitability.

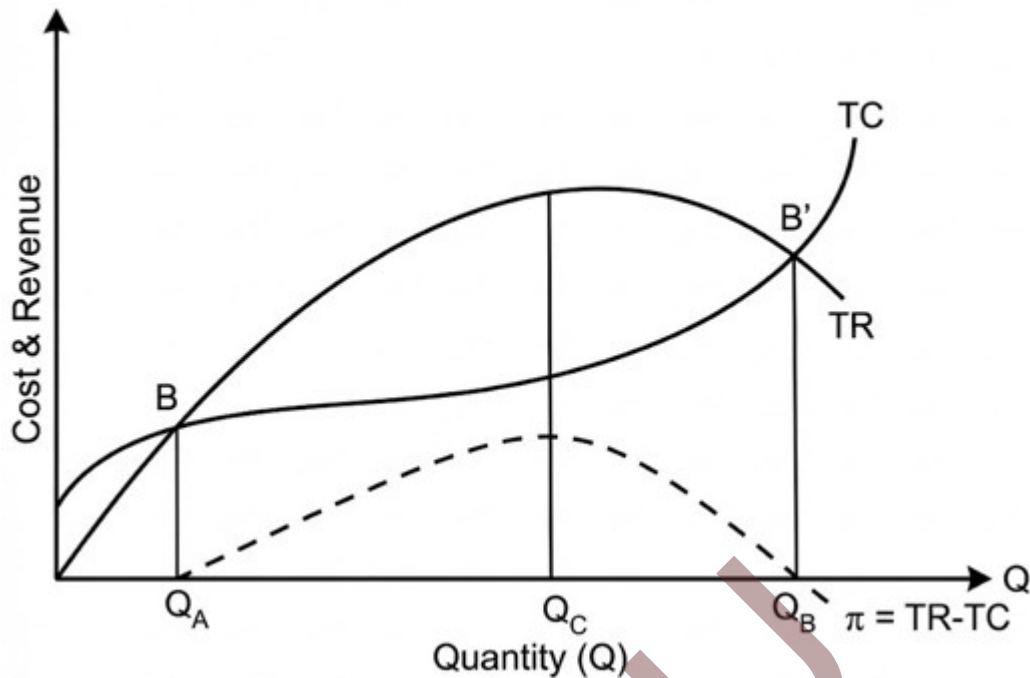


Fig. 3.2.4 Revenue in Imperfect Competition

The figure given above presents a more detailed version of break-even analysis than the simple linear model. Instead of straight lines for cost and revenue, the curves in this figure reflect a more realistic situation in which both total cost (TC) and total revenue (TR) change nonlinearly as output expands. The horizontal axis represents output, and the vertical axis measures revenue and cost.

The Total Revenue (TR) curve rises initially at a steady rate as output increases. In many real markets, firms cannot sell unlimited quantities at the same price; demand conditions may force the price to fall as sales rise. Because of this, the TR curve eventually bends downward and flattens, indicating that additional units add less and less to revenue.

The Total Cost (TC) curve also bends as output increases. At lower levels of production, cost rises slowly because the firm makes better use of its fixed inputs. As output grows further, the firm begins to face capacity constraints, overtime expenses, higher maintenance costs or efficiency losses. These pressures cause the TC curve to rise more steeply at higher output levels. This curved shape captures the practical reality that producing more units becomes more expensive after a point.

The figure contains two break-even points, marked as B and B'.

- ◇ The first break-even point, B, occurs at output level Q_A , where total revenue first becomes equal to total cost. At this point, the firm has finally covered its costs and moves out of the loss region.
- ◇ As output increases further beyond Q_A , the TR curve lies above the TC curve, meaning the firm is earning profit. The vertical line at Q_C marks the output level

at which profit is maximised. This is where the gap between TR and TC, the profit curve shown with the dashed line, is at its highest.

Beyond Q_c , profit begins to decline even though output increases. The reason lies in the steep rise in total cost compared to total revenue at higher output levels. Eventually, the TR and TC curves meet again at the second break-even point B', at output level Q_B . At this point, profit becomes zero once more. If the firm produces beyond Q_B , total cost exceeds total revenue, pushing the firm back into losses. This generalised model shows that break-even analysis is not always a simple one-point calculation. In industries where costs rise sharply with scale or demand weakens at high output levels, firms may face two break-even points: one when they first stop incurring losses and another when profits disappear again at very high output. The diagram helps learners see that profit does not always increase indefinitely; it expands only up to a certain level of output and then begins to fall when cost conditions worsen or market limitations set in.

Break-even analysis supports several everyday decisions within a firm. It helps managers assess whether a new product is financially viable and whether the expected sales volume is sufficient to cover its launch costs. It also guides decisions on pricing, because raising or lowering the price shifts the break-even point. Firms use this analysis when deciding whether to expand production, invest in new machinery, or restructure their cost pattern. For example, if a firm plans to replace workers with machines, fixed costs may rise while variable costs fall. Break-even analysis helps managers evaluate whether this change improves profitability in the long run. Overall, break-even analysis offers a simple yet powerful way for firms to study their cost structure and understand the minimum output necessary for financial stability.

Recap

- ◇ Cost is the expenditure a firm incurs to produce goods or services, including both explicit payments and the value of resources the firm uses
- ◇ Economic cost includes implicit costs, whereas accounting cost records only monetary payments
- ◇ Fixed costs remain unchanged with output, whereas variable costs change directly with the level of production
- ◇ Average cost measures cost per unit, and marginal cost shows the additional cost of producing one more unit
- ◇ When marginal cost is below average cost, the average falls, when it equals average cost, the average is at its minimum, and when it is above average cost the average rises
- ◇ Total revenue equals price multiplied by quantity, average revenue refers to revenue per unit, and marginal revenue is the extra revenue from selling one more unit

- ◇ In perfect competition, average revenue and marginal revenue remain constant and equal to price, while in imperfect markets, AR slopes downward and MR lies below AR
- ◇ Total revenue increases while marginal revenue is positive, reaches its maximum when marginal revenue is zero, and declines when marginal revenue becomes negative
- ◇ Break-even point is where total revenue equals total cost, marking the output level at which a firm earns neither profit nor loss
- ◇ When cost and revenue curves are non-linear, a firm may encounter two break-even points as profit first emerges and later disappears at higher output levels

Objective Questions

1. What type of expenditure does not vary with output?
2. What expenditure changes directly with production?
3. What measure shows cost per unit?
4. What refers to the extra cost of producing one more unit?
5. What type of expenditure is recorded as an actual monetary payment?
6. What term denotes the value of sacrificed alternatives?
7. What costs cannot be recovered once incurred?
8. What is the total income from selling all units called?
9. What is income per unit known as?
10. What is the additional income from one more unit sold?
11. In perfect competition, AR is equal to which measure?
12. When MR becomes zero, which measure reaches its maximum?
13. When MC is less than AC, what happens to AC?
14. At what point does TR equal TC?
15. What costs include private costs and external effects on society?

Answers

1. Fixed
2. Variable
3. Average
4. Marginal
5. Accounting
6. Implicit
7. Sunk
8. Total-revenue
9. Average-revenue
10. Marginal-revenue
11. Price
12. Total-revenue
13. Falls
14. Break-even
15. Social

Assignments

1. Define economic cost and explain how it differs from accounting cost using suitable examples.
2. Explain the behaviour of fixed cost and variable cost as output changes, with reference to their role in short-run decision-making.
3. Using an assumed total-cost schedule, compute AC and MC for any two consecutive output levels and interpret the results.
4. Illustrate with a diagram the U-shaped AC curve and the rising MC curve, and explain why MC intersects AC at its minimum point.
5. Describe the relationship between TR, AR, and MR in perfect competition and contrast it with the relationship observed in imperfect competition.

6. Given a hypothetical price–quantity schedule for an imperfect market, derive TR, AR, and MR and determine the point at which TR is maximised.
7. Explain break-even analysis.
8. Discuss the importance of marginal revenue and marginal cost in determining profit-maximising output.
9. Explain the role of incremental cost and sunk cost in evaluating new projects or expansion decisions.

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BLOCK

4

Capital Budgeting and Investment Analysis

Unit 1

Capital Budgeting

Learning Outcomes

After completing this unit, the learner will be able to:

- ◇ explain the meaning of capital budgeting
- ◇ distinguish between the demand for capital and the supply of capital
- ◇ identify and describe major internal and external sources of capital
- ◇ discuss capital rationing in firms

Prerequisite

Riya had always admired her grandfather's small workshop. It stood quietly at the corner of their street, filled with the gentle sound of tools and the hum of daily activity. One day, while helping him clean the shelves, she noticed how carefully he planned every little change in the workshop. He would pause, think, and then decide whether something was truly worth doing.

As she grew older, Riya realised that these decisions were not random. Her grandfather often spoke about choosing wisely because every choice shaped the future of the workshop. Sometimes he saved money for months before buying a new tool. At other times, he postponed an idea because he felt the time was not right.

Years later, when Riya started working in a company, she noticed the same kind of decisions being made on a much larger scale. The company discussed whether to open a new branch, invest in better technology or expand its existing operations. She instantly remembered her grandfather's patient way of thinking about the future.

That was when she understood that planning for the future is not just about dreams. It is about weighing today's resources against tomorrow's possibilities. It is about making thoughtful choices that guide a business toward stability and growth.



Keywords

Investment Decisions, Long-Term Planning, Future Returns, Project Evaluation, Retained Earnings, Equity Shares, Debentures, Leasing, Hire-Purchase, Venture Capital, Trade Credit, Risk, Return, Capital Rationing

Discussion

4.1.1 Capital Budgeting

Capital budgeting is the decision-making process a business uses when it plans to invest in activities that will shape its future for many years. These decisions usually involve a large amount of money and cannot be reversed easily. Because of this long-term impact, firms must think carefully before committing themselves. When a business decides to build a new production unit, introduce a fresh product line, upgrade its technology, or expand to another location, it is engaging in capital budgeting. Each of these choices influences the direction in which the firm will grow, the markets it will serve and the resources it will need in the coming years.

Capital budgeting can be understood more clearly with a simple example. Consider a small manufacturing firm that uses an old machine that often breaks down. The owner has two options: either continue repairing the old machine or invest in a new one. The new machine is expensive, but it promises lower maintenance costs and faster production. The owner must now consider the purchase price, expected future savings, increased output, and the time required to recover the investment. This weighing of present cost against future benefits is the essence of capital budgeting. The firm is deciding whether today's investment will yield sufficient returns tomorrow.

Another example is when a business plans to enter a new market. Suppose a food-processing company considers opening a branch in another city. This requires buying land, constructing a building, purchasing equipment, hiring staff, and setting up distribution channels. These expenses are not short-term; they are tied to the future of the company. Once the investment is made, the firm cannot simply walk away without losing money. Capital budgeting helps the firm assess whether this expansion is likely to succeed, how long it will take to recoup the investment, and whether the expected sales will justify the financial commitment.

At its core, capital budgeting helps a firm choose the most promising opportunities from among the many that might appear attractive. No business has unlimited money, so every decision must be wise. Capital budgeting encourages managers to estimate future earnings, understand the risks involved and compare different alternatives. It is a disciplined way of asking, 'Will this investment strengthen the firm in the long run?' The answer to this question decides whether the project should be accepted, postponed, or rejected.

Capital budgeting is important not only for growth but also for stability. Poor investment choices can drain a firm's finances, reduce profitability and limit its ability to compete. Well-planned investments, on the other hand, expand capacity, improve efficiency, and support the overall development of the business. In this way, capital budgeting serves as a bridge between the present and the future, helping firms to use today's resources to build a stronger tomorrow.

4.1.1.1 Characteristics of Capital Budgeting

Capital budgeting decisions shape the long-term direction of a business. These decisions involve selecting investments that will support the firm's growth and strengthen its ability to operate efficiently in the future. Because they influence production, profitability, and competitiveness for many years, capital budgeting decisions have important characteristics that managers must understand clearly. They are as follows:

1. **Long-Term Impact:** Capital budgeting decisions are concerned with investments that affect the business for several years. Whether a firm installs a new machine, expands its plant, or adopts new technology, the effects of these choices extend far beyond the current financial year. The commitment of funds is long-lasting, and any mistake may be difficult to reverse. This long-term nature makes careful planning and evaluation essential.
2. **Large Financial Commitment:** These decisions usually involve significant amounts of money. Even a small investment, such as a new piece of equipment or a small building expansion, requires substantial funds for the business. Because the amounts involved are large, the firm must consider whether it has enough internal resources or should rely on external financing. The financial risk is high, which requires a thoughtful assessment before committing to the project.
3. **Irreversibility:** Once a capital investment is made, it is difficult to reverse without incurring considerable losses. A purchased machine cannot always be sold for its original value, and a new building cannot be 'unbuilt.' Even if the firm changes its mind, recovering the full cost is usually impossible. This irreversibility makes capital budgeting a sensitive area where decisions must be made with great care.
4. **Future Uncertainty:** Capital budgeting decisions depend on estimates about future revenues, costs, and market conditions. Since no manager can predict the future perfectly, these decisions carry uncertainty. Demand may fluctuate, raw material prices may rise, or technological changes may make an investment less effective. Managers must consider these uncertainties and evaluate whether the expected benefits reasonably justify the risk.
5. **Long-Term Commitment of Resources:** Once the firm invests in a long-term project, it must continue supporting it with additional resources such as labour, maintenance, utilities, and periodic upgrades. Capital budgeting decisions,

therefore, involve much more than a one-time expenditure. They shape the pattern of future costs and affect the firm's long-term resource allocation.

6. **Growth and Competitiveness:** Capital budgeting decisions often determine the future direction of the business. Expansions, new product lines or technology upgrades improve efficiency and help the firm remain competitive. These decisions influence the firm's ability to respond to competition and meet customer expectations.
7. **High Risk and High Responsibility:** Because capital budgeting decisions involve large funds, long-term commitments, and uncertain outcomes, they carry higher risks than routine decisions. Managers must evaluate projects with care, balancing potential rewards with possible risks. A well-chosen investment can transform the business, while a poor decision can weaken its financial stability.

4.1.1.2 Types of Capital Budgeting Decisions

Capital budgeting decisions are not uniform. Firms face a variety of investment choices, each with different goals and implications. Understanding the types of decisions helps managers apply suitable evaluation methods and choose the projects that best support their long-term strategy. The major types of capital budgeting decisions are as given below:

1. **Expansion Decisions:** Expansion decisions involve increasing the scale of the firm's operations. A business may decide to expand its production capacity, enter new geographic markets, or add additional shifts to meet growing demand. These decisions aim to strengthen the firm's market presence and increase revenue over the long term. Expansion often requires careful forecasting of future demand and an assessment of whether the additional output can be sold profitably.
2. **Replacement or Modernisation Decisions:** Firms regularly replace outdated machinery or upgrade their equipment to improve efficiency. Replacement decisions become necessary when older machines incur high maintenance costs, experience frequent breakdowns, or produce lower-quality output. Modernisation helps reduce operating costs and improve productivity. Although such decisions may not immediately increase revenue, they improve cost efficiency and maintain the firm's competitiveness.
3. **Diversification Decisions:** Diversification involves entering new product lines or adding related business activities. A firm may diversify to reduce risk, tap new markets, or spread its resources more effectively. For example, a food-processing unit that makes curry pastes may also add pickles or ready-to-eat snacks. Diversification helps reduce dependence on a single product and provides additional revenue streams, but managers must evaluate the demand, production requirements, and financial feasibility of the new activity.
4. **Mutually Exclusive Project Decisions:** Sometimes a firm must choose one project from a set of alternatives. Accepting one option automatically means

rejecting the others. For instance, the firm may choose between installing Machine A or Machine B, where both perform the same function but differ in cost, efficiency, and capacity. Mutually exclusive decisions require careful comparison of benefits and costs to identify the option that generates the greatest value.

5. **Independent Project Decisions:** Independent projects are those whose acceptance does not affect the choice of other projects. A firm may install a small packaging machine and also invest in a separate solar panel system for power. Because the two projects do not interfere with each other, they can be accepted simultaneously if they meet the evaluation criteria. These decisions help the firm pursue multiple improvements within available resources.
6. **Mandatory or Compliance-Based Decisions:** Some investments are unavoidable. These include safety equipment, environmental controls, or government-mandated upgrades. Such decisions are not made for profit but for compliance with legal requirements or for social responsibility. While they may not generate direct financial benefits, they are essential for keeping the business operational and protecting it from legal risks.

4.1.2 Demand for Capital and Supply of Capital

Capital is the lifeline of every business decision that looks beyond the present moment. Whether a firm wants to expand, modernise, explore new markets, or simply maintain its productive strength, it must secure the financial resources required for these activities. This creates both a demand for capital and a need to understand the supply of capital available in the broader financial system. The relationship between these two elements forms the foundation of all long-term investment planning carried out by firms.

4.1.2.1 Demand for Capital

The demand for capital arises when a firm identifies a need or opportunity that requires long-term financial commitment. Unlike day-to-day expenses, which cover routine operations, the demand for capital is tied to decisions that shape the business's future path. A firm may seek capital to invest in new machinery, upgrade technology, enter new markets, redesign its production process, or replace worn-out equipment. In each case, the firm requires funds that will support decisions whose benefits are expected to unfold over many years.

Consider a small food-processing business that has been operating with basic equipment for many years. As demand for its products grows, the owner realises that continuing with the same machinery will not meet the rising orders. New equipment will speed up production, improve quality and allow the business to diversify its product range. However, this new machinery requires a significant financial investment. The owner's need for funds to support this long-term improvement represents the demand for capital.



Demand for capital also emerges when firms want to maintain their competitiveness. A textile firm facing pressure from newer industries may need to adopt updated technology to reduce waste and improve efficiency. A retail chain may wish to open stores in new locations to capture untapped markets. Every such step requires careful planning and a clear understanding of how much capital will be needed, how soon the firm can recover it and how the investment will contribute to future earnings.

The demand for capital is also shaped by the economic climate. When business conditions are stable and the market outlook is positive, firms become more willing to take on long-term investments. When uncertainty is high, firms may hold back, reducing their demand for capital. In this way, the demand for capital reflects not only the firm's internal goals but also its expectations about the broader economic environment.

Determinants of Demand for Capital

Firms do not invest in capital simply because funds are available; they invest when the business environment and internal expectations create a need for long-term assets. The demand for capital reflects the firm's desire to purchase new machinery, expand facilities, modernise equipment or enter new lines of production. Several factors influence this decision, each playing a different role depending on the nature of the industry, the state of the economy, and the firm's own strategic direction. Understanding these determinants helps managers make informed choices about long-term investments. They are as given below:

1. **Expected Profitability of the Investment:** The most important determinant of capital demand is the expected return from the investment. Firms invest in new machinery or facilities only when they believe that the additional output or cost savings will increase future profits. If a project is expected to generate steady revenues, support product expansion, or reduce operating costs, it naturally strengthens the firm's willingness to invest. Expected profitability also depends on demand forecasts, competition, market growth, and the firm's ability to sell the additional output at a sustainable price.
2. **Cost of Capital:** The cost of capital represents the price the firm must pay to obtain funds, whether through borrowing, issuing shares or using internal reserves. When interest rates are low and financial institutions are willing to lend at favourable terms, the demand for capital often rises because investment becomes more affordable. Conversely, when borrowing costs are high, firms postpone or scale down investment plans. For firms, including Small and Medium Enterprises (SMEs), the availability of affordable credit from banks and cooperative financial institutions significantly influences their investment decisions.
3. **Level of Technology:** Technological progress is a major driver of capital investment. When new and improved machines enter the market, firms may find it beneficial to replace older equipment. Investments in modern technology often improve productivity, reduce operational costs, and enhance the quality of

output. This is particularly relevant in sectors such as food processing, textiles, and small manufacturing, where modern machinery can significantly increase efficiency. Firms that delay technological upgrades risk losing competitiveness, which increases the pressure to invest in capital.

4. **Consumer Demand and Market Growth:** The firm's demand for capital is closely linked to the demand for its products. When consumer demand expands, either due to population growth, rising incomes or seasonal patterns, firms are encouraged to increase capacity. For example, a food-processing unit may invest in a new filling machine if it observes strong and sustained demand during festival seasons. In contrast, when demand slows down or becomes uncertain, firms tend to postpone investments because the risk of underutilisation increases.
5. **Competitive Pressure:** Competition plays an equally important role. Firms invest in capital not only to meet existing demand but also to defend or strengthen their market position. If competitors adopt advanced machinery, faster production methods or better-quality control systems, the firm may be compelled to invest in similar or better technology to avoid losing customers. This strategic motivation becomes a major determinant of capital demand in industries where efficiency and innovation directly affect market share.
6. **Internal Financial Strength:** A firm with healthy cash reserves or stable retained earnings finds it easier to undertake capital projects. Internal financial strength reduces reliance on external borrowing and lowers the overall cost of investment. Firms with strong internal funds can respond quickly to market opportunities, while those with limited resources must carefully balance investment needs with liquidity constraints. Internal strength also influences how much risk the firm is willing to absorb.
7. **Government Policies and Incentives:** Government policies can either encourage or discourage investment. Tax benefits, depreciation allowances, subsidies, export incentives, and credit support programmes often motivate firms to invest in new capital assets. In India, many small and medium enterprises in areas such as food processing, agriculture and manufacturing benefit from schemes that support equipment modernisation. On the other hand, strict regulations, compliance costs, and policy uncertainty can delay investment decisions.
8. **Risk and Future Uncertainty:** Capital demand is sensitive to the firm's expectations about future economic conditions. If managers anticipate economic stability, rising incomes or favourable market conditions, they are more confident in undertaking long-term investments. However, when uncertainty increases due to fluctuating raw material prices, political instability, unpredictable demand, or global shocks, firms often adopt a cautious approach. Since capital investments are difficult to reverse, uncertainty makes managers more selective in approving new projects.
9. **Nature of the Industry:** Industries differ in how frequently they need to invest in capital. Manufacturing, processing, and infrastructure sectors require regular



upgrades to machinery and technology. Service industries often need fewer physical assets, though they may invest heavily in digital infrastructure. Firms operating in highly mechanised industries naturally exhibit a higher demand for capital than those in labour-intensive sectors.

The demand for capital arises from the firm's need to grow, remain competitive and operate efficiently. Expected profitability, cost of funds, technology, market conditions, and internal financial strength collectively shape investment decisions. Because capital budgeting involves long-term commitment, managers must weigh these determinants carefully and select projects that align with the firm's strategic goals while managing future uncertainty.

4.1.2.2 Supply of Capital

If the demand for capital represents the firm's need for long-term funds, the supply of capital represents the availability of those funds in the financial system. Capital does not come from a single source; instead, it flows from households, financial institutions, banks, investors, and various intermediaries that channel savings into productive use. These savings form the pool of funds that firms can tap into when planning their long-term investments.

The supply of capital depends heavily on people's willingness to save and invest. When individuals save a portion of their income, these funds become available for lending and investment through banks, financial markets, and other institutions. A healthy flow of savings increases the supply of capital, making it easier for firms to borrow or raise funds for expansion. Conversely, when savings fall or when people prefer to keep their money idle, the supply of capital tightens, making investment more expensive.

Economic stability also influences the supply of capital. When interest rates are stable, inflation is moderate and financial markets function smoothly, more funds are available for firms to borrow. But during periods of uncertainty or financial stress, lenders become cautious, reducing the supply of capital available to businesses. This affects the cost of borrowing, the ease with which firms can obtain funds and the types of projects that can realistically be undertaken.

The supply of capital, therefore, reflects the financial strength and confidence of the entire economy. It determines how much funding firms can access, how costly it will be and how flexible their investment decisions can be. A firm planning a long-term project must therefore understand not only its own demand for capital but also the supply conditions that will influence its ability to secure funds.

Sources of Capital

Once a firm recognises its need for long-term funds, it must find suitable ways to obtain that capital. These sources form the supply channels through which money flows into the business. The choice of source depends on the size of the firm, the nature of the project, the cost of borrowing, the level of risk the firm is willing to take and the degree of flexibility it wants to maintain in the future. Understanding the broad sources

of capital helps businesses select financing that supports growth while keeping financial pressures manageable.

- 1. Internal Sources of Capital:** Internal sources of capital come from within the firm itself. These funds are generated through the business's own operations and do not require borrowing from outside. The most common internal source is retained earnings i.e., the portion of profit that is not distributed to owners but kept aside for future investment. A firm that consistently earns profits can build a strong internal reserve over time. These reserves are attractive because they avoid interest payments, reduce dependence on lenders and give the firm complete control over investment decisions. Another internal source includes sale of old or unused assets, such as outdated machinery, vehicles, or spare land. Although this source is limited, it allows the firm to convert idle assets into useful capital. Internal funds are often preferred for smaller investments, improvements to existing facilities or early stages of expansion. However, for large projects, internal sources alone may not be sufficient, and firms must look beyond their own resources.
- 2. External Borrowing from Banks and Financial Institutions:** Banks and financial institutions form one of the most important external sources of capital. They provide long-term loans for purchasing machinery, constructing buildings, expanding production capacity or upgrading technology. Banks usually require repayment over several years, along with interest, and they may ask for collateral to reduce the risk of lending. Development banks and specialised institutions also offer loans aimed at promoting industrial growth, sometimes on favourable terms. Borrowing from banks gives firms access to large sums of money without giving up ownership or control. However, the commitment to repay the loan regularly makes this source more suitable for firms with stable revenue. A change in interest rates or economic conditions can influence borrowing costs, so firms must plan carefully before choosing this route.
- 3. Equity Capital (Issue of Shares):** For larger firms, issuing shares is a common way to raise long-term capital. When a company issues shares, it invites individuals and institutions to invest in the business in return for ownership rights. This method can bring in substantial funds because the company is not required to repay shareholders in the same way as a loan. Instead, shareholders gain returns through dividends and an increase in the value of their shares. Equity capital strengthens a firm's financial position, but it also means that ownership becomes shared. Decisions may require approval from shareholders, and the firm must maintain transparency through regular financial reporting. Despite this, equity remains a powerful source for funding large projects, expansion into new markets and long-term strategic growth.
- 4. Debt Capital (Issue of Debentures or Bonds):** Another major source of capital is the issue of debentures or bonds. Through this method, the company borrows money directly from investors for a fixed period and at a fixed rate of interest. Unlike equity, debentures do not give investors ownership rights; they are



simply lenders. This allows the firm to raise capital without sharing control. Debt capital is beneficial when interest rates are stable and the firm can comfortably meet periodic interest payments. Bonds are often used for large infrastructural projects, long-term technology upgrades or expansion that requires substantial funding. Firms must be cautious, however, because high levels of debt increase financial risk during periods of low sales.

5. **Leasing and Hire-Purchase Arrangements:** In many cases, firms require machinery or equipment but may not want to invest large amounts immediately. Leasing provides a practical alternative. Under a lease, the firm pays a periodic charge to use an asset owned by another party. This allows access to modern equipment without the burden of buying it outright. Hire-purchase arrangements offer something similar, where the firm pays instalments and eventually gains ownership. These methods reduce initial financial pressure and help firms stay technologically updated, especially when equipment becomes obsolete quickly.
6. **Venture Capital and Private Investment:** For new firms or innovative projects that carry higher risk, traditional loans may be difficult to obtain. In such situations, venture capital firms and private investors become important sources of funding. They provide capital in exchange for a share in future profits or partial ownership. These investors usually support projects with strong growth potential, even if the idea is untested. While this source brings valuable guidance and financial support, it also requires the firm to share control with investors.
7. **Government Grants and Subsidies:** In some sectors, the government supports investment by offering grants, subsidies, or low-interest loans. These are common in industries that promote employment, exports, renewable energy or regional development. Government assistance reduces the overall cost of investment and encourages firms to undertake projects that might otherwise be too expensive.
8. **Trade Credit:** Though often used for short-term needs, trade credit can indirectly support investment decisions. When suppliers allow firms to purchase materials now and pay later, the firm can free its immediate cash for other purposes. While not a long-term source of capital, trade credit helps firms manage their cash flow during periods of expansion or when undertaking capital projects.

Together, these sources of capital provide firms with a range of options for financing investments. The best choice depends on factors such as project size, borrowing costs, ownership preferences, and the firm's long-term vision.

4.1.3 Capital Rationing

Capital rationing is a situation in which a firm must carefully choose among investment opportunities because it lacks sufficient funds to undertake all the projects it finds desirable. In an ideal world, a business would simply pick every project that promises a good return. In reality, however, financial resources are limited. Firms often face restrictions on how much capital they can raise, how much they are willing

to borrow, or how much risk they feel comfortable taking. These limitations make it necessary to ration capital and select only the most worthwhile investments.

Capital rationing usually becomes important when a firm receives several proposals for expansion or improvement at the same time. For example, a manufacturing company may need a new machine to increase output, a larger warehouse to manage growing inventory and a technology upgrade to reduce waste. All three projects may be beneficial, but the business may not have enough funds to carry out all of them together. It must now decide which project should come first, which can wait and which may have to be rejected. This process of deciding how limited capital should be allocated among competing projects is the essence of capital rationing.

The need for capital rationing can arise from both external and internal factors. External factors include difficulties in borrowing due to high interest rates, lack of collateral or tight lending conditions in the financial market. Even if lenders are willing, they may impose limits on the amount a firm can borrow. Internal factors also play an important role. A firm may choose to restrict its borrowing to maintain financial stability, avoid excessive debt or protect its credit rating. Sometimes management simply prefers a cautious approach, choosing only a few projects that match its long-term vision.

When capital is rationed, firms must rely on careful evaluation to decide which project deserves priority. They examine the expected returns, estimated costs, level of risk and the time required to recover the investment. Projects that generate higher returns for each rupee invested usually receive preference. In some cases, projects that promise quick returns may be selected to strengthen the firm's cash flow. In others, the firm may prefer long-term projects that enhance competitiveness, even if they take more time to pay off.

Capital rationing helps firms avoid reducing their finances too low. By selecting only the most promising projects, they reduce the risk of financial strain and ensure that their investments contribute meaningfully to the organisation's future. At the same time, capital rationing encourages the firm to think strategically, set priorities and allocate resources where they will have the strongest impact. It becomes a tool for disciplined growth, guiding the firm toward investments that fit both its financial capacity and its long-term goals.

4.1.3.1 Types of Capital Rationing

Capital rationing refers to situations where a firm cannot undertake all profitable investment projects because the funds available for capital expenditure are limited. Even if several projects show positive returns, the firm may be forced to choose only a few. This restriction may arise from external conditions or from the firm's own financial policies. Understanding the nature of these constraints helps managers select projects more realistically. Capital rationing is commonly classified into hard capital rationing and soft capital rationing, and the difference between the two lies in the source of the financial limitation.



1. Hard Capital Rationing

Hard capital rationing occurs when the firm faces external restrictions that prevent it from raising additional funds. These constraints come from outside the firm and usually cannot be controlled by management. Even if the firm identifies profitable investment opportunities, it may not be able to finance them due to limited access to capital markets or unwillingness from lenders.

Hard capital rationing is typically seen when:

- ◇ Banks or financial institutions refuse loans due to high perceived risk
- ◇ The firm has already reached its borrowing limit or lacks sufficient collateral
- ◇ Market conditions are unfavourable, making it difficult to issue new shares or debentures
- ◇ The firm has a low credit rating, preventing it from accessing external finance at reasonable interest rates

These restrictions often arise during economic slowdowns or periods of tight monetary policy, when banks become cautious and borrowing becomes expensive. Small and medium-sized enterprises in particular face hard rationing because they depend heavily on external finance and may not possess the financial strength required to negotiate favourable terms.

Under hard capital rationing, the firm must prioritise projects carefully. Even if several investments appear profitable, the firm can only accept those that deliver the highest value within the limited funds available. Managers may also explore creative financing options or partnerships, but ultimately the firm must work within strict financial boundaries.

2. Soft Capital Rationing

Soft capital rationing arises from internal policies rather than external financial constraints. In this case, the firm deliberately limits the amount of funds allocated to investment projects. These internal restrictions are usually imposed to maintain financial discipline, avoid excessive risk or ensure stable liquidity.

Soft capital rationing is typically seen when:

- ◇ The firm wants to maintain a target debt–equity ratio and avoid over-leveraging
- ◇ Management decides not to exhaust all internal reserves to preserve cash for contingencies
- ◇ The firm follows budgeting rules that limit annual capital expenditure
- ◇ Investment proposals must meet strict internal return benchmarks before being approved

In such cases, the limitation comes from within the organisation. The firm may be able to raise funds but chooses not to do so to keep risk under control, protect financial stability, or follow long-term strategic guidelines.

Soft capital rationing gives managers more flexibility compared with hard rationing. Since the restriction is internal, it can be relaxed when a highly attractive project emerges. However, this must be done carefully, as internal controls exist to maintain financial health. Managers must justify why an exception is necessary and evaluate whether the project truly aligns with long-term goals.

Table 4.1.1 Key Differences Between Hard and Soft Capital Rationing

Aspect	Hard Capital Rationing	Soft Capital Rationing
Source of restriction	External	Internal
Control by management	Little to none	High
Cause	Limited access to funds	Policy-based financial discipline
Flexibility	Very low	Can be relaxed for special projects
Common in	SMEs, high-risk firms, and recession periods	Stable firms with strong budgets

Capital rationing is common in real-world financial decision-making. While hard rationing reflects external financial barriers beyond the firm's control, soft rationing reflects the organisation's internal effort to maintain financial balance and reduce unnecessary risk. Understanding these two forms helps managers select projects wisely and align investment choices with both financial constraints and strategic priorities.

Recap

- ◇ Capital budgeting involves evaluating long-term investments that shape the future of a firm
- ◇ Capital budgeting compares present costs with expected future benefits to choose the best project.
- ◇ Demand for capital arises when firms plan expansion, modernisation or new market entry
- ◇ Supply of capital depends on savings, financial institutions and overall economic stability
- ◇ Internal capital comes from retained earnings and sale of unused assets
- ◇ External sources include bank loans, equity, debentures, leasing, venture capital and government support



- ◇ Capital rationing occurs when firms cannot fund all desirable projects due to limited financial resources
- ◇ Firms prioritise projects based on expected returns, risks and recovery time when capital is rationed

Objective Questions

1. What is the process of evaluating long-term investment projects called?
2. What term refers to a firm's need for long-term financial resources?
3. Which source of capital comes from profits retained within the firm?
4. What do companies issue to raise equity capital?
5. What is the term for borrowing money through long-term fixed-interest instruments?
6. What is the practice of selecting only some projects due to limited funds?
7. Which type of institution commonly provides long-term loans to firms?
8. What reflects the availability of long-term funds in the financial system?
9. What arrangement allows firms to use equipment without buying it outright?
10. What type of investor funds high-risk innovative projects?

Answers

1. Capital budgeting
2. Demand for capital
3. Retained earnings
4. Shares
5. Debentures
6. Capital rationing
7. Banks
8. Supply of capital
9. Leasing
10. Venture capital

Assignments

1. Define capital budgeting and explain why it is essential for long-term investment decisions.
2. Explain the factors that create demand for capital within a business.
3. Discuss how economic stability influences the supply of capital.
4. Describe internal sources of capital and explain when they are most suitable.
5. Define capital rationing and describe situations in which it becomes necessary.

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Unit 2

Investment Analysis

Learning Outcomes

After completing this unit, the learner will be able to:

- ◇ explain importance of systematic project appraisal for long-term investment decisions
- ◇ compute NPV, IRR, Payback Period and ARR
- ◇ interpret numerical results and economic meaning of each capital-budgeting measure

Prerequisite

Ravi walked down the lane to the river every morning and watched the villagers gather to trade, chat, and plan. On market days, the little settlement changed: stalls appeared, a builder arrived to measure a plot, and children raced along newly swept paths. Ravi often wondered how the village decided which new ideas to try and which to leave for later.

One autumn, the village council debated whether to build a covered market stall area. Some argued it would bring more traders; others worried about the cost. The elders told stories of past investments, a granary that served them well and a mill that had been abandoned. These memories shaped how the community judged new proposals.

As Ravi listened, he noticed that the conversation was not about fancy words but about simple questions: how much would a proposal cost now, how long it would take to help the village, and whether the future benefits would be worth the trouble. People compared experience, asked practical questions, and sketched simple sums on paper.

Keywords

NPV, IRR, Payback Period, Average Rate of Return, Initial Investment, Cash Flow, Discount Rate, Discounting, Time Value, Project Life, Scrap Value, Decision Rule, Reinvestment, Projects, Capital Rationing, Accounting Profit

Discussion

4.2.1 Methods of Capital Budgeting

Once a firm identifies potential investment opportunities, it must evaluate them carefully to decide which projects are worth undertaking. The tools used for this evaluation are known as capital budgeting methods. These methods help the firm compare the costs of an investment with the benefits it is expected to produce over time. Because capital budgeting decisions involve large sums of money and shape the firm's future, managers cannot rely on intuition alone. They need systematic methods that consider future earnings, the time value of money, the risk involved and the timing of returns.

Capital budgeting methods serve as decision-making guides. They allow managers to ask important questions: *Will this investment generate enough benefits to justify its cost? How long will it take to recover the initial expenditure? How do future returns compare with what the firm could earn from an alternative investment?* These questions become even more important because capital investments, once made, cannot be reversed easily. A new factory cannot be sold overnight; a new technology cannot be abandoned without loss. Using proper evaluation methods reduces the chance of costly mistakes and ensures that the firm's resources are used wisely.

Different capital budgeting methods highlight different aspects of an investment. Some focus on how fast the firm can recover the initial cost, while others look at the value of future earnings in today's terms. Some methods give importance to accounting figures, while others emphasise cash flows. Together, they offer a complete picture of the project's financial potential. Firms may use more than one method to cross-check their decisions, especially for large or risky investments.

The main methods used in capital budgeting include;

1. Net Present Value (NPV) method
2. Internal Rate of Return (IRR) method
3. Payback Period, and
4. Average Rate of Return (ARR)

Each method brings a different perspective to the evaluation. The NPV method, for instance, helps the firm understand the value of future cash flows in today's terms by considering the time value of money. The IRR method looks for the rate of return that makes the investment worthwhile. The payback period focuses on how quickly the investment can recover its cost, offering a sense of security in uncertain business environments. The ARR method evaluates the return on investment using accounting profit, helping firms compare projects based on familiar financial statements.

Each of these methods plays a significant role in helping firms make sensible investment decisions. Whether deciding to build a new facility, introduce a new



product, purchase advanced machinery, or enter a new market, firms rely on capital budgeting methods to assess the financial implications clearly. By applying these methods, businesses can select projects that strengthen their long-term position, support steady growth, and maximise the value created from their limited resources.

4.2.1.1 Net Present Value (NPV) Method

The Net Present Value (NPV) method is one of the strongest and most reliable tools used in capital budgeting. It helps a firm determine whether an investment truly adds value by comparing the present value of all future cash inflows to the project's initial cost. The idea behind NPV is rooted in a simple truth: *money received in the future is not as valuable as money held today*. A rupee today can be invested immediately, but a rupee expected years later is uncertain, delayed, and reduced in value because of inflation, risk, and lost opportunities. The NPV method adjusts all future benefits to their present value so that managers can compare inflows and outflows fairly.

At its core, NPV asks one key question: After adjusting future earnings to today's value, does the project generate more than *the firm spends now*? If it does, the investment adds value and should be accepted. If it does not, the project may drain the firm's resources. Because NPV reflects the firm's goal of maximising wealth, it is widely used by finance professionals, managers, and analysts.

The formula for NPV captures the process of discounting future cash flows:

$$NPV = \sum_{t=1}^n \frac{C_t}{(1+r)^t} - C_0$$

Where:

- ◇ C_0 = initial investment
- ◇ C_t = cash inflow in year t
- ◇ r = discount rate (cost of capital or required return)
- ◇ n = project life

The formula guides us through a clear sequence of steps for evaluating an investment. The first step is to discount each future cash inflow to its present value. This adjustment is necessary because money received in the future is worth less than money received today. After converting all future inflows to their present values, the next step is to sum these values to obtain the total present value of the benefits expected from the project. Once this sum is calculated, the final step is to subtract the initial investment from it.

If the result, known as the Net Present Value, is positive, it indicates that the project generates benefits that exceed its costs and therefore adds value to the firm. A negative NPV, on the other hand, suggests that the project's returns fall short of the initial outlay, meaning it is likely to reduce the firm's value.

To appreciate how the NPV method works, imagine a small business owner planning to invest in new equipment. The machine promises to reduce operating costs and generate steady returns in the coming years. However, the owner must spend a considerable amount up front. The owner needs to know whether this investment will truly pay off. The NPV method offers clarity by translating all future benefits into today's value and comparing them with what the firm spends today. This prevents overestimating future gains and gives a balanced view of profitability.

A firm is considering a project that requires an investment of ₹10,000 today. The project is expected to generate cash inflows of ₹4,000 at the end of each of the next three years. The firm uses a discount rate of 10%.

The cash-flow pattern is:

- ◇ Year 0: –10,000
- ◇ Year 1: +4,000
- ◇ Year 2: +4,000
- ◇ Year 3: +4,000

We now discount each inflow to its present value.

Step A — Discount the Cash Inflows

- ◇ Year 1: $PV_1 = \frac{4000}{1.10} = 3636.36$
- ◇ Year 2: $PV_2 = \frac{4000}{1.10^2} = \frac{4000}{1.21} = 3305.79$
- ◇ Year 3: $PV_3 = \frac{4000}{1.10^3} = \frac{4000}{1.331} = 3005.26$

Step B — Add the Present Values

$$Total\ PV = 3636.36 + 3305.79 + 3005.26 = 9947.41$$

Step C — Subtract the Initial Investment

$$NPV = 9947.41 - 10000 = -52.59$$

The NPV is slightly negative (about –₹52.59). This means:

- ◇ Even though the project brings in ₹12,000 over three years,
- ◇ The present value of this ₹12,000 is slightly less than ₹10,000,
- ◇ Meaning the firm does not fully recover the value of its investment when adjusted for the time value of money.

Therefore, the project does not meet the firm's required 10% return and should not be accepted. This example shows how NPV protects the business from investments that



appear profitable in nominal terms but fail to deliver real value when future earnings are discounted.

The decision rule for NPV is straightforward. A project is considered desirable when its NPV is greater than zero because this indicates that it adds value to the firm. When the NPV is exactly zero, the project neither adds nor reduces value, and the final decision may depend on strategic considerations such as market expansion or technological relevance. If the NPV is less than zero, the project reduces the firm's value and should generally be rejected. This approach fits directly with the broader objective of maximising the wealth of the business.

The Net Present Value method offers several important advantages that make it one of the most dependable tools for evaluating investment decisions. It recognises the time value of money, which ensures that its results reflect financial reality rather than simply adding up future amounts. Considering all cash flows over the entire life of a project provides a complete picture of long-term profitability. NPV expresses its results in clear currency terms, allowing managers to see exactly how much value an investment adds to the firm. It also makes it easier to compare projects, especially when capital is limited, and only the most valuable options can be selected. Most importantly, the NPV approach aligns closely with the firm's objective of maximising shareholder wealth. Because of these strengths, it is widely regarded as one of the most reliable and meaningful capital-budgeting methods.

The NPV method, while highly reliable, comes with certain limitations that managers should keep in mind. It depends on accurate forecasts of future cash flows, which can be uncertain, especially when projects span many years. The method is also sensitive to the chosen discount rate; selecting an inappropriate rate can significantly alter the outcome and may mislead decision-making. In addition, NPV is less intuitive for some managers, who prefer percentage-based measures like IRR, which they find easier to interpret at a glance. Even with these limitations, NPV remains the most dependable tool for comparing projects of different sizes, lengths, and risk profiles because it clearly shows the value the project adds in today's terms.

In practical decision-making, firms usually use NPV and IRR together because each method highlights a different aspect of an investment. NPV helps managers understand how much value a project adds in monetary terms, while IRR expresses the project's return as a percentage, showing the rate at which that value is generated. When both methods point in the same direction, the decision is straightforward. However, if they lead to different conclusions, firms generally rely on NPV because it provides a direct measure of value creation and aligns more closely to maximise the firm's wealth.

4.2.1.2 Internal Rate of Return (IRR)

The Internal Rate of Return (IRR) is a popular capital-budgeting technique that tells a firm the rate of return a project is expected to earn on the funds invested. In simple words, IRR is the discount rate that makes the present value of a project's future cash inflows equal to the initial outlay. It is an attractive measure because it expresses a

project's profitability as a single percentage that managers can compare with the firm's required rate of return or borrowing cost.

IRR answers the practical question: *"At what rate would this project break even in present-value terms?"* If the IRR exceeds the company's required return (cost of capital), the project is considered acceptable because it offers a return above the firm's hurdle rate. If the IRR is below the required return, the project is usually rejected.

The IRR is the rate, 'r' that solves the following equation:

$$NPV = \sum_{t=1}^n \frac{C_t}{(1+r)^t} - C_0 = 0$$

Here:

- ◇ C_0 is the initial investment (a cash outflow, normally written as a positive number and subtracted)
- ◇ C_t is the net cash inflow in year t
- ◇ r is the internal rate of return
- ◇ n is the project life in years

The equation states that the sum of the discounted cash inflows, using 'r' as the discount rate, exactly equals the initial cost C_0 . Put another way, NPV at 'r' is zero.

Because this equation is nonlinear in 'r', IRR is normally found by trial and error, interpolation, or with the help of a calculator or spreadsheet.

Consider a small firm that plans to buy a machine costing ₹10,000 today. It expects cash inflows of ₹4,000 at the end of each of the next three years. We want to find the IRR - the discount rate 'r' that makes the NPV zero.

The cash-flow stream is:

- ◇ Year 0: -10,000
- ◇ Year 1: +4,000
- ◇ Year 2: +4,000
- ◇ Year 3: +4,000

The IRR condition is: $\frac{4000}{1+r} + \frac{4000}{(1+r)^2} + \frac{4000}{(1+r)^3} = 10,000$

Because this is a cubic equation in $\frac{1}{1+r}$, we solve it by bracketing and interpolation.

Step A - bracket the IRR

First, compute NPV at two plausible rates.



At $r = 0\%$ (no discounting), present value of inflows is:

$$PV \text{ inflows at } 0\% = 4000 + 4000 + 4000 = 12,000$$

$$\text{So, NPV at } 0\% = 12,000 - 10,000 = +2,000.$$

This is positive, so $IRR > 0\%$.

At $r=10\%$ we discount each inflow:

$$\diamond \text{ Year 1 } PV: \frac{4000}{1.10} = 3636.36$$

$$\diamond \text{ Year 2 } PV: \frac{4000}{1.10^2} = \frac{4000}{1.21} = 3305.79$$

$$\diamond \text{ Year 3 } PV: \frac{4000}{1.10^3} = \frac{4000}{1.331} = 3005.26$$

Add these present values:

$$\text{Total PV at } 10\% = 3636.36 + 3305.79 + 3005.26 = 9,947.41$$

Subtract the initial cost:

$$NPV \text{ at } 10\% = 9,947.41 - 10,000 = -52.59$$

This NPV is negative, so IRR lies between 0% and 10%

Step B — Interpolate To Estimate IRR

A simple linear interpolation between the two points $(r_1, NPV_1) = (0\%, +2000)$ and $(r_2, NPV_2) = (10\%, -52.59)$ gives a reasonable approximation:

$$IRR \approx r_1 + \frac{NPV_1}{NPV_1 - NPV_2} (r_2 - r_1)$$

Substitute the numbers:

$$IRR \approx 0\% + \frac{2000}{2000 - (-52.59)} \times 10\% = \frac{2000}{2052.59} \times 10\%$$

Compute the fraction carefully. The denominator is $2000 + 52.59 = 2052.59$ The ratio $\frac{2000}{2052.59} \approx 0.9744$. Thus, $IRR \approx 0.9744 \times 10\% = 9.744\% (\approx 9.74\%)$

This is our estimated IRR.

Step C — Check By Plugging Back (Present Value Check)

A more refined way is to compute the discounted cash inflows using the estimate $r \approx 9.74\%$. Let $x = \frac{1}{1+r}$. Using $r = 9.744\%$ gives $1 + r \approx 1.09744$ and $x \approx 0.91156$

Now compute the present values:

$$\diamond \text{ Year 1 } PV = 4000 \times 0.91156 = 3646.24$$

$$\diamond \text{ Year 2 } PV = 4000 \times 0.91156^2 \approx 4000 \times 0.8310 = 3324.00$$

$$\diamond \text{ Year 3 } PV = 4000 \times 0.91156^3 \approx 4000 \times 0.7574 = 3029.60$$

Sum of $PVs \approx 3646.24 + 3324.00 + 3029.60 = 9,999.84$ extremely close to ₹10,000. Subtracting the initial outlay leaves $NPV \approx 0$. This confirms the IRR estimate of about 9.7–9.75%.

The decision rule for the internal rate of return is straightforward. When a project's IRR is greater than the firm's required rate of return or cost of capital, the project is considered acceptable because it promises a return higher than the firm's benchmark. If the IRR is lower than the required rate, the project should be rejected since it falls short of the firm's expectations. When the IRR equals the required rate, the project merely meets the benchmark, and its net present value is approximately zero. IRR is appealing to managers because it produces a single percentage figure that can be easily compared with borrowing costs or alternative investment returns.

Despite its usefulness, IRR has several limitations that must be understood clearly. One important issue is the possibility of multiple IRRs. When the pattern of cash flows changes direction more than once, such as an outflow occurring after earlier inflows, the IRR equation can produce more than one solution, making interpretation difficult. Projects with irregular or non-conventional cash flow patterns may therefore give misleading results. IRR can also be problematic when comparing mutually exclusive projects. A project with a high IRR does not necessarily add more value than a project with a lower IRR but a larger overall scale; in such cases, NPV gives a more accurate guide to the better choice. Another limitation concerns the reinvestment assumption. IRR assumes that the project's intermediate cash flows can be reinvested at the IRR itself, a rate that may be unrealistically high. NPV, in contrast, assumes reinvestment at the firm's cost of capital, which is generally more realistic. Because of these limitations, IRR is best used alongside NPV rather than as a stand-alone decision tool.

In practical settings, managers often rely on spreadsheet software or financial calculators to compute IRR. Functions such as IRR or XIRR in Excel use iterative techniques to determine the discount rate at which the net present value equals zero. These tools save time and offer precise estimates, but it is still important for users to understand the underlying idea and to cross-check results by examining the NPV at nearby discount rates.

A practical comparison of IRR and NPV highlights when each method should be used. Both techniques account for the time value of money, but they present information differently. NPV measures the actual value added by the project in currency terms, while IRR expresses the return as a percentage. When projects do not compete with one another, the methods usually lead to the same accept–reject decision. However, for mutually exclusive choices or for projects with unusual cash-flow patterns, NPV is the more reliable indicator of value creation. IRR can still be helpful as an intuitive



reference point, but NPV should guide the final decision, especially when capital is limited or when the firm aims to maximise long-term wealth.

The Modified Internal Rate of Return (MIRR) was developed to address certain limitations of the traditional IRR method, particularly its unrealistic reinvestment assumption and the possibility of multiple IRRs when cash flows change direction more than once. MIRR provides a more practical measure of a project's return by assuming that all positive cash inflows are reinvested at the firm's cost of capital rather than at the IRR, while the initial outflows are discounted at the firm's financing cost. This creates a clearer separation between the rate at which a firm can realistically reinvest earnings and the rate at which it borrows or uses its own funds. As a result, MIRR offers a single, consistent rate of return that reflects real financial conditions more accurately and avoids confusion caused by multiple IRRs. Because it provides a more stable and realistic estimate of profitability, MIRR is often used as a complementary tool alongside NPV and IRR when evaluating long-term investment projects.

4.2.1.3 Payback Period Method

The Payback Period method is one of the simplest and most widely used tools in capital budgeting. It tells a firm how long it will take to recover the initial investment through the cash inflows generated by the project. Instead of looking at complex measures such as discounted values or rates of return, the payback method focuses on a straightforward question: *"How many years will this project take to repay what we spend on it?"* This clarity makes the method especially attractive for managers who want a quick assessment of the risk and liquidity of an investment.

The logic behind the payback method is easy to understand. A project that recovers its cost quickly is generally considered less risky because the firm's money is tied up for a shorter period. On the other hand, a project with a long payback period leaves the firm exposed to uncertainty for a longer time. Markets change, technologies evolve, and customer preferences shift, so firms often prefer investments that return money sooner rather than later.

If annual cash inflows are equal:

$$\text{Payback Period} = \frac{\text{Initial Investment}}{\text{Annual Cash Inflow}}$$

If the inflows are unequal, the payback period is found by adding yearly cash inflows until the cumulative amount equals (or exceeds) the initial investment.

Imagine a retailer considering whether to install a new automated billing system. The system promises faster service, fewer errors, and potential savings in labour costs. Even before analysing profitability or long-term value, the owner may want to know how fast the investment will return the amount spent. This is where the payback period becomes useful. By simply looking at annual cash inflows and comparing them with the initial cost, the owner quickly gains a sense of how soon the project will "pay for itself."

A firm invests ₹10,000 in a small project. The project is expected to generate the following cash inflows:

- ◇ Year 1: ₹4,000
- ◇ Year 2: ₹4,000
- ◇ Year 3: ₹4,000

Since the annual inflow is the same, we can apply the simple formula:

$$\text{Payback Period} = \frac{10,000}{4,000} = 2.5 \text{ years}$$

This means the firm will recover its investment sometime in the second half of the third year. In a practical sense:

- ◇ After Year 1 → ₹4,000 recovered
- ◇ After Year 2 → ₹8,000 recovered
- ◇ Halfway through Year 3 → remaining ₹2,000 recovered

Thus, the total payback period is 2 years and 6 months. This simple example shows how intuitive the payback method is. Without discounting or complex calculations, the firm immediately knows when its initial outlay will be recovered.

In a payback analysis, a firm begins by setting a maximum acceptable payback period that reflects its tolerance for risk and its need for liquidity. The guiding principle is straightforward: if a project can recover its initial investment within this predefined time, it is considered acceptable. If the project takes longer than the allowable period, it is rejected. For instance, if a firm decides it cannot wait more than three years to recover its investment, any project with a payback period of three years or less would be approved. A project with a payback period of 2.5 years would therefore qualify, while one that requires more time would not.

The payback method is appreciated for its simplicity and ease of use. It allows managers to evaluate an investment quickly without relying on complex calculations. This makes it particularly helpful when assessing risk, because a project that returns money rapidly exposes the firm to uncertainty for a shorter period. The method also emphasises liquidity, making it suitable for firms with limited cash resources or those that need to recover funds quickly for other purposes. In many organisations, the payback period serves as a convenient preliminary screening tool that helps eliminate unsuitable projects early, before applying more comprehensive methods such as NPV or IRR.

Although helpful, the payback period has several important limitations. It does not consider the time value of money unless a modified or discounted version is used, meaning that all cash inflows are treated as having the same value regardless of when they are received. The method also ignores any cash flows that occur after the payback period. As a result, a project that generates substantial benefits in later years may appear



unattractive simply because it takes longer to recover its initial cost. The payback method also fails to measure profitability; it only indicates how quickly the investment is returned, not whether the project creates additional value. Because of these weaknesses, the payback method should not be the sole basis for major investment decisions. It is best used alongside more reliable measures such as NPV or IRR.

In practice, firms often rely on the payback period as an early-stage decision-making tool. It helps managers filter out projects that are clearly unsuitable, allowing them to focus resources on alternatives that warrant deeper analysis. The method becomes particularly valuable in industries where technology changes rapidly, such as electronics, retail automation, or software development. In such environments, firms prefer investments that recover their costs quickly before the technology becomes outdated or market conditions shift. The payback method, therefore, plays a practical role in guiding firms toward projects that offer quicker returns and lower exposure to long-term uncertainty.

The Discounted Payback Period improves on the traditional payback method by incorporating the time value of money, making it a more realistic tool for evaluating long-term investments. Instead of simply adding yearly cash inflows until the initial investment is recovered, the discounted payback method first reduces each future cash flow to its present value using the firm's cost of capital. These discounted inflows are then accumulated year by year until they equal the original outlay. Because it adjusts future earnings to their present value, the discounted payback period offers a more accurate measure of how long it actually takes for a project to repay its cost. However, like the simple payback method, it still ignores cash flows that occur after the recovery period and therefore does not measure overall profitability; rather, it serves as a useful indicator of risk and liquidity by showing how quickly the firm can recover its investment in present-value terms.

4.2.1.4 Average Rate of Return (ARR)

The Average Rate of Return (ARR) is an investment appraisal method that evaluates a project by comparing its average annual profit with the initial or average investment. Unlike NPV or IRR, which focus on cash flows and the time value of money, ARR relies on accounting profits drawn from financial statements. Because of this, ARR is easy to calculate and familiar to managers who regularly work with profit figures. It expresses the return as a percentage, which makes it intuitive and convenient for comparing different projects.

ARR answers a direct question: *“How much return, on average, will this project generate each year relative to the amount invested?”* If a project offers an ARR higher than the firm's minimum required return, it is considered acceptable. If the ARR falls short, the project may not be financially attractive. Although ARR does not account for the timing of profits, it remains a useful tool for a quick assessment of overall profitability.

There are two commonly used versions of ARR. The more widely preferred one is:

$$ARR = \frac{\text{Average Annual Profit}}{\text{Average Investment}} \times 100$$

Where:

$$\diamond \text{ Average Annual Profit} = \frac{\text{Total profit over project life}}{\text{Number of years}}$$

$$\diamond \text{ Average Investment} = \frac{\text{Initial Investment} + \text{Scrap Value}}{2}$$

(If there is no scrap value, it is simply half of the initial investment.)

Another version uses the initial investment in the denominator:

$$ARR = \frac{\text{Average Annual Profit}}{\text{Initial Investment}} \times 100$$

The choice depends on the firm's policy, but the first method is more aligned with accounting practice.

Imagine a small printing firm considering replacing its old machine with a new, more efficient one. The new machine will increase the firm's production capacity and reduce wastage, thereby improving its annual profit. Before making such an investment, the owner may want a simple measure that summarises the expected profit relative to the cost. ARR serves this exact purpose by turning accounting profit into a neat percentage return.

A project requires an initial investment of ₹10,000. It is expected to generate profits (after accounting for depreciation and expenses) of ₹3,000 per year for five years. The scrap value at the end of Year 5 is estimated at ₹2,000. We will calculate ARR using the standard formula.

Step A - Calculate Average Annual Profit

$$\text{Average Annual Profit} = \frac{\text{Total Profit}}{\text{Number of Years}}$$

Total profit over 5 years:

$$\text{Total Profit} = 3,000 \times 5 = 15,000$$

So:

$$\text{Average Annual Profit} = \frac{15,000}{5} = 3,000$$

Step B — Calculate Average Investment

$$\text{Average Investment} = \frac{\text{Initial Investment} + \text{Scrap Value}}{2}$$



Substituting values:

$$\text{Average Investment} = \frac{10,000 + 2,000}{2} = \frac{12,000}{2} = 6000$$

Step C - Compute ARR

$$\text{ARR} = \frac{3,000}{6,000} \times 100 = 50\%$$

The project earns an average return of 50% on its average investment each year. If the firm's required minimum return (cut-off rate) is, for example, 20%, the project would be considered attractive. If the required return were higher than 50%, the project would be rejected. This example shows how ARR reduces a project's profitability into a single percentage that managers can easily compare with targets or alternative opportunities.

The decision rule for the Average Rate of Return is straightforward. A project is accepted when its ARR is greater than or equal to the firm's required rate of return. If the ARR falls below this benchmark, the project is rejected. Since ARR relies on accounting profits rather than cash flows, it is often preferred by businesses that place greater emphasis on reported earnings and financial statement performance.

The ARR method carries several advantages that make it appealing for preliminary evaluations. It is easy to understand because it uses accounting profit figures that managers are already familiar with. The result is expressed as a simple percentage, allowing effortless comparison across projects. ARR is particularly helpful for firms focused on improving profitability, as reflected in their financial statements. It also allows projects to be compared with the returns generated by existing assets, supporting internal assessment of performance.

However, despite these strengths, the ARR method has notable limitations. It ignores the time value of money, so profits earned in later years are treated the same as those earned earlier, unlike methods such as NPV and IRR. ARR also relies entirely on accounting profits, which can vary with depreciation methods and other accounting practices, making the measure less reliable for investment evaluation. In addition, ARR overlooks cash flows, even though cash flows often provide a more accurate picture of a project's financial impact. Because of these weaknesses, ARR should not be used as the sole basis for major investment decisions. It is best applied as a supplementary tool alongside more rigorous methods such as NPV and IRR.

In practice, managers use ARR primarily as a quick screening device. It offers a simple indication of how profitable a project might appear from an accounting perspective, which can be helpful in organisations where performance is judged on reported returns. However, when a decision involves significant long-term financial commitments, firms turn to NPV and IRR, as these methods provide a deeper and more realistic understanding of the project's contribution to value creation.

Recap

- ◇ Capital-budgeting methods evaluate whether long-term proposals create value for the firm
- ◇ NPV discounts all future cash inflows to present value and subtracts the initial outlay
- ◇ A positive NPV indicates the project adds value; a negative NPV indicates it reduces value
- ◇ IRR is the discount rate that sets NPV equal to zero and is interpreted as the project's return rate
- ◇ IRR may produce multiple values for non-conventional cash flows and can mislead for mutually exclusive projects
- ◇ The Payback Period measures how long it takes to recover the initial outlay and ignores later cash flows
- ◇ Payback is simple and useful for liquidity and risk screening but does not consider the time value of money
- ◇ ARR compares average accounting profit to average investment and expresses profitability as a percentage
- ◇ ARR is easy to compute but ignores timing of profits and cash-flow realities
- ◇ Firms typically use more than one method, preferring NPV when methods conflict

Objective Questions

1. What does NPV measure in capital budgeting?
2. What rate makes the NPV of a project equal to zero?
3. What method tells how long an investment takes to recover its cost?
4. What method compares average annual profit to average investment?
5. What term refers to the value of future cash inflows converted to today's value?
6. What is the discount rate used for in NPV calculation?
7. What is the main input used in ARR instead of cash flows?
8. What tool is commonly used to compute IRR more easily?



9. What method assumes reinvestment at the firm's cost of capital?
10. What type of cash-flow pattern may lead to multiple IRRs?

Answers

1. Profitability
2. IRR
3. Payback
4. ARR
5. Present value
6. Discounting
7. Profit
8. Spreadsheet
9. NPV
10. Non-conventional

Assignments

1. A project requires an initial outlay of ₹50,000 and promises cash inflows of ₹20,000 at the end of each of the next 3 years. Using a discount rate of 8 per cent, compute the Net Present Value and state the decision.
2. Calculate the Internal Rate of Return for a project with initial investment ₹25,000 and cash inflows of ₹10,000, ₹9,000, and ₹8,000 at the end of years 1–3 respectively. Show your interpolation steps.
3. A firm invests ₹120,000 in equipment expected to return ₹30,000, ₹40,000, ₹35,000 and ₹25,000 over the next four years. Compute the Payback Period.
4. A project produces accounting profits of ₹6,000 annually for five years and has an initial cost of ₹20,000 with an estimated scrap value of ₹2,000. Compute the ARR using the average investment method and state whether the project meets a cut-off rate of 18 per cent.
5. Explain with reasons which method (NPV, IRR, Payback or ARR) you would prefer for: (a) a highly uncertain short-life tech project; (b) a long-term infrastructure project with large scale.

6. Two mutually exclusive projects A and B have the following cash flows: A: –₹100,000; +₹60,000; +₹60,000. B: –₹100,000; +₹40,000; +₹90,000. Compute NPVs at 10 per cent and recommend which project to accept.
7. Discuss three practical limitations of the IRR method with examples.
8. Describe how the choice of discount rate affects NPV and give two guidelines for selecting an appropriate rate in practice.

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BLOCK

5

**Decision
Making and
Practical
Activities**

Unit 1

Decision Making

Learning Outcomes

After completing this unit, the learner will be able to:

- ◇ understand how managerial decisions are made under uncertainty
- ◇ apply probability and expected value in evaluating choices
- ◇ construct and interpret decision trees for practical business decisions
- ◇ distinguish between good decisions and good outcomes
- ◇ get an idea the role of risk and limited information in managerial decision-making

Prerequisite

Riya often sat in a small park near her home before leaving for work. Every morning, she watched people make all kinds of choices. Some chose the longer path to avoid traffic, others tried a new route, hoping it might be quicker. No one knew exactly what the day would bring, yet everyone made decisions and moved ahead.

One day, she noticed an elderly shopkeeper looking uncertain about how much stock to order for the coming week. He did not know how many customers would visit, but he still had to decide. Watching him think aloud made her realise how often people must choose without having full information.

Later that evening, Riya's friend talked about accepting a new job. She was excited, but also unsure about the future team, workload, and opportunities. Even with these doubts, she had to choose what felt right based on whatever information she could gather.

As Riya walked home, she reflected on how decisions shape everyday life. Some decisions feel easy, others feel confusing, yet everyone must act. Waiting for perfect clarity is rarely possible.



Keywords

Uncertainty, Risk, Expected Value, Probability, Decision Tree, Outcomes, Payoff, Information, Good Decision, Bad Decision

Discussion

5.1.1 Decision Making Under Uncertainty

Decision making is at the heart of every managerial role, but not all decisions are made in a predictable environment. In many real-life situations, managers must make choices even when they do not know what the future holds. When information is incomplete, outcomes are unclear, and the business environment is shifting, managers operate under what economists call uncertainty. This is different from routine decision-making, where outcomes are known, and also different from risk, where the probabilities of outcomes can be estimated. Under uncertainty, the manager must rely on judgment, experience, and structured evaluation methods to choose the most reasonable option.

Uncertainty arises from several sources, such as changes in consumer preferences, unexpected shifts in competition, new government policies, natural disruptions, or technological advancements. A firm planning to launch a new product may have little idea about how consumers will respond. A business considering expansion into a new region may not know how stable the demand will be. When key information is missing, managers must still make decisions, because postponing choices can sometimes be more harmful than making imperfect choices. In such conditions, understanding how to make rational decisions under uncertainty becomes essential.

One of the biggest challenges under uncertainty is that managers must consider multiple possible futures rather than a single predicted outcome. Each possible future may carry different consequences for profit, cost, and long-term survival. Because there is no reliable way to assign probabilities to these outcomes, managers use structured approaches such as careful scenario building, sensitivity analysis, and observation of market signals to guide their decisions. These tools help the firm reduce confusion and focus on the range of outcomes most relevant to the decision at hand.

Decision making under uncertainty also requires a calm and balanced approach. Managers must not rely solely on instinct, nor should they freeze in the face of incomplete information. Instead, they are encouraged to define the choices clearly, identify the factors that may influence the outcome, gather as much information as possible within reasonable limits and compare the options based on how well they hold up across different possible futures. Even though perfect clarity is lacking, thoughtful analysis helps managers choose options that protect the firm's interests while leaving room for growth.

In practice, businesses handle uncertainty every day. A retailer deciding how much stock to order for a festival season does not know exactly how strong demand will be. A farmer choosing which crop to plant cannot be certain about rainfall or market prices. A technology company deciding whether to invest in a new platform cannot predict how competitors will react. These examples show that uncertainty is not an exceptional situation; it is a normal part of economic life. What distinguishes successful managers is their ability to respond intelligently, prepare for multiple scenarios and choose paths that balance opportunity with caution.

Decision making under uncertainty is therefore not about predicting the future perfectly. It is about preparing the mind to act responsibly when the future refuses to reveal itself. By learning to identify what can be known, what cannot be known, and what must still be decided, managers develop the confidence to lead their firms through challenging and unpredictable environments.

5.1.2 Uncertainty, Probability, and Expected Value

Decision making becomes far more challenging when managers must act without complete knowledge of the future. In many business situations, information is incomplete, events are unpredictable and the environment is constantly shifting. This is where the concept of uncertainty becomes central. Uncertainty refers to conditions in which managers do not know which outcome will occur but must still choose a course of action. Every business, from a small retail shop to a large multinational, operates in a world where change is continuous and decisions must be made even when clarity is limited.

To navigate such situations, managers try to bring structure to uncertainty. One of the most practical ways to do this is by using probability. Probability allows a manager to attach some measure of likelihood to different possible outcomes. Even when outcomes are not fully predictable, previous experience, market behaviour, surveys, and expert judgement may help estimate the likelihood of a given event. Probability does not remove uncertainty but provides a disciplined way to think about it, giving managers a meaningful framework rather than leaving them entirely in the dark.

5.1.2.1 Uncertainty and Probability

Uncertainty in business can arise from several sources. A company may not know how customers will respond to a new product, or what price competitors will set next year. Government policies may change without warning, affecting taxes or regulations. Natural events, such as sudden weather changes, may affect agricultural production or tourism. New technology may disrupt an industry overnight. When events such as these cannot be predicted accurately, but their broad possibilities are known, probability becomes useful.

Probability values range from 0 to 1, where a value closer to 0 indicates that an event is unlikely, and a value closer to 1 indicates a higher likelihood. Managers rarely have perfect historical data, but even rough estimates based on past sales patterns, market surveys, or expert discussion can help them understand possibilities in a structured way.



For example, a firm planning to introduce a seasonal product may estimate that demand has a 40% chance of being high, a 35% chance of being moderate and a 25% chance of being low. Such estimates provide a clearer picture than vague expectations like “sales may be good.” Instead of guessing, the firm now has a measurable and comparable set of possibilities.

5.1.2.2 Expected Value

Expected Value (EV) is a simple yet powerful tool that combines probability and payoff into a single number. It answers the question: “If this decision were repeated many times, what would be the average return?”

Even though a firm may face an uncertain outcome only once, EV provides a way to evaluate choices by looking at their long-term average performance. It tells managers which option offers the strongest expected return, even when no outcome is guaranteed.

Mathematical Formula for Expected Value:

$$EV = \sum_{i=1}^n P_i \times O_i$$

Where:

P_i = Probability of outcome, i

O_i = Monetary payoff of outcome, i

n = Total number of possible outcomes

This formula multiplies each outcome by its probability and then sums the results.

Expected value does not guarantee that the actual payoff will match the calculated value. Instead, it provides a balanced measure that allows comparisons of different decisions on equal terms.

A firm is considering launching a new product. Based on market analysis, it estimates the following possibilities:

Table 5.1.1 Estimates

Outcome	Probability	Profit (₹)
High demand	0.4	50,000
Moderate demand	0.35	30,000
Low demand	0.25	5,000

We now apply the expected value method.

Step A — Multiply each outcome by its probability

- ◇ High demand: $0.4 \times 50,000 = 20,000$
- ◇ Moderate demand: $0.35 \times 30,000 = 10,500$
- ◇ Low demand: $0.25 \times 5,000 = 1,250$

Step B — Add all weighted outcomes

$$EV = 20,000 + 10,500 + 1,250 = 31,750$$

Step C — Interpreting the Expected Value

The expected value is ₹31,750. This does not mean the firm will earn exactly ₹31,750. Instead, it means:

- ◇ If the firm could face this demand situation repeatedly
- ◇ The average profit per attempt would be about ₹31,750

From a decision-making perspective, the firm now compares this expected value with the expected returns of other options. If no alternative offers a higher expected return, the firm may go ahead with the product launch.

Expected value is extremely useful because it turns uncertain choices into comparable numerical estimates. Managers can evaluate long-term projects, new market entries, product launches, or investment decisions using EV to identify which option offers the strongest average outcome. EV is also a balanced method. It does not focus only on the best or worst outcomes; it captures every possible outcome and weighs them according to their likelihood. This makes it more comprehensive than decisions based on instinct or single-outcome forecasts. However, expected value has its limitations. It does not directly reflect risk. Two projects may have the same expected value, but one may have stable outcomes while the other may swing sharply between high profit and heavy loss. Firms that prefer stability may choose the less risky option even if the riskier one has a slightly higher EV. Therefore, EV should be used alongside additional measures such as variance analysis, sensitivity analysis, or risk assessment.

Probability gives managers a structured way to describe uncertainty, while expected value helps them summarise the consequences of uncertain outcomes. Together, these tools transform unpredictable situations into reasoned choices. Instead of being overwhelmed by uncertainty, managers can evaluate the strength of each option and choose the one that aligns with the firm's goals, risk tolerance, and long-term strategy.

Expected value does not eliminate uncertainty, but it helps the firm make decisions with confidence and clarity. It ensures that choices are based on logic, measurable outcomes, and careful thinking rather than assumptions or guesswork.



5.1.3 Decision Making Under Risk

Managers often face situations in which the future is uncertain, yet they have enough information to estimate the likelihood of different outcomes. This is known as decision making under risk. Unlike complete uncertainty, where probabilities are unknown, decision-making under risk involves situations in which managers can assign reasonable probabilities to future events based on experience, market trends, or expert judgement. Although the future cannot be predicted with certainty, these probability estimates provide a structured way to think about possible outcomes and make informed choices.

In many industries, particularly manufacturing, retail, agriculture, and food processing, decisions must be made even when demand, costs, or market conditions fluctuate. A firm may not know exactly how much it will sell next month, but it may know that the probability of high demand is greater during festivals or peak seasons. Similarly, the probability of low demand may be higher during off-season months. These probability estimates create a practical foundation for comparing alternatives when outcomes are not guaranteed.

Under risk, managers evaluate each decision by considering both the probability of each outcome and its payoff. The most common tool used in decision making under risk is the expected value, which provides an average return weighted by probabilities. By comparing the expected values of different choices, managers can decide which option offers the most favourable long-term result. Although expected value does not predict what will happen in a single instance, it helps managers make consistent decisions that balance potential gains and losses over time.

Decision making under risk also requires sensitivity to the pattern of outcomes. Two choices may have the same expected value but differ greatly in terms of stability. One option may offer steady returns, while another may swing sharply between very high and very low results. Understanding these patterns helps managers make decisions that align with the firm's comfort level and capacity to absorb risk. A small business with limited resources may prefer stable, moderate returns, while a larger firm may be willing to accept more variability in pursuit of higher profits.

In real-world settings, risk-based decisions often arise in areas such as pricing, inventory planning, capacity expansion, and investment evaluation. A retailer choosing how much stock to order faces the risk of overstocking or understocking. A food-processing firm deciding whether to invest in a new filling machine faces uncertainty about future demand. A transport company planning to purchase additional vehicles faces uncertainties regarding fuel prices and seasonal demand. In each case, probabilities and expected outcomes guide the manager toward choices that balance opportunity with caution.

Decision making under risk encourages managers to acknowledge uncertainty openly rather than ignore it. By assigning reasonable probabilities, evaluating expected values, and comparing the behaviour of different outcomes, managers can make decisions that are thoughtful, responsible, and aligned with the firm's long-term interests. While risk can never be eliminated, understanding it allows firms to navigate uncertainty confidently and make decisions that strengthen their ability to grow and remain competitive.

5.1.4 Risk Attitudes

Managers and firms differ in how they respond to situations involving risk. Even when probabilities and possible outcomes are known, individuals may prefer one option over another depending on how comfortable they feel with uncertainty. These differences are known as risk attitudes, and they influence decision making just as strongly as expected value or numerical calculations. Understanding risk attitudes is important because two managers looking at the same situation may reach different decisions simply because they view risk differently.

A risk-averse decision maker prefers stability and avoids choices where outcomes fluctuate widely. Even if an option offers a higher expected return, a risk-averse manager may choose a safer alternative with more predictable results. This behaviour is common in small and medium-sized businesses because financial cushions are limited. Even a single unfavourable outcome can have serious consequences. In such firms, managers tend to prioritise long-term stability over the possibility of unusually high returns.

A risk-neutral decision maker evaluates options purely based on expected value. They do not prefer or avoid risk; instead, they focus only on the average payoff associated with each choice. If two alternatives have the same expected value, a risk-neutral manager views them as equally attractive, even if one option involves greater risk. Many economic models assume risk neutrality to simplify analysis, but in real life, only a few firms and managers behave this way. It is more common among large organisations with diversified operations, where short-term fluctuations have a smaller impact on overall performance.

A risk-seeking or risk-loving decision-maker shows a preference for choices that involve greater uncertainty, especially if there is a chance of a very high payoff. Such behaviour is less common in traditional businesses. Still, it may appear in innovative sectors, start-ups, or entrepreneurial ventures where managers are willing to accept bigger risks in the hope of breakthrough gains. While risk-seeking behaviour can lead to rapid growth if successful, it can also expose the firm to greater financial pressure if outcomes turn unfavourable.

These risk attitudes influence real-world decisions in meaningful ways. A risk-averse manager may avoid launching a new product unless forecasts are strong and stable, while a risk-seeking manager may proceed despite uncertain demand. A risk-neutral manager, on the other hand, would compare only expected values and choose the option that offers the highest average return. Because risk attitudes shape how decisions are interpreted, managers must be aware of their own preferences. Recognising these tendencies helps ensure that decisions remain balanced and aligned with the organisation's capacity to handle risk. It also promotes better communication within the firm, as teams can understand why different people may favour different choices even when analysing the same information.

5.1.5 Decision Tree

When managers face decisions involving several possible paths and uncertain outcomes, a decision tree provides a clear and organised way to analyse the situation. A decision tree is a visual tool that lays out different choices, the events that may follow each choice, and the expected outcomes attached to those events. By arranging information in a tree-like structure, managers can see each decision step plainly, understand how different possibilities are connected, and compare the consequences of alternative strategies.

A decision tree begins with a starting point called a decision node, which represents the moment when a manager must choose between available options. Each option branches out into possible future events. These events are shown through chance nodes, which represent situations outside the manager's control, such as market demand, weather conditions, or competitor behaviour. Each chance node connects to further branches showing possible outcomes, each carrying a payoff and a probability. When the entire tree is complete, the manager evaluates each branch by working backwards from the outcomes to the present, calculating expected values, and determining which choice leads to the most favourable result.

A decision tree usually contains three main elements:

- a. **Decision Nodes (Square Shapes):** These represent points at which the manager must choose among different actions. Example: Launch product or delay launch.
- b. **Chance Nodes (Circle Shapes):** These represent uncertain events that may occur after a decision is made. Example: High demand or low demand.
- c. **Branches:** These are the lines that connect decisions and events. Each branch represents a path the future may take.

At the end of each branch is an outcome, such as a profit or a cost. By examining all branches, the manager gains a full view of the possible consequences of each choice.

Decision trees become especially valuable in situations where decisions unfold across several stages rather than a single step. When a manager's choice at the first stage influences what comes next, and when future choices depend on earlier outcomes, a step-by-step visual structure helps keep the entire process clear. They are also helpful when outcomes are shaped not only by the manager's decisions but also by uncertain events that lie outside the firm's control, such as shifts in demand, competitor reactions, or changes in market conditions.

Decision trees are useful when the manager can reasonably estimate probabilities for these uncertain events. Even if the probabilities are approximate, placing them within the tree allows the manager to compare the likely consequences of each alternative. Finally, decision trees are particularly effective when the situation is complex and difficult to understand through verbal explanation alone. The visual layout provides a clear comparison of different paths, making the overall decision easier to interpret, evaluate and communicate to others.

Decision Tree

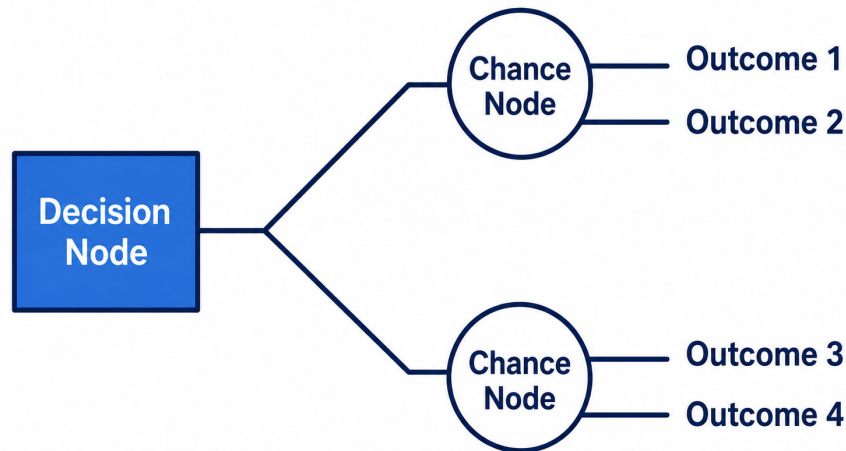


Fig. 5.1.1 Basic Structure of a Decision Tree

The figure given above helps reduce confusion and makes it easier to explain decisions to others in the organisation. Managers can see how one decision leads to another and how different scenarios unfold.

For example, a firm is deciding whether to introduce a new product. If it launches now, the success of the product depends on demand levels. The manager estimates the following:

- ◇ If demand is high (probability 0.6), profit will be ₹80,000.
- ◇ If demand is low (probability 0.4), profit will be ₹20,000.

Alternatively, the firm may delay the launch for one year to conduct a detailed market study. This delay costs ₹10,000. After the study:

- ◇ High demand (probability 0.7) yields a profit of ₹90,000.
- ◇ Low demand (probability 0.3) yields a profit of ₹15,000.

We now calculate the expected value for each choice.

A. Expected Value of Launching Now

$$EV_{\text{now}} = (0.6 \times 80,000) + (0.4 \times 20,000)$$

$$EV_{\text{now}} = 48,000 + 8,000 = 56,000$$

B. Expected Value of Delaying the Launch

First calculate expected profit from outcomes:

$$EV_{\text{future}} = (0.7 \times 90,000) + (0.3 \times 15,000)$$

$$EV_{\text{future}} = 63,000 + 4,500 = 67,500$$

Now subtract the cost of delay:

$$EV_{\text{delay}} = 67,500 - 10,000 = 57,500$$

C. Interpretation

- ◇ Expected value of launching now = ₹56,000
- ◇ Expected value of delaying = ₹57,500

Since delaying the launch yields a slightly higher expected value, the firm may decide to wait and conduct the market study.

Decision Tree Analysis: Product Launch Strategy

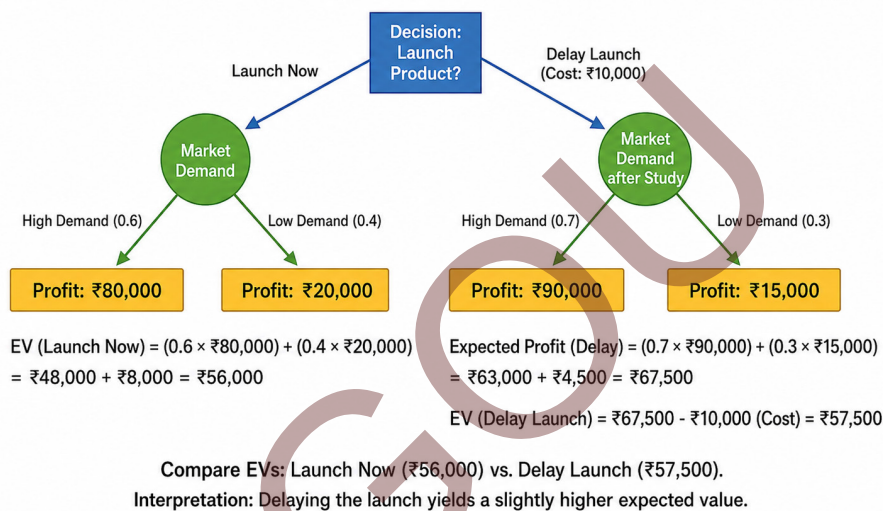


Fig. 5.1.2 Decision Tree : Product Launch Strategy

This example shows how decision trees help managers compare alternatives based on a combination of choices and uncertainties.

Evaluating a decision tree involves a simple but systematic backward process. The analysis begins at the outcomes, where the manager calculates the expected values at each chance node. These expected values represent the weighted average payoff (expected value) of all possible events that may occur after a particular decision. Once the expected values are computed at these endpoints, the manager works backwards toward the earlier decision points. At every decision node, the manager chooses the branch that carries the highest expected value, since this path represents the most favourable choice for the firm. This backward movement continues until it reaches the starting point, ensuring that every decision is evaluated with full awareness of how future choices and uncertainties will unfold.

Decision trees play an important practical role in managerial situations where uncertainty is significant. They convert complex, multi-stage decisions into clear diagrams that are easy to understand and interpret. By laying out decisions and uncertain events step by step, decision trees help managers compare alternative strategies, identify

which option is likely to deliver the most value, and understand the cost and usefulness of additional information. They also reveal how decisions develop over time, showing the logical connection between current actions and future outcomes.

In industries where the environment is highly unpredictable such as new product development, agriculture, pharmaceuticals, and fast-changing technology sectors, decision trees provide clarity and improve judgement. They allow managers to reason through uncertainty in a structured way, reducing confusion and supporting more confident and well-considered decisions.

5.1.6 Good and Bad Decisions and Outcomes

In managerial work, decisions are made long before results appear. This makes it important to understand that the quality of a decision is not the same as the quality of the outcome. A manager may make a well-reasoned decision and still face a poor outcome due to unexpected events. Likewise, a careless or poorly studied decision may sometimes appear successful by luck alone. Evaluating decisions solely on the basis of their outcomes can mislead managers and encourage bad habits.

A good decision is made thoughtfully, using the best information available at the time. It involves studying alternatives, gathering relevant data, assessing risks, and applying clear reasoning. A manager who weighs demand forecasts, cost estimates, competitive responses, and likely risks is practising good decision-making even if events later unfold unexpectedly. For instance, imagine a firm that launches a new packaged food product after conducting consumer surveys, studying price sensitivity, and analysing distribution costs. Months later, a sudden change in government food-labelling regulations disrupts the entire market, causing the product to fail. Although the outcome is unfortunate, the decision was still a good one because it followed a careful, disciplined approach.

A bad decision, in contrast, ignores essential information or relies on assumptions without verification. A manager may rush into an investment, blindly imitate a competitor, or rely on intuition without studying the details. Even if circumstances turn favourable and the result proves profitable, the decision remains poor because it was not based on sound reasoning. Imagine a retailer doubling its festival-season stock simply because “sales were good last year” without checking supply chain changes, customer trends, or price movements. If the sales boom continues, the outcome will be good, but the decision was weak, and such behaviour can easily lead to losses in the future.

This difference matters because if firms reward managers solely based on outcomes, they may unknowingly encourage risky or careless behaviour. A lucky manager who takes unreasonable gambles may appear “successful,” while a disciplined manager who made a thoughtful decision might be punished simply because external events shifted unexpectedly. Over time, such patterns damage organisational culture. Instead, firms should recognise and reward good decision-making, not just good results. Sound processes eventually produce better long-term performance, even if individual outcomes vary.



Learning to distinguish between decisions and outcomes helps managers grow intellectually. When reviewing results, they ask two important questions:

- ◇ *Was the decision-making process strong and reasonable?*
- ◇ *Were the unexpected factors truly beyond control?*

This reflective habit strengthens strategic thinking. Over time, managers gain the confidence to act responsibly even in uncertain conditions, understanding that their duty is to choose wisely, not to guarantee outcomes.

The matrix divides situations into four quadrants:



Fig. 5.1.3 Decision – Outcome Matrix

Table 5.1.2 Decision – Outcome Comparison

Decision Quality	Outcome Quality	Meaning
Good decision + Good outcome	Both reasoning and result are favourable	Ideal situation
Good decision + Bad outcome	Strong reasoning, but external uncertainty caused failure	Must be recognised as good decision
Bad decision + Good outcome	Lucky success despite poor reasoning	Needs correction, not celebration
Bad decision + Bad outcome	Poor reasoning leading to poor results	Shows need for training or process change

The table illustrates why managerial performance should not be judged solely by outcomes.

Recap

- ◇ Decision making under uncertainty occurs when outcomes are unknown and probabilities cannot be assigned accurately
- ◇ Managers use judgement, experience and structured tools like scenarios and market signals to act under uncertainty
- ◇ Probability provides a measurable way to describe uncertain events when approximate likelihoods are available
- ◇ Expected value combines probabilities and payoffs to give a single average return measure for comparing alternatives
- ◇ Decision trees map choices, uncertain events, and payoffs in a visual structure to identify the best expected value
- ◇ A good decision depends on the process used, not the outcome achieved, because outcomes depend on external factors

Objective Questions

1. What term describes situations where outcomes cannot be predicted with certainty?
2. What concept measures the likelihood of different outcomes?
3. What tool combines probability and payoff into one summary number?
4. What visual method shows choices, chance events and payoffs?
5. What node in a decision tree represents a manager's choice point?
6. What node represents uncertain future events in a decision tree?
7. What measure reflects the monetary result of an outcome?
8. What factor is used to estimate the long-term average result of repeated decisions?
9. What kind of decision is judged by the process rather than the outcome?
10. What value guides managers in comparing future possibilities?



Answers

1. Uncertainty
2. Probability
3. Expected value
4. Decision tree
5. Decision
6. Chance
7. Payoff
8. Probability
9. Good
10. Outcome

Assignments

1. Explain the major differences between decision making under certainty, risk and uncertainty.
2. A firm estimates that a new product has three possible outcomes with given probabilities and profits. Construct the expected value and interpret the result.
3. Describe two business situations where uncertainty arises due to external factors.
4. Calculate the expected value for a project with the following data: profits of ₹40,000 (probability 0.3), ₹25,000 (probability 0.5) and ₹5,000 (probability 0.2).
5. Prepare a simple decision tree for launching or delaying a new product and calculate expected values for both options.
6. Discuss how decision trees help compare multi-stage business options under uncertainty.
7. Using the decision–outcome matrix, classify four real-life managerial situations.

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Unit 2

Practical Activities

Learning Outcomes

After completing this unit, the learner will be able to:

- ◇ discuss how a real-life enterprise uses practical methods to forecast demand
- ◇ analyse the pricing strategies adopted by a small business
- ◇ examine the production process of a small unit and distinguish between fixed, variable, and semi-variable costs
- ◇ compute and interpret contribution, break-even quantity, and other basic cost measures
- ◇ evaluate investment proposals using capital budgeting techniques
- ◇ prepare a structured practical report

Prerequisite

Ananya had always taken the world around her for granted. Every morning on her way to work, she passed new shops, freshly laid roads, and buses that were far more modern than the ones.

Ravi often walked past a small shop near his college without really noticing it. One day, as he waited for a friend, he watched the owner arrange packets neatly on the shelves, talk kindly to customers, and check a small notebook where something was being written down again and again. It looked ordinary, but Ravi felt something quietly important was happening there.

Over the next few days, he saw how busy the shop became at certain times and how quiet it was at others. Sometimes new items appeared on the counter, and sometimes familiar items were missing. The prices on a small handwritten board changed once in a while, and Ravi wondered how the owner decided what to sell, how much to stock and what price to charge. Nothing in the shop looked like a big office or a complex system, yet many decisions were clearly being made every single day.

One evening, Ravi finally asked the owner how he managed everything. The owner smiled and said that he did not use any big words to describe his work. He watched his customers, remembered what sold well, kept track of his costs, and

tried not to take more risk than he could handle. For him, running the shop meant balancing many small choices so that the business stayed alive and the customers stayed happy.

Ravi realised that behind every simple-looking business lies a world of quiet thinking and careful planning. What looks like routine work from the outside is often guided by patterns, experiences and simple methods that help the owner make better decisions.

Keywords

Micro Enterprise, Forecasting, Pricing, Cost Management, Investment Decisions, Pricing Strategy, Production Process, Break Even Analysis, Capital Budgeting, Project Evaluation

Discussion

5.2.1 Selecting a Business with a Turnover Between ₹10 Lakhs and ₹1 Crore

For this practical unit, we will study a single, small business that meets the requirement of having an annual turnover between ₹10 lakhs and ₹1 crore. This size range is ideal because such enterprises are large enough to face real managerial decisions yet small enough for learners to understand their operations without complexity. Within this range, many Kerala-based micro- and small food producers face challenges in demand forecasting, pricing, production planning, cost management, and investment decisions. These features make them suitable for illustrating how managerial economics concepts operate in everyday business life.

In this unit, we will work with a hypothetical yet realistic enterprise named Kairali Crunch Foods, a small food-processing unit located in Kerala and owned by Kiran, who oversees the entire operation. The business specialises in traditional snack products such as banana chips, jackfruit chips and seasonal items that reflect local tastes. With a turnover that generally falls between ₹40 lakhs and ₹60 lakhs per year, Kairali Crunch Foods sits comfortably within the required range. Its scale is large enough to experience the everyday pressures of competition, raw material price fluctuations, labour management, and market uncertainty, yet small enough for its processes to be described clearly and meaningfully for learners.

Kairali Crunch Foods sources raw bananas, jackfruit and coconut oil from local suppliers and sells its finished products to supermarkets, bakeries, tourist outlets, and small retailers across districts such as Kollam and Thiruvananthapuram. The business experiences clear seasonal variations in demand, rising sharply during Onam and Vishu, stabilising during school holidays and slowing during monsoon months. The



mix of regular demand, festival-driven spikes and tourism-related fluctuations creates a natural setting for applying demand forecasting tools.

Because Kairali Crunch Foods produces multiple packet sizes and periodically experiments with new products, such as vacuum-fried banana slices, it also offers opportunities to examine different pricing strategies, such as mark-up pricing, product-line pricing, and penetration pricing. Similarly, the firm's production methods involve a combination of manual labour and small machinery, making it suitable for analysing short-run production behaviour, cost structures, break-even patterns, and investment choices.

From time to time, the firm considers investing in new equipment, such as an upgraded fryer or improved packaging machine. These decisions allow us to apply capital budgeting tools such as NPV, IRR, Payback Period and ARR. The business also faces uncertainties: raw banana prices fluctuate, labour availability is unpredictable, and demand for new products can vary. These conditions provide a natural backdrop for applying decision-making techniques such as expected value, probability-based reasoning, and decision trees.

Selecting a mid-sized enterprise like Kairali Crunch Foods helps learners see clearly how the tools of managerial economics are applied in a practical setting. The business is simple enough to understand yet rich enough in real-world detail to demonstrate integrated forecasting, pricing, cost analysis, investment evaluation, and risk-based decision-making. This realistic context will guide the remaining sections of the unit and show how theory connects directly with everyday managerial decisions.

5.2.2 Investigating the Demand Forecasting Methods Used by the Business

Once the business is selected, the next step is to understand how it forecasts demand for its products. For Kairali Crunch Foods, owned and managed by Kiran, forecasting demand is more than a routine task; it is the foundation on which production planning, procurement decisions and pricing adjustments are made. Because the enterprise operates in a segment where customer preferences are influenced by festivals, tourism, weather conditions, and retail patterns, predicting demand becomes essential to avoid both shortages and excess stock. Although Kairali Crunch Foods is not a large corporation with advanced forecasting software, it still uses practical and effective methods that reflect the everyday realities of Kerala's food market.

The simplest and most dependable forecasting tool available to Kiran is the firm's own past sales record. Over several years, certain patterns have repeated themselves with remarkable consistency. The weeks leading up to Onam and Vishu witness a clear increase in demand, with retailers requesting larger quantities of banana chips and jackfruit-based products. Tourist-heavy periods, such as December and January, also lift sales, particularly in areas like Varkala, Kovalam, and Kochi, where shops expect steady footfall. On the other hand, the monsoon season often brings a mild slowdown, as fewer tourists travel and local consumption dips slightly. By observing these patterns,

Kiran forms a simple seasonality-based forecast that helps the firm plan ahead without relying on complex tools.

Another important forecasting method comes from retailer and distributor insights. Local supermarkets, bakeries, and small shops that regularly stock Kairali Crunch Foods often share updates on which flavours are popular, whether customers prefer smaller or larger packet sizes and which products are moving faster during particular weeks. Distributors a wider network of stores, sometimes alert Kiran to expected surges in footfall due to regional events, school holidays, or seasonal travel. Although these insights are informal, they function as a practical form of expert opinion, helping the firm understand short-term changes in demand that may not be visible from past data alone.

When Kairali Crunch Foods experiments with a new product, such as a vacuum-fried banana slice or a flavoured variant of jackfruit chips, the firm conducts small market trials before making a full launch. This involves preparing limited quantities and supplying them to selected stores to observe customer reactions. The feedback received during these trials often reveals more than numerical data can: whether customers enjoy the taste, how they feel about the price, and whether the packaging appeals to them. These small-scale experiments help Kiran decide whether the new item deserves a permanent place in the product line or whether it needs refinement before wider distribution.

In addition to understanding demand, forecasting helps Kiran plan raw material purchases. Prices of bananas, jackfruit and coconut oil vary noticeably across seasons. A good forecast allows Kiran to secure raw materials early when prices are stable and quality is high. Poor forecasting, on the other hand, could force the firm to purchase raw materials at higher prices during festivals or tourist peaks, affecting profitability and potentially compromising product quality. Therefore, procurement planning closely follows the insights gathered from forecasting.

For a small enterprise like Kairali Crunch Foods, forecasting relies not only on mathematical techniques but also on recognising patterns, observing the market, and understanding customer behaviour. By combining sales history, retailer insights, seasonal indicators and cautious product trials, Kiran creates a practical and flexible forecasting system that helps the business operate smoothly even when demand fluctuates unexpectedly. These forecasting practices form a strong foundation for the firm's production planning, pricing decisions, cost management, and investment choices, demonstrating how managerial economics tools support everyday decision-making in a real-world business environment.

5.2.3 Evaluating the Pricing Strategies Adopted by the Business

Pricing decisions play a central role in shaping the performance of Kairali Crunch Foods, owned and managed by Kiran. Because the business sells everyday snack items, customers are highly sensitive to even small price changes. At the same time, the firm must handle fluctuating raw material costs, retailer margins, and varying levels of competition. This makes pricing a careful balancing act between affordability,



profitability, and market expectations. The methods Kiran uses reflect the practical realities of a small enterprise while also drawing on the pricing concepts discussed in earlier units.

For long-established products such as traditional banana chips and jackfruit chips, Kiran relies mainly on cost-based pricing. The first step is to work out the cost of producing a single packet. This includes the cost of raw bananas or jackfruit, coconut oil, slicing labour, frying time, packaging materials, electricity, and other day-to-day expenses. Since the prices of bananas and coconut oil often change with the season, Kiran reviews these costs frequently. After calculating the unit cost, a simple mark-up is added to determine the final price. For example, if the cost of producing a 100-gram packet is ₹20, a 40% markup would result in a selling price of ₹28. This type of pricing helps Kairali Crunch Foods maintain stable margins while keeping products affordable for retailers and customers.

Different pricing strategies are used for newer or more innovative products. When Kairali Crunch Foods introduced vacuum-fried banana slices, the product was unfamiliar to many local customers. To encourage trial purchases, Kiran initially adopted a penetration pricing strategy, keeping the price modest to attract attention and build acceptance. Customers tend to hesitate when trying a product they have never tasted, especially if the price is high. By starting at a comfortable price point, the firm reduces this hesitation. Once the product gains recognition and demand becomes steady, the price can be gradually adjusted to reflect the higher cost of production.

The business also uses product-line pricing, especially since it offers multiple packet sizes, such as 50 grams, 100 grams, and 200 grams. Smaller packets generally have a higher price per gram because packaging costs remain constant regardless of the quantity inside. Larger packets, however, provide better value and cater to families or customers who prefer bulk purchases. For example, a 50-gram packet may be priced at ₹15, while a 200-gram packet is priced at around ₹40, giving customers more value without reducing the firm's overall profitability. This approach ensures that different customer segments, those seeking convenience and those seeking value, are both accommodated.

In certain situations, especially during festivals or when a retailer places a bulk order, Kiran applies marginal cost pricing. Once the fixed costs of production are covered, additional packets mainly require variable costs such as raw bananas, oil and labour. During high-demand periods, Kairali Crunch Foods may offer competitive wholesale prices for large orders, provided that each additional unit contributes more than its marginal cost. This not only helps increase total sales but also strengthens relationships with key retailers.

Market conditions also influence pricing decisions. If competitors reduce prices or introduce similar products, Kiran avoids sudden price cuts and instead focuses on maintaining quality, freshness, and supply consistency. During periods of increased tourist activity, the firm keeps prices stable rather than raising them abruptly, as sudden changes can damage long-term customer trust. Retailers also shape pricing by adding

their own margins. Kiran must ensure that wholesale prices leave enough space for retailers to earn a fair margin without pushing the final consumer price too high.

Through this mix of cost-based pricing, mark-up methods, product-line strategies, penetration pricing and selective marginal cost considerations, Kiran ensures that prices remain fair, sustainable, and responsive to changing market conditions. Each strategy reflects a practical understanding of how customers behave, how costs fluctuate and how retailers operate. By managing pricing thoughtfully, Kairali Crunch Foods positions itself as a reliable producer in Kerala's competitive snack market, balancing profitability with long-term customer trust.

5.2.4 Assessing the Production Processes and Analysing Cost Structures at the Business

The production activities at Kairali Crunch Foods are shaped by the nature of the products it produces and the operating patterns of small food units in Kerala. Since the business produces traditional snacks such as banana chips and jackfruit chips, the production process combines both manual skill and machinery. The workflow begins with sourcing fresh bananas and jackfruit from nearby suppliers. Once delivered, the raw produce is cleaned, peeled, sliced, and fried using a combination of manual labour and semi-automatic fryers. The fried products are then seasoned, cooled, and finally packed into different-sized packets to suit retail customers' preferences. Throughout this process, Kiran must balance the use of labour and equipment to ensure smooth production while keeping costs under control.

The firm's production decisions reflect the concepts discussed in earlier blocks, especially the distinction between short-run and long-run production. In the short run, Kairali Crunch Foods operates with a limited number of machines - primarily fryers, slicers and sealing equipment - while labour can be adjusted depending on demand. If demand rises during festivals or tourist seasons, Kiran can bring in temporary workers to increase output without immediately investing in new machinery. This situation mirrors the idea of a fixed factor of production (machinery) and a variable factor of production (labour). As more workers are added to the existing set of machines, the firm experiences familiar stages of production: initially, output rises steadily because workers utilise spare capacity effectively; then, as machinery becomes fully utilised, further additions of labour produce diminishing returns. Understanding these patterns helps Kiran schedule workers efficiently and avoid overcrowding in the production area.

The firm's production methods also illustrate long-run decisions, particularly when Kiran evaluates whether to invest in new machinery. When the existing fryer reaches its capacity, Kiran must consider whether installing an additional fryer would reduce bottlenecks and improve productivity. This reflects the long-run scenario in which all inputs become variable, allowing the business to plan for expansion. By examining the cost savings, expected increase in output and the overall efficiency gains, Kiran assesses whether expanding capacity aligns with future demand trends. This approach reflects the idea of selecting the best combination of inputs, labour and machinery, to produce the desired level of output at the lowest possible cost.



The cost structure of Kairali Crunch Foods also clearly illustrates how fixed, variable, and semi-variable costs shape business decisions. Fixed costs include the monthly rent for the production area, depreciation of machinery, licence fees, and essential administrative expenses. These costs remain steady regardless of the quantity produced. Variable costs, on the other hand, fluctuate directly with output and include raw materials such as bananas, jackfruit, coconut oil, spices, and packaging materials, as well as wages for additional labour. Electricity bills and equipment maintenance often fall into the semi-variable category, rising with greater production but not changing for small variations in output. Understanding these categories helps Kiran predict how costs will change when production scales up or down.

Alongside the cost structure, the concepts of average cost, marginal cost, and contribution become relevant to the firm's daily operations. When Kiran assesses whether to increase production during festival periods, the decision depends heavily on marginal cost - the cost of producing one additional unit. As long as the selling price exceeds the marginal cost, each additional packet contributes positively to the firm's overall profit. This practical understanding allows Kairali Crunch Foods to accept bulk orders from retailers even at slightly lower margins, provided the additional units continue to generate contribution over their variable costs.

The firm also uses break-even analysis to understand how much it needs to sell to cover its fixed and variable costs. By estimating the contribution per packet and comparing it with total fixed costs, Kiran identifies the minimum sales level required to avoid losses. This analysis is particularly useful when planning the introduction of new products or considering changes in packet size or pricing. For instance, if Kiran plans to introduce a new flavoured variant, identifying its break-even point helps determine whether the expected demand is sufficient to justify production.

Production planning at Kairali Crunch Foods is closely tied to the firm's emphasis on maintaining quality and consistency. Because the business relies on repeat customers, poorly fried chips, flavour variations, or supply delays can affect its reputation. The production process is therefore designed to balance efficiency with attention to detail. Raw materials are carefully inspected, oil is replaced regularly to maintain freshness, and finished products are adequately cooled before packaging to preserve crispness. These steps ensure that the firm remains competitive in a crowded market where customers value taste and quality.

In this way, the production operations and cost structure of Kairali Crunch Foods demonstrate how theoretical concepts of managerial economics translate into everyday decisions. By understanding how labour, machinery and costs interact, Kiran manages the business with a steady and informed hand. The decisions made at each stage, whether adjusting labour, planning procurement, assessing costs or managing capacity, reflect a thoughtful application of production and cost concepts to maintain efficiency, quality and financial stability.

5.2.5 Examining Capital Budgeting and Investment Decisions at the Business

Investment decisions play an important role in shaping the long-term direction of Kairali Crunch Foods, especially as the business grows and demand fluctuates across seasons. For a small enterprise like this, capital budgeting becomes a practical tool for deciding whether new equipment or expanded capacity will genuinely strengthen the firm or place an unnecessary burden on its finances. Since Kairali Crunch Foods operates with limited resources, every investment must be evaluated carefully. The firm cannot afford to allocate funds to equipment that remains underutilised or fails to improve efficiency. Therefore, Kiran relies on a combination of financial analysis and practical judgement to decide how and when to invest.

One of the recurring challenges faced by the business is the pressure on existing machinery during peak demand periods. The fryer and slicer units often operate at near-full capacity during Onam, Vishu, and tourist-heavy months. This creates bottlenecks where labourers must wait for equipment to free up before moving to the next stage of production. Kiran has considered investing in an additional fryer or upgrading to a semi-automatic machine that offers higher output and better oil efficiency. However, such decisions cannot be made on intuition alone. They require a structured evaluation of the expected costs and benefits, using capital budgeting tools such as Net Present Value (NPV), Internal Rate of Return (IRR), Payback Period and Average Rate of Return (ARR).

To assess whether purchasing a new fryer is worthwhile, Kiran first estimates the initial investment required, including the cost of the fryer, installation, and other related expenses. This is followed by a realistic estimate of future cash flows that the new equipment might generate. These include higher production capacity, reduced labour fatigue, greater output consistency, and the ability to accept additional orders from retailers during peak seasons. Seasonal variations, raw material availability, and market stability are also considered to ensure that the projected cash flows reflect the fluctuations that the business normally experiences.

Once these estimates are in place, financial measures become useful guides. Using NPV, Kiran discounts the expected future cash inflows at an appropriate discount rate (often the cost of capital) to assess whether the investment adds positive value to the business. If the NPV is positive, it suggests that the investment is financially viable. The IRR, meanwhile, helps identify the rate of return the project is expected to generate. If the IRR exceeds the firm's required rate of return, the investment is considered attractive. The Payback Period provides a simple measure of how long it will take to recover the initial investment. While this method does not consider the time value of money, it is still useful for a small firm that must maintain liquidity. The ARR provides a percentage-based view of profitability based on accounting returns rather than cash flows. Together, these tools help Kiran form a clearer understanding of the risks and rewards associated with the investment.

Capital rationing plays a significant role in the decision-making process. As a small business with limited funds, Kairali Crunch Foods cannot undertake every potentially profitable project. Kiran must prioritise investments that strengthen the business's most critical needs. For example, if funds are limited, purchasing a new fryer may take priority over installing an advanced packaging machine, especially if the current packaging process is adequate. In this way, capital budgeting supports not only financial evaluation but also strategic thinking by helping Kiran decide which investments align with the firm's long-term goals.

Investment decisions at Kairali Crunch Foods are not restricted to machinery alone. Kiran also evaluates whether adopting solar drying units, upgrading storage facilities or introducing improved packaging systems can enhance product quality and reduce long-term operating costs. Each potential investment is reviewed through the lens of expected benefits, cost savings and overall feasibility. This disciplined approach ensures that the business grows steadily without taking unnecessary financial risks.

Through careful planning and thoughtful evaluation, capital budgeting becomes a practical roadmap that helps Kairali Crunch Foods expand its capacity, improve production efficiency and remain competitive in the snack market. By applying the tools of managerial economics, Kiran ensures that investments contribute meaningfully to the firm's growth rather than becoming financial burdens. This measured and informed approach strengthens the business and prepares it to meet future challenges with confidence.

5.2.6 Analysing How the Business Makes Decisions Under Uncertainty and Risk

Every business, especially one operating on a small scale like Kairali Crunch Foods, encounters uncertainty regularly. Demand fluctuates across seasons, raw material prices change without warning, and new competitors can emerge at any time. For Kiran, who manages the business day-to-day, these uncertainties create situations in which decisions must be made without complete information. The firm cannot always predict how much customers will buy, whether a new product will become popular or how suppliers will price raw bananas during festival seasons. In such situations, managerial decisions rely on thoughtful judgement supported by simple analytical tools.

One of the most common sources of uncertainty for Kairali Crunch Foods is the availability and cost of raw materials. The price of bananas and coconut oil can rise sharply during certain months due to higher demand, lower supply or sudden changes in agricultural conditions. Since these materials form the core of the firm's production, even a small price change can affect profitability. Kiran does not always know in advance how prices will move, but makes decisions by observing past patterns, speaking with suppliers, and keeping small stock buffers when prices are favourable. Although uncertainty remains, these steps help reduce the severity of unexpected fluctuations.

The business also faces uncertainty in consumer demand. While there are predictable increases during Onam, Vishu, and tourist-heavy months, the exact quantities retailers

will order are not always clear. To handle this, Kiran uses simple forecasting methods, such as studying historical sales and seeking regular updates from distributors. Even then, there are times when demand surprises the firm, either positively or negatively. When faced with uncertain demand, Kiran often prepares slightly below the expected quantity rather than overproducing, as unsold stock can lead to wastage. This cautious approach reflects risk-averse behaviour, ensuring the firm remains financially secure even when the market behaves unpredictably.

When evaluating new products, such as vacuum-fried banana slices, Kiran faces an even higher level of uncertainty because customer reactions are not known in advance. To make such decisions more systematic, Kiran uses tools such as expected value analysis and small-market trials. For example, if there is an estimated 60% probability that the new product will perform well and a 40% chance demand will be modest, Kiran estimates the likely returns under each scenario and calculates the average expected outcome. This helps determine whether launching the product is worth the risk. Although the expected value does not guarantee a particular result, it guides decision-making by giving a clearer picture of the possible outcomes.

More structured decisions, such as whether to invest in a new fryer, sometimes require decision trees. Kiran identifies possible scenarios such as high demand, moderate demand or low demand in future years and assigns probabilities to each based on past trends and retailer feedback. Expected returns for each scenario are calculated, and the branch with the highest expected value is the preferred option. This approach helps Kiran visualise the possible consequences of different choices and reduces the stress of making decisions in uncertain situations by providing a logical structure for comparison.

Risk attitudes also shape how decisions are made. Kiran tends to be risk-averse, preferring steady, predictable growth over taking large risks for potentially higher returns. This is typical of many small entrepreneurs who manage their own capital and cannot afford major losses. For example, even if a new flavour of chips has the potential to bring significantly higher profits, Kiran chooses to introduce it gradually rather than making a full-scale launch. This preference for caution helps the firm maintain stability, especially in years when market conditions are unpredictable.

Despite these uncertainties, Kiran understands that risks cannot be eliminated. Instead, the goal is to manage risks thoughtfully. Maintaining small cash reserves for emergencies, maintaining good relationships with retailers and suppliers, diversifying product offerings, and conducting trials before major decisions are among the ways Kairali Crunch Foods stays resilient. These practices, combined with analytical tools such as probability estimations, expected value calculations and decision trees, help Kiran navigate uncertainty confidently.

In this way, decision-making under uncertainty and risk becomes a natural part of the business's daily operations. By combining careful observation, practical experience and the basic tools of managerial economics, Kiran ensures that Kairali Crunch Foods remains steady, adaptable, and prepared to face whatever challenges arise in the market.



5.2.7 Final Practical Report

Submitted by: Kiran (Owner, Kairali Crunch Foods)

Title: Financial Evaluation Report – Kairali Crunch Foods

Turnover Category: ₹40–₹60 lakhs per annum

1. Introduction To The Business

Kairali Crunch Foods is a registered micro-enterprise based in Kollam District, Kerala, engaged in processing and selling traditional snack products, primarily banana chips, jackfruit chips, and seasonal fried snacks. The unit was established in 2019 and currently operates as a sole proprietorship owned and managed by Kiran, who oversees procurement, production, distribution, and financial operations.

The enterprise operates from a 1,200 sq ft rented facility fitted with semi-automatic slicing and frying equipment. The annual turnover has consistently remained between ₹40 lakh and ₹60 lakh over the past three years. Products are supplied to 31 retail outlets, including supermarkets, bakeries, local provision stores and selected tourist markets in Varkala and Thiruvananthapuram.

The following report evaluates the operational, financial, and strategic decisions of Kairali Crunch Foods using standard managerial economics tools.

2. Demand Forecasting Methods

Demand forecasting at Kairali Crunch Foods is conducted using a combination of historical data analysis, retailer feedback, and market trials. The forecasting period is typically monthly, with short-term adjustments during festival seasons.

2.1 Historical Sales Pattern

Past sales data across three financial years show clear seasonal patterns:

Table 5.2.1 Seasonal Sales Pattern

Season / Period	Average Monthly Sales (Packets)	Observations
Onam–Vishu (Aug–Sep & Apr)	52,000	Peak demand (tourist inflow + festive buying)
School Vacation (Apr–May)	38,000	Increased household consumption
Monsoon (Jun–Jul)	27,000	Slight decline in demand
December Tourist Season	45,000	High movement in tourist markets

2.2 Monthly Forecasting Approach (Example)

A simple three-period moving average is used for monthly forecasting.

If sales for the last three months were:

- ◇ December: 44,600
- ◇ January: 46,200
- ◇ February: 42,800

$$\text{Forecast for March} = \frac{(44,600 + 46,200 + 42,800)}{3} = 44,533 \text{ packets}$$

2.3 Market Feedback

Retailers provide weekly input on:

- ◇ Preferred packet sizes (significant shift towards 50 g and 100 g sizes)
- ◇ Slow-moving variants
- ◇ Demand surges caused by local events

This rapidly improves short-term forecasting accuracy.

2.4 Trial-Based Forecasting for New Products

A pilot batch of 1,000 packets of vacuum-fried banana slices was introduced.

Sell-through rate in 12 outlets = 78% within 10 days, indicating strong acceptance.

Forecasted first-month demand for full launch = 6,000 packets.

3. Pricing Strategies Adopted

Pricing at Kairali Crunch Foods is guided by cost structures, retail margins, competitive pricing and customer sensitivity.

3.1 Cost-Based Pricing (Example Calculation)

Cost of Producing 100 g Banana Chips Packet

Table 5.2.2 Cost Based Pricing

Cost Component	Amount (₹)
Raw bananas (0.35 kg @ ₹22/kg)	7.70
Coconut oil usage	5.40
Labour	2.80
Electricity	0.65
Packaging	1.60
Other overheads	1.20
Total Cost per Unit	₹19.35



Mark-up Pricing

Desired mark-up = 45% on cost

Selling Price = $19.35 + (19.35 \times 0.45) = ₹28.06 \rightarrow$ rounded to ₹28

3.2 Product-Line Pricing

Table 5.2.3 Product Line Pricing

Packet Size	Cost/Unit (₹)	Price (₹)	Price per Gram (₹)
50 g	11.40	15	0.30
100 g	19.35	28	0.28
200 g	34.20	40	0.20

Larger packets provide better value, strengthening bulk-sales volumes.

3.3 Penetration Pricing for New Product

Vacuum-fried banana slices:

- ◇ Initial introductory price: ₹42 per 50 g packet
- ◇ Estimated cost: ₹31 per packet
- ◇ Penetration margin kept low intentionally for trial adoption
- ◇ Post-demand stabilisation price expected: ₹48–₹50

3.4 Marginal Cost-Based Pricing (Festival Orders)

During Onam, retailers often place bulk orders.

- ◇ Marginal cost of an additional 100 g packet: ₹17.80
- ◇ Wholesale offered at: ₹24 per packet

Contribution = $₹24 - 17.80 = ₹6.20$ per unit (positive contribution $\rightarrow$ acceptable)

4. Production Process And Cost Structure

4.1 Production Flow

1. Procurement of bananas and jackfruit
2. Cleaning and slicing
3. Frying (two semi-automatic fryers, 18 kg/hour capacity each)
4. Oil draining and seasoning
5. Cooling and packaging
6. Dispatch to retailers

4.2 Short-Run Production Dynamics

Labour is variable; machinery is fixed. When additional workers are added during peak season:

- ◇ Total Product initially rises at an increasing rate
- ◇ Eventually slows due to fryer capacity constraints
- ◇ Diminishing returns observed beyond 7 workers per shift

This aligns with short-run production theory.

4.3 Cost Structure

Fixed Costs (Annual)

Table 5.2.4 Annual Fixed Cost

Item	Amount (₹)
Rent	₹2,40,000
Machinery Depreciation	₹1,10,000
Licence and Compliance	₹45,000
Administrative Overheads	₹60,000
Total Fixed Cost	₹4,55,000

- ◇ **Variable Costs (per 100 g packet):** Approximately ₹19–₹21 depending on season.
- ◇ **Semi-variable Costs:** Electricity and maintenance ~ ₹17,000–₹22,000/month

4.4 Break-Even Analysis

- ◇ Selling price per 100 g packet: ₹28
- ◇ Variable cost per packet: ₹19.35
- ◇ Contribution per unit: ₹8.65

Break-Even Quantity

$$BEQ = \frac{\text{Total Fixed Cost}}{\text{Contribution per Unit}}$$
$$= \frac{4,55,000}{8.65} \approx 52,601 \text{ packets/year}$$

The unit sells around 4.3 lakh packets annually, far above BEQ.



5. Capital Budgeting And Investment Decisions

Kiran is evaluating the purchase of a new semi-automatic fryer to expand capacity.

Initial Investment: ₹4,20,000

Life of Asset: 5 years

Expected Additional Cash Inflows:

Table 5.2.5 Expected Additional Cash inflows

Year	Cash Inflow (₹)
1	1,20,000
2	1,45,000
3	1,55,000
4	1,60,000
5	1,50,000

Cost of Capital: 10%

5.1 Net Present Value (NPV)

$$NPV = \frac{\sum CF_t}{(1+r)^t} - \text{Initial Investment}$$

Present Values:

Table 5.2.6 Present Value of Cash inflows

Year	PV Factor (10%)	PV of Cash Inflow (₹)
1	0.909	1,09,080
2	0.826	1,19,770
3	0.751	1,16,405
4	0.683	1,09,280
5	0.621	93,150
Total PV	–	₹5,47,685

$$NPV = 5,47,685 - 4,20,000 = ₹1,27,685 \text{ (ACCEPTABLE)}$$

5.2 IRR Calculation

Using interpolation method:

◇ At 20% discount rate → NPV = +₹12,000

◇ At 23% discount rate → NPV = –₹11,000

$$IRR \approx 20\% + \frac{12,000}{12,000 + 11,000} \times 3\% = 21.57\%$$

IRR $\approx$ 21.6% $\rightarrow$ higher than cost of capital (10%) $\rightarrow$ Acceptable

5.3 Payback Period

Cumulative inflow reaches the investment during Year 4.

Payback = 3 +

$$\frac{4,20,000 - 4,20,000 \text{ recovered till Year 3}}{1,60,000} \approx 3 + 0.87 = 3.87 \text{ years}$$

6. Decision Making Under Uncertainty & Risk

Key Uncertainties

- ◇ Raw banana price fluctuations (₹18–₹28/kg)
- ◇ Weather-related supply disruptions
- ◇ Demand variations during the monsoon
- ◇ Uncertain reception of new products

Decision Tree Example (Simplified)

Decision: Launch flavoured banana chips

Table 5.2.7 Expected Profit

Scenario	Probability	Expected Profit (₹)
High Demand	0.6	2,40,000
Low Demand	0.4	1,10,000

Expected Monetary Value (EMV)

$$\text{EMV} = (0.6 \times 2,40,000) + (0.4 \times 1,10,000) = 1,44,000 + 44,000 = ₹1,88,000$$

As EMV is positive and aligns with capacity, the launch is considered favourable.

Kiran is naturally risk-averse, preferring gradual scaling rather than aggressive expansion. This influences the pace of investment and new-product introduction.

7. Conclusion

The analysis indicates that Kairali Crunch Foods is financially stable, operationally efficient and capable of sustainable growth. Demand remains strong, the business comfortably exceeds its break-even point and pricing strategies support healthy margins. Proposed capital investment shows strong viability based on NPV, IRR and Payback analysis. Despite uncertainties, structured decision-making tools help the enterprise remain resilient.



5.2.8 Sample Template For Learners (Blank Format)

Learners can use this to prepare their own report

1. Introduction to the Business

- ◇ Name of the business:
- ◇ Location:
- ◇ Owner/Manager:
- ◇ Nature of products/services:
- ◇ Annual turnover range:
- ◇ Market served (local, regional, tourist, etc.):
- ◇ Key characteristics relevant to managerial decisions:

2. Demand Forecasting Methods Used

- ◇ Past sales patterns
- ◇ Seasonal variations
- ◇ Retailer/distributor feedback
- ◇ Market trials for new products
- ◇ Forecasting challenges and insights

3. Pricing Strategies Adopted

- ◇ Cost-based pricing
- ◇ Mark-up calculation
- ◇ Product-line pricing
- ◇ Strategies for new products
- ◇ Role of competition and retailer margins
- ◇ Any use of marginal cost pricing

4. Production Processes and Cost Structure

- ◇ Key steps in production
- ◇ Use of labour and machinery
- ◇ Short-run and long-run decisions
- ◇ Fixed, variable and semi-variable costs
- ◇ Average cost and marginal cost insights
- ◇ Break-even analysis (optional numerical example)

5. Capital Budgeting and Investment Decisions

- ◇ Machines/equipment considered for purchase
- ◇ Estimated costs and expected benefits
- ◇ NPV/IRR/Payback/ARR calculations (if possible)
- ◇ Capital rationing decisions
- ◇ Final investment recommendation

6. Decision-Making Under Uncertainty and Risk

- ◇ Explain:
- ◇ Sources of uncertainty
- ◇ Probability or expected value reasoning
- ◇ Use of decision trees
- ◇ Risk attitudes of the owner/manager
- ◇ Strategies adopted to manage risk

7. Conclusion

Summarise how managerial economics tools supported decisions in the selected business.

Recap

- ◇ The business faces seasonal demand patterns and uses past sales, retailer insights and product trials for demand forecasting
- ◇ Pricing strategies combine cost-based mark-up pricing, product-line pricing, penetration pricing and marginal cost-based decisions for bulk orders
- ◇ Production decisions reflect short-run and long-run choices, with clear distinctions between fixed, variable and semi-variable costs and the use of break-even analysis
- ◇ Capital budgeting tools such as NPV, IRR and Payback Period are applied to evaluate the purchase of a new fryer using projected cash inflows
- ◇ Decisions under uncertainty and risk are handled with expected value analysis, decision trees and a generally risk - approach support decisions relating to new products and investments.
- ◇ A structured template is provided to help learners prepare their own practical report on a chosen business using similar tools and analysis

Objective Questions

1. What term is used for predicting future sales based on past data and market information?
2. What is the general name for the amount added over cost to fix the selling price?
3. What type of cost remains unchanged within a relevant range of output?
4. What is the term for the extra cost incurred in producing one more unit of output?
5. Which cost category varies directly with the level of output?
6. What do we call the point at which total revenue equals total cost?
7. Which capital budgeting method calculates the present value of future cash flows minus initial investment?
8. Which capital budgeting tool indicates the rate of return at which NPV becomes zero?
9. What is the term for a situation in which future outcomes are not known with certainty but probabilities can be assigned?
10. What is the name of the graphical tool that shows different decision options and possible outcomes under risk?

Answers

1. Demand forecasting
2. Mark up
3. Fixed cost
4. Marginal cost
5. Variable cost
6. Breakeven point
7. Net Present Value
8. Internal Rate of Return
9. Risk
10. Decision tree

Assignments

1. Discuss how historical sales patterns, seasonal variations and retailer feedback together can improve the accuracy of demand forecasting for a small manufacturing unit.
2. Compare the price per gram for different packet sizes using the product line pricing table in the unit and explain how larger packs can offer better value to customers while still supporting the firm's profitability.
3. Using the decision tree example with high demand and low demand scenarios, compute the Expected Monetary Value and briefly explain why a new product launch may be considered favourable even under uncertainty.
4. Identify major sources of uncertainty for a typical small enterprise and discuss how tools like expected value, probability-based reasoning and decision trees help in managing these uncertainties.
5. Using the sample template provided, outline a practical report structure for any small business of your choice and indicate where you would include discussions on forecasting, pricing, cost analysis, investment decisions and risk.

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Suggested Reading

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Model Question Paper Sets





SREENARAYANAGURU OPEN UNIVERSITY

MODEL QUESTION PAPER I

QP CODE:

Reg. No:

Name:

FIFTH SEMESTER - BA NANO ENTREPRENEURSHIP EXAMINATION

DISCIPLINE CORE COURSE

B23NE05DC - MANAGERIAL ECONOMICS

(CBCS - UG)

2023-24 - Admission Onwards

Time: 3 Hours

Max Marks: 70

Section A - Objective Type Questions

Answer any 10 questions. Each question carries 1 mark

(10 X 1=10 marks)

1. Define capital budgeting.
2. Define demand forecasting.
3. What is meant by capital rationing?
4. Define Expected Value (EV).
5. State the meaning of scarcity according to Lionel Robbins.
6. Define the Internal Rate of Return (IRR).
7. What is meant by discounting?
8. Define a decision tree.
9. What is meant by product-line pricing?
10. Define mark-up pricing.
11. What is meant by short-run production?
12. Name the reward for labour.
13. Define break-even analysis.



14. What is meant by opportunity cost?
15. State the main objective of profit maximisation pricing.
16. Define accounting cost.

Section B – Very Short Answer

Answer any 5 questions. Each question carries 2 marks

(5 × 2 = 10 marks)

17. Write a note on Managerial Economics.
18. Explain the concept of Net Present Value (NPV).
19. Distinguish between labour and entrepreneurship.
20. Discuss the concept of the Average Rate of Return (ARR).
21. Distinguish between uncertainty and risk.
22. Explain the Trend Projection Method.
23. Describe the role of retailer feedback in improving demand forecasting.
24. Differentiate between short-run production and long-run production.
25. What are the determinants of demand?
26. State any four characteristics of capital budgeting.

Section C – Short Answer

Answer any 4 questions. Each question carries 5 marks

(4 × 5 = 20 marks)

27. Discuss the various sources of capital available to business firms.
28. Discuss the differences between short-run and long-run production.
29. Explain the concept of decision making under risk and discuss its significance in business decision-making.
30. Explain the concept and importance of profit management in business organisations.
31. Explain how a small company applies managerial economics tools to make decisions under uncertainty and risk.



32. Explain the concepts of Total Revenue (TR), Average Revenue (AR), and Marginal Revenue (MR) with suitable formulae.
33. Explain the different types of demand with suitable examples.
34. Discuss the steps in managerial decision-making.

Section D – Long Answer / Essay

Answer any 2 questions. Each question carries 15 marks

(2 × 15 = 30 marks)

35. Critically evaluate the major methods of capital budgeting and discuss their suitability for long-term investment decision-making.
36. Explain the Law of Variable Proportions in detail. Discuss its three stages and examine the relationships between TP, AP, and MP.
37. Elucidate on the scope of Managerial Economics with reference to operational and environmental issues.
38. Explain the different methods of demand forecasting with suitable examples and discuss their relevance in managerial decision-making.



SREENARAYANAGURU OPEN UNIVERSITY

MODEL QUESTION PAPER II

QP CODE:

Reg. No:

Name:

FIFTH SEMESTER - BA NANO ENTREPRENEURSHIP EXAMINATION

DISCIPLINE CORE COURSE

B23NE05DC - MANAGERIAL ECONOMICS

(CBCS - UG)

2023-24 - Admission Onwards

Time: 3 Hours

Max Marks: 70

Section A – Objective Type Questions

Answer any 10 questions. Each question carries 1 mark

(10 × 1 = 10 marks)

1. Define Trend Projection Method.
2. What is meant by decision making under risk?
3. Define Managerial Economics.
4. Define production.
5. What is meant by hard capital rationing?
6. Define cost analysis.
7. What is meant by transfer pricing?
8. Define penetration pricing.
9. What does a positive Net Present Value (NPV) indicate?
10. What is meant by sunk cost?
11. Define price elasticity of demand.
12. What does ARR measure?
13. What is meant by a risk-seeking attitude?



14. Define price skimming.
15. What is meant by Marginal Product (MP)?
16. Name the factors of production.

Section B – Very Short Answer

Answer any 5 questions. Each question carries 2 marks

(5 × 2 = 10 marks)

17. Explain the concept of decision making under risk.
18. Explain any four characteristics of a good forecasting method.
19. Distinguish between the NPV and IRR methods.
20. Differentiate between private cost and social cost.
21. Point out any two factors that cause shifts in an isocost line.
22. Distinguish between cost-based pricing and penetration pricing as practised by the business.
23. Differentiate between fixed cost and variable cost.
24. Explain the meaning of profit management.
25. Differentiate between mutually exclusive projects and independent projects.
26. State Lionel Robbins' definition of Economics.

Section C – Short Answer

Answer any 4 questions. Each question carries 5 marks

(4 × 5 = 20 marks)

27. Discuss the relationship between Average Cost (AC), Average Variable Cost (AVC), and Marginal Cost (MC).
28. Compare hard capital rationing and soft capital rationing with suitable examples.
29. Explain the different types of price elasticity of demand.
30. Explain the concept, components, and evaluation procedure of a decision tree.
31. Write a note on the various methods of demand forecasting used by business firms.

32. Discuss the role of probability and expected value in managerial decision-making under uncertainty.
33. Explain the concepts of isoquant, isocost line, and least-cost combination in production analysis.
34. Discuss the capital budgeting techniques used by a small firm to evaluate investment decisions.

Section D – Long Answer / Essay

Answer any 2 questions. Each question carries 15 marks

(2 × 15 = 30 marks)

35. Define profit management. Explain its objectives and discuss the various factors involved in effective profit management.
36. Discuss the various sources of capital available to business firms. Explain the advantages and limitations of internal and external sources of capital.
37. Define break-even analysis. Explain the concept of the break-even point and discuss the graphical interpretation of break-even analysis with reference to profit and loss regions.
38. Explain the concept of cost. Discuss the various types of costs and their importance in managerial decision-making.

സർവ്വകലാശാലാഗീതം

വിദ്യായാൽ സ്വതന്ത്രരാകണം
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