MASTER OF BUSINESS ADMINISTARTION (Management Studies)

Course Code:- MGO-6102

Course Name:- Managerial Economics

MASTER OF BUSINESS ADMINISTRATION
(Management Studies)

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BLOCK – 1: INTRODUCTION TO MANAGERIAL ECONOMICS

UNIT 1 BASIC CONCEPTS AND PRINCIPLES OF ECONOMICS

STRUCTURE

1.0 INTRODUCTION

In this unit we will try to understand term economics. Difference between the major branches of economics. The scope of economics

in traditional and modern context, various fundamental concept of economics and principle of economics on which various concepts are based.

1.1 OBJECTIVES

Studying this unit, will enable you to:

- understand basic concepts and principles of Economics;
- familiarize yourself with economic terminology;
- develop some insight into economic issues

1.2 DEFINITION OF ECONOMICS

The analysis of economic environment requires the knowledge of economic decision making and hence the study of "Economics" is significant.

There are 4 definitions of Economics.

(i) Wealth Definition:

Adam Smith defined "Economics as a science which inquired into the nature and cause of wealth of Nations".

According to this definition —

• Economics is a science of study of wealth only;

• It deals with production, distribution and consumption;

• This wealth centered definition deals with the causes behind the creation of wealth, and

• It only considers material wealth.

Criticisms of this definition:

(a) Wealth is of no use unless it satisfies human wants.

(b) This definition is not of much importance to man and welfare.

(ii) Welfare definition:

According to Alfred Marshall "Economics is the study of man in the ordinary business of life". It examines how a person gets his income

and how he invests it. Thus on one side it is a study of wealth and on the other most important side, it is a study of well being.

Features:

(a) Economics is a study of those activities that are concerned with material welfare of man.

(b) Economics deals with the study of man in ordinary business of life. The study enquires how an individual gets his income and how he uses it.

(c) Economics is the study of personal and social activities concerned with material aspects of well being.

(d) Marshall emphasized on definition of material welfare. Herein lies the distinction with Adam Smith's definition, which is wealth centric.

(iii) Scarcity definition This definition was put forward by Robbins. According to him "Economics is a science which studies human behavior as a relationship between ends and scarce means which have alternative uses.

Features:

(a) human wants are unlimited

(b) alternative use of scarce resources

(c) efficient use of scarce resources

(d) need for optimisation

(iv) Growth Oriented definition

This definition was introduced by Paul. A. Samuelson. According to the definition "Economics is the study of how man and society choose with or without the use of money to employ the scarce

productive resources, which have alternative uses, to produce various commodities over time and distributing them for consumption, how or in the future among various person or groups in society." It analyses costs and benefits of improving patters of resource allocation.

1.3 SCOPE OF ECONOMICS

Traditional Approach

Economics is a social science which studies man's behaviour as a rational social being. It considered as a science of wealth in relation to human welfare, earning and spending of income was considered to be end of all economic activities. Wealth was considered as a means to an end – the end being human welfare.

Modern Approach

• An individual, either as a consumer or as a producer, can optimize his goal is an economic decision. The scope of Economics lies in analyzing economic problems and suggesting policy measures. Social problems can thus be explained by abstract theoretical tools or by empirical methods. In classical discussion, Economics is a positive science. It seeks to explain what the problem is and how it tends to be solved. In modern time it is both a positive and a normative science. Economists of today deal economic issues not merely as they are but also as they should be. Welfare economics and growth economics are more normative than positive

Subject Matter of Economics The subject matter of economics is presently divided into two major branches. Micro Economic and Macro Economics. These two terms have now become of general use in economics

Micro Vs Macro Economics

The words Micro and Macro have Greek origins Mikros and Makros. Mikros implies small and Makros large. Microeconomics is concerned with the most 'Elemental' economic units, like consumer, firm, input, market and industry. In other words, microeconomic theory analyses the behaviour of a consumer or a group of consumers; a firm, an industry, a market; a supplier of an input etc. The unit of analysis is small. In contrast to this, with macro-economic theory the unit of analysis is large. In fact, both micro and macroeconomics are two ways of looking at the same thing, the functioningmor the working of an economy. They are two starting points in analysing how an economy functions or operates.

Micro-economic theory focuses attention on individual markets (like the grain market), consumers (say of wheat), firms, industries. It is an in-depth study of how these individual economic units or agents operate or function or make decisions, as well as how they interact with each other. Macro-economic theory, on the other hand, deals with broad aggregates like national income, national expenditure, aggregate consumption expenditure, aggregate investment expenditure, the level of employment, the general price level and so on. It analyses how the economy functions through the interactions of these broad aggregates; how these aggregative variables behave and how they are determined. The distinction between micro and macro is made in terms of the level of aggregation and disaggregation used in analysing the functioning of an economy. Microeconomics uses more disaggregative variables than macroeconomics. Together they form the two sides of the same coin. However, it must be noted that economic decisions are ultimately taken at the micro level, and the conjunction of all micro decisions have important ramifications at the macro level. For instance, when we add consumers' expenditures on all goods and

services, we get the aggregate consumption expenditure for the economy as a whole, which is a macro concept. Similarly, the functioning of the economy at the macro level will have bearings for decision-making at the micro level. When income tax is raised, disposable income of households falls, firms will experience a decline in sales and as a result will cut back output. Hence, a macro level event will generate a micro manifestation. Micro-economic theory will be basically concerned with relative prices of commodities and factors of production (inputs). Hence, we will not be incorrect if we call Microeconomic theory, a price theory. Following Quirk we can say, "micro-economic theory provides the framework within which the economist describes and analyses the behaviour patterns and inter-relationships of the elemental economic units like consumer, firms, industries, commodities and markets. The main objective of micro-economic theory is to explain and predict how production, exchange and distribution of goods and services respond to the incentive structure operating in a given society."

1.4 NATURE OF ECONOMICS

Nature of economics refers to whether economics is a science or art or both, and if it is a science, whether it is positive science or normative science or both.

Economics as a Science —

• We have often stated that economics is a social science.

• Economics as a social science studies economic activities of the people.

• Economics is a systematic body of knowledge as it explains cause and effect relationship between various variables such as price,

demand, supply, money supply, production, national income, employment, etc.

• Economic laws, like other scientific laws, state what takes place when certain conditions (assumptions) are fulfilled.

• This is the traditional Deduction Method where economic theories are deduced by logical reasoning.

• The law of demand in economics states that a fall in the price of commodity leads to a large quantity being demanded ‘given other things’, such as income of the consumer, prices of other commodities, etc., remaining the same.

• In economics we collect data, classify and analyse these facts and formulate theories or economic laws.

• The truth and applicability of economic theories can be supported or challenged by confronting them to the observations of the real world.

• If the predictions of the theory are refuted by the real-world observations, the theory stands rejected.

• If the predictions of the theory are supported by the real-world events, then the theory is formulated.

• The laws of economics or economic theories are conditional subject to the condition that other things are equal. • Economic theories are seldom precise and are never final; they are not as exact and definite as laws of physical and natural sciences.

• The laws of physical and natural sciences have universal applicability, but economic laws are not of universally applicable.

• The laws of physical and natural sciences are exact, but economic laws are not that exact and definite.

Economics as an Art —

• Various branches of economics, like consumption, production, distribution, money and banking, public finance, etc., provide us basic rules and guidelines which can be used to solve various economic problems of the society.

• The theory of demand guides the consumer to obtain maximum satisfaction with given income.

• Theory of production guides the producer to equate marginal cost with marginal revenue while using resources for production.

• The knowledge of economic laws helps us in solving practical economic problems in everyday life.

Economics as a Positive Science —

• A positive science is that science in which analysis is confined to cause and effect relationship. • Positive economics is concerned with the facts about the economy.

• It studies the economic phenomena as they exist.

• It finds out the common characteristics of economic events.

• It specifies cause and effect relationship between them. • It generalizes their relationship by formulating economic theories and makes predictions about future course of these economic events.

Economics as a Normative Science —

• The objective of Economics is to examine real economic events from moral and ethical angles and to judge whether certain economic events are desirable or undesirable.

• Normative economics involves value judgment.

• It deals primarily with economic goals of a society and policies to achieve these goals.

• It also prescribes the methods to correct undesirable economic happenings

1.5 FUNDAMENTAL CONCEPTS

Demand

In economics, by demand we mean effective demand and not absolute demand. The demand for a good by an individual consumer means individual's desire for the good backed by a capacity to pay. Human desires backed by purchasing power constitute demand. In other words, an individual's desire for a good to satisfy a particular want backed up by his/her willingness and ability to pay gives rise to demand for that good. If and only if individuals have means to pay that demand becomes effective in the market for goods. An individual's income measures his/her capacity to pay, purchasing power or means to pay for the goods desired. Example: A beggar desires milk, but has no purchasing power. Hence a beggar's desire for milk does not constitute an effective demand for milk. As a result a beggar cannot participate in market activities. However, suppose this beggar becomes successful in getting a job, becomes a helper in a shop and for his work as helper gets paid for in money. The beggar who is now a helper earns an income, with which she can buy milk. The beggar's demand for milk, which earlier constituted only an absolute demand, has now become an effective demand.

A demand function for a good expresses a causal relationship between quantity demanded of the good and its own price. In other words, it is a functional relationship between demand and price. If the good is X (milk in our case), Qd_x is quantity demand and P_x is

the own price of good X then the general form of the demand function will be $Qd_x = f(P_x)$

Supply

By supply of a good we mean a producer's desire to produce (manufacture) a good backed up by her capacity to produce as determined by technological knowledge and command over employable resources. A commodity (good) can be supplied if and only if it is produced. The concept of supply is, therefore, related to the concept of production.

The Supply Function of A Good How much of a good gets produced and supplied will depend on many factors. Some of these factors are the own price of the good, the prices of inputs used to produce the goods, the technology used etc. Of these factors the own price of the good is an important factor determining how much of it will be supplied. The supply function captures that relationship. The general form of supply function of a good is the following: $Qs_x = F(P_X)$ Where X is the good. Recall that a function expresses a cause-effect relationship. The above relationship indicates that the quantity supplied varies directly with the price of the good under consideration and the relationship is one of a positive correlation between quantity supplied and own price. As price of good X rises the quantity supplied tends to increase. And when own price of good X decreases the quantity supplied tends to decline. This is supposed to be a normal behaviour on the part of suppliers. Of course, such a relationship is based on ceteris paribus assumption. All other influences like technology, prices of inputs and so on are held constant. A supply schedule of good X indicates the quantities that will be supplied by potential sellers at its prevailing prices. In other words, it lists the various amounts of a good that potential suppliers will put up for sale at the alternate prices prevailing

Wealth

By wealth we mean the stock of goods under the ownership of a person or a nation.

(i) Personal wealth : It means the stock of all goods like houses and buildings, furniture, land, money in cash, money kept in banks, clothes, company shares, stocks of other commodities, etc. owned by a person. • Health, goodwill, etc., can also be considered to be parts of an individual's wealth. In Economics, they are transferable goods (whose ownership can be transferred to another person). These are considered to be components of wealth.

(ii) National wealth :It includes the wealth of all the citizens of the country. There are public properties whose benefits are enjoyed by the citizens of the country but no citizen personally owns these goods. Natural resources (mineral resources, forest resources, etc), roads, bridges, parks, hospitals, public educational institutions and public sector projects of various types (public sector industries, public irrigation projects, etc.) are example of public properties. There is some personal wealth which is to be deducted from national wealth. • Example, if a citizen of the country holds a Government bond, it is personal wealth. But from the point of view of the Government, it is a liability and, hence, it should not be considered as a part of the nation's wealth.

Wealth and Welfare

Welfare means the satisfaction or the well-being enjoyed by society. Social welfare depends on the wealth of the nation. In general, wealth gives rise to welfare, although they are not same. If wealth of society increases, but the distribution among the citizens of the

country is very unequal, this inequality may create social jealousy and tension. Economists, however, assume that when wealth increases, welfare increases too. Similarly, when wealth decreases, welfare is assumed to decrease.

Money

Anything which is widely accepted in exchange for goods, or in settling debts. In Barter System, goods were used as medium of exchange. •When general acceptability of any medium of exchange is enforced by law, that medium of exchange in called the legal tender, (example, the rupee notes and coins). When some commodity is used as a medium of exchange by custom, it is called customary money, (example, the rupee notes and coins). Constituents of money supply In any economy, the constituen (b) Credit cards, (c) Traveller's cheques, etc.

Markets

A system by which the buyers and sellers of a commodity can come into touch with each other (directly or indirectly). In Economics, a market for a commodity is a system. Here, the buyers and the sellers establish contact with each other directly or indirectly. They have a view to purchasing and selling the commodity.

Functions of a market The major functions of a market for a commodity are :

(i) to determine the price for the commodity, and

(ii) to determine the quantity of the commodity that will be bought and sold. Both the price and the quantity are determined by the interactions between the buyers and the sellers of the commodity. The market mechanism When economists talk of the market mechanism, they mean the totality of all markets (i.e., the markets for all the goods and

services in the economy). The market mechanism determines the prices and the quantities bought and sold of all the goods and services.

Investment

Investment means an increase in the capital stock. For a country, as a whole, investment is the increase in the total capital stock of the country. For an individual, investment is the increase in the capital stock owned by him.

Real investment and portfolio investment Economists talk of two types of investment : real investment and portfolio investment.

(a) Real investment : Real investment means an increase in the real capital stock, i.e., an addition to the stock of machines, buildings, materials or other types of capital goods.

(b) Portfolio investment : Portfolio investment essentially means the purchase of shares of companies. However, it is only the purchase of new shares issued by accompany that can properly be termed as investment (because the company will use the money for expanding its productive capacity, i.e., the company's real capital stock will increase). Purchase of an existing share from another shareholder is not an investment because in this case the company's real capital stock does not increase.

Gross investment and net investment

In any economy, the aggregate investment made during any year is called gross investment. The gross investment includes (a) inventory investment and (b) fixed investment. Investment in raw materials, semifinished goods and finished goods is referred to as inventory investment. On the other hand, investment made in fixed assets like machineries, factory sheds etc. is called fixed investment. By deducting depreciation cost, of capital from the gross investment,

we get new investment. So, Net investment = Gross investment – depreciation cost.

Production

Production means “creation of utility”. It also refers to creation of goods (or performance of services) for the purpose of selling them in the market. There was a time when production meant the fabrication of material goods only. A tailor’s activity was considered to be production but the activity of the trader who sold clothes to the purchasers was not considered as production. At present, both material goods and services are considered as production. Production must be for the purpose of selling the produced goods (or, services) in the market. Factors of production The goods and services with the help of which the process of production is carried out, are called factors of production. Economists talk about four main factors of production: land, labour, capital and entrepreneurship (or organization). They are also called as the inputs of production. On the other hand, the goods produced with the help of these inputs, are called as the output.

Consumption

By consumption, we mean satisfaction of wants. It is because we have wants that we consume various goods and services. Moreover, it is assumed that, if we have wants, these can be satisfied only through the consumption of goods and services. Thus, consumption is defined as the satisfaction of human wants through the use of goods and services.

Saving

Saving is defined as income minus consumption. Whatever is left in the hands of an individual after meeting consumption expenditure is the individual's saving. The sum-total of funds in the hands of an individual is obtained by accumulating the saving of the past years. Saving is generated out of current income of an individual. Savings are created out of past income of an individual.

Income

The income of a person means the net inflow of money (or purchasing power) of this person over a certain period. For instance, an industrial worker's annual income is his salary income over the year. A businessman's annual income is his profit over the year.

Wealth and income

The difference between wealth and income must be clearly understood. A person (or a nation) consumes a part of the income and saves the rest. These savings are accumulated in the form of wealth. Wealth is a stock. It is stock of goods owned at a point of time. Income is a flow; it is the inflow of money (or purchasing power) over a period of time

Consumer Surplus

The concept was introduced by Prof. Marshall in Economics. The excess satisfaction or utility that a consumer can enjoy from the purchase of a thing when the price that he actually pays is less than the price he was willing to pay for it. It is the difference between individual demand price and market price. The price that a man is willing to pay is determined by the marginal utility of the thing to him. The concept is derived from the Law of Diminishing Marginal Utility. As a man consumes successive units of a commodity, the Marginal Utility from each unit goes on falling. It is often argued

that the surplus satisfaction cannot be measured precisely. It is difficult to measure the marginal utilities of different units of a commodity consumed by person.

Capital

In a fundamental sense, capital consists of any produced thing that can enhance a person's power to perform economically useful work. Example, a stone or an arrow is capital for a caveman who can use it as a hunting instrument. Capital is an input in the production process. It refers to financial resources available for use. Capital is different from money. Money is used simply to purchase goods and services for consumption. Capital is more durable and is used to generate wealth through investment. Capital is something owned which provides ongoing services. Economic capital is used for measuring and reporting market and operational risks across a financial organization.

Utility

Utility, or usefulness, is the ability of something to satisfy needs or wants. Utility is an important concept in economics because it represents satisfaction experienced by the consumer of a good. Utility is a representation of preferences over some set of goods and services. One cannot directly measure benefit, satisfaction or happiness from a good or service, so instead economists have devised ways of representing and measuring utility in terms of economic choices that can be counted. Economists consider utility to be revealed in people's willingness to pay different amounts for different goods. Total utility is the aggregate sum of satisfaction or benefit that an individual gains from consuming a given amount of goods or services in an economy. The amount of a person's total utility corresponds to the person's level of consumption. Usually, the more the person consumes, the larger his or her total utility will

be. Marginal utility is the additional satisfaction, or amount of utility, gained from each extra unit of consumption. Total utility usually increases as more of a good is consumed. Marginal utility usually decreases with each additional increase in the consumption of a good. This decrease demonstrates the law of diminishing marginal utility.

Law of Diminishing Marginal Utility

This Law is a fundamental law of Economics. It relates to a man's behaviour as a consumer. The Law states that as a man gets more and more units of a commodity, marginal utility from each successive unit will go on falling till it becomes zero or negative. Marginal utility means the additional utility obtained from one particular unit of a commodity. It is expressed in terms of the price that a man is willing to pay for a commodity. The basis of the Law is satiability of a particular want. • Although human wants are unlimited in number yet a particular one can be fulfilled.

Demand Forecasting

In modern business, production is carried out in anticipation of future demand. There is thus a time-gap between production and marketing. So production is done on the basis of demand forecasting. The success of a business firm depends to a large extent upon its successful forecasting. The following methods are commonly used in forecasting demand.

(a) Expert opinion method – experts or specialists in the fields are consulted for their opinion regarding future demand for a particular commodity.
(b) Survey of buyers' intentions – generally a limited number of buyers' choice and preference are surveyed and on the basis of that the business man forms an idea about future demand for the product it is going to produce.

(c) Collective opinion method – the firm seeks opinion of retailers and wholesalers in their respective territories with a view to estimate expected sales.

(d) Controlled experiments – the firm takes into account certain factors that effect demand like price, advertisement, packaging. On the basis of these determinants of demand the firm makes an estimate about future demand.

(e) Statistical methods – More often firms make statistical calculations about the trend of future demand.Statistical methods comprising trend projection method, least squares method progression analysis etc. are used depending upon the availability of statistical data.

Production Posibility Curve (PPC)

In economics, a production–possibility curve (PPC), is also called a production–possibility frontier (PPF),production-possibility boundary or product transformation curve, is a graph that compares the production rates of two commodities that use the same fixed total of the factors of production. Graphically bounding the production set, the PPF curve shows the maximum specified production level of one commodity that results given the production level of the other. By doing so, it defines productive efficiency in the context of that production set.

Let us consider the shape and use of the production possibility curve. In our discussion we make the following assumptions:

(1) Only two goods, X and Y, are being produced.

(2) Only one factor of production is used in the production. That factor of production is labour. Supply of labour in the economy is fixed and total amount of labour is fully employed.

(3) The two goods can be produced in various ratios. This means that the country can produce more of X and less of Y or less X and more of Y

(4) In the production of both goods, law of increasing cost operates. This means that if the production of one good rises, its marginal cost will rise.

(5) There is no change in production process or production technology. With the help of these assumptions we can explain how the production possibility curve can be obtained. • Suppose the country can produce different alternative combinations of X and Y with its given amount of labour. Those combinations are shown with the help of the following hypothetical schedule: Production Possibility Schedule

GOOD X	GOOD Y
0	10
1	9
2	7
3	4
4	0

From this schedule we see that if the country produces only Y and no amount of good X, then it can produce a maximum of 10 units of Y. So, we get a combination (0, 10) on the production possibility curve. Again, if the country does not produce good Y and devote its entire resources in the production of X, then it can produce a maximum of 4 units of X. Hence, point (4, 0) will be a combination of two goods on the production possibility curve. • In this way,

employing the entire resource (labour), the country can produce 1 unit of good X and 9 units of good Y, or 2 units of good X and 7 units of good Y, etc

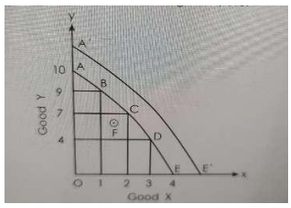

Fig: 1.1 production possibility curve

In the figure, we plot the amount of good X (say, x) on the horizontal axis and the amount of good Y (say, y) on the vertical axis. In this figure, AE is the production possibility curve. • At A on this curve, x = 0 and y = 10 i.e., point A expresses the combination (0, 10). Similarly, point B represents the combination (1, 9), point C represents the combination (2, 7), point D represents the combination (3, 4) and point E expresses the combination (4, 0). With the given amount of labour, the country can produce any product combination on the production possibility curve AE. This curve is downward sloping. It implies that, given the amount of labour, if the country increases the production of one good, it must reduce the production of the other. The country can produce any combination below AE but it cannot produce any combination lying to the right of AE. Let F be a point to the left of AE. At this point, some amount of labour will remain unutilised. By full employment of labour, the country can move from F to any point on AE where the production of at least one commodity will increase. Again, if it is found that there is full employment of labour but output is obtained as represented by F, then it should be understood that production has not been done efficiently. In that case, it is possible to increase the production of both goods by efficient utilisation of labour. If the given amount of labour is fully utilised, the country can produce any combination of X and Y on AE. Hence, to

determine the production levels of two goods means to determine the point on the production possibility curve at which the country will stay.

Meaning of Equilibrium or Disequilibrium

As with many other concepts in economics, the concept of equilibrium is also borrowed from physics, to be precise, mechanics. Equilibrium is described to be a situation where a body subjected to actions of opposing forces attains a position of rest. That is, the state when opposing forces are in balance. In the same way, in economics equilibrium is said to exist in a market where the forces operating from the side of potential buyers exactly offsets the forces operating from the side of potential sellers. This means that when quantity supplied balances (matches) the quantity demanded, the market for that commodity reaches equilibrium. Once again, for equilibrium to exist, opposing forces must be in balance. The price at which demand equals supply is the equilibrium price and the corresponding quantity traded, the equilibrium quantity for that price. Such an equilibrium is a static concept, describes the position of the market when it is at rest. So long as the factors on which demand and supply depend do not change, equilibrium will be maintained period after period. This is one definition of equilibrium, describing it as a position of rest. There is another concept of equilibrium, which is used in neo-classical economics, that is, equilibrium defined as a chosen position of individuals (the participants in a market transactions). As Gravelle & Rees put it, “Equilibrium as being that state in which economic agents find themselves in those positions in which they wish to be” (Gravelle & Rees). According to this definition, a market is in equilibrium when at a given price all economic agents can buy what they had planned to buy and all sellers can sell what they had planned to sell and the

chosen position of buyers and sellers coincide. It is quite possible that the two ways of defining equilibrium may or may not coincide. In the demand-supply model of price determination under perfect competition that we will be developing later, the point where demand schedule and supply schedule intersects is the point where both the definitions of equilibrium will coincide. In static micro theory we will be concerned with equilibrium configurations of markets. When the market is not in equilibrium, it must be in disequilibrium, which reflects a situation in which demand and supply forces are not in balance. What the buyers plan to buy do not match what the sellers plan to sell. So the market is not cleared. Either unsold stocks of inventories remain or a shortage develops which requires interventions by authorities with previously accumulated stocks. When the market is in a disequilibrium situation, the market adjustment process or corrective process must be brought into the picture, to analyse how the situation can be corrected. Such an analysis must be dynamic in nature, i.e., it involves movement of the market through time. When the market is not in equilibrium the role of economic agents and decision-makers become very important and relevant. In actual situation, equilibrium is never attained. As the market tends towards equilibrium, disturbances occur due to dynamic changes always taking place in the economy, which prevents equilibrium being attained. Hence, disequilibrium analysis is more relevant

Check your progresss:

1 What is difference between micro and macro economics?

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2 What is investment ?

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3 What do understand by equilibrium and disequilibrium?

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1.6 PRINCIPLES OF ECONOMICS

Economics study how Money Supply, Business and Industry are organized, basic principles may be laid down below:-

Gregory Mankiw in his Principles of Economics outlines Ten Principles of Economics that we will replicate here, they are:

People face trade-offs.

The cost of something is what you give up getting it.

Rational people think at the marginal cost and marginal revenue.

People respond to incentives.

Trade can make everyone better off.

Markets are usually a good way to organize economic activity.

Governments can sometimes improve market outcomes.

A country's standard of living depends on its ability to produce goods and services.

Growth of money leads to inflation

Society faces a short-run tradeoff between Inflation and unemployment.

1. People face trade offs Trade Off involved with giving up one aspects or quantity for something in return of aspects and quantity. “There is no such thing as a free lunch. Making decisions requires trading one goal for another.

Examples include how students spend their time, how a family decides to spend its income, how the government spends revenue, and how regulations may protect the environment at a cost to firm owners.A special example of a trade-off is the trade-off between efficiency and equity.

Efficiency: the property of society getting the maximum benefits from its scarce resources.

Equity: the property of distributing economic prosperity fairly among the members of society. For example, tax paid by wealthy people and then distributed to poor may improve equity but lower the incentive for hard work and therefore reduce the level of output produced by our resources. This implies that the cost of this increased equality is a reduction in the efficient use of our resources. Another Example is “guns and butter”: The more we spend on national defense(guns) to protect our borders, the less we can spend on consumer goods (butter) to raise our standard of living at home.

2. The cost of something is what you give up to get it

People face trade-offs, making decisions requires comparing the costs and benefits of alternative courses of action.

The cost of going to college for a year is not just the tuition, books, and fees, but also the foregone wages. seeing a movie is not just the price of the ticket, but the value of the time you spend in the theatre. This is called opportunity cost of resource.

Opportunity cost: whatever must be given up in order to obtain some item, or the value of the next best alternative foregone.

Rational people think at the margin

Economists generally assume that people are rational. Rational: systematically and purposefully doing the best you can to achieve your objectives. Consumers want to purchase the bundle of goods and services that allow them the greatest level of satisfaction given their incomes and the prices they face. Firms want to produce the level of output that maximizes their profits.

Many decisions in life involve incremental decisions: Should I remain in school this semester? Should I take another course this semester? Should I study an additional hour for tomorrow's exam?

Rational people often make decisions by comparing marginal benefits and marginal costs.If the additional satisfaction obtained by an addition in the units of a commodity is equal to the price a consumer is willing to pay for that commodity, he achieves maximum satisfaction, which is the main goal of every rational consumer.

Example: Suppose that flying a 200-seat plane across the country costs the airline $1,000,000, which means that the average cost of each seat must cost $5000 to break even. Suppose that the plane is minutes away from departure and a passenger is willing to pay $3000 for a seat. Should the airline sell the seat for $3000? In this case, the marginal cost of an additional passenger is very small. Another example: Why is water so cheap while diamonds are expensive? Because water is plentiful, the marginal benefit of an additional cup is small. Because diamonds are rare, the marginal benefit of an extra diamond is high.

4. People respond to incentives

Incentive is something that induces a person to act [by offering rewards or punishments to people who change their behaviour because rational people make decisions by comparing costs and benefits, they respond to incentives. Incentives may possess a negative or a positive intention.

For example, by offering a raise in the salary of whoever works harder can induce people to work hard which is a positive incentive. Whereas putting a tax on a good, fuel, can induce people to consume it less which is a negative incentive. How People Interact With Each Other

5. Trade can make everyone better

Trade is not like a sports competition, where one side gains and the other side loses. Consider trade that takes place inside your home. Your family is likely to be involved in trade with other families on a daily basis. Most families do not build their own homes, make their own clothes, or grow their own food. Countries benefit from trading with one another as well. Trade allows for specialization in products that benefits countries (or families) - comparative advantage

For example, it was widely believed for centuries that in international trade one country's gain from an exchange must be the other country's loss.

For example, giving the incentive of getting better grades in return for not having to take an exam.

6. Markets are usually a good way to organize economic activity

Many countries that once had centrally planned economies have abandoned this system and are trying to develop market economies. Market economy: an economy that allocates resources through the

decentralized decisions of many firms and households as they interact in markets for goods and services. Market prices reflect both the value of a product to consumers and the cost of the resources used to produce it. Centrally planned economies have failed because they did not allow the market to work.Ad am Smith and the Invisible Hand

Adam Smith's 1776 work suggested that although individuals are motivated by self-interest, an invisible hand guides this self-interest into promoting society's economic well-being.

Markets are where the buyers and sellers can meet to get goods and exchange items.

7. Government can sometimes improve market outcomes

There are two broad reasons for the government to interfere with the economy: the promotion of efficiency and equity. Government policy can be most useful when there is market failure.

Market failure: a situation in which a market left on its own fails to allocate resources efficiently. Examples of Market Failure

Externality: the impact of one person's actions on the well-being of a bystander. (Ex.: Pollution) Definition of market power: the ability of a single economic actor (or small group of actors) to have a substantial influence on market prices. As a market economy rewards people for their ability to produce things that other people are willing to pay for, there will be an unequal distribution of economic prosperity.

8. A country's standard of living depends on country production

Differences in the standard of living from one country to another are quite large. Changes in living standards over time are also quite large. The explanation for differences in living standards lies in

differences in productivity. Productivity: the quantity of goods and services produced from each hour of a worker's time. High productivity implies a high standard of living. Thus, policymakers must understand the impact of any policy on our ability to produce goods and services.

To boost living standards the policy makers, need to raise productivity by ensuring that workers are well educated, have the tools needed to produce goods and services, and have access to the best available technology. Per capita income of nation

9. Increase in Money Supply Causes the prices to rise

Inflation: sustained increase in the overall level of prices in the economy. When the government creates a large amount of money, the value of money falls. The value of money falls when the government creates a lot of money, so individuals have more money and the demand for goods and services increases. When the demand increases, price also increases and creates inflation of money. During the 1970s, for instance, the overall level of prices more than doubled, and President Gerald Ford called inflation "public enemy number one." Examples: Germany after World War I (in the early 1920s), the United States in the 1970s, Zimbabwe in the 2001s and Venezuela in the 2010s.

10. Society faces a short-run trade-off between inflation and unemployment Most economists believe that the short-run effect of a monetary injection (injecting/adding money into the economy) is lower unemployment and higher prices. An increase in the amount of money in the economy stimulates spending and increases the demand of goods and services in the economy.

Higher demand may over time cause firms to raise their prices but in the meantime, it also encourages them to increase the quantity of goods and services they produce and to hire more workers to

produce those goods and services. More hiring means lower unemployment.

Check your progress :

What are the principles of economics?

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Explain any two principles in detail?

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1.7 LET US SUM UP

We have started this unit with a definition of economics, difference between microeconomics and macroeconomics. Scope of economics under traditional and modern approach. Nature of economics, fundamental concept and last explained the principles of economics, these ten principles of economics have been explained which influences economics

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UNIT 2: INTRODUCTION TO MANAGERIAL ECONOMICS: NATURE, SCOPE

STRUCTURE

2.0 INTRODUCTION

People have limited number of needs which must be satisfied if they are to survive as human beings. Some are material needs, some are psychological needs and some others are emotional needs. People's needs are limited; however, no one would choose to live at the level of basic human needs if they want to enjoy a better standard of

living. This is because human wants (desire for the consumption of goods and services) are unlimited. It doesn't matter whether a person belongs to the middle class in India or is the richest individual in the World, he or she wants always something more. For example bigger a house, more friends, more salary etc., Therefore the basic economic problem is that the resources are limited but wants are unlimited which forces us to make choices. Economics is the study of this allocation of resources, the choices that are made by economic agents. An economy is a system which attempts to solve this basic economic problem. There are different types of economies; household economy, local economy, national economy and international economy but all economies face the same problem.

The major economic problems are (i) what to produce? (ii) How to produce? (iii) When to produce and (iv) For whom to produce? Economics is the study of how individuals and societies choose to use the scarce resources that nature and the previous generation have provided. The world's resources are limited and scarce. The resources which are not scarce are called free goods. Resources which are scarce are called economic goods.

Why Study Economics? A good grasp of economics is vital for managerial decision making, for designing and understanding public policy, and to appreciate how an economy functions. The students need to know how economics can help us to understand what goes on in the world and how it can be used as a practical tool for decision making.

Managers and CEO's of large corporate bodies, managers of small companies, nonprofit organizations, service centers etc., cannot succeed in business without a clear understanding of how market forces create both opportunities and constraints for business enterprises.

Five Reasons for Studying Economics:

It is a study of society and as such is extremely important.

It trains the mind and enables one to think systematically about the problems of business and wealth.

From a study of the subject it is possible to predict economic trends with some precision.

It helps one to choose from various economic alternatives.

Economics is the science of making decisions in the presence of scarce resources. Resources are simply anything used to produce a good or service to achieve a goal. Economic decisions involve the allocation of scarce resources so as to best meet the managerial goal. The nature of managerial decision varies depending on the goals of the manager. A Manager is a person who directs resources to achieve a stated goal and he/she has the responsibility for his/her own actions as well as for the actions of individuals, machines and other inputs under the manager's control. Managerial economics is the study of how scarce resources are directed most efficiently to achieve managerial goals. It is a valuable tool for analyzing business situations to take better decisions.

Prof. Evan J Douglas defines Managerial Economics as "Managerial Economics is concerned with the application of economic principles and methodologies to the decision making process within the firm or organization under the conditions of uncertainty"

According to Milton H Spencer and Louis Siegelman "Managerial Economics is the integration of economic theory with business practices for the purpose of facilitating decision making and forward planning by management"

According to Mc Nair and Miriam, 'Managerial Economics consists of the use of economic modes of thoughts to analyze business situations'.

Economics can be divided into two broad categories: micro economics and macro economics.

Macro economics is the study of the 6 economic system as a whole. It is related to issues such as determination of national income, savings, investment, employment at aggregate levels, tax collection, government expenditure, foreign trade, money supply etc., Micro economics focuses on the behavior of the individuals, firms and their interaction in markets.

Managerial economics is an application of the principles of micro and macro economics in managerial decision making. The economic way of thinking about business decision making provides all managers with a powerful set of tools and insights for furthering the goals of their organization. Successful managers take good decisions, and one of their most useful tools is the methodology of managerial economics.

2.1 OBJECTIVES

After studying this unit, you should be able to:

understand the nature and scope of managerial economics;

familiarize yourself with economic terminology; develop some insight into economic issues;

acquire some information about economic institutions;

understand the concept of trade-offs or policy options facing society.

2.2 NATURE OF MANAGERIAL ECONOMICS

A close relationship between management and economics has led to the development of managerial economics. Management is the guidance, leadership and control of the efforts of a group of people towards some common objective. While this description does inform about the purpose or function of management, it tells us little about the nature of the management process. Koontz and O'Donell define management as the creation and maintenance of an internal environment in an enterprise where individuals, working together in

groups, can perform efficiently and effectively towards the attainment of group goals.

Thus, management is Coordination An activity or an ongoing process A purposive process An art of getting things done by other people. On the other hand, economics as stated above is engaged in analyzing and providing answers to manifestations of the most fundamental problem of scarcity.

Scarcity of resources results from two fundamental facts of life: Human wants are virtually unlimited and insatiable, and Economic resources to satisfy these human demands are limited. Thus, we cannot have everything we want; we must make choices broadly in regard to the following: What to produce? How to produce? and

• For whom to produce? These three choice problems have become the three central issues of an economy as shown in figure 2.1.

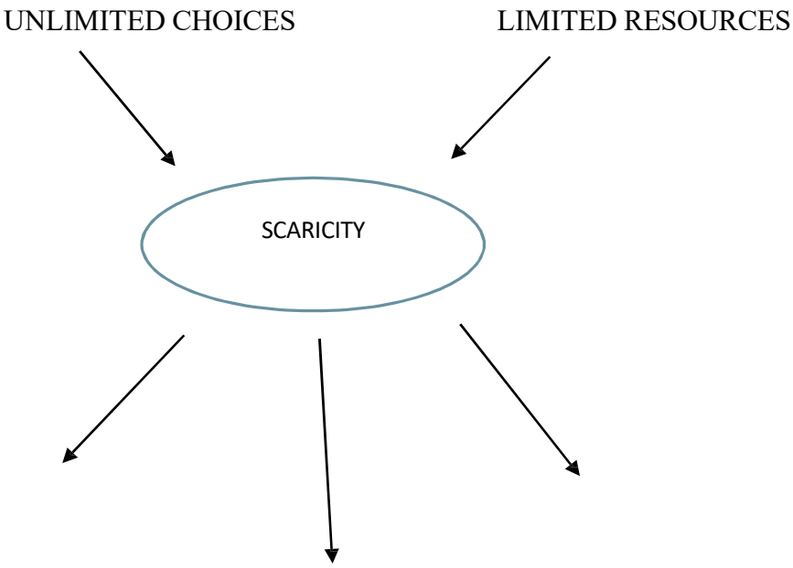

Figure 2.1 : Three Choice Problems of an Economy

Economics has developed several concepts and analytical tools to deal with the question of allocation of scarce resources among competing ends. The non-trivial problem that needs to be addressed is how an economy through its various institutions solves or answers the three crucial questions posed above. There are three ways by which this can be achieved. One, entirely by the market mechanism, two, entirely by the government or finally, and more reasonably, by a combination of the first two approaches. Realistically all economies employ the last option, but the relative roles of the market and government vary across countries. For example, in India the market has started playing a more important role in the economy while the government has begun to withdraw from certain activities. Thus, the market mechanism is gaining importance. A similar change is happening all over the world, including in China.

But there are economies such as Myanmar and Cuba where the government still plays an overwhelming part in solving the resource allocation problem. Essentially, the market is supposed to guide resources to their most efficient use. For example if the salaries earned by MBA degree holders continue to rise, there will be more and more students wanting to earn the degree and more and more institutes wanting to provide such degrees to take advantage of this opportunity. The government may not force this to happen, it will happen on its own through the market mechanism. The government, if anything, could provide a regulatory function to ensure quality and consumer protection. According to the central deduction of economic theory, under certain conditions, markets allocate resources efficiently. ‘Efficiency’ has a special meaning in this context.

The theory says that markets will produce an outcome such that, given the economy’s scarce resources, it is impossible to make anybody better-off without making somebody else worse-off . In

rich countries, markets are too familiar to attract attention. Yet, certain awe is appropriate. Let us take an incident where Soviet planners visited a vegetable market in London during the early days of perestroika, they were impressed to find no queues, shortages, or mountains of spoiled and unwanted vegetables. They took their hosts aside and said: “We understand, you have to say it’s all done by supply and demand. But can’t you tell us what’s really going on? Where are your planners and what are their methods?” The essence of the market mechanism is indeed captured by the supply-and demand the place where the demand and supply curves intersect, a price is set such that demand equals supply. There, and only there, the benefit from consuming one more unit exactly matches the cost of producing it. If output were less, the benefit from consuming more would exceed the cost of producing it. If output were higher, the cost of producing the extra units would exceed the extra benefits. So the point where supply equals demand is “efficient”. However, the conditions for market efficiency are extremely demanding—far too demanding ever to be met in the real world. The theory requires “perfect competition”: there must be many buyers and sellers; goods from competing suppliers must be indistinguishable; buyers and sellers must be fully informed; and markets must be complete—that is, there must be markets not just for bread here and now, but for bread in any state of the world.

In other words, market failure is pervasive. It comes in four main varieties:

Monopoly: By reducing his sales, a monopolist can drive up the price of his good. His sales will fall but his profits will rise. Consumption and production are less than the efficient amount, causing a deadweight loss in welfare.

Public goods: Some goods cannot be supplied by markets. If you refuse to pay for a new coat, the seller will refuse to supply you. If

you refuse to pay for national defence, the “good” cannot easily be withheld. You might be tempted to let others pay. The same reasoning applies to other “non-excludable” goods such as law and order, clean air, and so on. Since private sellers cannot expect to recover the costs of producing such goods, they will fail to supply them.

Externalities: Making some goods causes pollution: the cost is borne by people with no say in deciding how much to produce. Consuming some goods (education, anti-lock brakes) spreads benefits beyond the buyer; again, this will be ignored when the market decides how much to produce. In the case of “good” externalities, markets will supply too little; in the case of “bads”, too much.

Information: In some ways a special kind of externality, this deserves to be mentioned separately because of the emphasis placed upon it in recent economic theory. To see why information matters, consider the market for used cars. A buyer, lacking reliable information, may see the price as providing clues about a car’s condition. This puts sellers in a quandary: if they cut prices, they may only convince people that their cars are rubbish.

The labour market, many economists believe, is another such ‘market for lemons’. This may help to explain why it is so difficult for the unemployed to price themselves into work.

When markets fail, there is a case for intervention. But two questions need to be answered first. How much does market failure matter in practice? And can governments put the failure right? Markets often correct their own failures. In other cases, an apparent failure does nobody any harm. In general, market failure matters less in practice than is often supposed.

Monopoly, for instance, may seem to preclude an efficient market. This is wrong. The mere fact of monopoly does not establish that

any economic harm is being done. If a monopoly is protected from would-be competitors by high barriers to entry, it can raise its prices and earn excessive profits. If that happens, the monopoly is undeniably harmful. But if barriers to entry are low, lack of actual (as opposed to potential) competitors does not prove that the monopoly is damaging: the threat of competition may be enough to make it behave as though it were a competitive firm. Many economists would accept that Microsoft, for instance, is a near-monopolist in some parts of the personal-computer software business–yet would argue that the firm is doing no harm to consumers because its markets remain highly contestable. Because of that persistent threat of competition, the company prices its products keenly. In this and in other ways it behaves as though it were a smaller firm in a competitive market.

Even on economic grounds (never mind other considerations), there is no tidy answer to the question of where the boundary between state i.e. governments and market should lie. Markets do fail because of monopoly, public goods, externalities, lack of information and for other reasons. But, more than critics allow, markets find ways to mitigate the harm–and that is a task at which governments have often been strikingly unsuccessful. All in all, a strong presumption in favour of markets seems wise. This is not because classical economic theory says so, but because experience seems to agree. And as stated above, the real world seems to be moving in the direction of placing more reliance on markets than on governments

2.3 SCOPE OF MANAGERIAL ECONOMICS

From the point of view of a firm, managerial economics, may be defined as economics applied to “problems of choice” or

alternatives and allocation of scarce resources by the firms. Thus managerial economics is the study of allocation of resources available to a firm or a unit of management among the activities of that unit. Managerial economics is concerned with the application of economic concepts and analysis to the problem of formulating rational managerial decisions. There are four groups of problem in both decisions-making and forward planning.

Resource Allocation: Scare resources have to be used with utmost efficiency to get optimal results. These include production programming and problem of transportation etc. How does resource allocation take place within a firm? Naturally, a manager decides how to allocate resources to their respective uses within the firm, while as stated above, the resource allocation decision outside the firm is primarily done through the market. Thus, one important insight you can draw about the firm is that within it resources are guided by the manager in a manner that achieves the objectives of the firm.

Inventory and queuing problem: Inventory problems involve decisions about holding of optimal levels of stocks of raw materials and finished goods over a period. These decisions are taken by considering demand and supply conditions. Queuing problems involve decisions about installation of additional machines or hiring of extra labour in order to balance the business lost by not undertaking these activities. Pricing Problem: Fixing prices for the products of the firm is an important decision-making process.

Pricing problems involve decisions regarding various methods of prices to be adopted.

Investment Problem: Forward planning involves investment problems. These are problems of allocating scarce resources over

time. For example, investing in new plants, how much to invest, sources of funds, etc.

Study of managerial economics essentially involves the analysis of certain major subjects like: The business firm and its objectives

- Demand analysis, estimation and forecasting
- Production and Cost analysis
- Pricing theory and policies
- Profit analysis with special reference to break-even point Capital budgeting for investment decisions
- Competition.

Demand analysis and forecasting help a manager in the earliest stage in choosing the product and in planning output levels. A study of demand elasticity goes a long way in helping the firm to fix prices for its products. The theory of cost also forms an essential part of this subject. Estimation is necessary for making output variations with fixed plants or for the purpose of new investments in the same line of production or in a different venture. The firm works for profits and optimal or near maximum profits depend upon accurate price decisions. Theories regarding price determination under various market conditions enable the firm to solve the price fixation problems. Control of costs, proper pricing policies, break-even analysis, alternative profit policies are some of the important techniques in profit planning for the firm which has to work under conditions of uncertainty. Thus managerial economics tries to find out which course is likely to be the best for the firm under a given set of conditions.

Check your progress

1. explain the scope of managerial economics

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2. Which statement is true of the basic economic problem?

(i) The problem will exist as long as resources are limited and desires are unlimited.

(ii) The problem exists only in less developed countries.

(iii) The problem will disappear as production expands.

(iv) The advancement of technology will cause the problem to disappear.

3. Why is decision making by any management truly economic in nature?

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2.4 MANAGERIAL ECONOMICS AND OTHER DISCIPLINES

Managerial economics is linked with various other fields of study like– Microeconomic Theory: As stated in the introduction, the roots of managerial economics spring from micro-economic theory. Price theory, demand concepts and theories of market structure are few elements of micro economics used by managerial economists. It has an applied bias as it applies economic theories in order to solve real world problems of enterprises.

Macroeconomic Theory: This field has little relevance for managerial economics but at least one part of it is incorporated in managerial economics i.e. national income forecasting. The latter could be an important aid to business condition analysis, which in turn could be a valuable input for forecasting the demand for specific product groups.

Operations Research: This field is used in managerial economics to find out the best of all possibilities. Linear programming is a great aid in decision making in business and industry as it can help in solving problems like determination of facilities on machine scheduling, distribution of commodities and optimum product mix etc

Theory of Decision Making: Decision theory has been developed to deal with problems of choice or decision making under uncertainty, where the applicability of figures required for the utility calculus are not available. Economic theory is based on assumptions of a single goal whereas decision theory breaks new grounds by recognizing multiplicity of goals and persuasiveness of uncertainty in the real world of management.

Statistics: Statistics helps in empirical testing of theory. With its help, better decisions relating to demand and cost functions, production, sales or distribution are taken. Managerial economics is heavily dependent on statistical methods.

Management Theory and Accounting: Maximisation of profit has been regarded as a central concept in the theory of the firm in microeconomics. In recent years, organisation theorists have talked about “satisficing” instead of “maximising” as an objective of the enterprise. Accounting data and statements constitute the language of business. In fact the link is so close that “managerial accounting” has developed as a separate and specialized field in itself.

ECONOMIC ANALYSIS

Economic activity is the constant effort to match ends to means because of scarcity of resources. The optimal economic activity is to maximise the attainment of ends, the means and their scarcities or to minimise the use of resources, given the ends and their priorities. Decision making by management is truly economic in nature because it involves choices among a set of alternatives - alternative courses of action. The optimal decision making is an act of optimal economic choice, considering objectives and constraints. This justifies an evaluation of managerial decisions through concepts, precepts, tools and techniques of economic analysis of the following types:

Micro and Macro Analysis: In micro-analysis the problem of choice is focused on single individual entities like a consumer, a producer, a market etc. Macro analysis deals with the problem in totality like national income, general price level etc.

Partial and General Equilibrium Analysis: To attain the state of stable equilibrium, the economic problem may be analysed part by part - one at a time - assuming “other things remaining the same.” This is partial equilibrium analysis. In general equilibrium analysis the assumption of “given” or “other things remaining equal” may be relaxed and interdependence or interactions among variables may be allowed.

Static, Comparative Static and Dynamic Analysis: This is in reference to time dimension. A problem may be analysed - allowing no change at a point of time (static) - allowing once for all change at a point of time (comparative static) - allowing successive changes over a period of time (dynamic).

Positive and Normative Analysis: In positive economic analysis, the problem is analyzed in objective terms based on principles and

theories. In normative economic analysis, the problem is analyzed based on value judgement (norms). In simple terms, positive analysis is 'what it is' and normative analysis is 'what it should be.' For example, CEOs in private Indian enterprises earn 15 times as much as the lowest paid employee is a positive statement, a description of what is. A normative statement would be that CEOs should be paid 4-5 times the lowest paid employee.

Check your progress

1. What are various techniques of economic analysis?

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2. Explain the relationship of managerial economics with other fields

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2.5 LET US SUM UP

Managerial economics is used by firms to improve their profitability. It is the economics applied to problems of choices and allocation of scarce resources by the firms. It refers to the application of economic theory and the tools of analysis of decision science to examine how an organisation can achieve its objective most efficiently. Managerial decisions are evaluated through concepts, tools and techniques of economic analysis of various types. It is linked with various fields of study

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UNIT 3: IMPORTANCE AND SIGNIFICANCE IN DECISION MAKING, MANAGERIAL ECONOMIST-ROLE, RESPONSIBILITIES AND FUNCTIONS.

STRUCTURE

3.0 INTRODUCTION

Decision making is the process of choosing actions that are directed towards the resolution. It can be defined as "the selection from among alternatives of a course of action: it is at the core of planning". The decision making process can be carried out using managerial economics which is the microeconomics application in business. It applies economic theories and methods in decision-making in the business and management. More specifically, managerial economics uses the economic analysis tool and technique to analyze and solve the managerial problems. A managerial economist can play a very important role by assisting the Management in using the increasingly specialized skills and sophisticated techniques which are required to solve the difficult problems of successful decision-making and forward planning.

3.1 OBJECTIVES

After studying this unit, you should be able to:

understand the nature and scope of managerial economics;

familiarize yourself with economic terminology; develop some insight into economic issues;

acquire some information about economic institutions;

understand the concept of trade-offs or policy options facing society.

3.2 DECISION MAKING IN MANAGERIAL ECONOMICS

Managerial economics is a specialised branch of economics that empowers managers to conquer complex economic frontiers. Edwin Mansfield defines managerial economics as applying economic concepts and analysis to formulate rational managerial decisions.

Joel Dean introduced the subject of managerial economics, also known as business economics, in 1951. Since then, it has been widely used by business managers.

As "the application of economic theory and methods to business decision-making", managerial economics is fundamentally about making decisions. The discipline is partially prescriptive in nature because it suggests a course of action to a managerial

problem. Managerial economics aims to provide the tools and techniques to make informed decisions to maximize the profits and minimize the losses of a firm. Managerial economics has use in many different business applications, although the most common focus areas are related to the risk, pricing, production and capital decisions a manager makes. Managers study managerial economics because it gives them the insight to control the operations of their organizations. Organizations will function well if managers rationally apply the principles that apply to economic behavior.

Fig 3.1 Process of decision making in managerial economics

PROCESS OF DECISION MAKING IN MANAGERIAL ECONOMICS

1. Define the Problem

The first step in making a business decision is to understand the problem in its entirety. Without correct analysis of the problem, any solution developed will be inadequate.

Incorrect problem identification can sometimes cause the problem that is trying to be solved.

2. Determine the Objective

The second step is evaluating the objective of the decision, or what the decision is trying to achieve.

This step is determining a possible solution to the problem defined in step 1. Multiple possible solutions to the problem previously identified may be established.

3. Discover the Alternatives

After in depth analysis into what is required to solve the problem faced by a business, options for potential solutions can be collated. In most cases, more than one possible solution to the problem exists. For example, a business striving to gain more attraction on social media could improve the quality of their content, collaborate with other creators or a combination of the two.

4. Forecast the Consequences

This step involves assessing the consequences of the problem's solutions detailed in step 3. Possible consequences of a business decisions could include; productivity, health, environmental impacts and risk.

Here, managerial economics is used to determine the risks and potential financial consequences of an action.

5. Make a Decision

After the consequences and potential solutions to the problem at hand have been analyzed, a decision can be made. At this point, the potential decisions should be measurable values which have been quantified by managerial economics to maximise profits and minimise risk and adverse outcomes of the firm. This step includes a sensitivity analysis of the solution. A sensitivity analysis of the selected solution details how the output of the solution changes with changes to the inputs. The sensitivity analysis allows the strengths and weaknesses of the designed solution to be analysed.

ROLE OF MANAGERIAL ECONOMICS IN DECISION MAKING

Managerial economics plays a crucial role in terms of making strategic decisions. Here are some key roles of managerial economics in the decision-making process.

Strategic Planning: Managerial economics lays the foundation for strategic planning by providing techniques such as incremental principles to analyse economic factors and market conditions.

Pricing Decisions: Managerial economics assists business managers in setting optimal prices by considering costs, demand elasticity, and market conditions.

Risk Analysis: Using managerial economics in decision-making helps evaluate and manage risks through techniques such as risk analysis.

Market Analysis: Using managerial economics in business decision-making gives managers the knowledge of tools such as the equi-marginal principle, which helps allocate resources to equalise marginal benefits across activities, maximising overall utility.

3.3 SIGNIFICANCE OF MANAGERIAL ECONOMICS IN DECISION MAKING

Managerial economics holds great significance in various management processes. The main importance of managerial economics in an organization are Demand analysis & forecasting, Profit management, and Capital management. It assists an organization in its decision-making process by integrating the tools and techniques of economic theories with multiple business activities.

Managerial economics deals with the optimum utilization of scarce resources. It ensures the proper functioning of the firm by using the resources effectively. It guides the management in rational decision-making, implementing both economic theories and econometrics. With the help of factual data solutions, several economic problems are curated.

Decision-making Under Uncertainty

Decision-making under uncertainty is a fundamental concept of managerial economics. Managerial economics offers techniques and tools such as marginal and incremental principles and risk assessment models to help managers navigate uncertain situations in decision-making. More of these managerial tools and techniques are discussed in the section below.

Managerial economics tools and techniques

Here are some commonly used tools and techniques in managerial economics:

The Marginal Principle: This is a tool and technique used in managerial economics that involves analysing a decision's additional benefits and costs to determine the optimal level of production, pricing, or resource allocation.

The Incremental Principle: This principle in managerial economics involves analysing a decision's added costs and benefits. For instance, when a company plans to expand its product line, it assesses the additional costs of manufacturing and marketing the new products compared to the expected incremental revenue to ensure a financially sound and valuable decision.

The Principle of Risk and Uncertainty: This tool and technique involves analysing risks and uncertainties. It also involves

assessing probabilities and considering alternative scenarios to make informed decisions.

The Opportunity Cost Principle: In managerial economics, the opportunity cost principle assesses the value of the next best alternative for decision-making.

For instance, when a company invests in a new product line, the opportunity cost is the potential revenue and profits foregone from allocating resources to other projects or investment opportunities.

The Principle of Time Perspective: This is a valuable tool in managerial economics and is used to emphasise the importance of considering the timing of costs and benefits in decision-making, considering factors such as inflation and interest rates.

Equi-marginal Principle: The equi-marginal principle addresses the allocation of a given resource among different activities. It states that the resource should be allocated so that the last unit's added value is equal across all options, leading to optimal decision-making.

Discounting Principles: A discounting principle is used in managerial economics to evaluate investment projects by considering the timing and risks of future cash flows.

It helps managers determine the net present value of investments, allowing them to make decisions that maximise returns and account for the time value of money.

Managerial economics plays a crucial role in strategic decision-making. It equips managers with the tools and techniques to analyse market demand, assess costs, determine pricing strategies, evaluate risks, and understand competitive dynamics.

3.4 IMPORTANCE OF MANAGERIAL ECONOMICS IN DECISION MAKING :

1) Efficient business process:

Internal factors like the organization's goal, product demand, price, output, resource availability, etc., affect the smooth functioning of the organization. A comprehensive analysis of all internal factors helps you make better decisions in improving the internal business process.

Making rational decisions to suit the emerging trends and economic climate is the need of the hour. You need to schedule and monitor all production activities of the organization. And ensure effective functioning as per the process standards.

2) Framing policies:

Formulate policies after continuous testing and based on your past experiences. Managerial economics involves humans; with varied perspectives and approaches. The scope for universal application of policies is limited, and they are adapted depending on situations.

3) Long-term planning:

Analyze the internal and external factors; influencing the business environment using diverse economic theories and tools. It's a continuous process; and focuses on the what, how and who of the production process.

The future is uncertain; focus on effective long-term planning and devise strategies to utilize limited resources to maximize profits and reduce production costs.

4) Sourcing raw materials:

With the scarcity of raw materials, make suitable decisions involving suppliers, competitors, and customers. Including the internal business environment; to efficiently manage resources to lower costs. It enables you to handle scarce resources and find suitable alternatives.

5) Demand Analysis:

Demand theory helps you decide on the type of product/service. It involves studying consumer behavior, purchase trends, factors influencing purchase patterns, etc.

Demand analysis is critical in decision-making. Assessing and forecasting future sales helps strengthen the organization's position in the market and improve profitability. It also gives you the insight to handle losses with minimal impact.

6) Profit Analysis:

Profits decide an organization's success and failure. Earning reasonable profits is crucial for every business. Organizations take huge risks with capital investments to achieve long-term profitability.

Proper planning, profit analysis, profit distribution, and analyzing the scope for further investment are challenging aspects of managerial economics.

7) Efficient management of Funds:

Production, cost analysis, and project appraisal strategies help you make decisions concerning raw materials, production techniques, machinery, recruiting professionals, etc.

Budgeting and controlling the flow of funds are essential for every business. It involves a considerable amount of time and labor. Cost of capital and return on investment (ROI) is vital to capital management.

8) Effective market research:

A meticulous analysis of the market trends helps you to fix product prices and make output decisions. Analyzing domestic and foreign markets is crucial as it helps determine niche market segments and allows for global expansion. Thereby; reducing production costs and increasing product life.

9) Measure Efficiency:

You will be involved with utilizing various tools and techniques to measure the efficiency of the business process. Prepare necessary reports with the statistics and keep the management updated; with enhancement strategies for improving efficiency.

10) Economic Intelligence:

External factors like government policies, employment opportunities, stages of the product cycle, exchange rates, emerging economic, market trends, etc., affect the efficient functioning of the organization.

A complete survey and analysis of these factors help understand their impact on the organization. Update the management with the relevant data and the latest approaches.

11) Maintain healthy relationships:

You will also need to maintain healthy relationships with all internal and external parties concerned, like employees, suppliers, government agencies, financial institutions, etc., to ensure the smooth functioning of the business process.

Check your progress

1. What is the process of decision making in managerial economics?

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2. What is role of managerial economics in decision making?

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3.5 ROLE AND RESPONSIBILITY OF A MANAGERIAL ECONOMIST:

A managerial economist realistic attitude can lead the firm to the path of success. He uses his analytical skills in solving complex aspects of successful decision-making and future planning. Since the ultimate goal of any economic organization is to make profits, therefore managerial economist also woks and serves the firm by working for the same In advanced countries, big firms employ managerial economists to assist the management. The various roles played by him are highlighted as follows:

1. Acquiring knowledge about Environment A firm cannot work in isolation. The internal & external environment surrounds the firm. It is a matter of importance that internal environment is controllable but external environment is beyond the control & has important bearing on business. Right information about the environment helps manager a lot to wisely define the extent and trend of their own business plans. The managerial economist has to study the economic

trends and use the same information for the best functioning of his firm.

2. Participating in Public Debates The role of managerial economists is not confined to the four walls of their business firm rather they actively participate in public debates. They are regularly being the source of advice and views are being sought by the government in the formulation of the various national policies as having their hands on experience of the firm and industry.

3. Efficient Functioning of the Organization A managerial economist is the one who keep constant eye on the various factors and operations going in the organization. He ensures the efficient functioning of the organization by helping in formulation of decisions relating to the various areas like price, rate of operations, investment, expansion or contraction, cash availability, wage and price policies , purchase of raw material and production schedules.

4 . Varied Functions In the due course of business managerial economists has to perform the various functions such as planning about finance, production, purchase, marketing, sales, making various kinds of forecast, market analysis, determining pricing policies and Practices, acting as an analyst, acting as an adviser and also projecting various technological changes in the market.

5. Economic Intellect Managerial economist use to provide general intelligence service by providing relevant information in regard to prices fixed by competitors, products offered by them, tax and, tariff rates, trends prevailing in the market, competitive moves, things going on in the international market, new developments taking place in the market, political issues having effect on the business practices. etc.

6. Cost Benefit Analysis Managerial Economist is constantly involved in the process of cost benefit analysis. While taking the

various decisions manager gives due consideration to the cost invoved in the particular venture and the benefit expected from the same.

7. Assists in Decision-making He helps the decision maker in formulating the decisions relating to internal functioning of a firm like changes in price, plans of investment , type of goods and services to be manufactured, factor inputs to be employed, production techniques to be used, expansion or contraction plans of firm, allocation of funds, location of various plants, quantity of output to be manufactured, replacement of plant equipment, sales forecasting, inventory forecasting, etc.

8. Maintaining Relationships The managerial economists have to undertake forecasting and also have to analyse various situations. For the same he must establish contacts with the sources of data. He maintains contacts with experts in the different fields and must also join trade and professional associations, subscribe to the journals providing him the updates of the market.

3.6 FUNTIONS OF MANAGERIAL ECONOMISTS

The functions are as mentioned below.

1) Demand Forecasting.

Demand forecasting is one of the most important functions of the managerial economist. In this function, the economist will analyze the market conditions and predict the further demand for the products manufactured by his undertaking.

This will help the organisation to produce accordingly to maximize the profits and minimize the closing stock at the end of the year.

2) Capital Budgeting.

The company has to invest money and assets in every business before starting it. And the investment which is basically termed as the capital is very important and has a long run.

So they should be very careful in making this decision on how much to invest in which thing. Here the managerial economist can help the organization to make an effective investment.

3) Risk Analysis.

Every business involves risk and the company has to bear it to run the business operations. Here the management can take the help of the economist who can analyze the risk and help the organization. If the risk is high then the company can change the plan and go through the process of planning once more.

4) Pricing and Competitive Strategies.

After the production of the products and services, the organization has to set its selling price. And this price is a very important thing when we look at it from the profit point of view. So they can take the help of the managerial economist to set the price for the product which will help them to sell more units.He can even help the organization with the strategies which they can use while setting the price of the product to beat the competition.

5) Profit Planning.

The main goal of every organization to run business operations is to make profits. But what to do with the profit they earn by running the business operations?

They can take the help of managerial economists who can help them in terms of profit planning.

6) Government Regulations.

The government policies are getting complex these days and the organizations have to make sure that their business operations are not violating any government regulations.

Here they can take the help of the economist who will study the government regulations and suggest to them the best possible way to deal with them.

And if in case the organization is violating any of the regulations he can help it to change the way it operates to anticipate further violations.

7) Cost Analysis.

He can help the organization to analyze the costs which are involved in the production of the products and services. Basically, the production manager and the cost engineer does this job. But here economists can help them by breaking down the costs involved in the production process.

8) Strategic Planning.

No matter in which sector the organization is carrying out the business operations there is a competition to face. And the beat the competition the organization needs to plan good strategies. They can take the help of the economist to do this

Decision making is an integral part of management. Managerial economics helps in effective decision making and a business manager is essentially involved in the processes of decision making as well as forward planning. In doing so, managerial economics is of great importance for a business manager.

The fact that a business entity is influenced by the conditions is uncertainty about the future and due to the changes in the

business environment resulting complexities in business decisions. Since no information or the knowledge about the future sales, profits or the costs is available for a business executive, the decisions are to be made on the basis of past data as well as the approximations being forecasted. In order that the decision making process is carried out in such conditions in an efficient way, economic theory is of great value and relevance as it deals with production, demand, cost, pricing etc. This gives rise to understand the concepts of managerial economics for business manager, so that he may apply the economic principles to the business and appraise the relevance and impact of external factors in relation to the business.

Having been regarded as micro economic as well as the economics of the firm, managerial economics is related to the economic theory which is to be applied to the business with the objective of solving business problems and to analyze business situations and the factors constituting the environment in which a business is operated. Managerial economics has been defined by Spencer and Siegelman as,*"The integration of economic theory with business practice for the purpose of facilitating decision making and forward planning by management."*

Managerial economics is very much capable of serving various purposes and useful for managers in making decisions in relation to the internal environment. It aims at the development of economic theory of the firm while facilitating the decision-making process with regard to sales and profits etc.

Moreover, it enables to make decisions about appropriate production and inventory policies for the future.

It is a branch of economics that is applied to analyze almost all business decisions. It is meant to undertake risk analysis, production analysis that is useful for production efficiency. Likewise, it is of great use for capital budgeting processes as well.

In the most positive form, it seeks to make successful forecasts with the objective of minimizing the risks involved. It deals with the aspects as how much cash should be available and how much of it should be invested in relation to a choice of processes and projects while making possible the economic feasibility of various production lines.

As regards the pricing of products being produced by a business entity, it is one of the most critical decisions for a manager to fix the price of particular products as it is by means of pricing decisions taken by a manager, the inflow of revenue is determined. The areas that are to be covered through managerial economics application in this respect are, price methods, product line pricing and price forecasting etc.

1. Explain the role and responsibility of managerial economist?

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2. Explain function of managerial economist?

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3.7 LET US SUM UP

In this unit we have tried to explain how managerial economics is used in decision making, the process through which it is done the role of managerial economics in decision making and role, responsibility and functions of managerial economist.

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BLOCK II: DEMAND, SUPPLY AND REVENUE ANALYSIS

UNIT 4: DEMAND AND SUPPLY ANALYSIS

STRUCTURE

4.0 INTRODUCTION

As human wants are unlimited and recurring in nature, while the means available to satisfy them are limited. As a result, a rational consumer will make an optimal use of available resources. Therefore demand and supply analysis provides a framework within which these decisions have to be made. Hence, in this unit we shall discuss the various issues related to the theory of demand and supply analysis

4.1 OBJECTIVES

Studying of this unit, will enable you to:

• distinguish between want and demand;

• explain the law of demand with the help of a demand schedule and a demand curve;

• identify the movement along a demand curve and a shift of the demand curve;

• state the concept of supply and its determinants;

4.2 THE NATURE OF DEMAND

let us try to understand the meaning of terms like desire, want, and demand. Desire is only a wisht of the consumer to acquire the commodity. If the desire to acquire a commodity is backed by the purchasing power and willingness to buy that commodity, becomes want. The demand, is the desire of the consumer to acquire a definite quantity of a commodity at a given price from the market along with

willingness and purchasing power. There are three important points to remember about the quantity demanded:

First, is the quantity desired to be purchased is refereed as desired purchase. The quantity actually bought is referred to as actual purchase.

Secondly, quantity demanded is considered over a period of time, for example the quantity demanded of apples is 10, it must be per day or per week, etc.

Thirdly, the quantity demanded will have an economic measure in terms of price. For example, the demand for apples equal to 10 units per week at a price of Rs. 100 per dozen is complete statement, as used in micro-economic theory.

4.3 DETERMINANTS OF DEMAND

The demand of a product is determined by a number of factors. Let us discuss them in detail.

4.3.1 Determinants of Demand by a Consumer: The demand for commodity or the quantity demanded of a commodity by the consumer is depends on a number of factors.

They are as follows:

Price of the commodity in question

Prices of other related commodities

Income of the consumers, and

Taste of the consumers.

Demand function is referred to as a rule which indicates how the quantity demanded depends on above said factors.

A demand function can be shown as:

Dx = f (Px, Py,Pz, M, T)

where, Dx is quantity demanded of X commodity, Px is the price of X commodity, Py is the price of substitute commodity, Pz is price of a complement good, M stands for income, T is the taste of the consumer.

If all the factors influencing the demand for a particular commodity does not vary simultaneously, only one of the factors changes at a time, assuming that all other factors remaining constant (ceteris paribus' other things remaining equal).

Demand Relationship: Relationship between the quantity demanded of a commodity and its determinants can be stated as:

1) Price of the commodity: Generally, higher the price of the commodity, the lower the demand of the commodity. This is stated as the law of demand.

2) Size of the consumer's income: If the increase in income leads to an increase in the quantity demanded of the commodity such commodity is known as'normal good'. If an increase in income results in a fall in the quantity demanded, the commodity demanded is referred as an 'inferior good'.

3) Prices of related commodities: A consumer's demand for a commodity may also be influenced by the prices of related commodities. The related commodity complementary goods (goods which are consumed along with the commodity in question) or substitute goods (others goods may be used in place of the commodity in question). Demand bears an inverse relationship with prices of complementary goods and direct relationship with prices of substitutes. For example tea and coffee are substitutes and a car and petrol are example of a pair of complementary goods.

4) Tastes of consumer: The taste of a particular commodity influences demand , he/she will demand more of that commodity for which consumer has developed a taste and visa-versa. For example in summer months, demand for cold drinks and ice creams is more than in winters

4.3.2 Determinants of Market Demand

The factors determining the demand for a commodity in a market are the same as consumer demand along with two additional following factors.

1) Size of the population: All other factors remaining unchanged, the demand increase or decreases with increase or decrease in population

2) Income distribution: People in different income groups show marked differences in their preferences. With increase in income share rich demands for the luxury goods rises while poor will increase demand for the wage goods.

4.3.3 **Exceptions to the Law of Demand**

The law of demand holds true in most cases. The price keeps fluctuating until an equilibrium is created. However, there are some exceptions to the law of demand. These include the Giffen goods, Veblen goods, possible price changes, and essential goods. Let us discuss these exceptions in detail.

Giffen Goods

Giffen Goods is a concept that was introduced by Sir Robert Giffen. These goods are goods that are inferior in comparison to luxury goods. However, the unique characteristic of Giffen goods is that as its price increases, the demand also increases. This feature is what makes it an exception to the law of demand.

Veblen Goods

The second exception to the law of demand is the concept of Veblen goods. Veblen Goods is a concept that is named after the economist Thorstein Veblen, who introduced the theory of "conspicuous consumption ". According to Veblen, there are certain goods that become more valuable as their price increases. If a product is expensive, then its value and utility are perceived to be more, and hence t3he demand for that product increases.

The expectation of Price Change

In addition to Giffen and Veblen goods, another exception to the law of demand is the expectation of price change. There are times when the price of a product increases and market conditions are such that the product may get more expensive. In such cases, consumers may buy more of these products before the price increases any further. Consequently, when the price drops or may be expected to drop further, consumers might postpone the purchase to avail the benefits of a lower price.

Necessary Goods and Services

Another exception to the law of demand is necessary or basic goods. People will continue to buy necessities such as medicines or basic staples such as sugar or salt even if the price increases. The prices of these products do not affect their associated demand.

Change in Income

Sometimes the demand for a product may change according to the change in income. If a household's income increases, they may purchase more products irrespective of the increase in their price, thereby increasing the demand for the product. Similarly, they might postpone buying a product even if its price reduces if their income has

reduced. Hence, change in a consumer's income pattern may also be an exception to the law of demand.

Check Your Progress 1

1) Differentiate between want and demand of a commodity.

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2) Explain the determinants of demand of a commodity ?

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3) What are the factors influencing the market demand of a commodity.

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4.4 THE LAW OF DEMAND

The inverse relationship between the quantity of good demanded and its price, given all the other factors influencing the demand is constant it is called 'law of demand'. It gives us a demand curve that slopes downwards to the right. The concept can be explained with help of a demand schedule, a table that records quantities demanded at different prices. This schedule, is prepared on a two-dimensional axes system, that gives us a demand curve.

4.4.1 The Demand Schedule

Table 4.1 given below, showing the application of the law of demand, is called the 'Demand Schedule

Price of Apple per Kg. (in Rs.)	Quantity Demanded of Apples (in Kg. per week)
12	0
8	2
4	4
0	6

Table 4.1: The Demand Schedule of a Consumer for Apples

From the above combinations of price and quantity demanded are shown in the Table 2.1. We can easily conclude that as price of an apple decreases the quantity demanded of apples by the consumer is increasing.

4.4.2 The Demand Curve

The demand curve graphically shows the relationship between the quantity of a good that consumers are willing to buy and the price of the good. Let us understand the demand curve with the help of the Fig. 4.1.

Price	Quantity Demanded
$12	0
$8	2
$4	4
$0	6

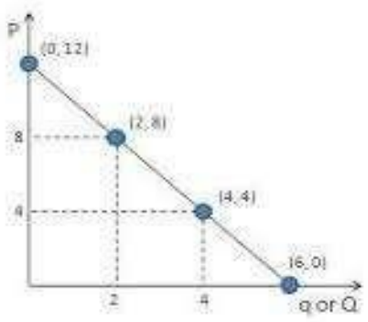

Fig. 4.1 Demand Curve

4.4.3 Why does a Demand Curve Slope Downwards?

Law of demand states that there is an inverse relationship between the price of a commodity and its quantity demanded.

1) Substitution Effect: when the price of a commodity falls the prices of its substitutes remaining constant, then the substitutes become relatively costlier or, in other words, the commodity whose price has fallen becomes relatively cheaper. Since a utility maximizing consumer substitute cheaper goods for costlier ones, demand for the cheaper commodity increases. The increase in demand on account of this factor is known as substitution effect. For example, if Pepsi Can and a Coke Can both are priced at Rs.30 and Rs. 20 each. If the price of Coke is raised to Rs. 25, and the price of Pepsi remains unchanged, Pepsi becomes relatively cheaper to Coke, i.e. although the absolute price of Pepsi has not changed, the relative price of Pepsi has gone down. The change in the relative price of commodity causes substitution effect items will register a decline.

2) Income Effect: when the price of a commodity falls other things remaining constant, then the real income of the consumer increases resulting in increased purchasing power since he is required to pay less for a given quantity. For example, price of mango falls the purchasing power of the given money income rises, or his real income rises. Thus, he can buy more of the mangoes with the same money income. A commodity with positive income effect is called a ‘normal good’. It shows a positive or direct relationship between the income and the quantity demanded. When rise in income leads to a fall in the quantity demanded, we have a case of negative income effect. Such goods are called the ‘inferior goods.

3) Price Effect: Price Effect is the sum total of the substitution effect and income effect, i.e. PE = SE + IE Where PE = Price Effect. SE = Substitution Effect IE = Income Effect It is important to note that

substitution effect and income effect operate simultaneously with the change in the price of the commodity. ‘Substitution effect’, and ‘income effect’ taken together give ‘price effect.’

GIFFEN GOOD A case where negative income effect outweighs substitution effect is possible when we have ‘Giffen good’ named after the Robert Giffen who first talked of such paradox. Here a fall in the price of a commodity does not lead to a rise in its demand, it may result in a fall in demand for this commodity

4.5 CHANGE IN QUANTITY DEMANDED Vs. CHANGE IN DEMAND

When the demand of a commodity changes due to change in its price, it is called ‘change in quantity demanded’. While on other hand, when the change in demand is due to the factors other than price of the commodity it is called ‘change in demand’.

Expansion and Contraction of demand is associated with the price quantity relationship of demand . it takes place along the same demand curve

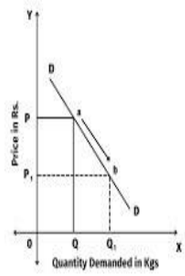

Fig 4.2: Expansion and Contraction in Demand Curve

The movement from point a to point b on the demand curve DD is referred to as ‘extension in demand’ it results due to increase in quantity demanded because of fall in prices. The movement from b

to a on the demand curve DD is known as ‘contraction in demand’ it is seen when there is decrease in quantity demanded due to increase in prices.

Change in Demand occurs due to a change in any determinant of demand other than the price of that commodity. Change in demand may take two forms:

Increase in demand, and (ii) Decrease in demand

Increase in demand takes place when;

at a given price, higher quantity is demanded,

at a higher price, the same quantity is demanded

Decrease in demand takes place when:

at a given price, lower quantity is demanded,

at a lower price, the same quantity is demanded

Graphically, increase in demand results in rightward shift of the whole demand curve. Likewise, decrease in demand results in leftward shift of the demand curve

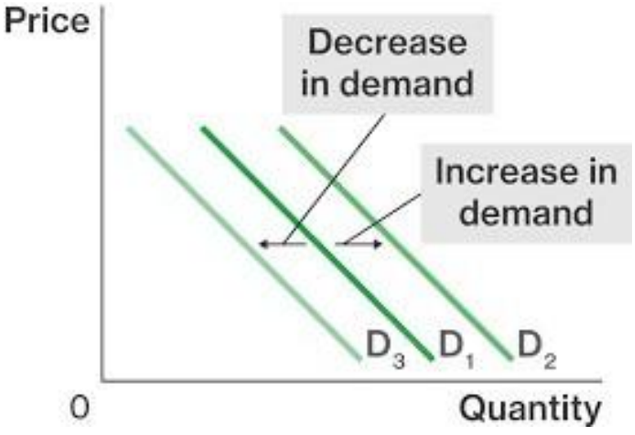

Fig 4.3: Increase and decrease in Demand curve

The shift of the demand curve to the right i.e from D1 to D2 shows ‘increase in demand’ and a movement of the demand curve to the left of the initial demand curve i.e from D1 to D3 is a ‘decrease in demand’

Many factors can cause a shift in a demand curve. Some are as follows :

1) An increase in income of the consumer enables him to demand more of a particular commodity at a given price and a decrease income will generally forces a consumer to decrease his demand.

2) A rightward shift or left ward shift in the demand curve can also take place because of increase or decrease in price of a substitute.

3) the consumers change of taste for a commodity causes a shift in the demand curve to the right (rightward shift occurs when consumer starts liking a product)or left (leftward shift occurs when the consumer starts disliking a product.

Check Your Progress 2

1) Explain the law of demand. Does it apply to all the goods?

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2) What is substitution effect? .

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3) Substitution effect + Income effect = Price effect. Is it always true?

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4) Does a change in taste leads to a movement along the demand curve?

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4.6 THE CONCEPT OF SUPPLY

Supply refers to the quantity of a commodity that producers are willing to sell at particular price per unit of time.

4.6.1 Determinants of Supply

1) Price of the commodity supplied: The price is most impotant determinant of supply. It helps person or firm to compare whether the costs will be covered by the price. As the price goes up, a firm/person are willing to sell larger quantity.

2) The prices of factors of production or cost of production: These affect the cost of production and possible profits of the firm. A rise in the prices of factors of production discourages the production and supply of the commodity.

3) Prices of other goods: As the prices of other commodities rise, they become more attractive to produce for a profit maximising firm. Hence supply of commodity whose price is unchanged will decline.

4) The state of technology: The improvement in the knowledge about the means and the methods of production lead to lower costs of production and helps increasing output.

5) Goals of the producer: The objective with which the producer undertakes production also influences his production and supply decisions.

4.7 THE LAW OF SUPPLY

The law of supply states that, all other factors being equal, as the price of a good or service increases, the quantity of that good or service that suppliers offer will increase, and vice versa.

A producer aims to maximise profits, the difference between total revenue and total cost. Total revenue is the price of the product multiplied by its quantity sold. Total cost is the cost of production.

Profit = TR – TC (TR = Total Revenue (quantity x price) TC = Total Cost (quantity x average cost). A higher price would mean more profits. The producer will supply more at a higher price. Similarly, a producer will supply smaller quantity at a lower price. This is a direct relationship between the price and the quantity supplied of a commodity and is called the 'Law of Supply'.

Supply Function

Qs = f(P1, P2, P3... Pn, F1… Fa, T, G, ….) Where Qs stands for the quantity of the commodity supplied; P1 is the price of that commodity, P2, P3...Pa are the prices of other commodities; F1 …… Fn are the prices of all factors of production; T is the state of technology; G is the goal of the producer.

4.7.1 The Supply Schedule

A supply schedule shows quantities of a commodity that a seller is willing to supply, per unit of time, at each price, assuming other factors remaining constant. A supply schedule of a product based on imaginary data is given in Table 2.2 illustrating the relationship between price and quantity supplied as given by the law of supply

Price (in Rs) per Pen	Quantity Supplied (in

	thousand) per Month
1	5
2	10
3	15
4	20
5	25

Table 4.2 Supply Schedule of a Pen Producer

The schedule presented in Table 4.2 shows that at Rs. 1 per pen, the producer is willing to supply 5 thousand pens per month. At a higher price of Rs. 3 per pen, he is willing to supply15 thousand pens per month and so on. This schedule depicts direct relationship between price per pen and quantity supplied of pens per month.

4.7.2 The Supply Curve

Look at Fig. 4.4 where the data from Table 4.2 has been plotted. Here price is plotted on the Y-axis and quantity supplied on X-axis.

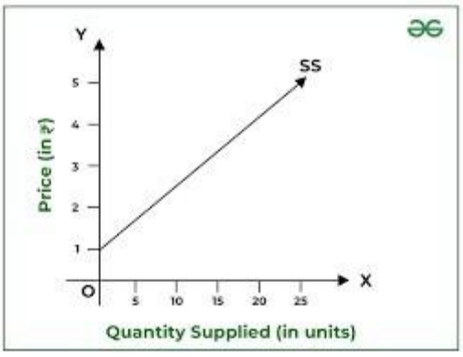

Fig 4.4 Supply Curve

The supply curve can be linear straight line, or in the shape of an upward slopping curve convex downwards. The upward slope of the supply curve shows that higher the price, the greater the quantity will be supplied. If the supply curve is extended to the Y axis, it may or may not pass through O. If it passes through O, it shows that the quantity supplied is zero hen the price is zero. If it does not pass through zero, it shows that until the price rises up to a certain point, the quantity supplied will remain zero. Re. 1 can be such a price. The producer will not offer any quantity for sale if price is Re. 1 or less. The upward sloping supply curve is just a diagrammatic representation of the law of supply.

4.7.3 Exceptions to the Law of Supply

the law of supply indicates a direct relation between the price and the quantity supplied. But there can be some exceptions to the law of supply such as:

Non-maximisation of profits: In some cases the enterprise may not be pursuing the goal of maximisation of profits. In that case, the quantity supplied may increase even when price does not rise. For example, if the firm wants to maximise sales, it may sell larger quantities even when the price remains unchanged. A multiproduct firm may aim at maximising total profits, rather than profit from each of the line of production. So, the law of supply may not apply for each product.

Factors other than price not remaining constant: We may notice that factors other than the price of the product may not remain constant. For example, the quantity supplied of a commodity may fall at a given price if prices of other commodities show a tendency to rise. The change in technology can also bring about a change in the quantity supplied of a commodity even if the price of that commodity does not undergo a change.

Check Your Progress 3

1) Explain why producers supply more at a higher price.?

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2) Why does a supply curve is upward moving curve to the right?

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4.8 CHANGES IN SUPPLY VERSUS CHANGES IN QUANTITY SUPPLIED

4.8.1 Changes in Quantity Supplied : There can be changes in the quantity offered for sale due to changes in the price of the commodity only, all other factors remaining constant.

The change in quantity supplied can be of two types,

1) When the price of a commodity falls and its quantity supplied falls. It is termed as ‘contraction in quantity supplied’.

2) When the price of a commodity rises and its quantity supplied rises, provided the law of supply applies, it is termed as “extension in quantity supplied supply”

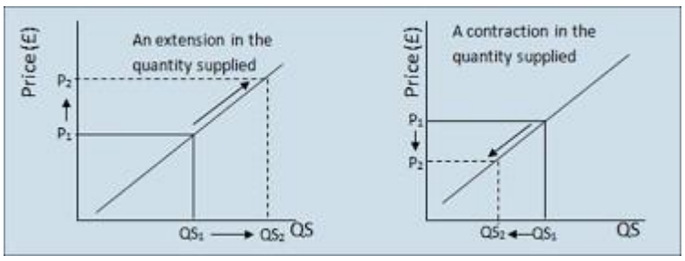

Fig: 4.5 Extension and contraction in quantity supplied

4.8.3 Why the Supply Curve Shifts?

The reasons for the change in supply (both increase and decrease in supply) are:

1) Change in the prices of other commodities: A decrease in the prices of other commodities increases the supply of the commodity in question at each price because relative profits from supplying other products fall. An increase in the prices of other commodities decreases the supply of the commodity in question at each price.

2) Change in the prices of factors of production: An increase in the prices of factors of production used in producing the commodity tends to reduce the supply of the commodity as the cost of production rises but the price is given. Conversely, a decrease in the price of factors of production used in making a commodity leads to an increase in supply, at each price.

3) Change in technology: An improvement in technology normally leads to a fall in cost of production and given the price of the product, a producer tends to produce more of that commodity, at each price. Conversely, loss in technical knowledge (the chances of which are meager) leads to a fall in supply.

4) Change or expectation of change in other factors: Sometimes, supply of a commodity may change because of the change in or expectation of a change in government policies, taxes or rate of interest, fear of war, inequalities of income and wealth which influence the demand pattern. This will affect supply through expectations of the producer about the profits.

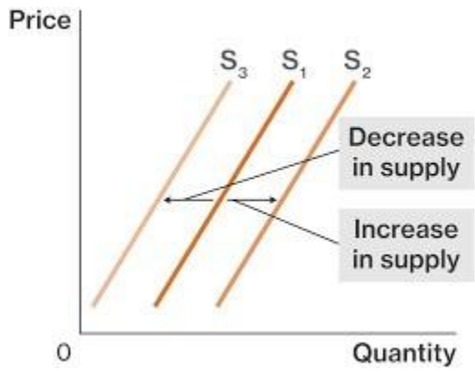

Fig 4.6 Increase and decrease in supply

Check Your Progress 4

1) How do you interpret a right shift of a supply curve?

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2) Effects of factors other than the own price are shown by a shift of entire supply curve. Why?

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4.9 LET US SUM UP

The demand refers to the wish on the part of the consumer to buy a commodity in the market at a given price backed by the sufficient purchasing power. The price of the commodity in question, prices of other related commodities, income and taste of the consumers determine the demand for consumer.

Supply refers to the quantity a firm is willing to sell at a given price in every time period. In addition to the own price, supply of a commodity depends on prices of related goods and the factors of production as well. State of technology is another important determinant of supply.

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UNIT 5: CONSUMER PREFERENCES AND CHOICES

Structure

5.0 INTRODUCTION

In previous units, we have understood the concept of demand and supply, their determinants. In this unit, we shall examine the theory of consumer behaviour. Consumer behaviour has always been a subject of curiosity and research. Researchers have been trying to understand and predict consumer behaviour ever since starting of trade. However, relevance of this subject has increased over the time. With global markets and more informed customers today, success of business is entirely dependent on its understanding of consumer behaviour

5.1 OBJECTIVES

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

- explain the concept of utility;
- analyse and use cardinal utility approach for measurement of utility;
- explain Law of Diminishing Marginal utility;
- describe consumer equilibrium with the help of law of equi- marginal utility;
- distinguish between cardinal and ordinal utility approaches; and
- list the assumptions of consumer preference taste ordinal utility approach for measurement of utility use Indifference curve analysis to explain consumer behaviour;
- identify shape of Indifference curve in case of perfect substitutes and complementary goods;
- explain the concept of Budget line;
- identify the factors causing shift in Budget line;
- describe consumer equilibrium through Indifference curve approach;
- decompose price effect into income effect and substitution effect using Hicksian and Slutsky approach; and

5.2 CONCEPT OF UTILITY

Utility is the basis of consumer demand. The consumers demand a commodity because they desire or expect to derive utility from that commodity.

5.2.1 What is Utility?

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

Utility of a product can be ‘absolute’ in the sense that the want satisfying power is ingrained or embeded in it. For example, pen has its own utility whether a person can write or not. However, utility is considered as ‘subjective’ in consumer analysis because a consumer

will demand a good only if those good holds utility for her. Utility not only varies from person to person but also from time to time, at different level of consumption and at different moods of a consumer. The most basic example to understand this concept is food. If a person is not hungry, even her favourite food will not have any utility for her at that point of time

5.2.2 Relationship between Want, Utility, Consumption and Satisfaction

Want of the consumer is the basis of understanding her behaviour. A consumer selects a commodity based on its want satisfying power. Consumption of the commodity leads to satisfaction of wants. Thus want, utility, consumption and satisfaction are related in following manner:

Want → Selection of commodity → Consumption of commodity → Getting utility in the commodity satisfaction of the want

Following points can be noted about utility:

a) Utility is a want satisfying power of a commodity

b) Utility varies from person to person

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

There are three concepts related to utility:

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

2) Total Utility- The utility derived by a person from the total number of units of a commodity consumed by her is called total utility. i.e. TUn= U1+ U2+ U3+ ….Un

3) Marginal Utility- It means addition made to total utility by consuming an additional unit. It can be measured with the help of following formula: MUn= TUn –TUn-1

Where: MUn = Marginal utility of nth unit TUn = Total utility of n units TUn-1 = Total utility of n – 1 units or one unit less than the total no. of units

Relationship between total utility and marginal utility

Units of a Good Consumed	total utility	marginal utility
1	6	6
2	10	4
3	12	2
4	12	0
5	10	-2
6	6	-4

Table 5.1: Relationship between Total utility (TU) and Marginal utility (MU)

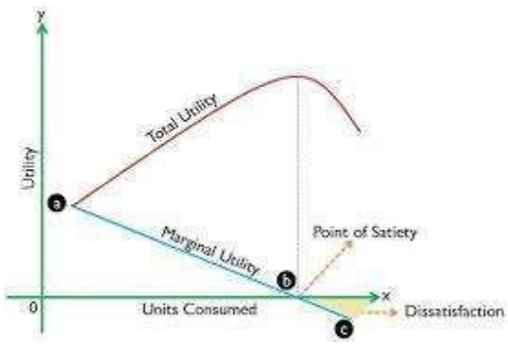

Fig. 5.1: Relationship between Total utility (TU) and Marginal utility (MU)

In Fig. 5.1, units of commodity are measured along x axis and utility is measured along y axis. when the total utility is increasing, marginal utility is diminishing but remains positive. When the total utility is maximum and the marginal utility is zero. Consumer is getting maximum satisfaction at this point. If a consumer consumes more units after total utility reaching maximum, total utility will diminish and the marginal utility will be negative and consumers feels dissatisfied. This is also called Law of diminishing Marginal Utility

5.2.3 Measurement of Utility

The concept of measurement of utility has evolved over the time. The classical economists viz Jeremy Bentham, Menger, Walras etc. and neoclassical economists like Marshall believed that utility is cardinally or quantitatively measurable like height, weight etc. The belief resulted in Cardinal Utility Approach. The exponents of cardinal utility analysis regard utility to be a cardinal concept. According to them, a person can express utility or satisfaction he derives from the goods in the quantitative cardinal terms. Jeremy Bentham (1748–1832), the founder of Utilitarian school of ethics coined a psychological unit of measurement called ‘utils’. Thus, a person can say that he derives utility equal to 10 utils from the consumption of a unit of good A, and 20 utils from the consumption of a unit of good B. Moreover, the cardinal measurement of utility implies that a person can compare utilities derived from how much one level of utility is greater than another. According to Marshall, marginal utility is actually measurable in terms of money and money is the measuring rod of utility.

The modern economists like J.R Hicks, Allen are of view that utility is not quantitatively measurable but can be compared or ranked. This is known as Ordinal concept of utility. Modern Economists hold that utility being a psychological phenomenon, cannot be measured quantitatively, theoretically and conceptually. However, a person can introspectively express whether a good or service provides more, less or equal satisfaction when compared to one another. In this way, the measurement of utility is ordinal, i.e. qualitative, based on the ranking of preferences for commodities. For example, Suppose a person prefers tea to coffee and coffee to milk. Hence, he or she can tell subjectively, his/her preferences, i.e. tea > coffee > milk

Check Your Progress 1

1) Explain the relationship between total utility and marginal utility.
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2) Distinguish between cardinal approach and ordinal approach.

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5.3 SOME BASIC ASSUMPTIONS ABOUT CONSUMER PREFERENCESE

Economists have identified three basic steps to understand consumer behaviour:

1) Consumer Preferences: First step is to identify consumer preferences. This can be done graphically or algebraically. Behaviour is based on preferences i.e. likes, dislikes of the consumers. Thus, it is important to identify ‘what gives value to the consumer’. We live in an information age and today. Companies follow their customers online, keep a track of sites

they visit, products they buy etc. in order to identify their preferences. Social networking sites have become popular data source to identify preferences.

2) Budget Constraints: This is next important aspect. Prices of goods and paying capacity of consumer has strong influence on his behaviour. Through online tracking, companies today are not only able to identify consumer preferences alone, but also their paying capacity and budget constraints. Additional discounts, cash back schemes, EMI options etc. are offered to the customer these days in order to ease their budget constraint.
3) Consumer choices: Final step to understand consumer behaviour is consumer choices. Given preferences and limited income, consumer chooses the combination of goods which maximise their satisfaction. With markets becoming global, consumers have large number of choices available these days. But final demand for a good will be dependent on combination of factors: their preferences, value offered by the product and budget constraint

5.3.1 Assumptions about Consumer Preferences

As discussed above, the theory of consumer behaviour is based on consumer preferences. For better understanding of consumer behaviour with the help of consumer preferences, economists usually make following assumptions about consumer preferences:

a) Completeness: Preferences are assumed to be complete i.e. any two different bundles of goods can be compared. A consumer either prefers one basket over other or is indifferent between two baskets. Mathematically, $(a1, a2) \geq (b1, b2)$ or $(a1, a2) \leq (b1, b2)$ or Both

b) Transitivity: Transitivity means that if a consumer prefers X over Y and Y over Z then the consumer also prefers X over Z. Transitivity is a necessary assumption to ensure consumer consistency.

c) More is always preferred over less: Consumer is rational and knows that greater utility can be derived by consuming more quantity of a commodity. Thus, he always prefers more quantity over less

Check Your Progress 2

1) What are the basic assumptions about consumer preferences?

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2) How does consumer preferences affect consumer behaviour?

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5.4 CARDINAL UTILITY ANALYSIS

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

1) The cardinal measurement of utility- Utility of any commodity can be measured in units called 'utils'.

2) Utilities are additive i.e. total utility can be calculated by measuring utility derived from all the units of a commodity consumed.

3) Utility is independent i.e. not related to the amounts of other commodities purchased by the consumer. Further, it is also assumed that it is not affected by utilities of other individuals

4) Marginal utility of money remains constant: When a person purchases more of a good, the amount of money diminishes and marginal utility of remaining money may increase. But in this approach, marginal utility of money is treated constant. This assumption is important as cardinalists have used money as a measure of utility and it is necessary to keep the measuring rod of utility as fixed.

5.5 LAW OF DIMINISHING MARGINAL UTILITY

Law of Diminishing Marginal Utility is one of the most fundamental law of utility analysis. It explains the relationship between utility and quantity of a commodity. **This law states that after sufficient quantity of a commodity is consumed, the utility derived from each successive unit decreases, consumption of all other commodities remaining sam**e.

For example, If a person is hungry, the first bread he consumes will have high utility for him as it will give him high level of satisfaction. As he keeps on consuming more and more breads, utility derived from each successive unit will go on decreasing. After a point of time, when person is satisfied, he will not be able to eat more. The utility will drop to zero here. If the consumption of bread is continued further, a person would get negative utility or disutility.

No. of Bread	Marginal Utility (MU)
1	25
2	17
3	13

4	5
5	0
6	-5

Table 5.2: Diminishing Marginal Utility

Fig. 5.2: Diminishing Marginal Utility

5.5.1 Exceptions to the Law/ Limitations of the Law

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

1) Small initial unit: The law is not applicable when the initial units of commodity are of very small size. For example, drinking water with a spoon. In such cases, initially utility derived from additional units will go on increasing and the law may not operate for sometime. It is only after a stage in consumption is reached that marginal utility begins to diminish.

2) Rare and curious things like rare paintings, gold and diamond jewellery: The law does not apply in such cases because collection of more and more units usually give more satisfaction to the collector/consumer.

5.5.2 Criticism of the Law

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

1) Measurement of utility is not possible: The major criticism of this approach is that it is not possible to measure utility in cardinal numbers. Utility is a psychological phenomenon and thus it is not possible to measure it in quantifiable terms. In real life, we can only describe utility of a product in words.

2) Marginal utility of money does not remain constant: Cardinal economists believe that marginal utility of money remains constant throughout. However, when a person uses money, stock of money reduces leading to increase in utility of remaining stock.

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

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

Check Your Progress 3

1) Why does marginal utility diminished?

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2) What does happen to marginal utility at a point when total utility is maximum?

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5.6 CONSUMER EQUILIBRIUM THROUGH UTILITY ANALYSIS

Consumer Equilibrium is a situation wherein a consumer gets maximum satisfaction out of his limited income and has no tendency to change his existing expenditure pattern.

A consumer is considered to be extremely satisfied when he allocates his income in such a way that the last rupee spent on each commodity yields the same level of utility. The concept of consumer equilibrium can be examined under one-commodity model and multicommodity model.

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

1) Consumer is rational: Consumer he measures, compares and chooses the best option in order to maximise his utility.

2) Cardinal measurement of utility: Utility can be measured in quantifiable terms.

3) Marginal utility of money is constant: It is assumed that utility is measured in terms of money and utility of money does not change.

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

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

5.6.1 Determination of Consumer Equilibrium

Consumer equilibrium can be examined under two cases:

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

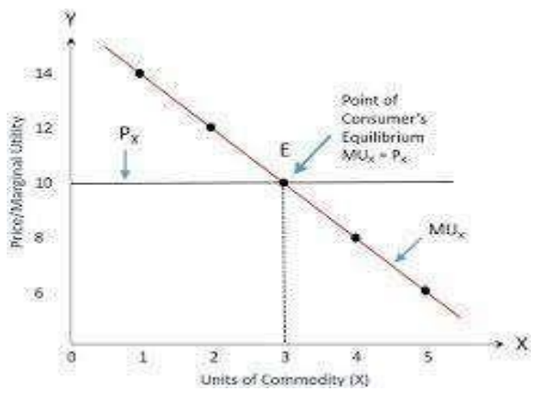

Fig 5.3: Consumer equilibrium in case of single commodity

2) Consumer equilibrium in Multi-commodity case:

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

This case of multi-commodities is known as Law of Equi-Marginal Utility, a consumer having choices of multiple goods distribute their limited income in such a way that the last rupee spent on each commodity yields equal marginal utility.

Suppose a customer consumes only two goods x (with price Px) and y (with price Py). Thus he will try to maximise his utility by equating his marginal utility and prices. MUx=Px (MUm) MUy=Py (MUm) Given these conditions, a consumer will be in equilibrium when: MUx/ Px (MUm) = MUy/ Py (MUm) Or MUx/ Px = MUy/Py (because MU of each unit of money is assumed to be constant at

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

MUx/ Px = MUy/ Py= MUc/ Pc= ……MUz/ Pz

Diagrammatically, equilibrium is achieved at a point when MUx/Px= MUy/Py

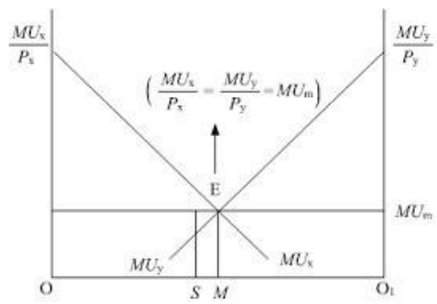

Fig. 5.4: Consumer equilibrium in multi commodity case

Check Your Progress 4

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

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

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5.7 DERIVATION OF DEMAND CURVE WITH THE HELP OF LAW OF DIMINISHING MARGINAL UTILITY

Marshallian technique of deriving demand curves for goods from their utility functions rests on the hypothesis of additive utility functions. Dr. Alfred Marshall derived the demand curve with the help of law of diminishing marginal utility. The law of diminishing marginal utility states that as the consumer purchases more and more units of a commodity, utility that he derives from successive units goes on decreasing.

A rational consumer, while purchasing a commodity compares the price of the commodity which he has to pay with the utility he receives from it. So long as the marginal utility of a commodity is higher than its price (MUx >Px), the consumer would demand more and more units of it till its marginal utility is equal to its price MUx = Px or the equilibrium condition is established. In other words, as the consumer consumes more and more units of a commodity, its

marginal utility goes on diminishing. So it is only at a diminishing price at which the consumer would like to demand more and more units of a commodity. Derivation of demand curve with the help of law of diminishing marginal utility is presented in Fig. 5.5.

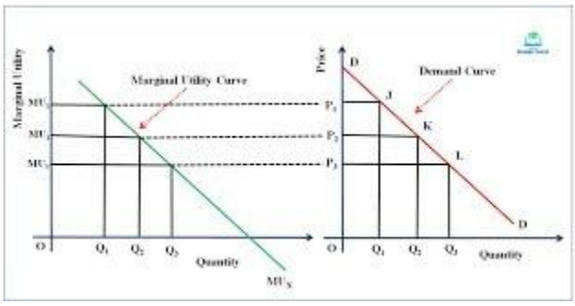

Fig.5.5: Derivation of demand curve with the help of law of diminishing marginal utility

In Fig. 5.5, the MUx is negatively slopped. It shows that as the consumer acquires larger quantities of good X, its marginal utility diminishes. Consequently, at diminishing price, the quantity demanded of the good X increases as is shown in the second Fig. of 4.5. At Q1, quantity of the marginal utility of a good is MU1. This is equal to P1 by definition. Thus, consumer demands OQ1 quantity of the commodity at P1 price. In the same way Q2 quantity of the good is equal to P2. Here at P2 price, the consumer will buy OQ2 quantity of commodity. At Q3 quantity the marginal utility is MU3, which is equal to P3. At P3, the consumer will buy OQ3 quantity and so on. It can be concluded that as the purchase of the units of commodity X are increased, its marginal utility diminishes. So, at diminishing price, the quantity demanded of good X increases. The rational supports the notion of down slopping demand curve that when price falls, other things remaining the same, the quantity demanded of a good increase and vice versa.

5.8 CONSUMER SURPLUS

The concept of consumer surplus was first formulated by Dupuit in 1844 to measure social benefits of public goods such as canals, bridges, national highways. Marshall further refined and played a significant role in providing it a theoretical structure in his book 'Principles of Economics' published in 1890. Marshall's concept of consumer's surplus was based on the cardinal measurability and interpersonal comparisons of utility. According to him, consumer's surplus is the difference between what 'one is willing to pay' and 'what one actually pays' to acquire a particular good.

Concept of consumer's surplus is a very important concept in economic theory, especially in theory of demand and welfare economics. It is also very useful in formulation of economic policies such as taxation by the Government.

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

The measurement of consumer surplus from a commodity from the demand or marginal utility curve is illustrated in Fig. 5.6. In the figure, quantity of a commodity is measured along the X-axis, the marginal utility (or willingness to pay for the commodity) and the price of the commodity are measured on the Y axis.

DD' is the demand or marginal utility curve which is sloping downward, indicating that as the consumer buys more units of the

commodity, marginal utility derived from the additional units of the commodity falls.

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

The Mth unit of the commodity does not yield any consumer's surplus to the consumer since this is the last unit purchased and for this price paid is equal to the marginal utility which indicates the price that he is prepared to pay rather than go without it. But for the units before Mth unit, marginal utility is greater than the price and therefore, these units yield consumer's surplus to the consumer. The total utility of a certain quantity of a commodity to a consumer can be known by summing up the marginal utilities of the various units purchased.

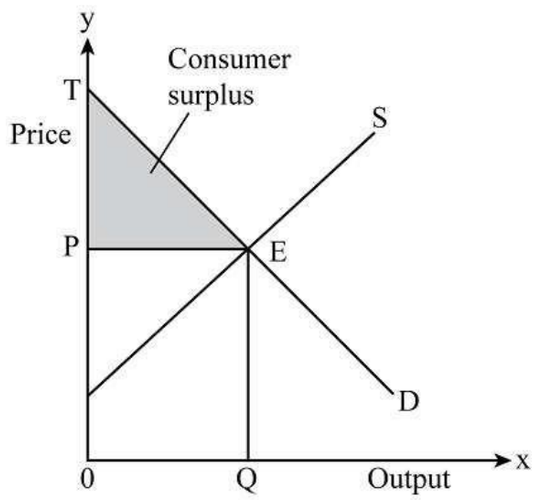

Fig. 5.6: Consumer Surplus

The total utility derived by the consumer from OQunits of the commodity will be equal to the area under the demand or marginal utility curve up to point Q. That is, the total utility of OQunits in Fig. 5.6 is equal to OTEQ. In other words, for OQ units of the good the

consumer will be prepared to pay the sum equal to Rs. OTEQ. But given the price equal to OP, the consumer will actually pay the sum equal to Rs. OPEQ for OQ units of the good. It is thus clear that the consumer derives extra utility equal to OTEQ minus OPEQ which has been shaded in Fig. 5.6. If market price of the commodity rises above OP, the consumer will buy fewer units of the commodity than OQ. As a result, consumer's surplus obtained by him from his purchase will decline. On the other hand, if price falls below OP, the consumer will be in equilibrium when he is purchasing more units of the commodity than OQ. As a result of this, the consumer's surplus will increase. Thus, given the marginal utility curve of the consumer, the higher the price, the smaller the consumer's surplus and the lower the price, the greater the consumer's surplus.

5.9 CRITICAL EVALUATION OF CARDINAL UTILITY ANALYSIS

Cardinal utility analysis of demand has been criticised by modern economists on following grounds:

1) Cardinal measurability of utility is impractical: Cardinal utility analysis of demand is based on the assumption that utility can be measured in absolute, objective and quantitative terms. But in actual practice utility cannot be measured in such quantitative or cardinal terms. Since utility is a psychological phenomenon and subjective feeling, it cannot be measured in quantitative terms. In reality, consumers are only able to compare the satisfactions derived from various goods or various combinations of the goods. In other words, in the real life consumer can state only whether a good or a combination of goods gives him more or less, or equal satisfaction as compared to another. Thus, economists like J.R. Hicks are of the

opinion that the assumption of cardinal measurability of utility is unrealistic and therefore it should be given up.

2) Wrong assumption of independent utilities: Cardinal Utility analysis also assumes that utilities derived from various goods are independent. This means that the utility which a consumer derives from a good is the function of the quantity of that good only. In other words, the assumption of independent utilities implies that the utility which a consumer obtains from a good does not depend upon the quantity consumed of other goods. On this assumption, the total utility which a person gets from the whole collection of goods purchased by him can be calculated as sum of the separate utilities of various goods. In other words, utility functions are additive. But in the real life this is not so. In actual life the utility or satisfaction derived from a good depends upon the availability of some other goods which may be either substitutes for or complementary with each other. For example, the utility derived from a pen depends upon whether ink is available or not. Similarly, utility of tea may increase if accompanied by biscuits. It is, thus, clear that the utilities derived from various goods are interdependent, that is, they depend upon each other.

3) Assumption of constant marginal utility of money is not true: An important assumption of cardinal utility analysis is that when a consumer spends varying amount on a good or various goods or when the price of a good changes, marginal utility of money remains constant. But in actual practice, this is not correct. As a consumer spends his money income on the goods, money income left with him declines. With the decline in money available to the consumer, the marginal utility of remaining money rises. Further, when price of a commodity changes, the real income of the consumer also changes. With this change in real income, marginal utility of money will change and this would have an effect on the demand for the good in

question, even though the total money income available with the consumer remains the same. Cardinal utility analysis ignores the changes in real income and its effect on demand for goods following the change in price of a good. Further, it is because of the constant marginal utility of money and therefore the neglect of the income effect by Marshall that he could not explain Giffen Paradox. Marginal utility of money also varies from a poor man to a rich one. For example, a person having just Rs. 80/- with him will place much higher valuation as each of these 10 rupees. But, someone who has thousands of rupees with him may not place that much value on a Rs. 10 note.

4) Cardinal utility analysis does not split up the Price effect into Substitution and Income effects: Another shortcoming of the cardinal utility analysis is that it does not distinguish between the income effect and the substitution effect of the price change. Marshall and other exponents of cardinal utility analysis ignored income effect of the price change by assuming the constancy of marginal utility of money. In real life, when the price of a good falls, the consumer becomes better off than before, that is, a fall in price of a good brings about an increase in the real income of the consumer. With this income he would be in a position to purchase more of this good as well as other goods. This is the income effect of the fall in price on the quantity demanded of a good. Besides, when the price of a good falls, it becomes relatively cheaper than other goods and as a result the consumer is induced to substitute that good for others. This results is increase in quantity demanded of that good. This is the substitution effect of the price change on the quantity demanded of the good. Thus total effect of price can be decomposed into substitution effect and income effect.

5) Marshall could not explain Giffen Paradox: By not visualising the price effect as a combination of substitution and income effects and

ignoring the income effect of the price change, Marshall could not explain the Giffen Paradox. He treated it merely as an exception to his law of demand. In contrast to it, indifference curve analysis has been able to explain satisfactorily the Giffen good case. According to indifference curve analysis, in case of a Giffen Paradox or the Giffen good, negative income effect of the price change is more powerful than substitution effect so that when the price of a Giffen good falls, the negative income effect outweighs the substitution effect with the result that quantity demanded of it falls.

Check Your Progress 5

1) Explain consumer surplus? Use utility analysis.

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2) Critically examine Cardinal utility approach.

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5.10 ORDINAL UTILITY APPROACH

Cardinal Utility approach was criticised for being restrictive in nature. This idea gave birth to ordinal approach. Edgeworth also believed that all consumer behaviour can be measured in terms of preferences and rankings and can be understood using Indifference curve approach. Though this approach was originally propounded by Edgeworth, it became popular because of Vilfred Pareto (1906), Slutsky (1915) and finally because of RGD Allen and J.R Hicks. However, this approach is also based on some assumptions.

Assumptions of Ordinal Utility Approach

1) Rationality: The basic assumption is that consumer is a rational being, i.e., he prefers more to less and tries to maximise his satisfaction.

2) Indifference curve analysis assumes that utility is only ordinally expressible i.e. utility derived from two goods can be compared, as more, less, or equal, but not how much more or less.

3) Transitivity: Consumer choices are assumed to be transitive. Transitivity of choices means that if a consumer prefers A to B and B to C, then he prefers A to C, or if she treats A>B and B>C, then she also treats A>C.

4) Consistency: Consistency of choice means that if a person prefers A over B in one period, he/she will not prefer B over A in another period.

5) Non satiety: This assumption means that a consumer prefers a larger quantity of all the goods over smaller quantities of the same.
6) Diminishing Marginal Rate of Substitution (MRS): MRS is that rate at which a consumer is willing to substitute one commodity (say X) for another (say Y) while maintaining the same utility or level of satisfaction to the consumer

5.11 INDIFFERENCE CURVE ANALYSIS

J.R Hicks used the concept of Indifference curve to analyse consumer behaviour. A consumer facing choice between large number of bundles of two goods tries to maximise his satisfaction by choosing a combination which gives him maximum utility. In the course of decision making, consumer finds out that goods can be substituted for each other and identifies various combinations of

commodities that give him equal level of satisfaction. When all these combinations are plotted graphically, it produces a curve called Indifference curve

5.11.1 Indifference Schedule An indifference schedule is a table which represents various combinations of two goods, which yield equal satisfaction to consumer. Since all the combinations give equal level of satisfaction, consumer is indifferent between them.

Combinations	Units of 'X' Goods (Cup of Tea)	Units of 'Y' Goods (Biscuits)	Satisfaction
A	1+	12	K
B	2+	8	K
C	3+	5	K
D	4+	3	K
E	5+	2	K

Table 5.3: Indifference schedule of two commodities 'X' and 'Y'

In above table, five different combinations of Tea and Biscuits are depicted. All these combinations give equal level of satisfaction i.e. K. The consumer is indifferent whether he buys 1 cup of tea and 12 biscuits or 2 cups of tea and 8 biscuits. Different schedules can be formed showing different levels of satisfaction.

5.11.2 Indifference Curve

The graphical presentation of Indifference schedule is known as Indifference curve. The indifference curve is locus of all the combinations of two commodities which give same level of satisfaction to the consumer

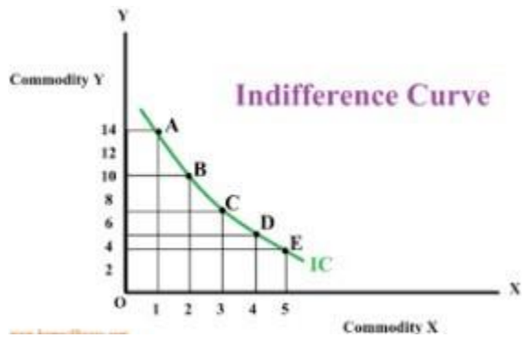

Fig. 5.7: Indifference curve

Fig. 5.7 is graphical representation of Table 5.3. It shows all the combinations of good X and good Y i.e. A, B, C, D and E which yield equal level of satisfaction to the consumer. The curve is downward sloping, convex to the point of origin

5.11.3 Indifference Map The combinations of two commodities X and Y given in the Indifference schedule are not the only possible combinations for these commodities. The consumer may make any other combinations with less of one or both of the goods, each yielding the same level of satisfaction but less than the one shown in schedule. IC curve of this schedule will be above IC1. Similarly, the consumer may make other combinations with more of one or both of the goods, each combination yielding the same satisfaction but greater than the satisfaction indicated. A diagram showing different indifference curves corresponding to different indifference schedules of the consumer is indifference map. In other words, a set or family of indifference curves is an indifference map.

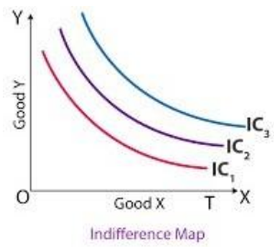

Fig. 5.8: Indifference map

Fig. 5.8 shows four indifference curves: IC1, IC2, IC3 and IC4. All the points on IC2 will yield higher satisfaction than the points on IC1 and all the points on IC3 will yield lesser satisfaction than the points on IC4.

5.11.4 Law of Diminishing Marginal Rate of Substitution

What is Marginal Rate of Substitution? Marginal rate of substitution may be defined as the rate at which a consumer will exchange successive units of a commodity for another. In other words, Marginal rate of substitution is the rate at which, in order to get the additional units of a commodity, the consumer is willing to sacrifice or give up to get one additional unit of another commodity. The Marginal Rate of Substitution can symbolically be represented as under:

$MRSxy = \Delta Y/\Delta X$

Where MRSxy= Marginal rate of substitution of X for Y

ΔY= Change in 'Y' commodity

ΔX= Change in 'X' commodity.

Diminishing Marginal rate of Substitution

One of the basic postulates of ordinal utility theory is that Marginal rate of substitution (MRSxy or MRSyx) decreases. It means that the quantity of a commodity that a consumer is willing to sacrifice for an additional unit of another commodity goes on decreasing. Law of diminishing Marginal rate of substitution is an extensive form of the law of diminishing Marginal Utility. As discussed in previous section, Law of diminishing marginal Utility states that as a consumer increases the consumption of a good, his marginal utility goes on diminishing. Similarly, as consumer gets more and more unit of good X, he is willing to sacrifice less and less units of good

Y for each extra unit of X. The significance of good X in terms of good Y goes on diminishing with each addition of good X.

5.11.5 Properties of Indifference Curve

1) Indifference curve slopes downwards from left to right: It implies that Indifference curve has a negative slope. This attribute is based on the assumption that if a consumer uses more quantity of one good, he has to reduce the consumption of the other good in order to stay at the same level of satisfaction.

2) Indifference curves are generally convex to the origin 'O': This property is based on the principle of Diminishing Marginal Rate of Substitution. It means that as the units of 'X' are increased by equal amounts, the 'Y' diminishes by smaller and smaller amounts. This happens because as a consumer gets more and more units of 'X' good, he is willing to give up less and less units of good Y for each extra unit of X.

3) Indifference curves cannot intersect each other: This is because of the fact that each indifference curve represents different level of satisfaction. If two indifference curves intersect, it will lead to self-contradictory result.

4) Higher Indifference curve represents higher level of satisfaction: In Fig. 5.9, the indifference curve IC2 lies above and to the right of the IC1. Point C on IC2 represents more units of 'Good 1' than point B on IC1. It is thus evident that higher the indifference curve, the higher the satisfaction it represents because our consumer prefers more of a good to less of it.

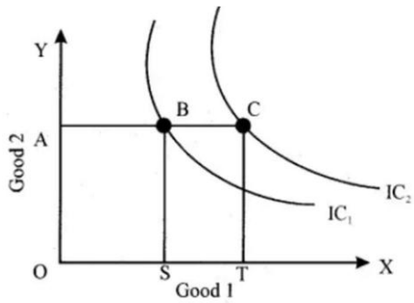

Fig. 5.9: Higher Indifference curve means higher level of satisfaction

5) Indifference curves do not touch either of the axes X or Y . This is because of the assumption that the consumer purchases combination of different commodities. In case, an indifference curve touches either axis, it means the consumer wants only one commodity and his demand for the second commodity is zero.

6) No Indifference curve cuts either of axes: If it were to happen, the consumer will be consuming negative quantity of that commodity which makes no sense

5.12 BUDGET LINE

As discussed above, a rational consumer always acts according to his budget constraint and tries to maximise his level of satisfaction. Thus, the knowledge of the concept of budget line or what is also called budget constraint is essential for understanding the theory of consumer's equilibrium.

A consumer in his attempt to maximise his satisfaction will try to reach the highest possible indifference curve. But in his pursuit of maximising satisfaction by buying more and more goods, he has to consider two constraints: first, he has to pay the prices for the goods and, secondly, he has a limited money income to purchase the goods. Thus, how much a person is capable to buy, depends upon the prices

of the goods and the money income which he has at his disposal. Price line or budget line represents all possible combinations of two goods that a consumer can purchase with his given income and the given prices of two goods. Let us try to understand the concept with the help of an example: Suppose a consumer has an income of Rs. 100 to spend on Oranges and Apples which cost Rs. 10 each. He can either spend his limited income only on one good or both the goods.

The budget line can be written algebraically as follows:

Algebraic Expression for Budget Set: The consumer can buy any bundle (A, B), such that:

$M \geq (PX * QX) + (PY * QY)$ Where PX and PY denote prices of goods X and Y respectively and M stands for money income

SLOPE OF BUDGET LINE

As we know that the slope of a curve is calculated as a change in variable on the Y-axis divided by change in variable on the X-axis, slope of the budget line in given example will be number of units of Oranges, that the consumer is willing to sacrifice for an additional unit of Apple.

Slope of Budget Line = Units of Oranges (Y) willing to Sacrifice/ Units of Apples (X) willing to Gain = $\Delta Y/\Delta$ This slope of budget line is equal to 'Price Ratio' of two goods. Price Ratio = Price of X (PX)/Price of Y (PY) = –PX /PY

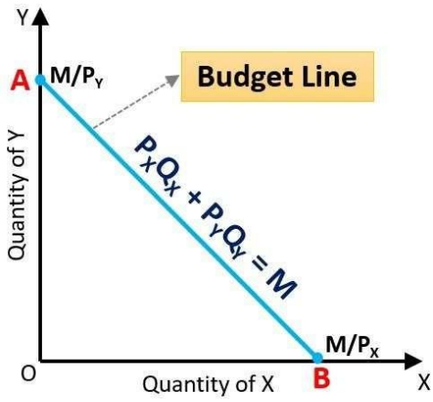

Fig. 5.8: Budget Line

5.13 SHIFT IN BUDGET LINE

Budget line is drawn on the basis of assumption of constant prices of the goods and constant income of the consumer. Thus, if there is any change in either of the two variables, budget line shifts.

Thus, there are two variables that causes shift in Budget Line:

1) Change in Income of the consumer

2) Change in equal proportion of Prices of both the goods.

Change in Income of the consumer If income changes while the prices of goods remain the same, Budget line will shift rightwards or leftwards. Since the prices of two goods are constant, slope of budget line will remain constant. The effect of changes in income on the budget line is shown in Fig. 5.9. If consumer's income increases while prices of both goods X and Y remain unaltered, the price line shifts upward and is parallel to the original budget line.

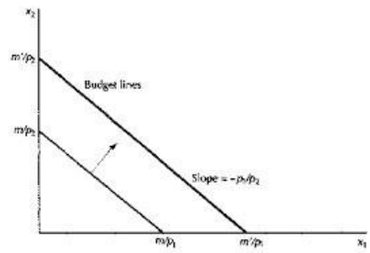

Fig. 5.9: Effect of change in Income on Budget Line

This is because with the increased income the consumer is able to purchase proportionately larger quantity of both goods than before. On the other hand, if income of the consumer decreases, prices of both goods X and Y remaining unchanged, the budget line shifts downward but remains parallel to the original price line. This is because a lower income will leave the consumer in a position to buy proportionately smaller quantities of both goods.

Changes in Price of either of the two goods:

Budget Line also shifts when there is change in price of either of the two goods. Increase in price of any commodity reduces the purchasing power of the consumer, in turn reducing the quantity demanded. Shift of Budget line due to change in prices of either good x or good y is presented below:

Changes in Budget Line as a Result of Changes in Price of Good X

Suppose, price of good X rises, the price of good Y and income remaining unaltered. With higher price of good X, the consumer can purchase smaller quantity of X.

In Fig. 5.10, original price line is BA. With increase in Price of good X, budget line will shift to BA2 i.e. consumer will be able to buy less quantity of good X, quantity of good Y remaining same. Similarly when there is fall in price of good X, keeping prices of good Y constant, budget line shifts from BA to BA1 i.e. consumer

will be able to buy more quantity of good X, quantity of good Y remaining same.

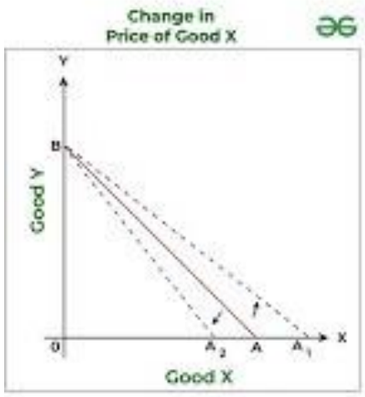

Fig. 5.10: Shift in Budget line due to change in price of good X

Change in Price of good Y

Fig. 5.11 shows the changes in the budget line when price of good Y falls or rises, with the price of X and income remaining the same. It can be observed from Fig. 5.11 that the initial budget line is AB. With fall in price of good Y, other things remaining unchanged, the consumer could buy more of Y with the given money income and therefore budget line will shift above to AB1. Similarly, with the rise in price of Y, other things being constant, and the budget line will shift below to AB2.

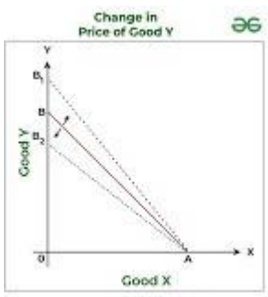

Fig. 5.11: Shift in Budget line due to change in price of good Y

Check Your Progress

1) What is budget line?

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2) Explain shift in budget line in brief?

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5.14 CONSUMER EQUILIBRIUM THROUGH INDIFFERENCE CURVE ANALYSIS

Consumer equilibrium is a point of maximum satisfaction for the consumer. It is a state of rest for the consumer. Study of Consumer equilibrium requires some assumptions to be made about the consumer behaviour. These are:

i) Rationality: The consumer is rational. He wants to obtain maximum satisfaction given his income and prices.

ii) Consumer has an indifference map, showing his scale of preference for various combinations of good x and y.

iii) Utility is ordinal: It is assumed that the consumer can rank his preference according to the satisfaction of each combination of goods. iv) Consistency of choice: It is also assumed that the consumer is consistent in the choice of combination of goods. v) Consumer has a given and fixed amount of money income to spend on the goods. Thus, consumer has to choose to spend his income on either of the two goods or a combination thereof.

iv) All the units of the goods are homogeneous.

v) The goods are divisible i.e. they can be divided into small units.

vi) Total utility: The total utility of the consumer depends on the quantities of the good consumed.

5.14.1 Conditions of Consumer's Equilibrium

There are two fundamental conditions of consumer's equilibrium through Indifference curve approach:

1) The price line should be tangent to the Indifference curve. It means that at the point of equilibrium the slope of the indifference curve and of the price line should be same. The slope of Indifference curve indicates MRSxy i.e. $-\Delta Y/\Delta X$. The slope of the price line indicates the ratio between price of two goods X and Y i.e. Px/Py.

2) Indifference curve should be convex to the point of origin: Marginal rate of substitution of X for Y (MRSxy i.e. $\Delta y/\Delta x$) is equal to the slope of the price line that indicates the ratio between prices of two goods.

Condition 1: MRSXY = Ratio of prices or PX/PY

Let the two goods be X and Y. The first condition for consumer's equilibrium is that

MRSxy = Px/Py

- If MRSxy> Px/Py, it means that the consumer is willing to pay more for X than the price prevailing in the market. As a result, the consumer buys more of X. As a result, MRS falls till it becomes equal to the ratio of prices and the equilibrium is established.

- If MRSxy< Px/Py, it means that the consumer is willing to pay less for X than the price prevailing in the market. It induces the consumer to buys less of X and more of Y. As a result, MRS rises till it becomes equal to the ratio of prices and the equilibrium is established.

Condition 2: MRS continuously falls

The second condition for consumer's equilibrium is that MRS must be diminishing at the point of equilibrium, i.e. the indifference curve must be convex to the origin at the point of equilibrium. Unless MRS continuously falls, the equilibrium cannot be established. Thus, both the conditions need to be fulfilled for a consumer to be in equilibrium. Let us now understand this with the help of a diagram: In Fig. 5.12, IC1, IC2 and IC3 are the three indifference curves and MM is the budget line. With the constraint of budget line, the highest indifference curve, which a consumer can reach, is IC2. The budget line is tangent to indifference curve IC2 at point 'E'. This is the point of consumer equilibrium.

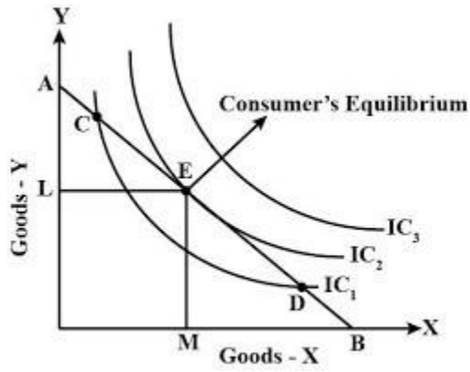

Fig. 5.12: Consumer equilibrium through indifference curve

All other points on the budget line to the left or right of point 'E' will lie on lower indifference curves and thus indicate a lower level of satisfaction. As budget line can be tangent to one and only one indifference curve, consumer maximises his satisfaction at point E, when both the conditions of consumer's equilibrium are satisfied:

i) MRS = Ratio of prices or PX/PY

At tangency point P, the absolute value of the slope of the indifference curve (MRS between X and Y) and that of the budget line (price ratio) are same. Equilibrium cannot be established at any other point such as MRSXY> PX/PY at

all points to the left of point P or MRSXY< PX/PY at all points to the right of point E. So, equilibrium is established at point P, when MRSXY = PX/PY

ii) MRS continuously falls: The second condition is also satisfied at point P as MRS is diminishing at point P, i.e. IC2 is convex to the origin at point E.

5.15 SOME EXCEPTIONAL SHAPES OF INDIFFERENCE CURVE AND CORNER EQUILIBRIUM

The indifference curve may take different shape in exceptional cases like perfect complements, perfect substitutes. Also if an assumption of 'two goods' is dropped, indifference curve may touch X axis or Y axis also.

In case of an exceptional shape of an indifference curve, equilibrium may be called as corner solution. Normally, an equilibrium is achieved at the point of tangency between the budget line and his indifference curve. At this point, consumer's preferences are such that he likes to consume some amount of both the goods. This equilibrium position at the point of tangency which lies within commodity space between the two axes is often called interior solution. Interior solution implies that consumers' pattern of consumption is diversified and they prefer basket or bundle of several different goods instead of spending their entire income on a single commodity. However, this may not be true in real life scenario and a customer may prefer small number of goods and service rather than buying all goods and services available. There may be various reasons for such behaviour – price, taste and preference etc.

Corner solution when only Commodity Y is purchased

Fig. 5.13 presents a case where indifference map between two goods X and Y and budget line BL are such that the interior solution is not possible and consumer in its equilibrium position at point B will not consume any quantity of commodity X. The reason behind such indifference map is high price of commodity X. As we already know that the slope of budget line is ratio of price of two goods, high price of good X makes the budget curve is steeper than the indifference curves between the two commodities i.e. price or opportunity cost of commodity X in the market is greater than the marginal rate of substitution of X for Y which indicates willingness to pay for the commodity X (Px/Py >MRSxy). The price of good X is so high that the consumer does not purchase even one unit of the commodity X. Thus the consumer maximises his satisfaction or is in equilibrium at the corner point B where he buys only commodity Y. Thus, consumer's equilibrium in this case is a corner solution.

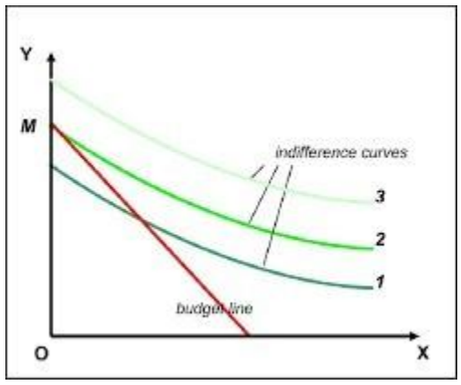

Fig. 5.13: Corner solution when only Commodity Y is bought

Corner solution when only Commodity X is purchased

On the other hand, when the indifference map between the two goods is such that the budget line MN is less steep than the indifference curves between the two goods so that the MRSxy > Px/Py for all levels of consumption along the budget line BL. Therefore, he maximises his satisfaction at the corner point A where he buys only commodity X and none of Y. In this case price of

commodity Y and willingness to pay (i.e. MRS) for it are low that he does not consider it worthwhile to purchase even one unit of it. Fig. 5.14 presents the corner solution when only commodity X is purchased

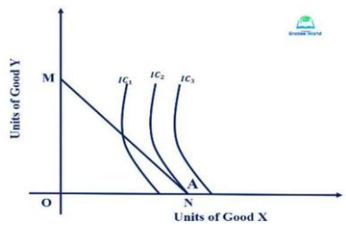

Fig. 5.14: Corner solution when only Commodity X is purchased

Corner Equilibrium and Concave Indifference Curves:

The indifference curves are usually convex to the origin. Convexity of indifference curves is due to the reason that marginal rate of substitution of X for Y falls as more of X is substituted for Y. However, indifference curves are concave to the origin in some exceptional cases. Concavity of the indifference curves implies that the marginal rate of substitution of X for Y increases when more of X is substituted for Y. Thus, in case of concave indifference curve, consumer will choose or buy only one good. It implies that the customer prefers to buy only one good and does not prefer diversification in his buying pattern. In case of concave indifference curves, the consumer will not be in equilibrium at the point of tangency between budget line and indifference curve, that is, in this case interior solution will not exist. Instead, we would have corner solution for consumer's equilibrium. Corner solution in case of concave indifference curve is presented in Fig. 5.15.

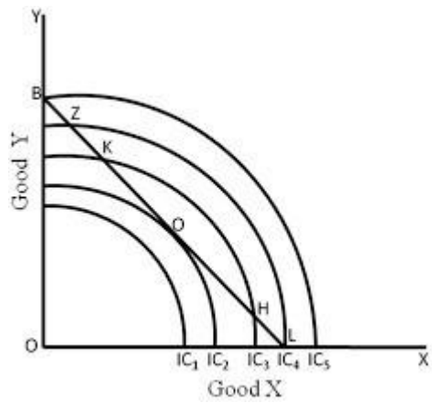

Fig. 5.15: Consumer equilibrium in case of concave indifference curves

It can be observed from Fig. 5.15 that the given budget line BL is tangent to the indifference curve IC2 at point Q. However, consumer cannot be in equilibrium at Q since by moving along the given budget line BL he can get on to higher indifference curves and obtain greater satisfaction than at Q. Thus, by moving on higher indifference curve he will reach at extreme point B or point L. In Fig. 5.15, point B is on higher indifference curve. Thus, consumer will be satisfied at point B where he will buy OB units of commodity Y. It should be noted that at B the budget line is not tangent to the indifference curve IC5, even though the consumer is here in equilibrium. It is clear that when a consumer has concave indifference curves, he will consume only one good

Corner solution in case of Perfect Substitutes and Perfect Complements: Another case of corner solution to the consumer's equilibrium occurs in case of perfect substitutes. As seen above, indifference curves for perfect substitutes are linear. In their case tangency or interior solution for consumer's equilibrium is not possible since the budget line cannot be tangent to a point of the straight-line indifference curve of substitutes. In this case budget line would cut the straight-line indifference curves. Fig. 5.16A presents a case where slope of the budget line BL is greater than the

slope of indifference curves. If the slope of the budget line is greater than the slope of indifference curves, B would lie on a higher indifference curve than L and the consumer will buy only Y.

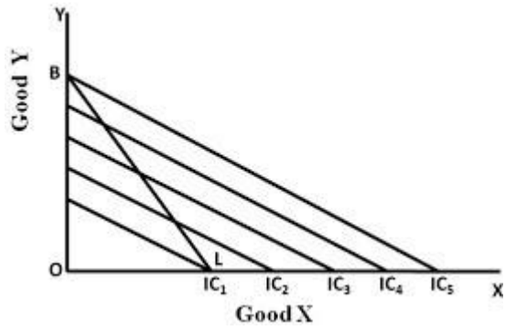

Fig. 5.16 A: Corner equilibrium in case of Perfect Substitutes

Fig. 5.16 B presents a case the slope of the budget line can be less than the slope of indifference curve. If the slope of the budget line is less than the slope of indifference curves, L would lie on a higher indifference curve than B and the consumer will buy only X

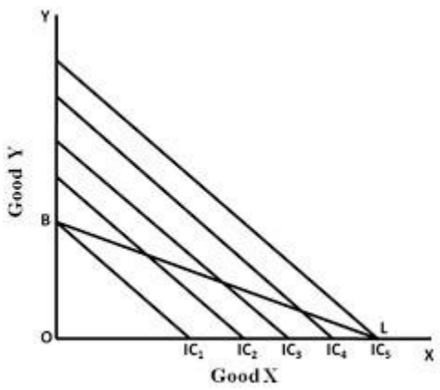

Fig. 5.16 B: Corner equilibrium in case of Perfect Substitutes

Perfect complements Another exceptional case of perfect complementary goods is presented in Fig. 5.17. Indifference curves of perfect complementary goods have a right-angled shape. In such a case the equilibrium of the consumer will be determined at the corner of indifference curve which just touches the budget line. It can be noted from Fig. 5.17 that in case of perfect complements

equilibrium point will be point C and will be consuming OM of X and ON of Y

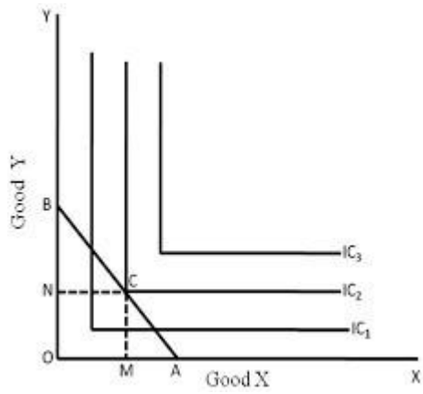

Fig. 5.17: Corner solution in case of Perfect Complements

MEASURING INCOME AND SUBSTITUTION EFFECTS OF PRICE CHANGE

The change in consumption basket due to change in the prices of consumer goods is called price effect. Price effects combines two effects: Income effect and substitution effect. Income effect is the result of increase in real income due to decrease in price of a commodity. Substitution effect arises due to substitution of costly good by cheaper good. This section presents the decomposition of Income and substitution effect from the price effect. There are two approaches for the decomposition:

a) Hicksian approach, and b) Slutsky approach.

Hicksian approach uses two methods of splitting the price effect, namely

i) Compensating variation in income
ii) Equivalent variation in income. Slutsky uses cost-difference method to decompose price effect into its two component parts.

Hicksian or Compensating Variation approach

In this method of decomposition of price effect into income and substitution effects by compensating variation, income of the consumer is adjusted so as to offset the change in satisfaction and bring the consumer back to his original indifference curve, that is, his initial level of satisfaction before the change in price. For instance, with the fall in price of a commodity, a consumer moves to a new equilibrium position at a higher indifference curve i.e. at a higher level of satisfaction. To offset this increase in satisfaction resulting from a fall in price of the good, one part of income is taken back to force him to come back at his original indifference curve. This requires reduction in income (say, through levying a lump sum tax) to cancel out the gain in satisfaction or welfare on account of by reduction in price of a good. It is called compensating variation in income. The effect is called compensating variation in income because it compensates (in a negative way) for the gain in satisfaction resulting from a price reduction of the commodity. Process of decomposition of price effect into substitution effect and income effect through the method of compensating variation in income is presented in Fig. 5.18.

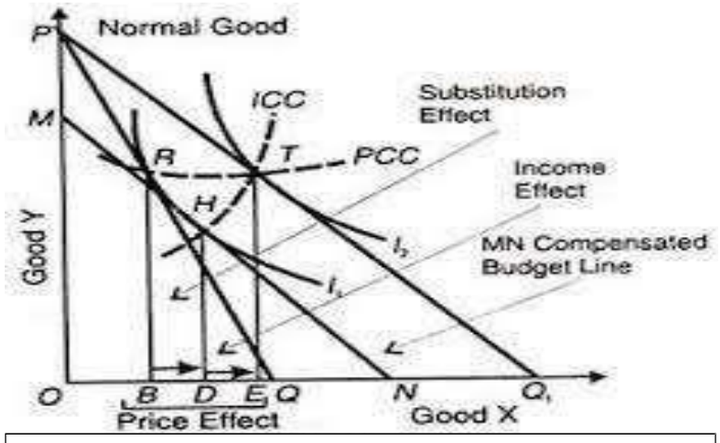

Fig. 5.18: Decomposition of price effect into income effect and substitution effect through Compensating variation in Income

It can be observed from Fig. 5.18, that when price of good X falls, budget line shifts to PQ1 i.e. real income of the consumer i.e. he can buy more of both the goods with his increased income. With the new budget line PQ1, consumer is in equilibrium at point T on a higher indifference curve IC2 and enjoy increased satisfaction as a result of fall in price of good X. Suppose, money income of the consumer is reduced by the compensating variation in income so that he is forced to come back to the original indifference curve IC1 he would buy more of X since X has now become relatively cheaper than before. In Fig. 5.18, with the reduction in income by compensating variation, budget line will shift to MN which has been drawn parallel to PQ1 so that it just touches the indifference curve IC1 on which he was before the fall in price of X. Since the price line MN has got the same slope as PQ1, it represents the changed relative prices with X being relatively cheaper than before. Now, X being relatively cheaper than before, the consumer, in order to maximise his satisfaction, in the new price income situation substitutes X for Y. Thus, when the consumer's money income is reduced by the compensating variation in income (which is equal to PM in terms of Y or NQ1 in terms of X), the consumer moves along the same indifference curve IC1 and substitutes X for Y. At price line MN consumer is in equilibrium at H at indifference curve IC1 and is buying BD more of X in place of Y. This movement from R to H on the same indifference curve IC1 represents the substitution effect since it occurs due to the change in relative prices alone, real income remaining constant. If the amount of money income which was taken away from him is now given back to him, he would move from H at indifference curve IC1 to T on a higher indifference curve IC2. The movement from H at lower indifference curve to T on a higher in difference curve is the result of income effect. Thus the movement from R to T due to price effect can be regarded as having taken place into two steps first from R to H as a result of substitution effect and

second from H to T as a result of income effect. Thus, price effect is the combined result of a substitution effect and an income effect. In Fig. 5.18 the various effects on the purchases of good X are: Price effect = BE Substitution effect = BD Income effect = DE

- BE = BD+DE or Price effect = Substitution effect + Income effect

Slusky's Cost difference , when the price of gd changes and consumer's real income or purchasing power increases, the income of the consumer is changed by the amount equal to the change in its purchasing power which occurs as a result of the price change. His purchasing power changes by the amount equal to the change in the price multiplied by the number of units of the good which the individual used to buy at the old price.

In other words, in Slutsky's approach, income is reduced or increased (as the case may be), by the amount which leaves the consumer to be just able to purchase the same combination of goods, if he so desires, which he was having at the old price.

That is, the income is changed by the difference between the cost of the amount of good X purchased at the old price and the cost of purchasing the same quantity of X at the new price. Income is then said to be changed by the cost difference. Thus, in Slutsky substitution effect, income is reduced increased not by compensating variation as in case of the Hicksian substitution effect, but, by the cost difference. Slutsky substitution effect is explained in Fig. 5.19

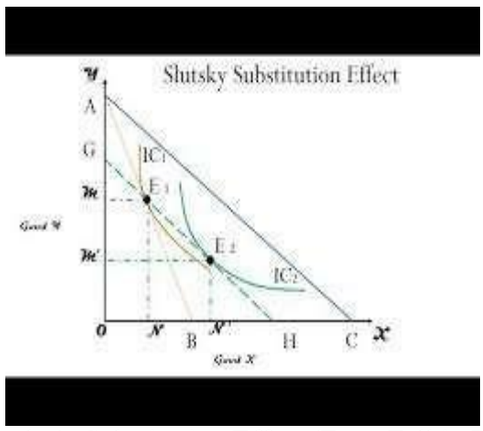

Fig. 5.19: Slutsky's Substitution Effect (For a Fall in Price)

Initially, with a given money income and the given prices of two goods as represented by the price line AC, the consumer is in equilibrium at point E1 on the indifference curve IC1 where consumer is buying OM units of good X and OM units of good Y. Suppose that price of X falls, price of Y and money income of the consumer remaining constant. As a result of this fall in price of X, the price line will shift to AC and the real income or the purchasing power of the consumer will increase. In order to identify Slutsky's substitution effect, consumer's money income must be reduced by the cost difference or, in other words, by the amount which will leave him to be just able to purchase the old combination E1, if he so desires. For this, a price line GH parallel to AC has been drawn which passes through the point E1. It means that income equal to AG in terms of Y or BH in terms of X has been taken away from the consumer and as a result he can buy the combination E1, if he so desires, since E1 also lies on the price line GH. Consumer will not now buy the combination E1 since X has now become relatively cheaper and Y has become relatively dearer than before. The change in relative prices will induce the consumer to rearrange his purchases of X and Y. He will substitute X for Y. But in this Slutsky substitution effect, he will not move along the same indifference curve IC1, since the price line GH, on which the consumer has to remain due to the new price-income circumstances is nowhere

tangent to the indifference curve IC1. The price line GH is tangent to the indifference curve IC2 at point E2. Therefore, the consumer will now be in equilibrium at a point E2 on a higher indifference curve IC2. This movement from E1to E2 represents Slutsky substitution effect according to which the consumer moves not on the same indifference curve, but from one indifference curve to another. It is important to note that movement from E1to E2 as a result of Slutsky substitution effect is due to the change in relative prices alone, since the effect due to the gain in the purchasing power has been eliminated by making a reduction in money income equal to the cost-difference. At E2, the consumer is buying ON of X and OM ^{1}of Y; N^{1} N of X has been substituted for MM^{1}of Y.

Check your progress

1. What is consumer equilibrium?

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2. Explain Slutsky substitution effect?

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5.16 LET US SUM UP

In this unit, Utility is a psychological phenomenon. It is a feeling of satisfaction, pleasure or well-being experienced by the consumer from the consumption or possession of the commodity or a service. In this sense, it is a subjective or relative concept i.e. level of utility derived from a product differs from person to person. We also examined the relationship between want, utility, consumption and satisfaction i.e. how want leads to selection of commodity having

utility which in turn leads to consumption and finally satisfaction of want. We further analysed the relationship between Marginal utility and Total utility and the law of diminishing marginal utility. We also explained consumer equilibrium using utility approach in case of single commodity and multiple commodity . Consumer preference .We have learnt consumer equilibrium through Indifference curve analysis. Consumer equilibrium is a situation, in which a consumer derives maximum satisfaction, with no intention to change it and subject to given prices and his given income. In indifference curve analysis, the point of maximum satisfaction is achieved by studying indifference map and budget line together. We have discussed the concept of budget line to identify consumer equilibrium. Price line or budget line represents all possible combinations of two goods that a consumer can purchase with his given income and the given prices of two goods. Budget line may shift due to change in income or change in prices of either of the two commodities. We further examined the two conditions of consumer equilibrium i.e. MRSXY = Ratio of prices or PX/PY and continuous fall of MRS. We have also learnt how is Price effect combination of income effect and substitution effect using Hicksian and Slutsky's analysis. Demand curve has been derived from price consumption curve.

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UNIT 6 DEMAND ELASTICITY

Structure

6.0 INTRODUCTION

The demand function and the law of demand tell us about the direction of change if the value of any independent variable changes. But these do not tell us anything about the magnitude of the change. If, for example, the price of a commodity falls, we know its quantity demanded will increase. By how much, we do not know. To measure the change we make use of another concept. This is called Elasticity of Demand. In this unit you will study the extent to which the price of a commodity, income of the consumer and prices of other commodities exercise influence on the quantity demanded of a commodity. This you will study with the help of price elasticity of demand, income elasticity of demand and the cross-elasticity of demand.You will also study the factors on which the price elasticity of demand of a commodity depends along with the importance of the concept of price elasticity of demand in various government policies.

6.1 OBJECTIVES

After studying this unit, you should be able to:

- explain the concept of elasticity of demand

- identify price elasticity of demand, income elasticity of demand and price
- cross-elasticity of demand • describe various methods to measure price elasticity of demand
- identify the case of unitary price elastic
- demand curve list the factors determining price elasticity explain the importance of the price elasticity of demand.

6.2 CONCEPT OF ELASTICITY OF DEMAND

The elasticity of demand is the responsiveness of a dependent variable (demand) to a given change in independent variables (price of a commodity, income of the consumer or price of a commodity other than the commodity in question). Elasticity is always worked in terms of a percentage or proportionate change in the dependent variable to a given percentage or proportionate change in the independent variable. It is important to remember that though the demand of a commodity is dependent on various factors, yet the law of demand states that the demand of a commodity is inversely related to its price. This is possible because the factors other than the price of the commodity are assumed to remain unchanged.

In technical terms, such a situation is referred to as partial equilibrium approach. It is called partial because all the factors exercising influence on demand of a commodity are not allowed to

change at the same time. It is also possible to assume the price of the commodity and prices of other commodities remain unchanged and we can work out a relationship between the demand of the commodity and the income of the consumer' who demands the commodity. Similarly, we can assume the price of the commodity and income of the consumer as unchanged and a relationship can be worked out between the demand of the commodity and the price of the commodity other than the commodity in question.

The concept of elasticity, on the other hand, tries to quantify the relationship between the demand of the commodity and the price of the commodity or income of the consumer or price of the commodity other than the commodity in question, but at a time only one of the three factors mentioned above are allowed to change, keeping other factors as unchanged. Accordingly, there are three concepts of elasticity we are going to consider in this unit.

They are (i) price elasticity of demand, (ii) Income elasticity of demand, and (iii) Cross elasticity of demand.

6.2.1 Price Elasticity of Demand

Price elasticity of demand measures the relative change in quantity demanded of a commodity resulting from a given (percentage or proportional) change in its price. This can also be stated by saying that the price elasticity of demand is the relative responsiveness of quantity demanded of a commodity to change in the price of the commodity. This can be expressed in a different way by stating that the price elasticity of demand is the proportional or percentage change in quantity demanded of a commodity divided by the proportional or percentage change in the price of the commodity.

Let price elasticity of demand be represented by Ped where P stands for price and ed for elasticity of demand. Then,

P_{ed} = Proportional change in quantity demanded of a commodity

Proportional change in price of a commodity

Proportional change of a variable need to be explained. This can be explained with the help of an example.

Suppose, the quantity demanded is 20 units and it gets increased to 30 units, then the proportional change in quantity demanded is the new quantity demanded (30 units) minus the old quantity demanded (20 units) and whatever figure of quantity demanded is left (30 units – 20 units) if divided by the old figure of quantity demanded (20 units), this is the proportional change in quantity demanded. Similarly, proportional change in the price of a commodity can also be explained with the help of an example. Suppose the price of a commodity is Rs. 3 per unit and it falls to Rs. 2, then the proportional change in price is the new price (Rs. 2) minus the old price (Rs. 3) and whatever figure is left (Rs. 2 - Rs. 3) if divided by the original price (Rs. 3) will give the proportional change price Symbols can be used to express proportional changes. Let the difference between the new quantity demanded and the old quantity demanded be represented by A D and the original demand be represented by D, then proportional change in quantity demanded of commodity is $\Delta Q_d/Q$. Similarly, let us represent the difference between the new price and the old price by AP and the original price be represented by P, then the proportional change in price is $\Delta \mathbf{P}$ /P

If proportional change in quantity demanded of a commodity$\Delta Q_d/Q$ is divided by proportional change in price $\Delta \mathbf{P}$ /P then price elasticity of demand Ped is:

P_{ed} = **%Δ in Q_d/%Δ in P**

%Δ in Q_d = Percentage change in the quantity demanded

%Δ in P = Percentage change in price

$$P_{ed} = \frac{\Delta Q_d}{\Delta P} \times \frac{p}{Q_d}$$

Δ Q_d = Percentage change in the quantity demanded

Δ **P** = Percentage change in price

P = Original price

Q_d = Original quantity demanded

Interpretation of price elasticity coefficient

The value of P_{ed} may vary from Zero ($P_{ed} = 0$) to infinity ($P_{ed} = \propto$). For sake of convenience, we can classify these in following five groups

1. P_{ed} equal to infinity (Ped = ∝). This type of elasticity of demand obtains when a small change in price results in infinite changes in quantity demanded. Alternatively, it can be represented as a situation in which it is not possible to determine the quantity that would be demanded at a given price. This type of demand is also called perfectly elastic demand. Perfectly elastic demand can be represented graphically with the help of a horizontal straight line, as shown in Fig. 6.1

2. P_{ed} = 0. This happens when the quantify demanded does not change absolutely with a change in the price of the commodity. This situation is called perfectly inelastic demand. Graphically it can be represented in the form of a vertical straight line demand curve as shown in Fig. 6.1. This would be seen that the

quantity demanded of commodity remains unchanged at OQ, irrespective of the change in the price of the commodity.

3. P_{ed} equal to one (P_{ed} = 1). This value is obtained when the percentage change in quantity demanded equals the percentage change in price. A 10 percent fall in price induces a 10 percent increase in quantity demanded. This type of demand is said to be equal to Unitary Elastic.

4. 4. P_{ed} more than one (Ped> 1). This type of elasticity of demand obtains when the percentage change in quantity demanded is more than the percentage change in the price of a commodity. For example, a 10 per cent reduction in the price of quality chocolate may result in a 30 percent increase in the quantity demanded of chocolates. In this case, P_{ed} = 30% / 10% = 3. This type of demand is called more than unit elastic demand or Relatively elastic

5. 5. P_{ed} greater than zero but less than one – (Ped> 0 < 1). This value is obtained when the percentage change in quantity demanded is less than the percentage change in price. For example, a 10 percent fall in price may induce 8 percent rise in quantity demanded. This type of demand is known as less than unit elastic or Relatively inelastic

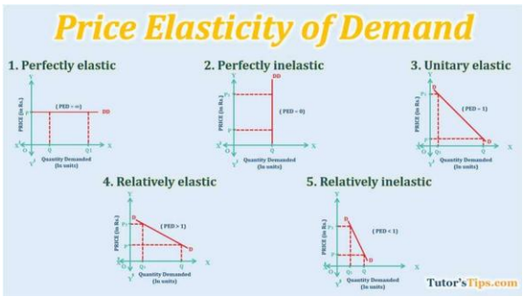

Figure 6.1: Price elasticity of Demand

Application of Interpretation

The value of Ped is of significant use, especially in business decision-making.

For example,What does Ped = 1.2, means? The answer is: If the price of a commodity it raised by 1 per cent, quantity demanded of this commodity will fall by 1.2 per cent. Similarly, if the price of a commodity is reduced by 10 percent, the quantity demanded of this commodity may increase by 12 percent.

6.2.2 Income Elasticity of Demand

Income elasticity of demand is the relative responsiveness of quantity demanded of a commodity to changes in income of the consumer demanding the commodity. It is the proportional or percentage change in quantity demanded of a commodity divided by the proportional change in income of the consumers demanding the commodity. Let us use symbols to represent income elasticity of demand (Y_{ed}) where Y stands for income and ed for elasticity of demand.

Y_{ed} = Proportional change in quantity demanded of a commodity

Proportional change in income of a commodity

Y_{ed} = **%Δ in Q_d/%Δ in Y**

%Δ in Q_d = Percentage change in the quantity demanded

%Δ in Y = Percentage change in Income

$$\mathbf{Y_{ed}} = \frac{\Delta \mathbf{Q_d}}{\Delta \mathbf{Y}} \times \frac{\mathbf{Y}}{\mathbf{Q_d}}$$

Δ **Q_d** = change in the quantity demanded

Δ **Y** = change in income

Y = Original income

Q_d = Original quantity demanded

It is worth noting that if no minus sign is attached to the co-efficient. It is so because we have assumed that there is a direct relationship between the quantity demanded and the income of the consumer demanding the commodity they are 'Normal commodities'. The case where there is an inverse relationship between the quantity demanded of a commodity and the income of the consumer is termed, as a case of an inferior commodity but if income elasticity is zero there is no relationship between the income of the consumer and the quantity demanded of the commodity

6.2.3 Price Cross Elasticity of Demand

The cross-elasticity of demand is the relative responsiveness of quantity demanded of a given commodity. It is the proportional or percentage change in the quantity demanded of a commodity say X divided by the proportional or percentage change in the price of related commodity say Y. Let us use symbols to represent cross-elasticity of demand (C_{ed}) where C stands for cross and ed for elasticity of demand.

C_{ed} = Proportional change in quantity demanded of a commodity X

Proportional change in price of a commodity Y

$$C_{ed} = \frac{\Delta Q_{dx}}{\Delta P_y} \times \frac{P_y}{Q_{dx}}$$

Δ Q_{dx} = change in the quantity demanded of commodity X

Δ P_y = change in price of a commodity Y

P_y = Original price of commodity Y

Q_{dx} = Original quantity demanded of commodity X

Cross elasticity coefficient between two commodities is plus, we should know that the two commodities are substitutes (as Pepsi and Coke, or Samsung and Apple Tablets), and Cross elasticity coefficient between two commodities is negative, we should know that the two commodities are complementary goods (as motorbike and petrol, cell phone and sim card, heir die and shampoo, etc.

Check Your Progress A

1) What is meant by price elasticity of demand?

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2) What is the difference between price elasticity of demand and income elasticity of demand?

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3) Distinguish between price elasticity of demand and cross-elasticity of demand.

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6.3 MEASUREMENT OF PRICE ELASTICITY OF DEMAND

There are a number of methods to measure price elasticity of demand. Some of the important methods are as follows:

1) Point Method: The main point to remember about this method is that it is employed only when the changes in price and quantity demanded are very small.

2) Total Expenditure Method: This total outlay method to measure price elasticity of demand is used whenever the changes in price and demand are not small. But it only helps us to distinguish three situations (i) whether the price elasticity of demand is one or unity, (ii) whether the price elasticity of demand is more than one, and (iii) whether the price elasticity of demand is less than one. Here the elasticity is measured by ratio P_1Q_1/P_0Q_0.

$E = (P_1Q_1) / (P_0Q_0)$.

3) Geometrical Method: According to this method, elasticity of demand is different at different points on a given demand curve, and is measured as follows on any point of a straight line curve.

$$E_p = \frac{\text{lower segment of demand curve}}{\text{Upper segment of demand curve}}$$

6.4 DETERMINANTS OF PRICE ELASTICITY OF DEMAND

There are a number of factors on which the price elasticity of commodity depends. Some of the important factors affecting price elasticity of demand are discussed below:

1. Nature of the Commodity: The commodities are normally divided into three categories (1) necessities, (ii) comforts, and (iii) luxuries, if the commodity happens to be a necessity price elasticity of demand will be less. Take the case of wheat. Even if the price of wheat rises people will not be able to reduce much the quantity demanded of wheat and therefore, the demand for wheat is relatively less elastic. In the case of comforts, the change in price makes the consumer change the quantity demanded relatively more and so it is more elastic. As regards luxuries, since they are purchased by people who have higher income the demand does not change much with change in price and thus tend to be less price elastic.

2. Number of Substitutes: Commodities with few and poor substitutes – wheat and salt, for example, will always tend to have low price elasticity of demand. Commodities with many substitutes – wool, for which cotton and synthetics can be substituted for example, will have relatively high price elasticity of demand.

3. Number of uses of a commodity: The greater the number of possible uses of a commodity, the greater its price elasticity of demand will be. Thus a commodity, such as coal - which can be used in producing power generation, domestic purposes and industrial purposes - will have higher price elasticity of demand than a commodity with only one or a very few uses – butter, for instance.

4. Price level of a commodity: The level of price will also have an impact on price elasticity of demand. A commodity like a box of

matches which has a very low price will have less price elasticity of demand. A commodity like car which has a very high price will also tend to have less price elasticity of demand since it is demanded by persons who have very high incomes. A medium price commodity like fan will have relatively more price elasticity of demand

6.5 IMPORTANCE OF PRICE ELASTICITYOF DEMAND

The price elasticity of demand is very important in a number of policy decisions. It is especially useful for government policies relating to individual commodity markets. Some of the important fields in which the importance of price elasticity of demand can be realized are discussed below:

1. Price fixation by a monopolist: The monopolist is always interested in charging a higher price from the consumer. If he comes to know that the price elasticity of demand of a commodity is low, he would fix up a higher price for the commodity. He would not be able to charge a very high price for a commodity whose price elasticity of demand is relatively higher.

2. Price support programme of the government: Normally, the price elasticity of demand of agricultural commodities like wheat, rice etc, is relatively less. This implies that a given increase in supply say because of better monsoon will lead to a relatively more fall in price. This would reduce the income of the farmer. The government in order to protect the interest of the farmers can announce what is called price support programme such that the price of the commodity will not be allowed to fall below a particular level. Obviously, this would lead to a situation where the quantity supplied will be more than the quantity demanded of a commodity at the price announced by the government. Therefore, the government has to be

prepared to procure the excess supply of the commodity from the farmers. Similarly, if for some reasons the quantity supplied of a commodity falls which has low price elasticity of demand, the price will tend to be higher and the consumer will be forced to pay relatively higher price. In order to protect the interest of the consumer, the government can announce what is called 'ceiling price' which is a price beyond which the farmer will not be allowed to charge. Whenever the government fixes a price less than what would have prevailed in the market otherwise, the quantity demanded of the commodity will be more than the quantity supplied at the price fixed by the government. The government in order to meet the excess demand of the commodity will either have to release stocks from its godowns or will have to import the commodity from other countries.

3. Incidence of indirect taxes: A government imposes indirect taxes on the commodities. Whenever an indirect tax is imposed, the burden of this tax is borne partly by the consumer and partly by the producer himself. The share of burden of an indirect tax borne by the consumer and the producer depends on

Price elasticity of supply

Price elasticity of demand

For example, a situation where Price elasticity of demand the demand curve is perfectly inelastic, irrespective of the shape of the supply curve, the whole burden of the indirect tax will be borne by the consumer, on the other hand if the demand curve is perfectly elastic the whole burden of the indirect tax will be borne by the producer or the supplier. The situations between two will be decided by the ratio of price elasticity of supply to price elasticity of demand

Check Your Progress B

1. What is the point method to measure price elasticity of demand?

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2. Explain the outlay method taking a numerical example.

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3. Show that the price elasticity of demand is not the same throughout the demand curve.

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4. What is meant by price elastic demand and price inelastic demand?

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5. When does the demand curve have unity price elasticity of demand?

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6.6 LET US SUM UP

The concept of elasticity of demand is the responsiveness of demand to a given change in an independent variable such as the price of the commodity in question, income of the consumer, price of a commodity related to the commodity in question. Price elasticity of demand is the responsiveness of demand to a given proportional change in the price of the commodity. Income elasticity of demand is the responsiveness of the demand of the commodity to a given change in the income of the consumer. Price cross-elasticity of demand is the responsiveness of demand to a given change in the price of the commodity other than the commodity in question. The

other commodity can be a substitute or a complement to the commodity in question. Normally, the coefficient of price elasticity of demand is negative. But the co-efficient of income and price cross-elasticity of demand may be positive or negative. Price elasticity of demand can be measured by the point method which is used whenever the changes in price and quantity demanded are very small. Outlay method is employed to determine the direction of price elasticity of demand which may be unity, more than unity or less than unity. Geometrical method is employed to find out price elasticity of demand at a given point on the demand curve. We can have a demand curve which may have the same price elasticity of demand throughout the demand curve. Such a curve is called 'Rectangular Hyperbola'. The nature of the commodity-necessity, comfort or luxury-the number of substitutes of the given commodity, the number of uses to which the commodity can be put and the price level of the commodity are sources of the factors on which the price elasticity of demand of a commodity depends. The concept of price elasticity of demand can be put to a number of uses. It helps the government to fix the support price or the ceiling price of a commodity. It can also help the monopolist to fix the price of the commodity. Further, it helps us to find out what share of an indirect tax will be borne by the consumer.

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UNIT 7 : TYPES & ITS RELEVANCE, DEMAND FORECASTING, REVENUE ANALYSIS

STRUCTURE

7.0 INTRODUCTION

An important aspect of demand analysis from the management point of view is concerned with forecasting demand for products, either existing or new. Demand forecasting refers to an estimate of most likely future demand for product under given conditions Such forecasts are of immense use in making decisions with regard to production, sales, investment, expansion, employment of manpower etc., both in the short run as well as in long run.

7.1 OBJECTIVES

By studying this unit, you should be able to:

- identify a wide range of demand estimation and forecasting methods;
- apply these methods and to understand the meaning of the results; understand the nature of a demand function;
- identify the strengths and weaknesses of the different methods;
- understand that demand estimation and forecasting is about minimizing.

7.2 MEANING AND FEATURES OF DEMAND FORECASTING

Demand forecasting seeks to investigate and measure the forces that determine sales for existing and new products. Generally companies plan their business – production or sales in anticipation of future demand. Hence forecasting future demand becomes important. In fact it is the very soul of good business because every business decision is based on some assumptions about the future whether right or wrong, implicit or explicit. The art of successful business lies in avoiding or minimizing the risks involved as far as possible and face the uncertainties in a most befitting manner . Thus Demand Forecasting refers to an estimation of most likely future demand for a product under given conditions.

Important features of demand forecasting

- It is basically a guess work – but it is an educated and well thought out guesswork.
- It is in terms of specific quantities It is undertaken in an uncertain atmosphere.
- A forecast is made for a specific period of time which would be sufficient to take a decision and put it into action.
- It is based on historical information and the past data.

- It tells us only the approximate demand for a product in the future.
- It is based on certain assumptions.
- It cannot be 100% precise as it deals with future expected demand

Demand forecasting is needed to know whether the demand is subject to cyclical fluctuations or not, so that the production and inventory policies, etc, can be suitably formulated

Demand forecasting is generally associated with forecasting sales and manipulating demand. A firm can make use of the sales forecasts made by the industry as a powerful tool for formulating sales policy and sales strategy. They can become action guides to select the course of action which will maximize the firm's earnings. When external economic factors like the size of market, competitors attitudes, movement in prices, consumer tastes, possibilities of new threats from substitute products etc, influence sales forecasting, internal factors like money spent on advertising, pricing policy, product improvements, sales efforts etc., help in manipulating demand. To use demand forecasting in an active rather than a passive way, management must recognize the degree to which sales are a result not only of external economic environment but also of the action of the company itself.

MANAGERIAL USES OF DEMAND FORECASTING:

In the short run:

Demand forecasts for short periods are made on the assumption that the company has a given production capacity and the period is too short to change the existing production capacity. Generally it would be one year period.

- Production planning: It helps in determining the level of output at various periods and avoiding under or over production.

• Helps to formulate right purchase policy: It helps in better material management, of buying inputs and control its inventory level which cuts down cost of operation

. Helps to frame realistic pricing policy: A rational pricing policy can be formulated to suit short run and seasonal variations in demand.

• Sales forecasting: It helps the company to set realistic sales targets for each individual salesman and for the company as a whole.

• Helps in estimating short run financial requirements: It helps the company to plan the finances required for achieving the production and sales targets. The company will be able to raise the required finance well in advance at reasonable rates of interest.

• Reduce the dependence on chances: The firm would be able to plan its production properly and face the challenges of competition efficiently.

• Helps to evolve a suitable labour policy: A proper sales and production policies help to determine the exact number of labourers to be employed in the short run.

In the long run: Long run forecasting of probable demand for a product of a company is generally for a period of 3 to 5 or 10 years.

1. Business planning It helps to plan expansion of the existing unit or a new production unit. Capital budgeting of a firm is based on long run demand forecasting.

2. Financial planning: It helps to plan long run financial requirements and investment programs by floating shares and debentures in the open market.

3. Manpower planning : It helps in preparing long term planning for imparting training to the existing staff and recruit skilled and efficient labour force for its long run growth.

4. Business control : Effective control over total costs and revenues of a company helps to determine the value and volume of business. This in its turn helps to estimate the total profits of the firm. Thus it is possible to regulate business effectively to meet the challenges of the market.

5. Determination of the growth rate of the firm : A steady and well conceived demand forecasting determine the speed at which the company can grow.

6. Establishment of stability in the working of the firm : Fluctuations in production cause ups and downs in business which retards smooth functioning of the firm. Demand forecasting reduces production uncertainties and help in stabilizing the activities of the firm.

7. Indicates interdependence of different industries : Demand forecasts of particular products become the basis for demand forecasts of other related industries, e.g., demand forecast for cotton textile industry supply information to the most likely demand for textile machinery, colour, dye-stuff industry etc.,

8. More useful in case of developed nations: It is of great use in industrially advanced countries where demand conditions fluctuate much more than supply conditions. The above analysis clearly indicates the significance of demand forecasting in the modern business set up.

7.3 LEVELS OF DEMAND FORECASTING

Demand forecasting may be undertaken at three different levels, viz., micro level or firm level, industry level and macro level

Micro level or firm level

This refers to the demand forecasting by the firm for its product. The management of a firm is really interested in such forecasting. Generally speaking, demand forecasting refers to the forecasting of demand of a firm.

Industry level

Demand forecasting for the product of an industry as a whole is generally undertaken by the trade associations and the results are made available to the members. A member firm by using such data and information may determine its market share.

Macro-level

Estimating industry demand for the economy as a whole will be based on macro-economic variables like national income, national expenditure, consumption function, index of industrial production, aggregate demand, aggregate supply etc, Generally, it is undertaken by national institutes, govt. agencies etc. Such forecasts are helpful to the Government in determining the volume of exports and imports, control of prices etc. The managerial economist has to take into consideration the estimates of aggregate demand and also industry demand while making the demand forecast for the product of a particular firm.

7.4 CRITERIA FOR GOOD DEMAND FORECASTING

Apart from being technically efficient and economically ideal a good method of demand forecasting should satisfy a few broad economic criteria. They are as follows:

- Accuracy: Accuracy is the most important criterion of a demand forecast, even though cent percent accuracy about the future demand cannot be assured. It is generally measured in terms of the past forecasts on the present sales and by the number of times it is correct.

- Plausibility: The techniques used and the assumptions made should be intelligible to the management. It is essential for a correct interpretation of the results.

- Simplicity: It should be simple, reasonable and consistent with the existing knowledge. A simple method is always more comprehensive than the complicated one

- Durability: Durability of demand forecast depends on the relationships of the variables considered and the stability underlying such relationships, as for instance, the relation between price and demand, between advertisement and sales, between the level of income and the volume of sales, and so on.

- Flexibility: There should be scope for adjustments to meet the changing conditions. This imparts durability to the technique.

- Availability of data: Immediate availability of required data is of vital importance to business. It should be made available on an up-to-date basis. There should be scope for making changes in the demand relationships as they occur.

• Economy: It should involve lesser costs as far as possible. Its costs must be compared against the benefits of forecasts

• Quickness: It should be capable of yielding quick and useful results. This helps the management to take quick and effective decisions.

Thus, an ideal forecasting method should be accurate, plausible, durable, flexible, make the data available readily, economical and quick in yielding results.

Check your progress

1. What is demand forecasting?

…….

2. What are the various levels of the demand forecasting?

……

3. Explain the criteria of good demand forecasting.?

……

4. What are managerial uses of demand fore casting?

…….

7.5 ESTIMATING DEMAND USING REGRESSION ANALYSIS

The basic regression tools discussed in Block 1 can also be used to estimate demand relationships. Consider a small restaurant chain specializing in Chinese dinners. The business has collected information on prices and the average number of meals served per day for a random sample of eight restaurants in the chain. These data

are shown below. Use regression analysis to estimate the coefficients of the demand function $Q_d = a + bP$ Based on the estimated equation, calculate the point price elasticity of demand at mean values of' the variables.

City	Meals per Day (Q)	Price (P)
1	100	150
2	90	180
3	85	190
4	110	140
5	120	130
6	90	190
7	105	160
8	100	140

Solution: The mean values of the variables are $\overline{Q} = 100$ and $\overline{P} = 160$. The other data needed to calculate the coefficients of the demand equation are shown below.

CITY	$Q_1 - \overline{Q}$	$P_1 - \overline{P}$	$(P_1 - \overline{P})^2$	$(Q_1 - \overline{Q})(P_1 - \overline{P})$
1	0	-10	100	0
2	-10	20	400	-200
3	-15	30	900	-450
4	10	-20	400	-200
5	20	-30	900	-600
6	-10	30	900	-300

7	5	00	00	0
8	0	-20	400	0
			4000	-1750

As shown, the sum of the $(P_1 - \bar{P})^2$ is 4000 and the sum of the $(Q_1 - \bar{Q})(P_1 - \bar{P})$ is –1750. Thus, using the equations for calculating b and a, b = − 1750/4000 = −.4375 and a =

100 − (. 4375)(160) = 170. Hence, the estimated demand equation is Q_d = 170 − .4375*P. Recall from the previous unit that the formula for point price elasticity of demand is Ep = (dQ/dP)(P/Q). Based on the estimated demand function, dQ/dP = –.4375. Thus, using the mean values for the price and quantity variables, Ep = (–.4375)(160/100) = – 0.7.

7.6 METHODS OR TECHNIQUES OF FORECASTING

Demand forecasting is a highly complicated process as it deals with the estimation of future demand. It requires the assistance and opinion of experts in the field of sales management. While estimating future demand, one should not give too much of importance to either statistical information, past data or experience, intelligence and judgment of the experts. Demand forecasting, to become more realistic should consider the two aspects in a balanced manner. Application of commonsense is needed to follow a pragmatic approach in demand forecasting.

Broadly speaking, there are two methods of demand forecasting. They are:

1. Survey methods and

2 Statistical methods.

Survey Methods

Survey methods help us in obtaining information about the future purchase plans of potential buyers through collecting the opinions of experts or by interviewing the consumers. These methods are extensively used in short run and estimating the demand for new products. There are different approaches under survey methods. They are

A. Consumers interview Method:

Under this method, efforts are made to collect the relevant information directly from the consumers with regard to their future purchase plans. In order to gather information from consumers, a number of alternative techniques are developed from time to time. Among them, the following are some of the important ones.

Survey of buyer's intentions or preferences:

It is one of the oldest methods of demand forecasting. It is also called as "Opinion surveys".

Under this method, consumer-buyers are requested to indicate their preferences and willingness about particular products. They are asked to reveal their 'future purchase plans with respect to specific items. They are expected to give answers to questions like what items they intend to buy, in what quantity, why, where, when, what quality they expect, how much money they are planning to spend etc. Generally, the field survey is conducted by the marketing research department of the company or hiring the services of outside research organizations consisting of learned and highly qualified professionals.

The heart of the survey is questionnaire. It is a comprehensive one covering almost all questions either directly or indirectly in a most

intelligent manner. It is prepared by an expert body who are specialists in the field or marketing.

The questionnaire is distributed among the consumer buyers either through mail or in person by the company. Consumers are requested to furnish all relevant and correct information.

The next step is to collect the questionnaire from the consumers for the purpose of evaluation. The materials collected will be classified, edited analyzed. If any bias prejudices, exaggerations, artificial or excess demand creation etc., are found at the time of answering they would be eliminated.

The information so collected will now be consolidated and reviewed by the top executives with lot of experience. It will be examined thoroughly. Inferences are drawn and conclusions are arrived at. Finally a report is prepared and submitted to management for taking final decisions.

The success of the survey method depends on many factors. 1) The nature of the questions asked, 2) The ability of the surveyed 3) The representative of the samples 4) Nature of the product 5) characteristics of the market 6) consumer buyers behavior, their intentions, attitudes, thoughts, motives, honesty etc. 7) Techniques of analysis conclusions drawn etc.

The management should not entirely depend on the results of survey reports to project future demand. Consumer buyers may not express their honest and real views and as such they may give only the broad trends in the market. In order to arrive at right conclusions, field surveys should be regularly checked and supervised.

This method is simple and useful to the producers who produce goods in bulk. Here the burden of forecasting is put on customers.

However this method is not much useful in estimating the future demand of the households as they run in large numbers and also do not freely express their future demand requirements. It is expensive and also difficult. Preparation of a questionnaire is not an easy task. At best it can be used for short term forecasting

B. Direct Interview Method

Experience has shown that many customers do not respond to questionnaire addressed to them even if it is simple due to varied reasons. Hence, an alternative method is developed. Under this method, customers are directly contacted and interviewed. Direct and simple questions are asked to them. They are requested to answer specifically about their budget, expenditure plans, particular items to be selected, the quality and quantity of products, relative price preferences etc. for a particular period of time. There are different methods of direct interviews. They are as follows:

1. Complete enumeration method

Under this method, all potential customers are interviewed in a particular city or a region. The answers elicited are consolidated and carefully studied to obtain the most probable demand for a product. The management can safely project the future demand for its products. This method is free from all types of prejudices. The result mainly depends on the nature of questions asked and answers received from the customers.

However, this method cannot be used successfully by all sellers in all cases. This method can be employed to only those products whose customers are concentrated in a small region or locality. In case consumers are widely dispersed, this method may not be physically adopted or prove costly both in terms of time and money. Hence, this method is highly cumbersome in nature.

2. Sample survey method or the consumer panel method

Experience of the experts‟ show that it is impossible to approach all customers; as such careful sampling of representative customers is essential. Hence, another variant of complete enumeration method has been developed, which is popularly known as sample survey method. Under this method, different cross sections of customers that make up the bulk of the market are carefully chosen. Only such consumers selected from the relevant market through some sampling method are interviewed or surveyed. In other words, a group of consumers are chosen and queried about their preferences in concrete situations. The selection of a few customers is known as sampling. The selected consumers form a panel. This method uses either random sampling or the stratified sampling technique. The method of survey may be direct interview or mailed questionnaire to the selected consumers. On the basis of the views expressed by these selected consumers, most likely demand may be estimated. The advantage of a panel lies in the fact that the same panel is continued and new expensive panel does not have to be formulated every time a new product is investigated.

As compared to the complete enumeration method, the sample survey method is less tedious, less expensive, much simpler and less time consuming. This method is generally used to estimate short run demand by government departments and business firms.

Success of this method depends upon the sincere co-operation of the selected customers. Hence, selection of suitable consumers for the specific purpose is of great importance.

Even with careful selection of customers and the truthful information about their buying intention, the results of the survey can only be of limited use. A sudden change in price, inconsistency in buying intentions of consumers, number of sensible questions

asked and dropouts from the panel for various reasons put a serious limitation on the practical usefulness of the panel method.

C. Collective opinion method or opinion survey method

This is a variant of the survey method. This method is also known as “Sales – force polling” or “Opinion poll method”. Under this method, sales representatives, professional experts and the market consultants and others are asked to express their considered opinions about the volume of sales expected in the future. The logic and reasoning behind the method is that these salesmen and other people connected with the sales department are directly involved in the marketing and selling of the products in different regions. Salesmen, being very close to the customers, will be in a position to know and feel the customer‟s reactions towards the product. They can study the pulse of the people and identify the specific views of the customers. These people are quite capable of estimating the likely demand for the products with the help of their intimate and friendly contact with the customers and their personal judgments based on the past experience. Thus, they provide approximate, if not accurate estimates. Then, the views of all salesmen are aggregated to get the overall probable demand for a product.

Further, these opinions or estimates collected from the various experts are considered, consolidated and reviewed by the top executives to eliminate the bias or optimism and pessimism of different salesmen. These revised estimates are further examined in the light of factors like proposed change in selling prices, product designs and advertisement programs, expected changes in the degree of competition, income distribution, population etc. The final sales forecast would emerge after these factors have been taken into account. This method heavily depends on the collective wisdom of salesmen, departmental heads and the top executives.

It is simple, less expensive and useful for short run forecasting particularly in case of new products. The main drawback is that it is subjective and depends on the intelligence and awareness of the salesmen. It cannot be relied upon for long term business planning.

D. Delphi Method or Experts Opinion Method

This method was originally developed at Rand Corporation in the late 1940‟s by Olaf Helmer, Dalkey and Gordon. This method was used to predict future technological changes. It has proved more useful and popular in forecasting non– economic rather than economical variables. It is a variant of opinion poll and survey method of demand forecasting. Under this method, outside experts are appointed. They are supplied with all kinds of information and statistical data. The management requests the experts to express their considered opinions and views about the expected future sales of the company. Their views are generally regarded as most objective ones. Their views generally avoid or reduce the "Halo – Effects" and "Ego – Involvement" of the views of the others. Since experts‟ opinions are more valuable, a firm will give lot of importance to them and prepare their future plan on the basis of the forecasts made by the experts.

E. End Use or Input – Output Method

Under this method, the sale of the product under consideration is projected on the basis of demand surveys of the industries using the given product as an intermediate product. The demand for the final product is the end – use demand of the intermediate product used in the production of the final product. An intermediate product may have many end – users, For e.g., steel can be used for making various types of agricultural and industrial machinery, for construction, for transportation etc. It may have the demand both in the domestic market as well as international market. Thus, end – use demand

estimation of an intermediate product may involve many final goods industries using this product, at home and abroad. Once we know the demand for final consumption goods including their exports we can estimate the demand for the product which is used as intermediate good in the production of these final goods with the help of input – output coefficients. The input – output table containing input – output coefficients for particular periods are made available in every country either by the Government or by research organizations.

This method is used to forecast the demand for intermediate products only. It is quite useful for industries which are largely producers‟ goods, like aluminum, steel etc. The main limitation of the method is that as the number of end – users of a product increase, it becomes more inconvenient to use this method.

Check your progress

What is Delphi method?

……..

Explain in brief survey method?

……..

Statistical Method

It is the second most popular method of demand forecasting. It is the best available technique and most commonly used method in recent years. Under this method, statistical, mathematical models, equations etc are extensively used in order to estimate future demand of a particular product. They are used for estimating long term demand. They are highly complex and complicated in nature. Some of them require considerable mathematical back – ground and competence.

They use historical data in estimating future demand. The analysis of the past demand serves as the basis for present trends and both of them become the basis for calculating the future demand of a commodity in question after taking into account of likely changes in the future. There are several statistical methods and their application should be done by some one who is reasonably well versed in the methods of statistical analysis and in the interpretation of the results of such analysis.

A. Trend Projection Method

   An old firm operating in the market for a long period will have the accumulated previous data on either production or sales pertaining to different years. If we arrange them in chronological order, we get what is called as „time series". It is an ordered sequence of events over a period of time pertaining to certain variables. It shows a series of values of a dependent variable say, sales as it changes from one point of time to another. In short, a time series is a set of observations taken at specified time, generally at equal intervals. It depicts the historical pattern under normal conditions. This method is not based on any particular theory as to what causes the variables to change but merely assumes that whatever forces contributed to change in the recent past will continue to have the same effect. On the basis of time series, it is possible to project the future sales of a company.

Further, the statistics and information with regard to the sales call for further analysis. When we represent the time series in the form of a graph, we get a curve, the sales curve. It shows the trend in sales at different periods of time. Also, it indicates fluctuations and turning points in demand. If the turning points are few and their intervals are also widely spread, they yield acceptable results. Here the time series show a persistent tendency to move in the same

direction. Frequency in turning points indicates uncertain demand conditions and in this case, the trend projection breaks down.

The major task of a firm while estimating the future demand lies in the prediction of turning points in the business rather than in the projection of trends. When turning points occur more frequently, the firm has to make radical changes in its basic policy with respect to future demand. It is for this reason that the experts give importance to identification of turning points while projecting the future demand for a product.

The heart of this method lies in the use of time series. Changes in time series arise on account of the following reasons:-

1. Secular or long run movements: Secular movements indicate the general conditions and direction in which graph of a time series move in relatively a long period of time.

2. Seasonal movements: Time series also undergo changes during seasonal sales of a company. During festival season, sales clearance season etc., we come across most unexpected changes.

3. Cyclical Movements: It implies change in time series or fluctuations in the demand for a product during different phases of a business cycle like depression, revival, boom etc.

4. Random movement. When changes take place at random, we call them irregular or random movements. These movements imply sporadic changes in time series occurring due to unforeseen events such as floods, strikes, elections, earth quakes, droughts and other such natural calamities. Such changes take place only in the short run. Still they have their own impact on the sales of a company.

An important question in this connection is how to ascertain the trend in time series? A statistician, in order to find out the pattern of change in time series may make use of the following methods.

1. The Least Squares method.
2. The Free hand method.
3. The moving average method.
4. The method of semi – averages.

The method of Least Squares is more scientific, popular and thus more commonly used when compared to the other methods. It uses the straight line equation Y= a + bx to fit the trend to the data.

B. Economic Indicators

Economic indicators as a method of demand forecasting are developed recently. Under this method, a few economic indicators become the basis for forecasting the sales of a company. An economic indicator indicates change in the magnitude of an economic variable. It gives the signal about the direction of change in an economic variable. This helps in decision making process of a company. We can mention a few economic indicators in this context.

1. Construction contracts sanctioned for demand towards building materials like cement.
2. Personal income towards demand for consumer goods.
3. Agriculture income towards the demand for agricultural in puts, instruments, fertilizers, manure, etc,
4. Automobile registration towards demand for car spare parts, petrol etc.,
5. Personal Income, Consumer Price Index, Money supply etc., towards demand For consumption goods.

The above mentioned and other types of economic indicators are published by specialist organizations like the Central Statistical Organization etc. The analyst should establish relationship between the sale of the product and the economic indicators to project the correct sales and to measure as to what extent these indicators affect

the sales. The job of establishing relationship is a highly difficult task. This is particularly so in case of new products where there are no past records.

Under this method, demand forecasting involves the following steps:

a. The forecaster has to ensure whether a relationship exists between the demand for a product and certain specified economic indicators.

b. The forecaster has to establish the relationship through the method of least square and derive the regression equation. Assuming the relationship to be linear, the equation will be $y = a + bx$.

c. Once the regression equation is obtained by forecasting the value of x, economic indicator can be applied to forecast the values of Y. i.e. demand.

d. Past relationship between different factors may not be repeated. Therefore, the value judgment is required to forecast the value of future demand. In addition to it, many other new factors may also have to be taken into consideration.

When economic indicators are used to forecast the demand, a firm should know whether the forecasting is undertaken for a short period or long period. It should collect adequate and appropriate data and select the ideal method of demand forecasting. The next stage is to determine the most likely relationship between the dependent variables and finally interpret the results of the forecasting.

However it is difficult to find out an appropriate economic indicator. This method is not useful in forecasting demand for new products.

Demand Forecasting For A New Product

Demand forecasting for new products is quite different from that for established products. Here the firms will not have any past

experience or past data for this purpose. An intensive study of the economic and competitive characteristics of the product should be made to make efficient forecasts. Professor Joel Dean, however, has suggested a few guidelines to make forecasting of demand for new products.

a. Evolutionary approach The demand for the new product may be considered as an outgrowth of an existing product. For e.g., Demand for new Tata Indica, which is a modified version of Old Indica can most effectively be projected based on the sales of the old Indica, the demand for new Pulsor can be forecasted based on the sales of the old Pulsor. Thus when a new product is evolved from the old product, the demand conditions of the old product can be taken as a basis for forecasting the demand for the new product.

b. Substitute approach If the new product developed serves as substitute for the existing product, the demand for the new product may be worked out on the basis of a „market share". The growths of demand for all the products have to be worked out on the basis of intelligent forecasts for independent variables that influence the demand for the substitutes. After that, a portion of the market can be sliced out for the new product. For e.g., A moped as a substitute for a scooter, a cell phone as a substitute for a land line. In some cases price plays an important role in shaping future demand for the product.

c. Opinion Poll approach Under this approach the potential buyers are directly contacted, or through the use of samples of the new product and their responses are found out. These are finally blown up to forecast the demand for the new product.

d. Sales experience approach Offer the new product for sale in a sample market; say supermarkets or big bazaars in big cities, which are also big marketing centers. The product may be offered for sale

through one super market and the estimate of sales obtained may be „blown up‟ to arrive at estimated demand for the product.

e. Growth Curve approach According to this, the rate of growth and the ultimate level of demand for the new product are estimated on the basis of the pattern of growth of established products. For e.g., An Automobile Co., while introducing a new version of a car will study the level of demand for the existing car.

f. Vicarious approach

A firm will survey consumers‟ reactions to a new product indirectly through getting in touch with some specialized and informed dealers who have good knowledge about the market, about the different varieties of the product already available in the market, the consumers‟ preferences etc. This helps in making a more efficient estimation of future demand. These methods are not mutually exclusive. The management can use a combination of several of them supplement and cross check each other.

Check your progress

Explain in brief the statistical method of demand forecasting?

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..……..

Explain the methods of forecasting New Product?

……..

……

7.8 LET US SUM UP

In this chapter we have looked at a range of demand estimation and forecasting techniques which can be used by the firm either singly

or in combination in order to predict the level of demand for their product(s). The 129 Demand Estimation and Forecasting choice of technique will depend upon the resources at the firm's disposal, the cost to the firm of insufficient knowledge of the market(s) in which it operates and the ease with which information can be obtained. Each of the methods we have considered has its own advantages and disadvantages in its use and there is no 'right' or 'wrong' approach in any given situation. It is for the decision maker to choose the technique(s) which are most appropriate to the firm's needs. As a general principle, however, the more, and the more accurate, information the firm has the better able it will be to take the best decisions possible for the firm's efficient operation. Thus, the firm can substantially reduce the risk to which it will be exposed, particularly in rapidly changing markets. Sales forecasts can be developed using qualitative methods, such as expert opinion, the Delphi method, or market surveys or by using quantitative models, such as exponential smoothing, time series decomposition, or multiple regression analysis. In many cases, firms use a combination of qualitative and quantitative forecasting techniques. The use of more than one sales forecast method is advisable because doing so can reduce errors in the final forecast

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BLOCK – 3: PRODUCTION AND COST ANALYSIS

UNIT 8: COST: CONCEPTS, MEASUREMENT & ANALYSIS,

Structure

8.0 INTRODUCTION

The analysis of cost is important in the study of managerial economics because it provides a basis for two important decisions made by managers: (a) whether to produce or not and (b) how much to produce when a decision is taken to produce. In this Unit, we shall discuss some important cost concepts that are relevant for managerial decisions. We analyse the basic differences between these cost concepts and also examine how accountants and economists differ in their treatment of different cost concepts.

After going through this unit, you should be able to:

understand some of the cost concepts that are frequently used in the managerial decision-making process;

differentiate between different cost concepts;

distinguish between economic costs and accounting costs

8.1 OBJECTIVES

After going through this unit, you should be able to:

understand some of the cost concepts
that are frequently used in the
managerial decision-making process;

differentiate between different cost concepts;

distinguish between economic costs and accounting costs

8.2 ACTUAL COSTS AND OPPORTUNITY COSTS

Actual costs are those costs, which a firm incurs while producing or acquiring a good or service like raw materials, labour, rent, etc. Suppose, we pay Rs. 150 per day to a worker whom we employ for 10 days, then the cost of labour is Rs. 1500. The economists called this cost as accounting costs because traditionally accountants have been primarily connected with collection of historical data (that is the costs actually incurred) in reporting a firm's financial position and in calculating its taxes. Sometimes the actual costs are also called acquisition costs or outlay costs.

On the other hand, opportunity cost is defined as the value of a resource in its next best use. For example, Mr. Ram is currently working with a firm and earning Rs. 5 lakhs per year. He decides to quit his job and start his own small business. Although, the accounting cost of Mr. Ram's labour to his business is 0, the opportunity cost is Rs. 5 lakhs per year.

Therefore, the opportunity cost is the earnings he foregoes by working for his own firm. One may ask you that whether this

opportunity cost is really meaningful in the decision-making process. As we see that the opportunity cost is important simply because, if Mr. Ram cannot recover this cost from his new business, then he will probably return to his old job. Opportunity cost can be similarly defined for other factors of production. For example, consider a firm that owns a building and therefore do not pay rent for office space. If the building was rented to others, the firm could have earned rent. The foregone rent is an opportunity cost of utilizing the office space and should be included as part of the cost of doing business. Sometimes these opportunity costs are called as alternative costs.

8.3 EXPLICIT AND IMPLICIT COSTS

Explicit costs are those costs that involve an actual payment to other parties. Therefore, an explicit cost is the monitory payment made by a firm for use of an input owned or controlled by others. Explicit costs are also referred to as accounting costs. For example, a firm pays Rs. 100 per day to a worker and engages 15 workers for 10 days, the explicit cost will be Rs. 15,000 incurred by the firm. Other types of explicit costs include purchase of raw materials, renting a building, amount spent on advertising etc.

On the other hand, implicit costs represent the value of foregone opportunities but do not involve an actual cash payment. Implicit costs are just as important as explicit costs but are sometimes neglected because they are not as obvious. For example, a manager who runs his own business foregoes the salary that could have been earned working for someone else as we have seen in our earlier example. This implicit cost generally is not reflected in accounting statements, but rational decision-making requires that it be considered. Therefore, an implicit cost is the opportunity cost of using resources that are owned or controlled by the owners of the

firm. The implicit cost is the foregone return, the owner of the firm could have received had they used their own resources in their best alternative use rather than using the resources for their own firm's production.

8.4 ACCOUNTING COSTS AND ECONOMIC COSTS

For a long time, there has been a considerable disagreement among economists and accountants on how costs should be treated. The reason for the difference of opinion is that the two groups want to use the cost data for dissimilar purposes. Accountants always have been concerned with firms' financial statements. Accountants tend to take a retrospective look at firms finances because they keep trace of assets and liabilities and evaluate past performance. The accounting costs are useful for managing taxation needs as well as to calculate profit or loss of the firm

On the other hand, economists take forward-looking view of the firm. They are concerned with what cost is expected to be in the future and how the firm might be able to rearrange its resources to lower its costs and improve its profitability. They must therefore be concerned with opportunity cost. Since the only cost that matters for business decisions are the future costs, it is the economic costs that are used for decision-making.

Accountants and economists both include explicit costs in their calculations. For accountants, explicit costs are important because they involve direct payments made by a firm. These explicit costs are also important for economists as well because the cost of wages and materials represent money that could be useful elsewhere. We have already seen, while discussing actual costs and opportunity costs, how economic cost can differ from accounting cost. In that

example we have seen how a person who owns business chooses not to consider his/her own salary. Although, no monitory transaction has occurred (and thus would not appear as an accounting cost), the business nonetheless incurs an opportunity cost because the owner could have earned a competitive salary by working elsewhere. Accountants and economists use the term 'profits' differently. Accounting profits are the firm's total revenue less its explicit costs. But economists define profits differently. Economic profits are total revenue less all costs (explicit and implicit costs). The economist takes into account the implicit costs (including a normal profit) in addition to explicit costs in order to retain resources in a given line of production. Therefore, when an economist says that a firm is just covering its costs, it is meant that all explicit and implicit costs are being met, and that, the entrepreneur is receiving a return just large enough to retain his/ her talents in the present line of production. If a firm's total receipts exceed all its economic costs, the residual accruing to the entrepreneur is called an economic profit, or pure profit.

Controllable and Non-Controllable costs

Controllable costs are those which are capable of being controlled or regulated by executive vigilance and, therefore, can be used for assessing executive efficiency.

Non-controllable costs are those, which cannot be subjected to administrative control and supervision. Most of the costs are controllable, except, of course, those due to obsolescence and depreciation. The level at which such control can be exercised, however, differs: some costs (like, capital costs) are not controllable at factory's shop level, but inventory costs can be controlled at the shop level.

Out-of-pocket costs and Book costs

Out of pocket costs are those costs that improve current cash payments to outsiders. For example, wages and salaries paid to the employees are out-of pocket costs. Other examples of out-of-pocket costs are payment of rent, interest, transport charges, etc.

On the other hand, book costs are those business costs, which do not involve any cash payments but for them a provision is made in the books of account to include them in profit and loss accounts and take tax advantages. For example, salary of owner manager, if not paid, is a book cost. The interest cost of owner's own fund and depreciation cost are other examples of book cost.

The out-of-pocket costs are also called explicit costs and correspondingly book costs are called implicit or imputed costs. Book costs can be converted into out-of-pocket costs by selling assets and leasing them back from buyer. Thus, the difference between these two categories of cost is in terms of whether the company owns it or not. If a factor of production is owned, its cost is a book cost while if it is hired it is an out-of-pocket cost.

Past and Future costs

Past costs are actual costs incurred in the past and they are always contained in the income statements. Their measurement is essentially a record keeping activity. These costs can only be observed and evaluated in retrospect. If they are regarded as excessive, management can indulge in post-mortem checks just to find out the factors responsible for the excessive costs, if any, without being able to do anything about reducing them.

Future costs are those costs that are likely to be incurred in future periods. Since the future is uncertain, these costs have to be estimated and cannot be expected to be absolutely correct figures.

Past costs serve as the basis for projecting future costs. In periods of inflation and deflation, the two cost concepts differ significantly. Managerial decisions are always forward looking and therefore they require estimates of future costs and not past costs. Unlike past costs, future costs are subject to management control and they can be planned or avoided.

If the future costs are considered too high, management can either plan to reduce them or find out ways and means to meet them. Management needs to estimate future costs for a variety of reasons such as expense control pricing, projecting future profits and capital budgeting decisions.

When historical costs are used instead of explicit projections, the assumption is made that future costs will be the same as past costs. In periods of significant price variations, such an assumption may lead to wrong managerial decisions.

Historical and Replacement costs

The historical cost of an asset is the actual cost incurred at the time, the asset was originally acquired. In contrast to this, replacement cost is the cost, which will have to be incurred if that asset is purchased now. The difference between the historical and replacement costs results from price changes over time.

Suppose a machine was acquired for Rs. 50,000 in the year 1995 and the same machine can be acquired for Rs. 1,20,000 in the year 2001. Here Rs. 50,000 is the historical or original cost of the machine and Rs. 1,20,000 is its replacement cost. The difference of Rs.70,000 between the two costs has resulted because of the price change of the machine during the period. In the conventional financial accounts the value of assets is shown at their historical costs. But for decision-making, firms should try to adjust historical costs to reflect price level changes. If the price of the asset does not

change over time, the historical cost will be the same as the replacement cost.

If the price rises the replacement cost will exceed historical cost and vice versa. During periods of substantial price variations, historical costs are poor indicators of actual costs. Historical costs and replacement costs represent two ways of reflecting the costs of assets in the balance sheet and establishing the costs that are used to determine net income.

The assets are usually shown in the conventional accounts at their historical costs. These must be adjusted for price changes for a correct estimate of costs and profits. Managerial decisions must be based on replacement cost rather than historical costs. The historical cost of an asset is known, for it is actually incurred while acquiring that asset. Replacement cost relates to the current price of that asset and it will be known only if an enquiry is made in the market.

Private Costs and Social Costs

A further distinction that is useful to make - especially in the public sector - is between private and social costs.

Private costs are those that accrue directly to the individuals or firms engaged in relevant activity.

Social costs, on the other hand, are passed on to persons not involved in the activity in any direct way (i.e., they are passed on to society at large). Consider the case of a manufacturer located on the bank of a river who dumps the waste into water rather than disposing it of in some other manner. While the private cost to the firm of dumping is zero, it is definitely harmful to the society. It affects adversely the people located down current and incur higher costs in terms of treating the water for their use, or having to travel a great deal to fetch potable water. If these external costs were included in the

production costs of a producing firm, a true picture of real, or social costs of the output would be obtained. Ignoring external costs may lead to an inefficient and undesirable allocation of resources in society

Relevant Costs and Irrelevant Costs

The relevant costs for decision-making purposes are those costs, which are incurred as a result of the decision under consideration. The relevant costs are also referred to as the incremental costs. Costs that have been incurred already and costs that will be incurred in the future, regardless of the present decision are irrelevant costs as far as the current decision problem is concerned.

There are three main categories of relevant or incremental costs. These are the present-period explicit costs, the opportunity costs implicitly involved in the decision, and the future cost implications that flow from the decision. For example, direct labour and material costs, and changes in the variable overhead costs are the natural consequences of a decision to increase the output level. Also, if there is any expenditure on capital equipments incurred as a result of such a decision, it should be included in full, not withstanding that the equipment may have a useful life remaining after the present decision has been carried out. Thus, the incremental costs of a decision to increase output level will include all present-period explicit costs, which will be incurred as a consequence of this decision. It will exclude any present-period explicit cost that will be incurred regardless of the present decision.

The opportunity cost of a resource under use, as discussed earlier, becomes a relevant cost while arriving at the economic profit of the firm. Many decisions will have implications for future costs, both explicit and implicit. If a firm expects to incur some costs in future

as a consequence of the present analysis, such future costs should be included in the present value terms if known for certain.

Sunk Costs and Incremental Costs

Sunk costs are expenditures that have been made in the past or must be paid in the future as part of contractual agreement or previous decision. For example, the money already paid for machinery, equipment, inventory and future rental payments on a warehouse that must be paid as part of a long term lease agreement are sunk costs. In general, sunk costs are not relevant to economic decisions. For example, the purchase of specialized equipment designed to order for a plant. We assume that the equipment can be used to do only what it was originally designed for and cannot be converted for alternative use. The expenditure on this equipment is a sunk cost. Also, because this equipment has no alternative use its opportunity cost is zero and, hence, sunk costs are not relevant to economic decisions. Sometimes the sunk costs are also called as non-avoidable or non-escapable costs.

On the other hand, incremental cost refers to total additional cost of implementing a managerial decision. Change in product line, change in output level, adding or replacing a machine, changing distribution channels etc. are examples of incremental costs. Sometimes incremental costs are also called as avoidable or escapable costs. Moreover, since incremental costs may also be regarded as the difference in total costs resulting from a contemplated change, they are also called differential costs. As stated earlier sunk costs are irrelevant for decision making, as they do not vary with the changes contemplated for future by the management. It is the incremental costs, which are important for decision-making purpose

Check your progress 1:

Why is the historic cost of inventory or capital equipment irrelevant for managerial decision making?

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Comment on the nature of costs involved in depreciation from both economic and accounting approaches.

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8.5 DIRECT COSTS AND INDIRECT COSTS

There are some costs, which can be directly attributed to the production of a given product. The use of raw material, labour input, and machine time involved in the production of each unit can usually be determined. On the other hand, there are certain costs like stationery and other office and administrative expenses, electricity charges, depreciation of plant and buildings, and other such expenses that cannot easily and accurately be separated and attributed to individual units of production, except on arbitrary basis. When referring to the separable costs of first category accountants call them the direct, or prime costs per unit. The accountants refer to the joint costs of the second category as indirect or overhead costs. Direct and indirect costs are not exactly synonymous to what economists refer to as variable costs and fixed costs. The criterion

used by the economist to divide cost into either fixed or variable is whether or not the cost varies with the level of output, whereas the accountant divides the cost on the basis of whether or not the cost is separable with respect to the production of individual output units.

The accounting statements often divide overhead expenses into 'variable overhead' and 'fixed overhead' categories. If the variable overhead expenses per unit are added to the direct cost per unit, we arrive at what economists call as average variable cost. Separable Costs and Common Costs can also be classified on the basis of their traceability. The costs that can be easily attributed to a product, a division, or a process are called separable costs.

On the other hand, common costs are those, which cannot be traced to any one unit of operation. For example, in a multiple product firm the cost of raw material may be separable (traceable) product-wise but electricity charges may not be separable product-wise. In a university the salary of a Vice-Chancellor is not separable department-wise but the salary of teachers can be separable department-wise. The separable and common costs are also referred to as direct and indirect costs respectively. The distinction between direct and indirect costs is of particular significance in a multi-product firm for setting up economic prices for different products.

8.6 TOTAL COST, AVERAGE COST AND MARGINAL COST

Total cost (TC) of a firm is the sum-total of all the explicit and implicit expenditures incurred for producing a given level of output. It represents the money value of the total resources required for production of goods and services. For example, a shoe-maker's total cost will include the amount she/ he spends on leather, thread, rent for his/her workshop, interest on borrowed capital, wages and

salaries of employees, etc., and the amount she/he charges for his/her services and funds invested in the business

Average cost (AC) is the cost per unit of output. That is, average cost equals the total cost divided by the number of units produced (N). If TC = Rs. 500 and N = 50 then AC = Rs. 10.

Marginal cost (MC) is the extra cost of producing one additional unit. At a given level of output, one examines the additional costs being incurred in producing one extra unit and this yields the marginal cost. For example, if TC of producing 100 units is Rs. 10,000 and the TC of producing 101 units is Rs. 10,050, then MC at N = 101 equals Marginal cost refers to the change in total cost associated with a one-unit change in output. This cost concept is significant to short-term decisions about profit maximizing rates of output. For example, in an automobile manufacturing plant, the marginal cost of making one additional car per production period would be the labour, material, and energy costs directly associated with that extra car.

Marginal cost is that sub category of incremental cost in the sense that incremental cost may include both fixed costs and marginal costs. However, when production is not conceived in small units, management will be interested in incremental cost instead of marginal cost. For example, if a firm produces 5000 units of TV sets, it may not be possible to determine the change in cost involved in producing 5001 units of TV sets. This difficulty can be resolved by taking units to significant size. For example, if the TV sets produced is measured to hundreds of units and total cost (TC) of producing the current level of three hundred TV sets is Rs. 15,00,000 and the firm decides to increase the production to four hundred TV sets and estimates the TC as Rs. 18,00,000, then the incremental cost of producing one hundred TV sets (above the present production level of three hundred units) is Rs. 3,00,000. The total cost concept is

useful in break-even analysis and finding out whether a firm is making profit or not.

The average cost concept is significant for calculating the per unit profit. The marginal and incremental cost concepts are needed in deciding whether a firm needs to expand its production or not. In fact, the relevant costs to be considered will depend upon the situation or production problem faced by the manager.

8.7 FIXED AND VARIABLE COSTS

Fixed costs are that part of the total cost of the firm which does not change with output. Expenditures on depreciation, rent of land and buildings, property taxes, and interest payment on bonds are examples of fixed costs. Given a capacity, fixed costs remain the same irrespective of actual output. Variable costs, on the other hand, change with changes in output. Examples of variable costs are wages and expenses on raw material. However, it is not very easy to classify all costs into fixed and variable.

There are some costs, which fall between these extremes. They are called semi variable costs. They are neither perfectly variable nor absolutely fixed in relation to changes in output. For example, part of the depreciation charges is fixed, and part variable. However, it is very difficult to determine how much of depreciation cost is due to the technical obsolescence of assets and hence fixed cost, and how much is due to the use of equipments and hence variable cost. Nevertheless, it does not mean that it is not useful to classify costs into fixed and variable. This distinction is of great value in break-even analysis and pricing decisions. For decision-making purposes, in general, it is the variable cost, which is relevant and not the fixed cost. To an economist the fixed costs are overhead costs and to an accountant these are indirect costs. When the output goes up, the

fixed cost per unit of output comes down, as the total fixed cost is divided between larger units of output.

8.8 SHORT-RUN AND LONG-RUN COSTS

The short run is defined as a period in which the supply of at least one element of the inputs cannot be changed. To illustrate, certain inputs like machinery, buildings, etc., cannot be changed by the firm whenever it so desires. It takes time to replace, add or dismantle them. Long run, on the other hand, is defined as a period in which all inputs are changed with changes in output.

In other words, it is that time-span in which all adjustments and changes are possible to realise. Thus, in the short run, some inputs are fixed (like installed capacity) while others are variable (like the level of capacity utilisation); but in the long run all inputs, including the size of the plant, are variable. Short-run costs are the costs that can vary with the degree of utilisation of plant and other fixed factors. In other words, these costs relate to the variation in output, given plant capacity.

Short-run costs are, therefore, of two types: fixed costs and variable costs. In the short-run, fixed costs remain unchanged while variable costs fluctuate with output. Long-run costs, in contrast, are costs that can vary with the size of plant and with other facilities normally regarded as fixed in the short-run. In fact, in the long-run there are no fixed inputs and therefore no fixed costs, i.e. all costs are variable.

Both short-run and long-run costs are useful in decision-making. Short-run cost is relevant when a firm has to decide whether or not to produce and if a decision is taken to produce then how much more or less to produce with a given plant size. If the firm is considering

an increase in plant size, it must examine the long-run cost of expansion. Long-run cost analysis is useful in investment decisions.

Check your progress

Classify different cost concepts into:

a. useful for decision making

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b. not useful for decision making

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8.9 SUMMARY

Cost concepts are important for decision-making but neither the accounting approach nor the economic approach is completely acceptable when decision making is involved. Costs must be considered in various ways, depending on the decision at hand. Both traditional economists and traditional accountants have tended to be fairly dogmatic in their definitions of costs. On the other hand, managerial economists want a flexible approach. All the cost concepts need to be considered in such a way so as to help make sound decisions. The decision maker should try to discover the "relevant" costs by asking what costs are relevant to a particular decision at hand, and the decision maker is not necessarily bound by traditional concepts constructed for other purposes.

In this unit the basic cost concepts have been covered to give a fair view about the understanding of cost.

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UNIT 9: PRODUCTION FUNCTION & ITS MANAGERIAL APPLICATIONS,

Structure

9.0 INTRODUCTION

Production process involves the transformation of inputs into output. The inputs could be land, labour, capital, entrepreneurship etc. and the output could be goods or services. In a production process managers take four types of decisions: (a) whether to

produce or not, (b) how much output to produce, (c) what input combination to use, and (d) what type of technology to use.

In this unit, we shall begin with a general discussion of the concept of production function. The analysis of this unit mainly focuses on the firms that produce a single product. Analysis on decisions related to multiproduct firms is also given briefly. The nature of production when there is only one variable input is taken up first. We then move on to the problem of finding optimum combination of inputs for producing a particular level of output when there are two or more variable inputs. You will also learn about the production decisions in case of product mix of multiproduct firms. The unit concludes with various functional forms of production frequently used by economists and their empirical estimation.

9.1 OBJECTIVES

After going through this unit, you should be able to:

- familiarise with the concepts and rules relevant to production decision analysis;
- understand the economics of production;
- understand the set of conditions required for efficient production.

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9.2 PRODUCTION FUNCTION

Suppose we want to produce apples. We need land, seedlings, fertilizer, water, labour, and some machinery. These are called inputs or factors of production. The output is apples. In general a given output can be produced with different combinations of inputs. A production function is the functional relationship between inputs and output. It shows the maximum output which can be obtained for a given combination of inputs. It expresses the technological relationship between inputs and output of a product.

In general, we can represent the production function for a firm as:

$$Q = f(x_1, x_2, \ldots\ldots\ldots, x_n)$$

Where Q is the maximum quantity of output, x_1, x_2, ….,x_n are the quantities of various inputs, and f stands for functional relationship between inputs and output. For the sake of clarity, let us restrict our attention to only one product produced using either one input or two

inputs. If there are only two inputs, capital (K) and labour (L), we write the production function as:

$$Q = f(L, K)$$

This function defines the maximum rate of output (Q) obtainable for a given rate of capital and labour input. It may be noted here that outputs may be tangible like computers, television sets, etc., or it may be intangible like education, medical care, etc. Similarly, the inputs may be other than capital and labour. Also, the principles discussed in this unit apply to situations with more than two inputs as well.

Economic Efficiency and Technical Efficiency

We say that a firm is technically efficient when it obtains maximum level of output from any given combination of inputs. The production function incorporates the technically efficient method of production. A producer cannot decrease one input and at the same time maintain the output at the same level without increasing one or more inputs. When economists use production functions, they assume that the maximum output is obtained from any given combination of inputs. That is, they assume that production is technically efficient.

On the other hand, we say a firm is economically efficient, when it produces a given amount of output at the lowest possible cost for a combination of inputs provided that the prices of inputs are given. Therefore, when only input Production Function combinations are given, we deal with the problem of technical efficiency; that is, how to produce maximum output. On the other hand, when input prices are also given in addition to the combination of inputs, we deal with the problem of economic efficiency; that is, how to produce a given

amount of output at the lowest possible cost. One has to be careful while interpreting whether a production process is efficient or inefficient. Certainly a production process can be called efficient if another process produces the same level of output using one or more inputs, other things remaining constant. However, if a production process uses less of some inputs and more of others, the economically efficient method of producing a given level of output depends on the prices of inputs. Even when two production processes are technically efficient, one process may be economically efficient under one set of input prices, while the other production process may be economically efficient at other input prices.

Let us take an example to differentiate between technical efficiency and economic efficiency. An ABC company is producing readymade garments using cotton fabric in a certain production process. It is found that 10 percent of fabric is wasted in that process. An engineer suggested that the wastage of fabric can be eliminated by modifying the present production process. To this suggestion, an economist reacted differently saying that if the cost of wasted fabric is less than that of modifying production process then it may not be economically efficient to modify the production process.

Short Run and Long Run

All inputs can be divided into two categories;

fixed inputs and

variable inputs.

A fixed input is one whose quantity cannot be varied during the time under consideration. The time period will vary depending on the circumstances. Although any input may be varied no matter how short the time interval, the cost involved in augmenting the amount

of certain inputs is enormous; so as to make quick variation impractical. Such inputs are classified as fixed and include plant and equipment of the firm.

On the other hand, a variable input is one whose amount can be changed during the relevant period. For example, in the construction business the number of workers can be increased or decreased on short notice. Many 'builder' firms employ workers on a daily wage basis and frequent change in the number of workers is made depending upon the need. The amount of milk that goes in the production of butter can be altered quickly and easily and is thus classified as a variable input in the production process. Whether or not an input is fixed or variable depends upon the time period involved. The longer the length of the time period under consideration, the more likely it is that the input will be variable and not fixed. Economists find it convenient to distinguish between the short run and the long run. The short run is defined to be that period of time when some of the firm's inputs are fixed. Since it is most difficult to change plant and equipment among all inputs, the short run is generally accepted as the time interval over which the firm's plant and equipment remain fixed. In contrast, the long run is that period over which all the firms' inputs are variable. In other words, the firm has the flexibility to adjust or change its environment.

Production processes of firms generally permit a variation in the proportion in which inputs are used. In the long run, input proportions can be varied considerably. For example, at Maruti Udyog Limited, an automobile dye can be made on conventional machine tools with more labour and less expensive equipment, or it can be made on numerically controlled machine tools with less labour and more expensive equipment i.e. the amount of labour and amount of equipment used can be varied. Later in this unit, this aspect is considered in more detail. On the other hand, there are very

few production processes in which inputs have to be combined in fixed proportions. Consider, Ranbaxy or Smith-Kline-Beecham or any other pharmaceutical firm. In order to produce a drug, the firm may have to use a fixed amount of aspirin per 10 gm of the drug. Even in this case a certain (although small) amount of variation in the proportion of aspirin may be permissible. If, on the other hand, no flexibility in the ratio of inputs is possible, the technology is described as fixed proportion type. We refer to this extreme case later in this unit, but as should be apparent, it is extremely rare in practice.

Check your progress 1

What is a production function? How does a long run production function differ from a short run production function?

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When can we say that a firm is: (a) technically efficient, (b) economically efficient? Is it necessary that a technically efficient firm is also economically efficient?

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9.3 PRODUCTION FUNCTION WITH ONE VARIABLE INPUT

Consider the simplest two-input production process - where one input with a fixed quantity and the other input with its a variable quantity. Suppose that the fixed input is the service of machine tools, the variable input is labour, and the output is a metal part. The production function in this case can be represented as:

$$Q = f(K, L)$$

Where Q is the output of metal parts, K is the service of five machine tools (fixed input), and L is labour (variable input). The variable input can be combined with the fixed input to produce different levels of output.

Total, Average, and Marginal Products The production function given above shows us the maximum total product (TP) that can be obtained using different combinations of quantities of inputs. Suppose the metal parts company decides to know the output level for different input levels of labour using fixed five machine tools. Table 9.1 explains the total output for different levels of variable input. In this example, the TP rises with increase in labour up to a point (six workers), becomes constant between sixth and seventh workers, and then declines.

Table 9.1: Total, Average and Marginal Products of labour

(with fixed capital at five machine tools)

Number of workers (L)	Total output (TP) (thousands per year) (Q)	Marginal product ($MP_L = \Delta Q/\Delta L$)	Average product ($AP_L = Q/L$)

0	0	-	--
1	10	10	10
2	28	18	14
3	54	26	18
4	76	22	19
5	90	14	18
6	96	6	16
7	96	0	13.5
8	92	-4	11.5

Two other important concepts are the average product (AP) and the marginal product (MP) of an input. The AP of an input is the TP divided by the amount of input used to produce this amount of output. Thus AP is the output-input ratio for each level of variable input usage. The MP of an input is the addition to TP resulting from the addition of one unit of input, when the amounts of other inputs are constant. In our example of machine parts production process, the AP of labour is the TP divided by the number of workers. AP_L = Q/L As shown in Table 9.1, the AP_L first rises, reaches maximum at 19, and then declines thereafter. Similarly, the MP of labour is the additional output attributable to using one additional worker with use of other input (service of five machine tools) fixed. MPL = $\Delta Q/\Delta L$ Where Δ means 'the change in'. For example, from Table 9.1 for MP_4 (marginal product of 4 th worker) $\Delta Q = 76–54 = 22$ and $\Delta L = 4–3 = 1$. Therefore, MP4 = (22/1) = 22. Note that although the MP first increases with addition of workers, it declines later and for the addition of 8^{th} worker it becomes negative (–4).

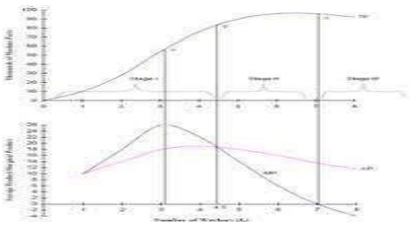

Figure 9.1: Relationship between TP, MP, and AP curves and the three stages of production

The graphical presentation of total, average, and marginal products for our Production Function example of machine parts production process is shown in Figure 9.1. Relationship between TP, MP and AP Curves Examine Table 9.1 and its graphical presentation in Figure 9.1. We can establish the following relationship between TP, MP, and AP curves. 1a) If MP > 0, TP will be rising as L increases. The TP curve begins at the origin, increases at an increasing rate over the range 0 to 3, and then increases at a decreasing rate. The MP reaches a maximum at 3, which corresponds to an inflection point (x) on the TP curve. At the inflection point, the TP curve changes from increasing at an increasing rate to increasing at decreasing rate. b) If MP = 0, TP will be constant as L increases. The TP is constant between workers 6 and 7. c) If MP < 0, TP will be declining as L increases. The TP declines beyond 7. Also, the TP curve reaches a maximum when MP = 0 and then starts declining when MP < 0. 2. MP intersects AP (MP = AP) at the maximum point on the AP curve. This occurs at labour input rate 4.5. Also, observe that whenever MP >AP, the AP is rising (upto number of workers 4.5) — it makes no difference whether MP is rising or falling. When MP < AP (from number of workers 4.5), the AP is falling. Therefore, the intersection must occur at the maximum point of AP. It is important to understand why. The key is that AP increases as long as the MP is greater than AP. And AP decreases as long as MP is less than AP. Since AP is positively or negatively sloped depending on whether MP is above or below AP, it follows that MP=AP at the

highest point on the AP curve. This relationship between MP and AP is not unique to economics. Consider a cricket batsman, say Sachin Tendulkar, who is averaging 50 runs in 10 innings. In his next innings he scores a 100. His marginal score is 100 and his average will now be above 50. More precisely, it is 54 i.e. (50 * 10 + 100)/ (10+1) = 600/11. This means when the marginal score is above the average, the average must increase. In case he had scored zero, his marginal score would be below the average, and his average would fall to 45.5 i.e. 500/11 is 45.45. Only if he had scored 50 would the average remain constant, and the marginal score would be equal to the average.

Check your progress

1. State clearly the relation between APLand MPL.

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2. Why is the marginal product of labour likely to increase and then decline in the short-run?

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3. Faced with constantly changing conditions, why would a firm ever keep any factors fixed? What determines whether a factor is fixed or variable?

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9.4 PRODUCTION FUNCTION WITH TWO VARIABLE INPUTS

Production functions where two inputs (say capital and labour) are variable. Although, we restrict our analysis to two variable inputs, all of the results hold for more than two also. We are restricting our analysis to two variable inputs because it simply allows us the scope for graphical analysis. When analyzing production with more than one variable input, we cannot simply use sets of AP and MP curves like those discussed in section 9.3, because these curves were derived holding the use of all other inputs fixed and letting the use of only one input vary. If we change the level of fixed input, the TP, AP and MP curves would shift. In the case of two variable inputs, changing the use of one input would cause a shift in the MP and AP curves of the other input. For example, an increase in capital would probably result in an increase in the MP of labour over a wide range of labour use.

Production Isoquants in Greek the word ‘iso’ means ‘equal’ or ‘same’.

A production isoquant (equal output curve) is the locus of all those combinations of two inputs which yields a given level of output. With two variable inputs, capital and labour, the isoquant gives the different combinations of capital and labour, that produces the same level of output.

For example, 500 units of output can be produced using either 15 units of capital (K) or 2 units of labour (L) or K=10 and L=3 or K=5 and L=5 or K=3 and L=7. These four combinations of capital and labour are four points on the isoquant associated with 5 units of output as shown in Figure 9.2. And if we assume that capital and labour are continuously divisible, there would be many more combinations on this isoquant. Now let us assume that capital, labour, and output are continuously divisible in order to set forth the typically assumed characteristics of isoquants. Figure 9.3 illustrates three such isoquants. Isoquant I show all the combinations of capital and labour that will produce 10 units of output. According to this isoquant, it is possible to obtain this output if K_0 units of capital and L_0 units of.

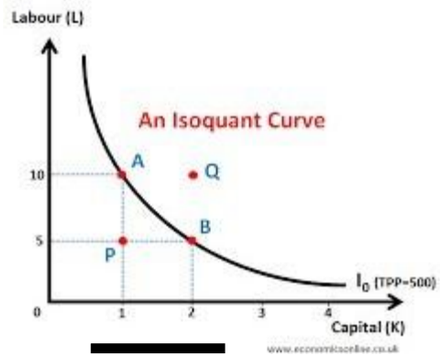

Figure 9.2: Production Isoquant

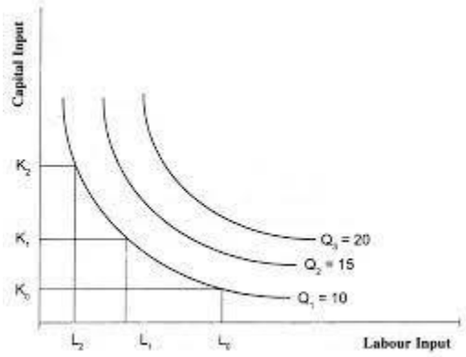

Figure 9.3: Isoquant Map

labour inputs are used. Alternately, this output can also be obtained if K_1 units of capital and L_1 units of labour inputs or K_2 units of capital and L_2 units of labour are used. Similarly, isoquant II shows the various combinations of capital and labour that can be used to produce 15 units of output. Isoquant III shows all combinations that can produce 20 units of output. Each capital labour combination can be on only one isoquant. That is, isoquants cannot intersect. These isoquants are only three of an infinite number of isoquants that could be drawn. A group of isoquants is called an isoquant map. In an isoquant map, all isoquants lying above and to the right of a given isoquant indicate higher levels of output. Thus, in Figure 9.3 isoquant II indicates a higher level of output than isoquant I, and isoquant III indicates a higher level of output than isoquant II.

In general, isoquants are determined in the following way.

First, a rate of output, say Q_0 , is specified. Hence the production function can be written as

$$Q_0 = f(K,L)$$

Those combinations of K and L that satisfy this equation define the isoquant for output rate Q_0

Marginal Rate of Technical Substitution

As we have seen above, generally there are a number of ways (combinations of inputs) that a particular output can be produced. The rate, at which one input can be substituted for another input, if output remains constant, is called the marginal rate of technical substitution (MRTS). It is defined in case of two inputs, capital and labour, as the amount of capital that can be replaced by an extra unit of labour, without affecting total output.

$$MRTS_L \text{ for } K = L\ \Delta K/\ \Delta L$$

It is customary to define the MRTS as a positive number, since wK/wL, the slope of the isoquant, is negative. Over the relevant range of production the MRTS diminishes. That is, more and more labour is substituted for capital while holding output constant, the absolute value of wK/wL decreases.

For example, let us assume that 10 pairs of shoes can be produced using either 8 units of capital and 2 units of labour or 4 units each of capital and of labour or 2 units of capital and 8 units of labour. From Figure 9.4 the MRTS of labour for capital between points a and b is equal to wK/wL = (4–8) / (4–2) = –4/2 = –2 or | 2 |. Between points b and c, the MRTS is equal to –2/4 = –½ or | ½ |. The MRTS has decreased because capital and labour are not perfect substitutes for each other. Therefore, as more of labour is added, less of capital can be used (in exchange for another unit of labour) while keeping the output level constant.

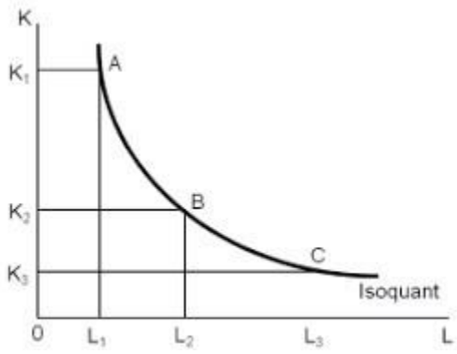

Figure 9.4: Marginal Rate of Technical Substitution

There is a simple relationship between MRTS of labour for capital and the marginal product MPK and MPL of capital and labour respectively. Since along an isoquant, the level of output remains the same, if WL units of labour are substituted for WK units of capital, the increase in output due to WL units of labour (namely, wL * MP_L) should match the decrease in output due to a decrease of

WK units of capital (namely, wK * MP_K). In other words, along an isoquant,

$$wL * MP_L = wK * MP_k$$

which is equal to

$$MPL /MPK = \Delta K/ \Delta L$$

However, as we have seen earlier wK/wL is equal to MRTSL for K, and hence, we get the following expression for MRTS of L for K as the ratio of the corresponding marginal products.

$$MRTS_{L \text{ for } K} = MP_L/ MP_K$$

There are vast differences among inputs in how readily they can be substituted for one another. For example, in some extreme production process, one input can perfectly be substituted for another; whereas in some other extreme production process no substitution is possible. On the other hand, in most of the production processes what we see is imperfect substitution of inputs. These three general shapes that an isoquant might have are shown in Figure 7.5. In panel I, the isoquants are right angles implying that the two inputs a and b must be used in fixed proportion and they are not at all substitutable. For instance, there is no substitution possible between the tyres and a battery in an automobile production process. The MRTS in all such cases would, therefore, be zero. The other extreme case would be where the inputs a and b are perfect substitutes as shown in panel II. The isoquants in this category will be a straight line with constant slope or MRTS. A good example of this type

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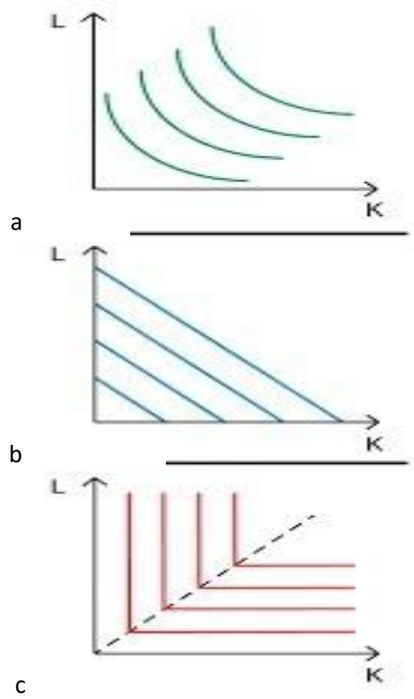

Figure 9.5: Three General Types of Shapes of Isoquants

would be natural gas and fuel oil, which are close substitutes in energy production. The most common situation is presented in panel III. The inputs are imperfect substitutes in this case and the rate at which input a can be given up in return for one more unit of input b

keeping the output constant diminishes as the amount of input b increases.

The Economic Region of Production

Isoquants may also have positively sloped segments, or bend back upon themselves, as shown in Figure 9.6. Above OA and below OB, the slope of the isoquants is positive, which implies that increase in both capital and labour are required to maintain a certain output rate. If this is the case, the MP of one or other input must be negative. Above OA, the MP of capital is negative. Thus output will increase if less capital is used, while the amount of labour is held constant. Below OB, the MP of labour is negative. Thus, output will increase if less labour is used, while the amount of capital is held constant. The lines OA and OB are called ridge lines. And the region bounded by these ridge lines is called economic region of production. This means the region of production beyond the ridge lines is economically inefficient.

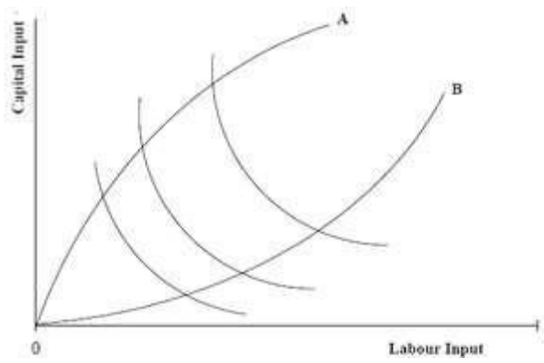

Figure 9.6: Economic Region of Production

9.5 THE OPTIMAL COMBINATION OF INPUTS

In the above section you have learned that any desired level of output can be produced using a number of different combinations of

inputs. As said earlier in the introduction of this unit one of the decision problems that concerns a production process manager is, which input combination to use. That is, what is the optimal input combination? While all the input combinations are technically efficient, the final decision to employ a particular input combination is purely an economic decision and rests on cost (expenditure). Thus, the production manager can make either of the following two input choice decisions:

1. Choose the input combination that yields the maximum level of output with a given level of expenditure.

2. Choose the input combination that leads to the lowest cost of producing a given level of output. Thus, the decision is to minimize cost subject to an output constraint or maximize the output subject to a cost constraint. We will now discuss these two fundamental principles. Before doing this we will introduce the concept isocost, which shows all combinations of inputs that can be used for a given cost.

Isocost Lines

If the firm maximizes profit, it will necessarily minimize cost for producing a given level of output or maximize output for a given level of cost. Suppose there are 2 inputs: capital (K) and labour (L) that are variable in the relevant time period. What combination of (K,L) should the firm choose in order to maximize output for a given level of cost? If there are 2 inputs, K,L, then given the price of capital (P_k) and the price of labour (P_L), it is possible to determine the alternative combinations of (K,L) that can be purchased for a given level of expenditure. Suppose C is total expenditure, then

$$C = P_L * L + P_K * K$$

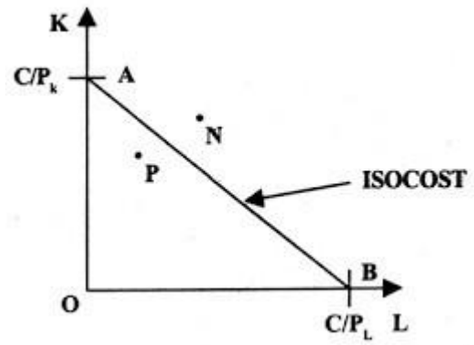

Figure 9.7 : Isocost line

If only capital is purchased, then the maximum amount that can be bought is C/Pk shown by point A in figure 9.7. If only labour is purchased, then the maximum amount of labour that can be purchased is C/PL shown by point B in the figure. The 2 points A and B can be joined by a straight line. This straight line is called the isocost line or equal cost line. It shows the alternative combinations of (K,L) that can be purchased for the given expenditure level C. Any point to the right and above the isocost is not attainable as it involves a level of expenditure greater than C and any point to the left and below the isocost such as P is attainable, although it implies the firm is spending less than C. You should verify that the slope of the isocost is.

$$\frac{\Delta K}{\Delta L} = \frac{C}{P_K} * \frac{C}{P_L} = \frac{P_L}{P_K}$$

Optimal Combination of Inputs:

The Long Run When both capital and labour are variable, determining the optimal input rates of capital and labour requires the technical information from the production function i.e. the isoquants be combined with market data on input prices i.e. the isocost function. If we super impose the relevant isocost curve on the firm's isoquant map, we can readily determine graphically as to which combination of inputs maximize the output for a given level of

expenditure. Consider the problem of minimizing the cost of a given rate of output.

Specifically if the firm wants to produce 50 units of output at minimum cost. Two production isoquants have been drawn in Figure 9.8 Three possible combinations (amongst a number of more combinations) are indicated by points A, Z and B in Figure 9.8 Obviously, the firm should pick the point on the lower isocost i.e point Z. In fact, Z is the minimum cost combination of capital and labour. At Z the isocost is tangent to the 50 unit isoquant. Alternatively, consider the problem of maximizing output subject to a given cost amount. You should satisfy yourself that among all possible output levels, the maximum amount will be represented by the isoquant that is tangent to the relevant isocost line. Suppose the budget of the firm increases to the amount shown by the higher of the two isocost lines in Figure 9.8, point Q or 100 units of output is the maximum attainable given the new cost constraint in Figure9.8.

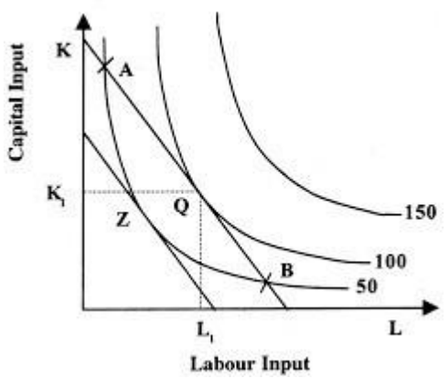

Figure 9.8: Optimal combination of inputs

Regardless of the production objective, efficient production requires that the isoquant be tangent to the isocost function. If the problem is to maximize output, subject to a cost constraint or to minimize cost for a given level of output, the same efficiency condition holds true

in both situations. Intuitively, if it is possible to substitute one input for another to keep output constant while reducing total cost, the firm is not using the least cost combination of inputs. In such a situation, the firm should substitute one input for another. For example, if an extra rupee spent on capital generates more output than an extra rupee spent on labour, then more capital and less labour should be employed. At point Q in Figure 9.8 the marginal product of capital per rupee.

Production Function spent on capital is equal to the marginal product of labour per rupee spent on labour. Mathematically this can be shown as

$MP_L/P_L = MP_K/P_K$

Or equivalently,

$MP_L/MP_K = P_L/P_K$

Whenever the 2 sides of the above equation are not equal, there are possibilities that input substitutions will reduce costs. Let us work with numbers. Suppose $P_L = 10$, $P_k = 20$, $MP_L = 50$ and

$MP_k = 40$. Thus, we have:

$50/10 > 40/20$

This cannot be an efficient input combination, because the firm is getting more output per rupee spent on labour than on capital. If one unit of capital is sold to obtain 2 units of labour

(Pk = 20, PL = 10), net increase in output will be 60. Thus the substitution of labour for capital would result in a net increase in

output at no additional cost. The inefficient combination corresponds to a point such as A in Figure 9.8. At that point two much capital is employed. The firm, in order to maximize profits will move down the isocost line by substituting labour for capital until it reaches point Q. Conversely, at a point such as B in figure 9.8 the reverse is true-there is too much labour and the in equality

$MP_L/P_L < MP_K/P_K$ will hold

This means that the firm generates more output per rupee spent on capital than from rupees spent on labour. Thus a profit maximizing firm should substitute capital for labour. Suppose the firm was operating at point B in Figure 9.8. If the problem is to minimize cost for a given level of output (B is on the isoquant that corresponds to 50 units of output), the firm should move from B to Z along the 50-unit isoquant thereby reducing cost, while maintaining output at 50. Alternatively, if the firm wants to maximize output for given cost, it should move from B to Q, where the isocost is tangent to the 100-unit isoquant. In this case output will increase from 50 to 100 at no additional cost.

Thus both the following decisions:

(a) the input combination that yields the maximum level of output with a given level of expenditure, and

(b) the input combination that leads to the lowest cost of producing a given level of output are satisfied at point Q in Figure9.8. You should be satisfied that this is indeed the case. The isocost-isoquant framework described above lends itself to various applications. It demonstrates, simply and elegantly, when relative prices of inputs change, managers will respond by substituting the input that has become relatively less expensive for the input that has become relatively more expensive.

On average, we know that compared to developed countries like the US, UK, Japan and Germany, labour in India is less expensive. It is not surprising therefore to find production techniques that on average, use more labour per unit of capital in India than in the developed world. For example, in construction activity you see around you in your city, inexpensive workers do the job that in developed countries are performed by machines.

One application of the isocost-isoquant framework frequently cited is the response of industry to the rapidly rising prices of energy products in the 1970s. (Remember the oil price shock of 1973 and again of 1979). Most prices of petrol and petroleum products increased across the world, and as our analysis suggests, firms responded by conserving energy by substituting other inputs for energy.

Check your progress

1. What is isoquant?

   …….

   …….

2. What is isocost line

   ……

   ……..

3. What is optimum combination of output?

   …….

   ……..

9.6 FUNCTIONAL FORMS OF PRODUCTION FUNCTION

The production function can be estimated by regression techniques using historical data (either time-series data, or cross-section data, or engineering data). For this, one of the first tasks is to select a

functional form, that is, the specific relationship among the relevant economic variables. We know that the general form of production function is,

$Q = f(K,L)$

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

Although, a variety of functional forms have been used to describe production relationships, only the Cobb-Douglas production function is discussed here. The general form of Cobb-Douglas function is expressed as:

$Q = AK^{\alpha}L^{\beta}$

where A, α, and β are the constants that, when estimated, describe the quantitative relationship between the inputs (K and L) and output (Q). The marginal products of capital and labour and the rates of the capital and labour inputs are functions of the constants A, α, and β and. That is,

$$MP_K = \frac{dQ}{dk} \alpha AK^{\alpha-1} L^{\beta}$$

$$MP_L = \frac{dQ}{dK} \beta AK^{\alpha} L^{\beta-1}$$

The sum of the constants (α+β) can be used to determine returns to scale. That is,

$\alpha + \beta > 1$ ⇒ increasing returns to scale,

$\alpha + \beta = 1$ ⇒ constant returns to scale and,

$\alpha + \beta < 1$ ⇒ decreasing returns to scale.

Having numerical estimates for the constants of the production function provides significant information about the production system under study. The marginal products for each input and returns to scale can all be determined from the estimated function. The Cobb-Douglas function does not lend itself directly to estimation by the regression methods because it is a nonlinear relationship. Technically, an equation must be a linear function of the parameters in order to use the ordinary least-squares regression method of estimation. However, a linear equation can be derived by taking the logarithm of each term.

$\log Q = \log A + \alpha \log K + \beta \log L$

Types of Statistical Analyses Production Function

Once a functional form of a production function is chosen the next step is to select the type of statistical analysis to be used in its estimation. Generally, there are three types of statistical analyses used for estimation of a production function. These are:

time series analysis

cross-section analysis and

engineering analysis.

Time series analysis:

The amount of various inputs used in various periods in the past and the amount of output produced in each period is called time series data. For example, we may obtain data concerning the amount of labour, the amount of capital, and the amount of various raw materials used in the steel industry during each year from 1970 to 2000. On the basis of such data and information concerning the annual output of steel during 1970 to 2000, we may estimate the relationship between the amounts of the inputs and the resulting

output, using regression techniques. Analysis of time series data is appropriate for a single firm that has not undergone significant changes in technology during the time span analyzed. That is, we cannot use time series data for estimating the production function of a firm that has gone through significant technological changes. There are even more problems associated with the estimation a production function for an industry using time series data. For example, even if all firms have operated over the same time span, changes in capacity, inputs and outputs may have proceeded at a different pace for each firm. Thus, cross section data may be more appropriate.

Cross-section analysis:

The amount of inputs used and output produced in various firms or sectors of the industry at a given time is called cross- section data. For example, we may obtain data concerning the amount of labour, the amount of capital, and the amount of various raw materials used in various firms in the steel industry in the year 2020. On the basis of such data and information concerning the year 2020, output of each firm, we may use regression techniques to estimate the relationship between the amounts of the inputs and the resulting output.

Engineering analysis:

In this analysis we use technical information supplied by the engineer or the agricultural scientist. This analysis is undertaken when the above two types do not suffice. The data in this analysis is collected by experiment or from experience with day-today working of the technical process. There are advantages to be gained from approaching the measurement of the production function from this angle. Because the range of applicability of the data is known, and,

unlike time- series and cross-section studies, we are not restricted to the narrow range of actual observations.

Limitations of Different Types of Statistical Analysis

Each of the methods discussed above has certain limitations

1. Both time-series and cross-section analysis are restricted to a relatively narrow range of observed values. Extrapolation of the production function outside that range may be seriously misleading. For example, in a given case, marginal productivity might decrease rapidly above 85% capacity utilization; the production function derived for values in the 70%-85% capacity utilization range would not show this.

2. Another limitation of time series analysis is the assumption that all observed values of the variables pertains to one and the same production function. In other words, a constant technology is assumed. In reality, most firms or industries, however, find better, faster, and/or cheaper ways of producing their output. As their technology changes, they are actually creating new production functions. One way of coping with such technological changes is to make it one of the independent variables.

3. Theoretically, the production function includes only efficient (leastcost) combinations of inputs. If measurements were to conform to this concept, any year in which the production was less than nominal would have to be excluded from the data. It is very difficult to find a time-series data, which satisfy technical efficiency criteria as a normal case.

4. Engineering data may overcome the limitations of time series data but mostly they concentrate on manufacturing activities. Engineering data do not tell us anything about the firm’s marketing

or financial activities, even though these activities may directly affect production.

5. In addition, there are both conceptual and statistical problems in measuring data on inputs and outputs. It may be possible to measure output directly in physical units such as tons of coal, steel etc. In case more than one product is being produced, one may compute the weighted average of output, the weights being given by the cost of manufacturing these products. In a highly diversified manufacturing unit, there may be no alternative but to use the series of output values, corrected for changes in the price of products. One has also to choose between 'gross value' and 'net value'. It seems better to use "net value added" concept instead of output concept in estimating production function, particularly where raw-material intensity is high.

9.7 MANAGERIAL USES OF PRODUCTION FUNCTION

There are several managerial uses of the production function. It can be used to compute the least-cost combination of inputs for a given output or to choose the input combination that yields the maximum level of output with a given level of cost. There are several feasible combinations of input factors and it is highly useful for decision-makers to find out the most appropriate among them. The production function is useful in deciding on the additional value of employing a variable input in the production process. So long as the marginal revenue productivity of a variable factor exceeds it price, it may be worthwhile to increase its use. The additional use of an input factor should be stopped when its marginal revenue productivity just equals its price. Production functions also aid long-run decision-making. If returns to scale are increasing, it will be worthwhile to increase production through a proportionate increase

in all factors of production, provided, there is enough demand for the product. On the other hand, if returns to scale are decreasing, it may not be worthwhile to increase the production through a proportionate increase in all factors of production, even if there is enough demand for the product. However, it may in the discretion of the producer to increase or decrease production in the presence of constant returns to scale, if there is enough demand for the product.

Check your progress

1. Explain Cobb-Douglas production function ?

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   …….

2. What are Different Types of Statistical Analysis

   ……..

   ……

9.8 LET US SUM UP

A production function specifies the maximum output that can be produced with a given set of inputs. In order to achieve maximum profits the production manager has to use optimum input-output combination for a given cost. In this unit, we have shown how a production manager minimizes the cost for a given output in order to maximize the profit. Also, we have shown how to maximize the output at a given level of cost.

A production isoquant consists of all the combinations of two inputs that will yield the same maximum output. The marginal rate of technical substitution is $\Delta K/\Delta L$, holding output constant. The law of diminishing marginal rate of substitution implies the rate at which one input can be substituted for another input, if output remains

constant. An isocost line consists of all the combinations of inputs which have the same total cost. The absolute slope of the isocost line is the input price ratio. Returns to scale, a long run concept, involves the effect on output of changing all inputs by same proportion and in the same direction. Although, there are many different forms of production function we have discussed here only Cobb-Douglas production function

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UNIT 10: COST CURVES: TRADITIONAL & MODERN APPROACH

Structure

10.0 INTRODUCTION

In a production process, cost is involved due to employment factors of production. In this regard, it is essential to know various types of costs a producer faces while deciding upon the employment of factors. We can think of two types of costs – explicit and implicit. The "explicit" cost is incurred for using a particular factor. For example, if a producer employs 20 units of labour at Rs.5 per unit, the explicit cost is Rs.100. This is also called the accounting cost. The "implicit" or "opportunity cost" is defined as the value of a resource in its next best use; suppose a Miss Sen quits her job of Rs.5, 00,000 per year and opens her own small business. Although, the accounting cost to her from her own business is zero, the opportunity cost is Rs.5, 00,000 per year. In following, we would deal with "explicit" costs of production. These costs could be of two types – fixed and variable. Fixed cost is incurred on account of a fixed factor. For example, office building, a piece of land etc. Variable cost, on the other hand, is incurred from a variable factor. For example, payment according to labour hours, purchasing certain raw materials, whose volume of employment can be easily changed. However, no factor can be strictly fixed or variable. The definition of a fixed or variable factor depends, therefore, on the time frame in which the production process is being considered. If the time frame is very short, a particular input cannot be varied whereas it becomes variable if the time period is sufficiently long

In the short-run since we have some fixed inputs and some other inputs are variable, one has to draw the distinction between the fixed costs and the variable costs. However, in the long-run because the amounts of all the inputs can be varied, all costs are considered together. Finally, the theory of costs attempts to explain as to how cost changes occur in response to changes in the size of production.

In the last two units we have discussed the theory of production at some length. This discussion should help us to understand that the cost changes depend largely on how changes in production take place as a result of changes in the amounts of inputs.

10.1 OBJECTIVES

After going through this unit, you should be able to:

- differentiate between short-run and long-run cost functions;
- know the difference between fixed cost and variable cost and the nature of total cost curve;
- explain the concept of average fixed cost, average variable cost, average total cost and marginal cost and nature of these curves;
- discuss the relationship between marginal cost curve and average cost curve; • appreciate the difference between short-run and long- run cost curves; and
- assess the theoretical insights on the shape of the cost curves; and
- examine the traditional and modern theories of cost.

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10.2 COST FUNCTIONS: SHORT-RUN AND LONG-RUN

The relationship between product and costs is known as the cost function

There are two elements in determining the cost function of a firm. First, the production of the firm, and second, the prices paid by the firm for the factors used.

In practice, production functions can be of various types. At times, one factor of production is variable and other factors fixed. It is also possible for some factors to be variable. On account of this reason, cost function can also be of various types. In economics, generally two types of cost functions are considered under the price theory:

i) The short-run cost function, and
ii) The long-run cost function.
Cost functions can be illustrated in diagrammatic forms as cost curves.

Cost Function and the Time Element

To understand the theory of cost, it is necessary to be clear about the meaning of short-run and long-run. In common usage, these terms may be used for weeks, months and years but for the economist they indicate conditions of production and have no reference to the calendar year. Even then, the concept of time does creep in indirectly when the terms short-run and long-run are discussed.

Generally, economists regard that period of time as short-run in which some factors of production are fixed (at least one factor is fixed) and the firm depends only on the variable factors of production to increase the level of output. If the firm does not employ the variable factors at all, the output will be zero in the short-run. However, the maximum quantity of output that can be produced depends upon the quantity of the fixed factors of production. In the long-run, all factors are variable and the quantity of the output can be increased to any limit. For example, in a manufacturing industry the plants, machinery, building of the factory, etc. are fixed resources in the short-run while the raw materials, labour, power, etc. are variable. Therefore, to increase the amount of output in this period, it will become necessary to employ more units of the variable resources in conjunction with the fixed resources. Obviously, the maximum output that can be obtained in this period will depend to a great extent upon the total quantity of the fixed resources of production.

Long-Run Cost Function In the long-run, total cost is a multivariable function which implies that total cost is determined by many factors. The long-run cost function may be written as $C = f(Q, T, P_f)$

Where, C = total cost of production Q = output T = technology P_f = prices of the relevant factors of production.

Graphically, the long-run cost function is shown on two dimensional diagram as C=f(Q), ceteris paribus. With the assumption that the technology and the prices of relevant factors of production remain constant, the long-run cost function may be written as

$C = f(Q, \overline{T}, \overline{P}_f$ or $C = f(Q)$

However, the technology and the factor prices need not remain constant. When these factors change, their effect on cost is shown by a shift of the cost curve. It is this reason why the factors other

than output are known as shift factors. Theoretically there is no difference between the various factors which determine the costs, and the distinction we have drawn above between the output level and other factors determining costs can sometimes be misleading. However, for showing costs on two dimensional diagrams this distinction has to be made.

Short-Run Cost Function

In the short-run, in addition to output level, technology and factor prices, the fixed factors such as capital equipment, land, etc. also determine costs of production. Therefore, the short-run cost function is written as

$C = f(Q, \bar{T}, \bar{P}f, \bar{K})$

Where, $\bar{K}$ indicates fixed factors. In the discussion on the production function, it has been stated that in the short-run certain factors like capital equipment, land, factory building and top managerial staff remain constant. $\bar{K}$ underlines the fact of the constancy of the fixed factors. Since the amount of fixed factors does not change in the short-run under any circumstances, $\bar{K}$ is not a shift factor like technology and factor prices.

10.3 THEORY OF COST IN THE SHORT-RUN (TRADITIONAL)

The short-run costs of a firm are divided into fixed and variable costs. Therefore, T

C = TFC + TVC
where, TC = total cost
TFC = total fixed cost
TVC = total variable cost

Fixed Cost

This is known as fixed cost of production. Interest paid by the producer on the capital borrowed for purchasing plant and machinery, rent of the factory building, depreciation of the machinery, the wages of foremen and organisers, etc. are all fixed costs. These costs remain fixed even when the level of output is varied. Even if the producer decides to close down production, he has to bear these costs since the factory rent, wages of managers, interest on capital, etc. have to be paid. This makes it clear that larger the level of production in a firm, the lower will be the per unit fixed cost (or average fixed cost).

Variable Cost

The cost which keeps on changing with the changes in the quantity of output produced is known as variable cost.

For instance, raw material has to be used in the process of production in a manufacturing industry, labour has to be employed for running machines, and energy (electricity) has to be arranged. Generally expenditure on these inputs increases or decreases due to changes in the level of production. It is important to remember in this context that when the producer abandons production in the short run, these costs also vanish completely. In fact, it is due to this direct relationship between expenditure on such inputs and the level of production that these expenditures are known as variable costs.

Total Fixed Cost

Total fixed cost is the total expenditure by the firm on fixed inputs

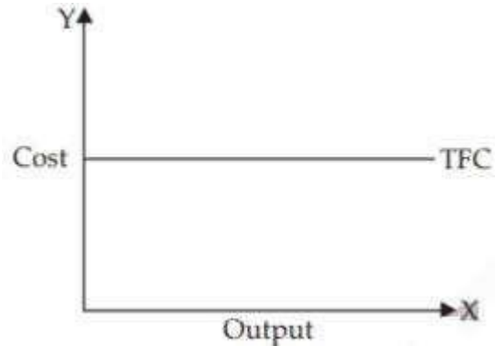

Fig.10.1 : Total Fixed Cost curve

Total Variable Cost

Total variable cost is firm's total expenditure on variable inputs used to carry out production

Since higher output levels require greater utilisation of variable inputs, they mean higher total variable cost. Fig. 10.2 shows the firm's total variable cost function. Notice one peculiar feature of TVC – initially it rises sharply, then, there is a moderation in its rate of rise and ultimately it resumes rising at a faster pace

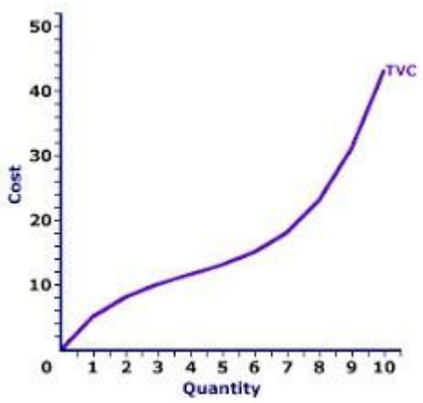

Fig. 10.2 : Total Variable Cost Curve rises from left to right

Total Cost

Total cost is the sum of total fixed cost and total variable cost.

Thus, to obtain the firm's total cost at a given output, we have only to add its total fixed cost and its total variable cost at that output.

Fig. 10.3. Since the total cost function and the total variable cost

function differ by only the amount of total fixed cost which is constant, they have the same shape.

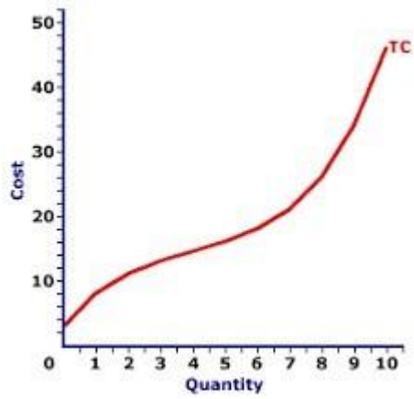

Fig 10.3: short run total cost

In Fig. 10.3, all the three cost functions discussed above (total fixed cost function, total variable cost function and total cost function) have been shown together. Cost functions, when depicted graphically, are often called cost curves

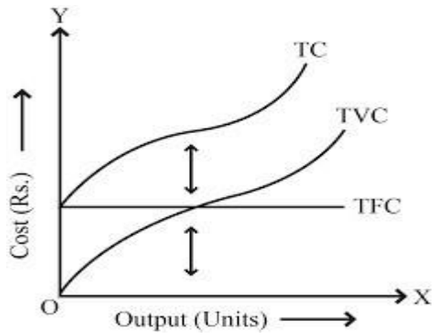

Fig. 10.4: Total Fixed Cost, Total Variable Cost and Total Cost

In Fig. 10.4, TFC is the total fixed cost curve. Since it is parallel to X-axis, it indicates that whatever be the level of output the total fixed cost remains the same (i.e., it does not change in response to a change in the level of production). TC is total cost curve. It indicates the sum of total fixed cost and total variable cost for the various output levels. If the level of production is to be raised, the use of variable inputs will have to be increased and this will push up the costs. The rising total cost curve TC from left to right (the positive

slope of TC curve) indicates this fact. The vertical distance between the total cost curve TC and the total fixed cost curve TFC indicates total variable cost. For example, if the firm wishes to produce OQ units of output, the total variable cost will be GQ – MQ = GM and if the level of output is OR, the total variable cost will be HR – NR = HN. The total variable cost has been depicted by the curve TVC in Fig. 10.4. This is parallel to the total cost curve TC and the vertical distance between the two curves (TC and TVC) indicates total fixed cost.

Check your progress

1. Define and distinguish between long run cost function and short run cost function.

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2. Production and Costs 178 3) Distinguish between fixed cost and variable cost.

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3. Define total fixed cost and total variable cost and trace the nature of the total cost curve.

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SHORT-RUN COST CURVES

To find out the per unit profit, the firm has to compare the per unit cost (or average cost) with per unit price. Therefore, it is necessary for us to understand the concepts of average fixed cost, average variable cost and average total cost.

Average Fixed Cost

Generally, all those firms whose total costs of production include a significant proportion of fixed costs try to increase the level of production to such an extent that per unit fixed cost which is often known as average fixed cost, is reduced substantially. To find out the average fixed cost, total fixed cost has to be divided by the output. In the form of a formula,

$$AFC = \frac{TFC}{Q}$$

where, AFC is the average fixed cost TFC is the total fixed cost Q is the output

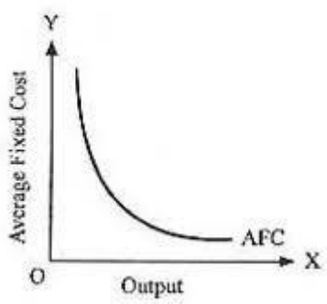

Fig. 10.5: Average Fixed Cost curve

The average fixed cost curve (AFC) is a rectangular hyperbole because multiplication of average fixed cost with the quantity of output produced always yields a fixed value (the area under the curve is always same and is equal to the total fixed cost). As the output is expanded, there is a sharp decline in average fixed cost

Average Variable Cost

To obtain the average variable cost, we divide the total variable cost by the output. In the form of formula:

$$AVC = \frac{TVC}{Q}$$

where, AVC = the average variable cost TVC = the total variable cost and Q = the output. With an increase in the amount of variable factor, the efficiency in production increases (resulting in an increase in average product) and the average variable. In fact, the average variable cost curve (AVC) gives us the same information in money terms that we obtain from the average product curve of the variable factor in physical terms.

With an increase in the amount of variable factor, the efficiency in production increases (resulting in an increase in average product) and the average variable cost declines. If average productivity remains constant, average variable cost will also remain constant. If it declines, average variable cost increases. Thus, average variable cost curve is the reciprocal of the average variable (factor) product curve.

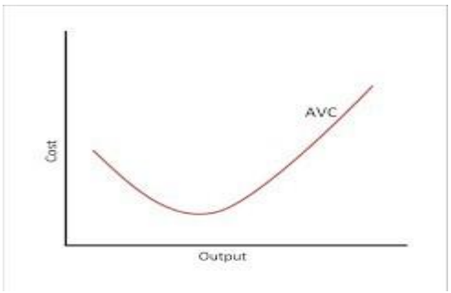

Fig. 10.6: Average variable cost curve

Average Total Cost

The average total cost is also known as average cost. To find out average cost, we divide total cost (which is the sum of total fixed cost and total variable cost) by the output. In the form of a formula:

$$AC = \frac{TC}{Q}$$

OR

$$ATC = \frac{TFC}{Q} + \frac{TVC}{Q}$$

Modern economists are generally agree that in all areas of economic activity, average total cost declines initially. The reasons are the same that lead to increasing returns in the initial stages. Average cost declines initially because some of the resources are indivisible and there are possibilities of specialisation in the production process. As long as the indivisible factors are not fully utilised, the average total cost falls, and when expansion in output leads to a stage where the indivisible resources are fully utilised, an optimum proportion is established between the factors of production. The output obtained at this point is the optimum output. Here, the average total cost is minimum. If the output is expanded beyond this point (which denotes an optimum combination of resources) by increasing the amount of variable inputs, then total production increases at a diminishing rate. This leads to a rise in average This shows why the average total cost curve is U-shaped as shown below

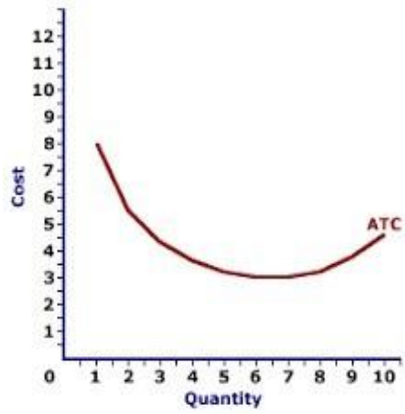

Fig.10.7: Average Total Cost curve

We can understand the shape of average total cost curve ATC better with the help of average variable cost curve AVC and average fixed cost curve AFC drawn in Fig. 10.8. Since the ATC curve is obtained

by vertically summing up the AVC and AFC curves, when both AVC and AFC curves slope downward, the ATC curve also slopes downwards. The point R on the AVC curve shows the minimum average variable cost. After this point, the average variable cost starts increasing and thus the AVC curve is sloping upward. However, the fall in the average fixed cost more than compensates for the rise in average variable cost. Hence, the ATC curve slopes downward. Since at point T on the AVC curve the rate of increase of the average variable cost is the same as the rate at which the average fixed cost falls corresponding to this level of output, average total cost is minimum at this output level. As the level of output increases beyond this point, the average variable cost rises far more rapidly than the rate at which average fixed cost falls. Therefore, the ATC curve slopes upward.

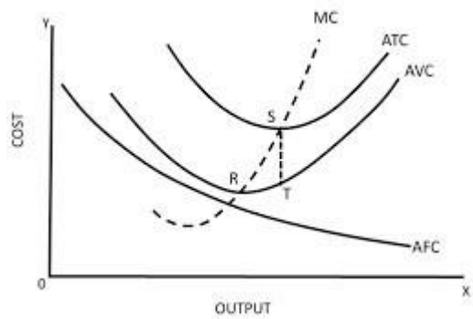

Fig. 10.8: Average total cost is the vertical sum of AFC and AVC

Marginal Cost

The marginal cost is the increase in the total cost owing to a small increase in output.

In symbols,

$$MC = \frac{\Delta TC}{\Delta Q} \quad \text{or} \quad \frac{\Delta TVC}{\Delta Q}$$

where,

MC is marginal cost

ΔTC is change in total cost associated with a small change in output

ΔTVC is change in total variable cost associated with a small change in output

ΔQ is small change in output

The marginal cost (MC) curve as it would be clear from Fig. 10.9 is U-shaped. This implies that the marginal cost curve MC first slopes downward and then at the point where marginal cost is minimum, it starts sloping upward because marginal cost after decreasing with increases in output at low output levels, increases with further increases in output. The shape of marginal cost curve is in fact attributable to the law of variable proportions. According to the law of variable proportions, the marginal product of the variable input rises at low output levels and then falls with the expansion in output. Hence, the marginal cost curve will first fall and then rise. There are two important points to remember about the marginal cost curve

i) The MC curve reaches its minimum point before the ATC and the AVC curves reach their minimum points; and

ii) When the MC curves rises, it cuts the AVC and the ATC curves at their minimum points.

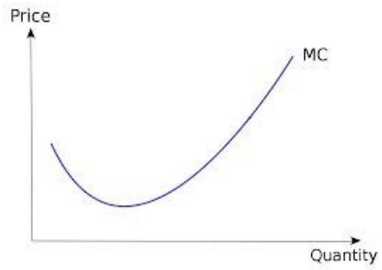

Fig. 10.9 : Marginal Cost Curve

Relationship between Marginal Cost and Average Cost

There is a close relationship between the marginal cost (MC) curve and the average total cost (ATC) and average variable cost (AVC) curves. We shall explain the relationship only between the MC curve and the ATC curve, but the relationship between the MC curve and the AVC curve can be explained along the same lines of reasoning. Fig. 8.10 shows the MC curve together with the ATC curve and the AVC curve. The relationship between the ATC curve and the MC curve is as follows:

Fig. 10.10 shows the MC curve together with the ATC curve and the AVC curve. The relationship between the ATC curve and the MC curve is as follows:

1) When the MC curve is below the AC curve (which means marginal cost is less than average cost), the latter falls.
2) When the MC curve is above the AC curve (which means marginal cost is more than average cost), the latter rises.
3) The MC curve intersects the AC curve at its minimum point.

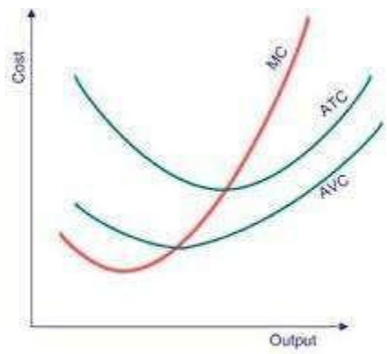

Fig.10.10 MC curve intersects both AVC curve and ATC

The reason for the above stated relationship between the MC curve and the ATC curve is simple. So long as the MC curve lies below

the ATC curve, it pulls the latter downwards; when the MC curve rises above the ATC curve, it pulls the latter upwards. Consequently, marginal cost and average total cost are equal where the MC curve intersects the ATC curve. Further when output is small, marginal cost remains lower than average total cost; but when output is expanded, marginal cost exceeds average total cost. Thus, it is natural that the MC curve intersects the ATC curve at its minimum point

Check Your Progress

1) Indicate the following statement as true (T) or false (F):

i) Average fixed cost curve is a rectangular hyperbole ( )

ii) Average variable cost curve is the reciprocal of the average variable factor productivity curve ( )

iii) The average total cost curve has inverted U shape ( ) iv) When the MC curve is below the AC curve, the latter rises ( )

2) What is average cost? What is the nature of the average total cost curve?

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3) Define and distinguish between average cost and marginal cost.

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LONG-RUN COST CURVES

In the long-run, all factors are variable. Due to the absence of fixed factors in the production function, all costs of production are variable in the long-run and therefore there is no need to distinguish

between fixed and variable costs as is done in the short-run. In the long-run, to increase the level of production, all factors have to be increased and this results in an expansion of scale. In the short-run, the production capacity of the firm depends upon the size of the plant. Generally, there are many options before a firm. According to the circumstance, it can choose any plant out of the large and small plants available to it.

Let us suppose that a firm has three options and corresponding to them, the short-run average total cost (SATC) curves are as given in Fig 10.11. We shall call the smallest plant as 1, the medium size plant as 2, and the large size plant as 3. The short-run average total cost curves corresponding to these plants are designated $SATC_1$, $SATC_2$ and $SATC_3$. The firm decides about the size of plant keeping the market considerations in view. If the demand is small, the firm will use plant 1 for purposes of production but in doing so it will have to incur a higher average total cost. If the firm has to produce OQ_2 quantity of output, it has two options open before it: firstly, it can employ plant 1. The optimum level of output that can be produced with the help of this plant is itself OQ_2.

Secondly, it can opt for plant 2. If it does so, the capacity of plant2 will not be fully utilised nevertheless per unit cost of production will be lower than the cost of production the firm will have to incur if it opts for producing OQ_2 amount of output with the help of plant 1 (even though OQ_2 is the optimum level of output that can be produced on plant 1). This is due to the tendency of 'increasing returns to scale'. Not that plant 3 is larger in size than plant 2 yet, the curve $SATC_3$ is higher than the $SATC_2$ curve. If the firm opts for plant C in this case, the average total cost will increase due to the operation of 'diminishing returns to scale'

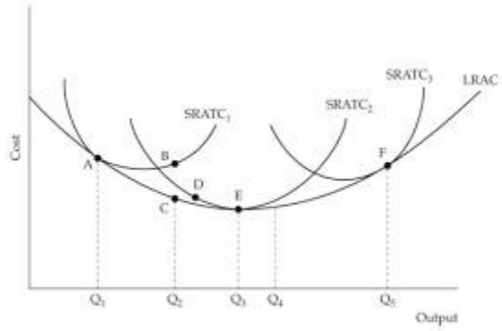

Fig 10.11: long run average cost

Theoretically speaking, the long-run average cost (LAC) curve touches the short-run average total cost (SATC) curves on their minimum points. Geometrically this is possible only under those circumstances when the tendency of constant returns to scale prevails. It is due to the fact that initially increasing returns to scale and after some time diminishing returns to scale prevail in the production process that the LAC curve touches the lowest SATC curve at its minimum point. In the phase of increasing returns to scale when average total cost is falling, the LAC curve touches the SATC curves to the left of the minimum points of the SATC curves and in the phase of diminishing returns towards the right of minimum points of these curves. In Fig. 10.11, the curve LAC touches the $SATC_2$ curve at its minimum point K, the $SATC_1$ curve towards the left of its minimum point (at A) and the SAT C_3 curve towards the right of its minimum point (at F).

Long Period Economic Efficiency

The behaviour of the firm which seems to be efficient in the short-run may be found to be inefficient in the long-run. To understand this let us consider Fig. 10.12. Let us suppose that the firm is producing OQ_1 quantity of output. If, due to an increase in demand, the firm wishes to increase output by Q_1Q_2, plant cannot be changed in the short-run and only variable factors will be increased. Thus, the firm will advance on the curve $SATC_1$. As a result, the efficiency

of the variable resources will improve and per unit production cost will decline from BQ_1 to JQ_2. In the short-run the level of efficiency cannot improve further because this is the optimum level of production that can be achieved with the help of the plant available to the firm. However, in the long-run to produce the level of output OQ_2, the use of plant of such a small size is inefficient. If the firm uses a plant of a larger size, it will benefit from the increasing returns that would thus become available. As a result, the per unit cost will fall and come down to the level KQ_2. Though the full capacity of this plant will not be fully utilised, even then it would be more efficient as compared to the earlier plant.

In a similar way when an expansion in scale leads to diseconomies or diminishing returns to scale emerge, it will be in the interest of the firm to reduce the level of production. If the firm is producing the output OQ_4 in Fig. 10.12, it will not be a right strategy from the point of view of maximising profits. The firm can cut down production by Q_3Q_4 in the short-run and this will enable it to reduce the average total cost from DQ_4 to MQ_3. This will result in optimum use of the plant. However, in the long-run, this position will not be satisfactory as the firm can reduce the average cost to the level NQ_3 by reducing the size of the plant. Since $NQ_3 < MQ_3$, the position which was optimum for the firm in the short-run becomes inefficient in the long-run. It is clear that when the firm uses plant of a relatively small size, it produces output much larger than is technologically optimum yet the cost remains low because it becomes possible to reduce the diseconomies of the large plant.

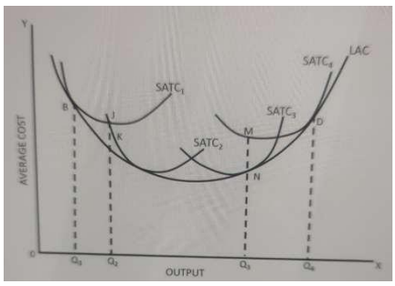

Fig.10.12: Explanation of long-run economic efficiency

The Long-Run Average Cost Curve

We have explained in detail above that the short-run average total cost curve is U-shaped. Let us now discuss the shape of long-run average cost curve. There is general agreement that the long-run average cost falls initially due to economies of scale. But whether it falls to a certain point and then becomes constant or rises again, cannot be conclusively said. In traditional analysis, the long-run average cost (LAC) curve is assumed to be U-shaped (as in Fig.10.12). The shape of the long-run average cost curve is based on the assumption that ultimately the tendency of diminishing returns operates in the production process. If this belief of the economists is correct that every producer wishes to maximise profits and conditions of production are perfectly competitive, then it is true that the LAC curve must ultimately rise to the right

Long-Run Marginal Cost Curve

After having understood the meaning of short-run marginal cost, it is not difficult to understand what long-run marginal cost is. Long-run marginal cost designates the change in total cost consequent upon a small change in total output when the firm has ample time to accomplish the output changes by making the appropriate adjustments in the quantities of all resources used, including those that constitute its plant. As can be seen, this definition of longrun marginal cost is practically the same as the definition of short-run

marginal cost given by us earlier. The only difference between the two is that whereas in the short-run the existing plant will continue to be used for affecting an increase in output, in the long-run the plant itself will be changed. As far as the relationship between the long-run marginal cost curve and longrun average cost curve is concerned, it is precisely the same as exists between the short-run marginal cost curve and the short-run average total cost curve. This would be clear from a mere glance at Fig. 10.13.

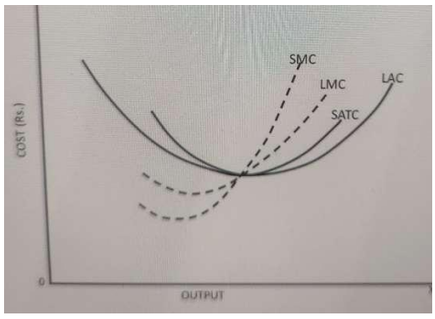

Fig. 10.13: Long-run marginal and average cost curves

Relationship between Long-Run Marginal Cost and Short-Run Marginal Cost

When to produce a certain given level of output, a firm sets up the most efficient plant, its short-run marginal cost (SMC) becomes equal to its long-run marginal cost (LMC). Let us explain this with the help of Fig. 10.14. In this figure, the given quantity of output is OQ_1. This output can be produced at lowest unit cost with the help of plant A. The short-run average cost curve of the firm when it produces with the help of plant A is given by SAC. Short-run average cost curves corresponding to other plants have not been drawn in Fig. 10.14. It is clear from the figure that at OQ_1 level of output, SMC and LMC are equal. However, we must see why they should be equal.

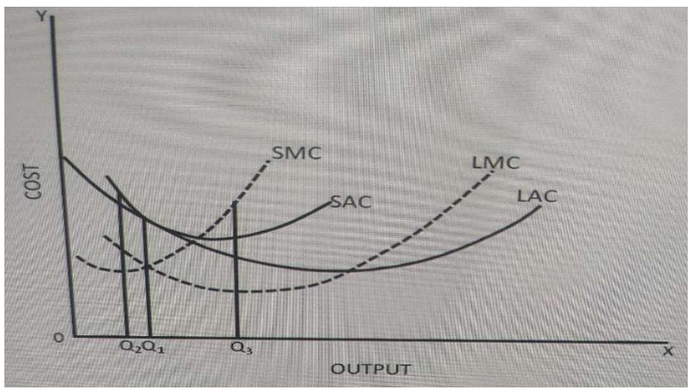

Fig. 10.14: Equality of SMC and LMC on use of an optimum size plant

To find out why SMC and LMC must be equal at the level of output OQ_1, let us consider the implications of a small change in the output by a small amount. For instance, let us take the level of output OQ_2. At this output level, short-run average cost will be greater than long-run average cost (SAC > LAC). In other words, short-run total cost is greater than long-run total cost (STC > LTC). When output rises from the level OQ_2 to the level OQ_1 the short run total cost becomes equal to the long-run total cost. If the level of output is raised to OQ_3 then since SAC is greater than LAC at this output, STC will also be greater than LTC. In other words, when output level is raised beyond OQ_1, we find that SMC exceeds LMC. Actually as we move from OQ_2 to OQ_1, we find that rate of decline in SMC is declining. In fact, beyond OQ_1, it stands rising. On the other hand, LMC keeps falling over the entire range. Therefore, between OQ_1 and OQ_3 SAC is rising and LAC is falling. On practical considerations, the equality of short-run marginal cost and the long-run marginal cost is very significant for a firm. If the firm has to increase the level of output only by a very small amount whether it continues to employ the existing plant and changes only the quantity of the variable resources or makes a small change in the size of the plant, the results are the same. Therefore, from the point of view of the firm, both the methods are equally correct.

Check Your Progress

1) Indicate the following statements as True (T) or False (F):

i) There is no need to distinguish between fixed costs and variable costs in the long-run. ( )

ii) Long-run average cost curve envelopes the short-run average total cost curves. ( )

iii) Long-run marginal cost curve cuts the long-run average cost curve from below at the latter's lowest point. ( )

2) Discuss the nature of the long-run average cost curve.
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3) Discuss the concept of long period economic efficiency.
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4) What is the relationship between long-run marginal cost curve and longrun average cost curve

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10.4 MODERN THEORY OF COST

The U-shaped cost curves of the traditional theory have been questioned both on theoretical as well as empirical grounds. George Stigles suggests that the short-run average variable cost has a flat

stretch over a range of output, which reflects the fact that firms build plants with some flexibility in their productive capacity. The reasons for this reserve have been discussed in detail by various economists. The U-shape of LAC has been questioned and is often pointed out that it is L-shaped. In the following sections, we would look at the short-run and the long-run costs under modern cost theory. Short-Run Short-run total cost (SRTC) consists of short-run total variable cost (SRTVC) and the short-run total fixed cost (SRTFC) i.e., SRTC = SRTVC + SRTFC

The corresponding average costs are obtained by dividing each of the above by total output 'Q'.

STC = STVC + STFC or,

$$\frac{STC}{Q} = \frac{STVC}{Q} + \frac{STFC}{Q}$$

or,

ATC = AVC + AFC

Average Fixed Cost

This cost consists of the physical and personal organisation of the firm. These include expenses of maintenance of buildings, land machinery, salaries of the administrative staff etc. The 'planning' of the firm consists in deciding the 'size' of these fixed factors, which sets a limit to the firm's production (In contrast, variable factors, like labour hours, do not limit the firm's production because these can be hired very easily from the market).

The entrepreneur will plan to produce that level of output, which she anticipates to sell and accordingly she would choose that size of plant, which will allow her to produce that level of output efficiently and with maximum flexibility. The chosen plant would, therefore, have a capacity larger than the 'expected average' level of sales,

because the entrepreneur would want to have some reserve capacity for various reasons.

The reserve capacity helps to meet the seasonal and cyclical fluctuations in demand. It gives the entrepreneur greater flexibility in repairing broken-down of the production process. Besides, some machinery may be so specialised that they are available only to order, which takes time. In such a cases, the machinery will be bought in excess of the minimum requirement, as a reserve. Generally, some reserve capacities are always allowed in the land and building since expansion of operations may be seriously limited if these have to be acquired. Therefore, an entrepreneur will not necessarily choose the plant, which will give her today the lowest cost, but rather that equipment which will allow the greatest flexibility.

Under these conditions the AFC curve would look like as shown in Figure 10.15. The firm has some ‘larges-capacity’ units of machinery, which set an absolute limit to the short-run expansion of output (boundary II). The firm also has small unit machinery, which can set a limit to expansion (boundary I). Boundary I is not an absolute boundary, because the firm can increase its output in the short-run, until it is encountered. This can be done in two ways: either by raising the variable factors employed in production or, by buying some additional small-unit types of machinery. If the first method is chosen, then we have the AFC getting extended beyond I, (this then looks like the AFC in traditional theory of cost), if the second is chosen there occurs a break in AFC, whereby we have the portion ‘ab’

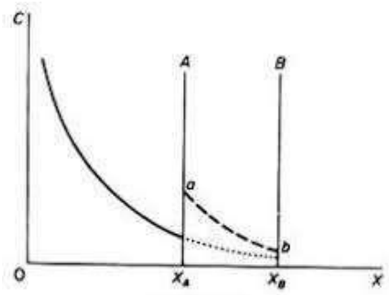

Fig. 10.15: Average Fixed cost in the Modern Theory

Average Variable Cost

As in the traditional theory, the average variable cost of modern theory consists of the cost of variable inputs like labour and raw materials. The SAVC, in modern cost theory is U-shaped but it also has a flat stretch over a range of output, as shown in Figure 10.16. Over this stretch the SAVC = SMC, i.e., both being constant per unit of output. As usual, to the left of the flat stretch,SMC lies below SAVC and to the right, it lies above SAVC.

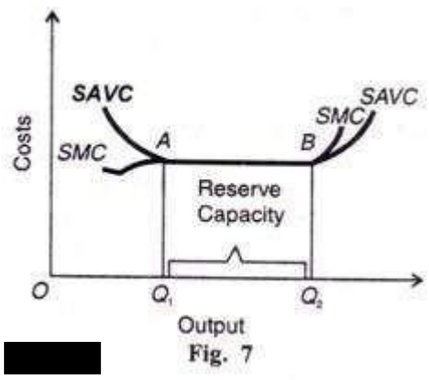

Fig. 10.16: Short-run Average Variable Cost

The flat stretch in the SAVC is due to the presence of "reserve capacity". It may be important to take note of features that the reserve capacity is planned in order to give the maximum flexibility in the operation of the firm. It is different from "excess capacity", which arises with the U-shaped costs of the traditional theory of the

firm. By definition, excess capacity is given by the difference in output corresponding to the minimum level of average cost curve

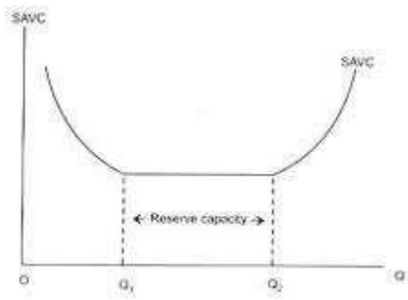

Fig. 10.17: SAVC under Modern Theory

The traditional theory assumes that each plant is designed without any flexibility i.e., it is designed to produce optimally only a single level of output where as in the modern theory of costs, the range of output X1X2 in panel (B) of Figure Theory of Cost 10.17, reflects the planned reserve capacity, which does not lead to increases in costs. The firm sometimes chooses to operate the plant closer to Q_1 and at others closer to Q_2. Generally, the entrepreneur expects to operate her plant within the Q_1Q_2 range.

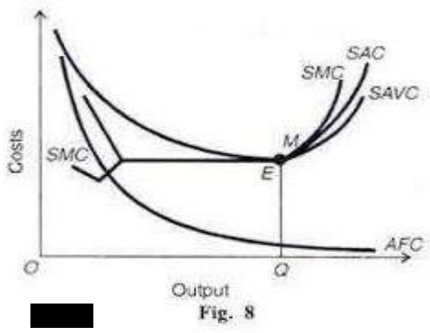

Fig. 10.18: Short run average total cost under Modern Theory

Average Total Cost

The ATC is obtained by adding the AFC and AVC at each level of output. The ATC is shown in Figure 10.18. The ATC curve falls continuously up to the level of output (Q) at which the reserve

capacity is exhausted. Beyond that level, ATC will start rising. The MC will intersect the ATC curve at its minimum point

Long-Run

In the modern theory of cost, the long-run cost curve is taken to be L-shaped. The production costs fall steeply to begin with and then gradually as the scale of production increases. The L-shape of the production cost curve is explained by the technical economies of large-scale production. Initially, these economies are substantial, but after a certain level of output is reached, all or most of these are attained and the firm is said to have reached the minimum optimal scale, given the technology of the industry. If new techniques are invented for larger scales of output, they must be cheaper to operate. But even with the existing known technologies some economies can always be achieved at larger outputs like the economies from further decentralization and improvement in skills. Also, being a large firm it may undertake production of some raw materials or equipments needed in production, and thereby may reduce costs.

Derivation of LAC

The LAC as in the traditional theory is derived from the SATC. Let us assume that the firm faces plant sizes represented by short-run costs – $SATC_1$, $SATC_2$, $SATC_3$ and $SATC_4$.

Let us further assume that for all SATCs, costs fall as size increases. In business practice, it is customary to consider that a plant is used 'normally' when it operated at a level between 2/3 rd or 3 /4th of capacity.

Therefore, assuming that the typical load factor of each plant is 2/3rd of its full capacity, we draw the LAC curve by joining the points on full capacity of each plant size. This is shown in Figure 10.19. Assuming that there are a very large number of available plant sizes,

the LAC will be continuous (Figure 10.19). If there is a minimum optimal scale of plant (Q in Figure 10.21.), at which all possible scale economies are reaped, then beyond that point the LAC remains constant. As usual if LAC falls continuously, then LMC lies below LAC as in Figure 10.20and beyond the optimal output level X,

LAC = LMC

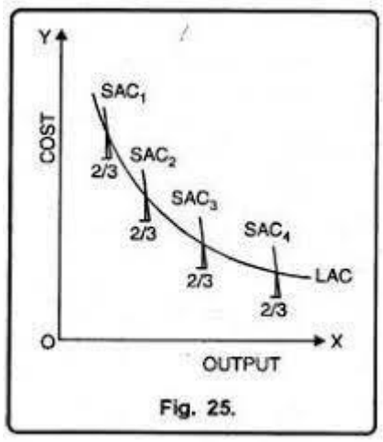

Fig. 10.19 (a): LAC under Modern Theory

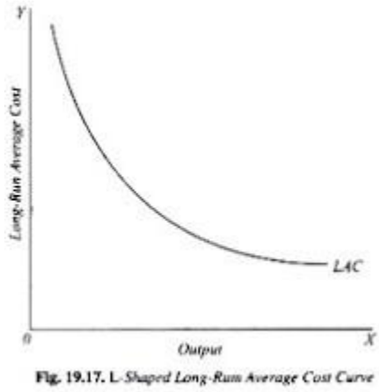

Fig. 10.19 (b): LAC under Modern Theory

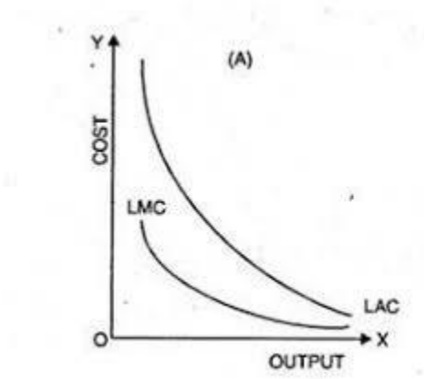

Fig.10.20: LAC, LMC

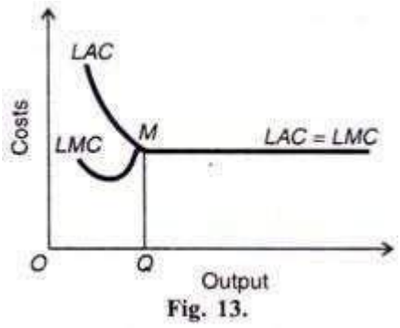

Fig. 13.

Fig. 10.21: LAC, LMC, Beyond Output Q

Most of the empirical studies on cost have provided evidence, which substantiates the hypotheses of a flat-bottomed SAVC and of an L-shaped LAC.

Check Your Progress

1) How does the AFC curve in modern cost theory differ (graphically) from that of in traditional cost theory?

   ……...…

   ……

2) What is the shape of the SAVC curve in the modern theory?

   ……

   ……

LET US SUM UP

In a production process, costs play an important role. Much of the output to be produced depends on cost conditions. Costs differ with time. Generally, costs are higher if the production occurs in a short period of time due to lack of flexibility in inputs. Therefore, we need to analysis issues for the short-run. This gives rise to concept of short-run cost functions. In the long-run with greater flexibility, costs conditions are different from that of the short-run. This gives rise to long-run cost functions – LAC, LMC, etc. Another important issue associated with the long-run in the concept of "Economies of Scale", which affects the shape of the LRAC. Finally, we consider the modern theory of costs, which is more closer to reality. Unlike the traditional theory, which rules out the existence of "reserve capacity", generally maintained by the firms, the modern theory incorporates it and accordingly, we get somewhat different short-run and long-run cost functions.

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UNIT 11: PRODUCTION FUNCTION AND LAWS OF RETURNS.

Structure

11.0 INTRODUCTION

After going through this unit, you should be able to :

1. The production functions and its type
2. state the concept of returns to scale;
3. distinguish between the stage of increasing, constant and diminishing returns to scale; and
4. explain the concepts of economies and diseconomies of scale (both internal and external).

11.1 OJECTIVES

In production process, economic resources or inputs in the form of raw materials, labour, capital, land, entrepreneur, etc. are combined and transformed into output. The three phases of production are discussed: increasing returns to scale, constant returns to scale, and diminishing returns to scale. Expansion of scale confers a number of economies i.e. advantages on the firm - both internal and external. Internal economies, in turn, can be divided into real internal economies of scale and pecuniary internal economies. If the scale of production is continuously expanded, a stage of internal diseconomies of scale sets in i.e. after a certain point, increase in

production is less than proportionate increase in the factors of production. In this unit, we propose to discuss all these issues. We shall also explain the concept of external economies and external diseconomies

11.2 PRODUCTION FUNCTION

A firm produces output with the help of various combinations of inputs by harnessing available technology. The production function is a technological relationship between physical inputs or factors and physical output of a firm. It is a mathematical relationship between maximum possible amounts of output that can be obtained from given amount of inputs or factors of production, given the state of technology. It expresses flow of inputs resulting in flow of output in a specific period of time. It is also determined by the state of technology. Algebraically, production function can be written as:

$Q = f(A, B, C, D, \ldots)$

where Q stands for the maximum quantity of output, which can be produced by the inputs represented by A, B, C, D,…, etc. where f (.) represents the technological constraint of the firm.

Short-run Production Function

A Short run production function is a technical relationship between the maximum amount of output produced and the factors of production, with at least one factor of production kept constant among all the variable factors.

A two factor short run production function can be written as:

$Q = f(L, K)$

where, Q stands for output, L for Labour which is a variable factor here, K for Capital, and f (.) represents functional relationship. A bar over letter K indicates that use of capital is kept constant, that is, it is a fixed factor of production.

Supply of capital is usually assumed to be inelastic in the short run, but elastic in the long run. This inelasticity of the factor is one of the reasons for it to be considered fixed in the short run. Hence, in the short run, all changes in output come from altering the use of variable factor of production, which is labour here.

Total Product (TP)

Total Product (TP) of a factor is the maximum amount of output (Q) produced at different levels of employment of that factor keeping constant all the other factors of production. Total product of Labour (TPL) is given by:

$TPL = Q = f(L)$

Average Product (AP)

Average product is the output produced per unit of factor of production, given by:

Average Product of Labour,

$AP_L = Q/L$

and

Average Product of Capital,

$AP_K = Q/K$.

Marginal Product (MP)

Marginal Product (MP) of a factor of production is the change in the total output from a unit change in that factor of production keeping

constant all the other factors of production. It is given by: Marginal Product of Labour, MPL = ΔQ/ ΔL and Marginal Product of Capital, MPK = ΔQ/ ΔK, where Δ stands for "change in" [here we are considering a production function with two factors of production, Q = f (L,K)].

Law of Diminishing Marginal Product

The law of diminishing marginal product says that in the production process as the quantity employed of a variable input increases, keeping constant all the other factors of production, the marginal product of that variable factor may at first rise, but eventually a point will be reached after which the marginal product of that variable input will start falling.

Law of Variable Proportions

It is also called the law of non-proportional returns, law of variable proportions is associated with the short-run production function where some factors of production are fixed and some are variable. According to this law, when a variable factor is added more and more to a given quantity of fixed factors in the production process, the total product may initially increase at an increasing rate to reach a maximum point after which the resulting increase in output become smaller and smalle

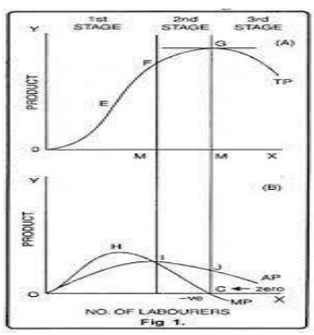


Fig 1.

Fig. 11.1: Law of Variable Proportion

Stage 1: This stage begins from origin and ends at point F (in part (a) of the Fig. 11.1). Corresponding to the point F, you may see the APL reaches maximum and APL = MPL represented by point J in part (b) of Fig. 11.1. Point E where the total product stops increasing at an increasing rate and starts increasing at diminishing rate is called point of inflexion. At point E, TPL changes its curvature from being convex to concave.

Stage 2: This stage begins from point F and ends at point G (in part (a) of the Fig. 11.1). Corresponding to the point F, you may see the AP curve reaches its maximum (point J) and both AP and MP curves are having falling segments along with MP reaching 0 i.e., MP curve touches the horizontal axis (at point C). From point F to point G, the total product increases at a diminishing rate, marginal product falls but remains positive. At point C marginal product of the variable factor reduces to zero. Since both the average and marginal products of the variable factor fall continuously, this stage is known as stage of diminishing returns

Stage 3: Beginning from point G, the total product declines and slopes downward. Marginal product of variable factor is negative. Given the fixed factor, the variable factor is too much in proportion and hence this stage is called stage of negative returns.

Relationship between Average Product and Marginal Product

1) So long as MP curve lies above AP curve, the AP curve is sloping upwards. That is, when MP > AP, AP is rising.

2) When MP curve intersects AP curve, this is the maximum point on the AP curve. That is, when MP = AP, AP reaches its maximum.

3) When MP curve lies below the AP curve, the AP curve slopes downwards. That is, when MP < AP, AP is falling.

Long-run Production Function

In long run, all factors can be varied, thus, for a long-run production function all inputs vary proportionally. Consider a long-run two factor production function:

$Q = f(L, K)$

where, Q stands for output, L for Labour and K for Capital (here, K is without bar, that is, it represents a variable factor like L).

The basic assumption we make about the production function is monotonicity, which means as the factor labour (L) increases, given the factor capital (K), the production Q also increases. Similarly as the factor capital (K) increases, given the factor labour (L), the production Q increases. Thus, the first derivative of the production function is positive w.r.t. L and K i.e., $f'(L) > 0$, $f'(K) > 0$. In other words the marginal product of labour and capital are positive. The second assumption we usually make about the production function is with the curvature. The assumption is the concavity i.e., $f''(L) < 0$, $f''(K) < 0$; diminishing returns to the marginal product of L and K. But the second order cross partial derivative i.e.,

Homogenous And Homothetic Functions

Homogenous Function A function $f(X_1, X_2,\ldots, X_n)$ is said to be homogenous of degree k if

$f(mX1, mX2,\ldots, mXn) = m^k f(X1, X2,\ldots, Xn)$ where m is any positive number and k is constant. A zero-degree homogeneous function is one for which

$f(mX1, mX2,\ldots, mXn) = m^0 f(X1, X2,\ldots,Xn)$

In a similar way, Homogeneous production function of first degree can be expressed as

$f(mX, mY) = m^1 f(X, Y)$

Here X and Y are the two factors of production. It simply says if factors X and Y are increased m times, total production also increases m times. In case of a Linear Homogeneous production function or Homogeneous production function of first degree with k = 1, if all factors of production are increased in a given proportion, output also increases in the same proportion. This represents the case of constant returns to scale (CRS). When k > 1, production function yields increasing returns to scale (IRS), whereas when k < 1, it yields decreasing returns to scale (DRS).

Euler's Theorem

For a homogenous of degree k function $f(X_1,X_2,\ldots,X_n)$, Euler's theorem gives the following relationship between a homogeneous function and its partial derivatives:

$$X_1\frac{\partial f}{\partial X_1} + X_2\frac{\partial f}{\partial X_2} + \ldots\ldots\ldots + X_n\frac{\partial f}{\partial X_n} = k\, f(X_1,X_2,\ldots,X_n)$$

Properties of Homogenous Functions

1) If $f(X_1, X_2,\ldots, X_n)$ is homogenous of degree k then it's first order partial derivatives will be homogenous of degree (k – 1).

2) For a homogenous of degree k function f (.), if f(X) = f(Y), then f(tX) = f(tY).

3) Level curves of a homogenous function f(X, Y) have constant slopes along each ray from the origin. That is, if f(X, Y) is a homogeneous production function of degree k, then the MRTS is constant along rays extending from the origin.

TYPES OF PRODUCTION FUNCTIONS

Linear Production Function

A Linear production function is given by the following form:

$Q = \alpha K + \beta L$

Where, Q stands for output, K and L, the two inputs in production, α and β, the two constant terms. Production function of this form represents inputs which behave as perfect substitutes to each other in the production process. For this reason MRTS remains constant along an isoquant resulting in a straight line downward sloping Isoquant curves. Refer Fig. 11.2 for Isoquants of a linear production function

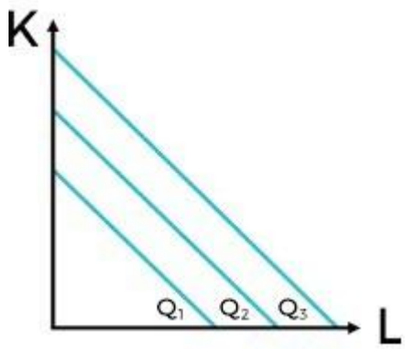


Fig. 11.2: Isoquants for a Linear Production function

$MRTS_{LK} = MPL / MPK = \beta/\alpha^{1}$, which is a constant. , Now, Elasticity of Technical Substitution is given by,

$$\sigma = \frac{\Delta K/L \,/\, K/L}{\Delta \text{ MTRS/MTRS}}$$

Here along the Isoquant, MRTS remains constant, so that Δ MRTS = 0. This implies that Elasticity of Technical Substitution(σ) = ∞ for a linear production function. That is, inputs are perfectly substitutable for each other in the production process.

Leontief Production Function

Production technology sometimes could be such that factors of production must be employed in a fixed proportion. For instance, to produce a unit of output, capital and labour must be employed in proportion of 2:1, so that no output increase could be possible by increasing the units of capital alone or of labour alone, or of both in a different ratio than 2:1. Leontief production technology represents the case where inputs must be combined in fixed proportions, for this reason it is also called a Fixed-proportions production function. The Leontief production function is given as the following form:

$$Q = \min\left(\frac{K}{\theta_K}, \frac{L}{\theta_L}\right)$$

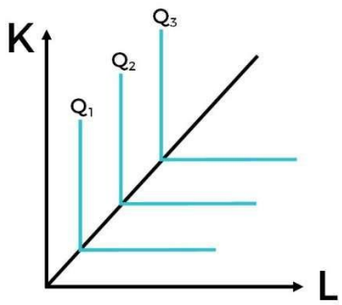


Fig. 11.3: Isoquants for a Leontief Production function

Where Q is the output produced, K and L represent the factors of production, θ_K and θ_L are the unit input requirements. That is, to produce a single unit of output, θ_K unit of factor K and θ_L units of factor L are needed. Consequently for Q units of output, $\theta_K Q$ units of factor K and $\theta_L Q$ units of factor L will be needed. Thus, the fixed proportion of factors to produce output is given by $K/L = \theta_K/\theta_L$. Factors of such production function behave as Perfect compliments to each other in the production process.

Cobb-Douglas production function

$Q = AL^{\alpha} K^{\beta}$

where Q is the output, L and K the factors of production, and A, α, β are all positive constants. The Isoquants of this production function are hyperbolic, asymptotic to both the axis (i.e. it never touches any axis).

Some properties of a Cobb-Douglas production function are as follows: Returns to Scale For the Cobb-Douglas production function $Q = AL^{\alpha} K^{\beta}$, when

$\alpha + \beta = 1$ there are constants returns to scale (CRS)

$\alpha + \beta > 1$ there are increasing returns to scale (IRS)

$\alpha + \beta < 1$ there are decreasing returns to scale (DRS)

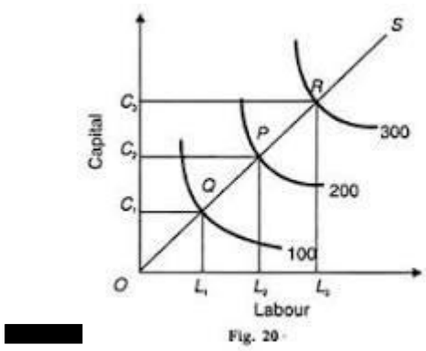


Fig11.4: Isoquants for a Cobb-Douglas production function

The CES Production Function

Linear, Leontief and Cobb-Douglas production functions are a special case of the Constant Elasticity of Substitution (CES) production function, which has been jointly developed by Arrow, Chenery, Minhas and Solow. CES production function is a general production function wherein elasticity of factor substitution can take any positive constant value. The function is given by the following equation:

$$Q = C\,[\alpha K^{\rho} + (1 - \alpha)L^{\rho}]^{1/\rho}$$

Where, Q stands for output.

'C ' is an efficiency parameter, a measure of technical progress. The value of C > 0 and any change in it resulting from technological or organisational change causes shift in the production function. 'α ' is a distribution parameter, determining factor shares and $0 \leq \alpha \leq 1$.

It indicates relative importance of capital (K) and labour (L) in various production processes. ρ is a substitution parameter, used to derive elasticity of substitution (σ) between factors K and L, given by σ = 1/1- ρ . The value of ρ is less than or equal to 1 and can be $-\infty$. The two extreme cases are when $\rho \rightarrow 1$ or $\rho \rightarrow -\infty$.

i) When $\rho \rightarrow 1$, the elasticity of substitution tends towards ∞, the case representing Linear Production function where factors are perfect substitutes to each other in the production process giving straight line Isoquants.

ii) ii) When $\rho \rightarrow -\infty$, the elasticity of substitution tends towards 0, the case representing Leontief Production function where factors are perfect compliments to each other in the production process giving L-shaped Isoquants.

iii) When ρ = 0, the elasticity of substitution = 1, then CES production function becomes a Cobb-Douglas production function giving convex Isoquants. CES Production function are extensively used by economists in the empirical studies of production processes because it permits the determination of the value of elasticity of factor-substitution from the data itself rather than prior fixing of the value of substitution elasticity (σ)

Check your progress

1 what is production function?

…….

……..

2. Explain different types of production function

……

……..

11.3 CONCEPT OF RETURNS TO SCALE

The concept of returns to scale is associated with the tendency of production that is observed when the ratio between the factors is kept constant but the scale is expanded, that is use of all the factors is changed in same proportion**.**

When all the factors of production (labour, capital, etc.) are increased in the conditions of constant techniques, three possibilities arise:

I) Output increases in a greater proportion as compared to the increase in the factors of production. This is the case of increasing returns to scale.

2) Output increases in the same proportion as the increase in the amount of the factors of production. This is the case of constant returns to scale.

3) Output increases in a smaller proportion as compared to the increase in the amounts of the factors of production. This is the case of diminishing returns to scale

Increasing Returns to Scale

When the ratio between the factors of production is kept fixed and the scale is expanded, initially output increases in a greater proportion than the increase in the factors of production.

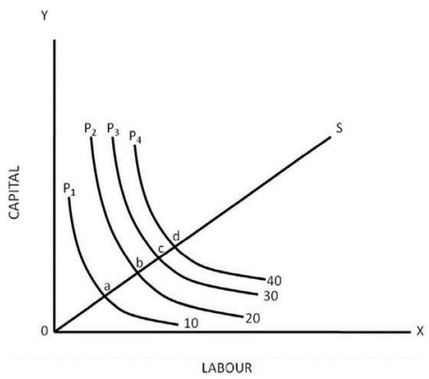


Fig. 11.5: Increasing returns to scale output increases in a greater proportion than the increase in the factors of production

For example, if factors are doubled the output is more than doubled. In other words, to double the quantity of the output, it is not necessary to double the quantity of the factors of production. This can be understood with the help of Fig. 11.5. In this figure P_1 P_2, P_3, P_4 are isoquants. They show 10, 20, 30, 40 units of output respectively. OS is the scale line which is cut by the isoquants at unequal distances. In the figure, it can be seen that cd < be <ab< oa. This means that to enable the firm to rise from isoquant $P_1$to P_2 (so that production increases from 10 to 20 units), the amount of factors of production required is less than the amount required to produce the initial 10 units of output

Similarly, to increase the output further by 10 units so as to reach isoquant P_3, the amount of factors of production required is less than the amount required to produce the earlier 10 units of output as be< ab. This position seems to hold true till isoquant P_4. There are three main factors which account for increasing returns to scale:

1) **Indivisibility:** The most important reason of increasing

returns to scale is the 'technical and managerial indivisibilities'. The meaning of an indivisible factor of production is that there is a certain minimum size of the factor and even if it is large in relation to the size of the output, it has to be used (i.e., it cannot be divided). For example, even if only 10-15 letters are to be despatched from an office, it would be necessary to keep a typewriter. It is not possible to purchase only half the typewriter since only a small number of letters have to be typed daily. We would, therefore, say that typewriter is not divisible. In a similar way, plants and managerial services in modern factories are not divisible. Accordingly, when the scale of production is enlarged initially, there is no equi-proportionate increase in the demand for the factors of the production.

2) **Specialisation:** Chamberlin does not regard indivisibility as an important cause of' increasing returns to scale'. According to him, the main reason of increasing returns to scale is specialisation. When due to division of labour, workers are given jobs according to their ability, their productivity increases while cost declines. According to Donald S. Watson, acknowledgement of this fact contradicts the assumption that the ratio of different factors of production remains constant. Accordingly, he casts doubts whether specialisation can be regarded as leading to increasing returns to scale. The importance of specialisation can be accepted only if we assume that although an increase by an equal amount in quantity of labour and capital employed is necessary for an expansion in scale, this increase does not mean the doubling or trebling their units employed but it does mean an increase in their fixed money cost. But this can lead to technical changes and it is very much possible that

increasing returns emerge not due to an expansion in scale but due to technical reasons.

Constant Returns to Scale

Increasing returns to scale can be obtained only upto a point. After this point is reached, expansion of scale only leads to equal proportionate change in output. Empirical evidence suggests that the phase of constant returns is a fairly long one and is observed in the case of a number of commodities. In a scientific sense, constant returns to scale implies that when the quantity of the factors of production is increased in such a way that the ratio of the factors remains unchanged, output increases in the same proportion in which the factors are increased. In other words, when the quantity of the factors is doubled, the output also doubles. Such a production function is often called linear homogeneous production function or homogeneous production function of the first degree. The phase of constant returns to scale can be understood with the help of Fig. 11.6. In this figure, when the firm goes from isoquant P_3 to P_4, or from isoquant P_4 to P_5 or from isoquant P_5 to P_6, constant returns to scale are obtained. The fact cd = de = ef on the scale line indicates this phenomenon

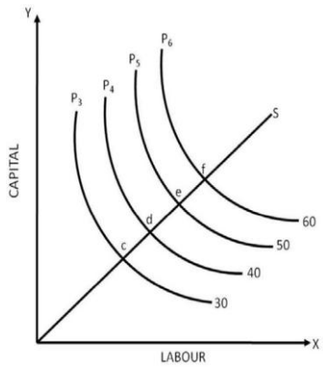
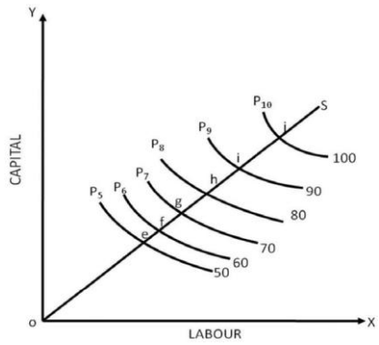


Fig 11.6: Constant returns to scale-output increases in the same proportion in which inputs are increased

The question that now arises is what are the reasons which account for constant returns to scale. Generally when inefficiencies of production on a small scale are overcome and no problems regarding technical and managerial indivisibilities remain, expansion in scale leads to a situation where returns increase in the same proportion as the factors of production. Some economists are of the view that when benefits of specialisation of a factor in the unit of production are small or when such benefits have already been reaped at a small level of production, then for a considerable period of time, production increases according to the law of constant returns to scale.

Economists have argued that if the factors of production are perfectly divisible, the production function must exhibit constant returns to scale. In their opinion, if constant returns to scale does not prevail in some industries, it is because in these industries either due to scarcity or indivisibility of some factors, it is not possible to vary all them in the same proportion. Indivisibility of a factor often results in its under-utilisation at lower levels of output. When a producer for obtaining a larger output increases quantities of other factors, the amount of the lumpy factor which had not been fully utilised at lower levels of output, will not be increased. These economists do not think that economies of scale will be available when the factors of production are perfectly divisible. They however, stress the role of optimum factor proportionality in production. When factors of production are perfectly divisible, they can be increased or decreased in such amounts that an optimum proportion between factors is achieved. The output can be increased or decreased by increasing, or decreasing the amounts of the factors in the optimum proportion without any economies or

diseconomies of scale which means that constant returns to scale will necessarily prevail.



Diminishing Returns to Scale

Diminishing returns to scale ensure that the size of the productive firms cannot be infinitely large. Generally after a limit when the quantity of the factors of production is increased in such a way that the proportion of the factors remains unchanged, output increases in a smaller proportion as compared to increases in the amounts of the factors of production. For example, it may happen that an increase in amount of labour and capital by 100 per cent leads to an increase in output by only 75 per cent. In other words, if output has to be doubled, the factors of production will have to be more than doubled. We can understand this phenomenon with the help of Fig. 11.7. In this figure, when the firm is at isoquant P_6, the tendency of constant returns to scale has come to an end. From here, the increasing distance between two consecutive isoquants is an indication that to obtain the same increase in output, factors of production will have to be increased at a higher and higher rate. On the scale line OS, ij >hi> gh >fg > ef indicate this phenomenon very explicitly. Economists do not agree on the causes which leads to operation of diminishing returns to scale. Nevertheless, the two causes that are often mentioned are as follows:

1) Enterprise: Some economists emphasise that enterprise is a constant and indivisible factor of production and its supply cannot be increased even in the long run. Accordingly, when the quantity of other factors is increased and the scale of production expanded in a bid to boost up production, the proportion of other factors in relation to enterprise increases. Beyond a certain point, this results in diminishing returns as enterprise becomes scarce in relation to other factors.

2) Managerial difficulties: According to some other economists, the main reason for the operation of diminishing returns to scale is managerial difficulties. When the scale of production expands, the co-ordination and control on different factors of production tend to become weak and therefore output fails to increase in the same proportion as the factors of production increase. This results in diminishing returns to scale

11.4 ECONOMIES AND DISECONOMIES OF SCALE

Expansion of the scale confers a number of economies on the firm. Some of these are in 'real terms' while others are in 'pecuniary terms'. Economies that are obtained in production work, marketing, management, transport, etc. are in real terms, while economies that are obtained in terms of, say, purchase of inputs at wholesale rate, availability of finance at lower rate of interest, saving on advertisement costs, etc. are in money terms. Then, there are certain economies that do not accrue to the firm whose scale of operation is large but accrue to certain other firms which benefit from the large scale of this firm

Internal Economies of Scale

Generally, when the scale of production is sought to be enlarged, the firm replaces its small plant by a larger plant. This increases the efficiency of production. However, it is not always necessary to change the plant for expanding the scale of production. The firm can keep the old plant in a running condition and either establish a new plant of the same type or a new plant of some new type. In all these alternatives, the firm obtains many different kinds of economies. The fact is that it is the economies of scale that determine the nature of the long-run average cost curve.

Real Internal Economies of Scale

When expansion in the scale of production takes place, the firm obtains some real internal economies. These economies accrue in the form of saving in the physical quantities of raw materials, labour, fixed and variable capital, and other inputs. Broadly speaking, real internal economies are of the following four types: (i) production economies, (ii) selling or marketing economies, (iii) managerial economies, and (iv) economies in transport and storage.

1) Production economies: When the scale of production expands, a number of economies accrue to the firm in the production process itself First, opportunities for obtaining various types of economies emerge in the workshop of the factory. Production on a large scale enables the firm to carry out extensive division of labour and employ large automatic machines. The capacity of the machines is also fully used on account of the large volume of production. Instead of depending on others for carrying out repairs of machines and machine tools, the firm can itself employ technicians and workmen for the purpose. Techniques of production are

changing so rapidly in the modern world that every producer has to remain ever alert. Large size of the firm and large-scale of operations is distinctly better in this regard since a larger firm can easily make use of its big financial resources to conduct research in its laboratories and/or adapt technology discovered elsewhere to suit its own requirements. The firm is, thus, able to discover better and less expensive techniques of production

Whatever be the scale of operations, some waste material is invariably left out in each factory. If the scale of operations is small, a relatively larger quantity of this material goes unutilised. However, if the scale of operations is large, some useful goods can be prepared even from the waste material. For example, from the syrup left out in the sugar factory, liquor can be prepared. Similarly, in bangles factory, a number of small glass goods can be prepared out of the broken bangles.

When the scale of production is small, the producer generally cannot afford a packaging department. Therefore, he has to depend on others for obtaining packaging material like boxes, labels, etc. This leads to a substantial expenditure on packaging. However, if the scale of production is large, the firm can setup its own packaging department which is economical and also leads to lower per unit packaging costs.

2) Selling or marketing economies: Every producer produces with the purpose of selling. Therefore, he has to incur some expenditure in making his goods available to the consumer. When the scale of production is large, the per unit expenditure of the producer on marketing of goods is reduced substantially due to a number of reasons. All firms advertise their products in a number of ways. Even very small firms have to spend a certain minimum amount on advertising, though the expenditure of the small firms is

considerably less than the expenditure of the large firms, yet the per unit cost of the large firms is smaller due to the fact that advertising cost is not required to be increased proportionately as the volume of production increases. Also, when the scale of production is large, the firm can economise on the expenditure on salesmen, agents, etc. The large firms can also enter into such contracts with the wholesalers and distributors that they take more interest in selling the products of the firm. Naturally, a small firm is deprived of this benefit.

3) Managerial economies: Managerial costs are partially production costs and partially selling costs. However, they are generally considered separately since it is convenient to do so. Managerial economies are obtained on account of the following two basic reasons: First, benefits of specialisation in the field of management can be obtained only when the scale of operations is considerably large. When the scale of production is small, all managerial responsibilities regarding production, marketing, finance, etc. will have to be borne by one person only. However, as the scale of operations expands, separate managers are appointed to look after these tasks. This raises the level and quality of management. At the same time, cost does not increase in proportion to the increase in the scale of operations. Large firms are in a position to use a number of machines for purposes of management. The use of computers, telephone, fax, etc. can be made only by a sufficiently large firm. If small firms use these machines, the total costs incurred on them would be very much higher in relation to the level of production attained.

The economists are, however, not in complete agreement on the managerial economies. Some economists argue that with the expansion of scale, managerial economies are obtained only upto a limit. After this limit, costs on management increase in a greater

proportion. This is due to two reasons. First, the managerial structure in large companies is bureaucratic and when the scale of production expands, delays in decision making creep in. This weakens managerial efficiency. Second, the degree of uncertainty increases as the size of the firm increases. On account of this reason, various difficulties have to be encountered in decision making leading to an increase in managerial costs.

4) Economies in transport and storage: When the scale of production expands, economies in transport and storage accrue to the firm. Small firms have usually to depend on public transport and therefore their per unit transport cost is higher. As the scale of operation expands, the firm can purchase its own truck, lorry, etc. This will reduce the per unit transport cost for the firm. If the scale of operation expands still further, the firm can go in for larger trucks and lorries. The railways also give siding facilities to large producers and this reduces their loading costs. In reality, the transport cost is partly production cost and partly selling and marketing cost. When the firm purchases raw material, the loading cost is a part of its production cost. On the other hand, when finished goods are transported to the market, it is a part of selling and marketing cost. However, for convenience in analysis, the economists prefer to treat transport costs separately.

Like transport costs, storage costs are also partly production costs and partly selling and marketing costs. For example, expenditure on storing the raw material is a production cost whereas expenditure on finished and semi- finished goods is a part of marketing costs. From the point of view of the size of the warehouse, an important thing to remember is that larger the size of warehouse, larger will be the economies accruing to the firm. The reason is that the cost of construction of the warehouse does not increase in the same proportion as the increase in the storage capacity of the warehouse.

Pecuniary Internal Economies of Scale

Some pure pecuniary economies accrue to a firm as its scale of operation expands. The more important ones are the following:

1) A large sized firm can ask the suppliers of raw materials to give specific concessions and discounts. No raw material supplier usually ignores such requests (or pressures) of the large firm.

2) Perfect competition generally does not prevail in the capital market. Since the large companies have greater goodwill in the capital market, they are in a position to obtain loans at lower rates of interest from the banks and financial institutions.

3) Transport companies are also willing to provide discounts and concessions if the cargo is substantially large. This enables the firm to obtain monetary economies in transport costs by expanding its scale of operations.

4) When production is large, the firm is required to spend a large amount on advertising as well. However, advertising on a large scale attracts discounts and concessions from the media in which the advertisements appear.

Internal Diseconomies of Scale

If the scale of production is continuously expanded, is it possible that after a certain point, increase in production is less than proportionate than increase in the factors of production? Many economists believe that such a situation can and does arise if production is pushed beyond the point of optimum scale. The reasons that they advance are as follow

1) Limitations on the availability of factors of production: The factors of production are always available in limited supply at the place of production. When the scale of production is increased

beyond a certain point, it no longer remains possible to meet the requirements of some factors from local sources and, accordingly, factors have to be transported from other regions. This is generally possible only at higher prices. Let us suppose that an engineering factory is to be set up at Rudrapur in the Terai region. When the scale of production is small, it would be possible to meet the demand for some materials from local sources. As the scale of production expands, it will become more and more difficult to get even the labour from local sources and after a certain point, workers will have to be attracted from other regions by offering them higher wages.

2) Problems in management: When the scale of production is very large, the task of management at the top level becomes increasingly more and more burdensome and some inefficiency is bound to creep in. At times, information vital for taking a decision does not reach the top managers of the company in time. This delay, in turn, leads to a delay in decision making and increases the per unit cost.

3) Technical factors: When the scale of production is expanded, per unit cost increases due to a number of technical reasons. The establishment cost of large and sophisticated plants and machinery is generally high. The buildings of large factories should also have stronger foundations and the factory itself must be equipped with coolers, air-conditioners, etc. All these factors lead to an increase in per unit cost.

External Economies

External economies were discussed first of all by Alfred Marshall. According to him, when a firm enters production, it obtains a number of economics for which the firm's own production strategy, managerial arrangements, etc. are not responsible. In fact, these are economies external to the firm. For example, let us suppose that a firm is established at a place where transport, advertising facilities,

etc. are not available. If the size of the firm remains small, it is possible that these facilities are not locally available in the future as well. However, if the size of the firm increases significantly, these facilities will themselves start coming to the firm. These are, in fact, external economies.

When a firm expands its scale of production, other firms also earn many economies. For example, when a large factory attracts various factors of production fairly regularly, many other factories set up in the neighbourhood, that could not have attracted these factors on their own, also stand to gain. They obtain these factors at practically the same prices at which the large factory obtained them.

Because of external economies of large-scale production, there is a gap between private and social returns. When a firm expands its scale of production, it becomes possible for the other firms to reduce their cost of production. However, there is no method available in the prevalent price mechanism to the firm expanding its scale of operations to charge for the benefits it confers on the other firms.

External Diseconomies

When the scale of operations is expanded, many such diseconomies emerge that have no particular ill-effect on the firm itself. In fact, their burden falls on the other firms. On account of this reason, they are termed external diseconomies. The smoke rising from the chimney of a factory pollutes the atmosphere. When the firm is of a small size, the pollution is less and its ill- effects on the people living in colony nearby is limited. However, if the scale of the firm is large, the smoke will be very dense and can cause serious health hazard to the people. Similarly, as the scale of production of the factories increases, employment rises sharply. This creates problems of traffic congestion and overcrowding in the city where these factories are located. In agriculture, increase in the scale of production leads to

problems of soil erosion and this reduces the fertility of the adjoining fields as well. From the above illustrations, it is clear that external economies and diseconomies can be both pecuniary and technological.

Check Your Progress

1) Indicate the following statements as true (T) or false (F):

i) When output increases in a greater proportion as compared to the increase in the amount of the factors of productions, we have the stage of increasing returns to scale.

ii) Those economies which accrue to a firm an account of the other firms are known as external economies.

iii) Production economies are a part of pecuniary internal economies.

iv) In the case of linear homogenous production function, we have constant returns to scale.

2 Discuss the factors which account for increasing returns to scale.

……

……

3. Explains how decreasing returns to scale arise.

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11.5 LET US SUM UP

In this unit, the concept of returns to scale has been explained. As noted in the beginning itself, this concept is associated with the tendency of production that is observed when the ratio between the

factors is kept constant but the scale is expanded. This, in turn, can give rise to three possibilities - increasing returns to scale, constant returns to scale, and diminishing returns to scale. After discussing all these possibilities, we shift our focus to a discussion of economies and diseconomies of scale. Economies of scale, in turn, are divided into two parts - internal economies of scale and external economies of scale. Economies which accrue to a firm on expansion of its own size are known as internal economies while economies which accrue to a firm not due to its own operations but due to operations of other firms are termed as external economies. We have discussed in detail all the causes which can result in the generation of such economies. In the end, we have focussed our attention on diseconomies of scale - both internal and external.

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BLOCK – 4: PRICING DECISIONS AND PROFIT PLANNING

UNIT 12: MARKET STRUCTURES, PRICING UNDER DIFFERENT MARKET STRUCTURES

STRUCTURE

12.0 OBJECTIVE

- After going through this unit, you should be able to:
- understand the concept of market structure and the impact it has on the competitive behaviour of the firms;
- classify different types of market structures;
- analyze the factors that influence the pricing decisions of a firm;

12.1 INTRODUCTION

WAe will examine the factors that govern this key decision area. Traditional economic theory explains this in term of demand and supply functions. According to traditional analysis, firms aim towards maximization of profits. The interplay of demand and

supply in the market determines the price, which is often referred to as equilibrium price. There are, however, many other factors that influence the pricing decision of a firm. These are – the number of firms in the industry, the nature of product, and the possibility of new firms entering the market and so on. In this unit you will understand more about some of the crucial factors that operate in the market place. In the process, you should gain valuable insights into the operations of firms under different market structures, which are more typical of the existing real world situations.

12.2 MEANING OF MARKET

People cannot have all that they want because they need to pay price for goods and services and the resources at their disposal are scarce. We have come across some goods which are free or having zero prices i.e. we need not make any payment for them. Example: air, sunlight etc. These are called free goods. Free goods being abundant in supply does not have scarcity and need no cost to obtain them. In contrast, economic goods are scarce in relation to their demand and have an opportunity cost. Unlike free goods, they are exchangeable in the market and command a price. What do we understand by the term price and why do people pay a price? In common parlance, price signifies the quantity of money necessary to acquire a good or service. Price connotes money-value i.e. the purchasing power of an article expressed in terms of money. In other words, price expresses the value of a thing in relation to money i.e. the quantity of money for which it will exchange. Value in exchange or exchange value, according to Ricardo, means command over commodities in general, or power in exchange over purchasable commodities in general. We need to distinguish between two important concepts namely, ‘value in use’ and ‘value in exchange’. Value in use refers to usefulness or utility i.e the attribute which a thing may have to

satisfy human needs. Thus, value in exchange or economic value is measured by the most someone is willing to give up in other goods and services in order to obtain a good or service. In a market economy, the amount of currency (e.g. Dollar, Rupees) is a universally accepted measure of economic value, because the number of units of money that a person is willing to pay for something tells how much of all other goods and services they are willing to give up to get that item.

In Economics, we are only concerned with exchange value. Considerations such as sentimental value mean little in a market economy. Sentimental value is subjective and reflects an exaggerated judgment about the worth of a commodity. Exchange value is determined in the market where exchange of goods and services takes place. In our day to day life, we come across many references to markets such as oil market, wheat market, vegetable market etc. These have connotations of a place where buyers and sellers gather to exchange goods at a price.

In Economics, markets are crucial focus of analysis, and therefore we need to understand how this term is used. A market is a collection of buyers and sellers with the potential to trade. The actual or potential interactions of the buyers and sellers determine the price of a product or service.

A market need not be formal or held in a particular place. Second-hand cars are often bought and sold through newspaper advertisements. Second-hand goods may be disposed oby listing it in an online shop or by placing a card in the local shop window. In the present high tech world, goods and services are effortlessly bought and sold online. Online shopping has revolutionized the business world by making nearly everything people want available by the simple click of a mouse button.

While studying about market economy, it is essential to understand how price is determined. Since this is done in the market, we can define the market simply as all those buyers and sellers of a good or service who influence price.

The elements of a market are:

(i) Buyers and sellers;
(ii) A product or service;
(iii) Bargaining for a price;
(iv) Knowledge about market conditions; and
(v) One price for a product or service at a given time.

Classification of Market

Markets are generally classified into product markets and factor markets. Product markets are markets for goods and services in which households buy the goods and services they want from firms. Factor markets, on the other hand, are those in which -rms buy the resources they need – land, labour, capital and entrepreneurship- to produce goods and services. While product markets allocate goods to consumers, factor markets allocate productive resources to producers and help ensure that those resources are used efficiently. The prices in factor markets are known as factor prices.

In Economics, generally the classification of markets is made on the basis of

(a) Geographical Area

(b) Time

(c) Nature of transaction

(d) Regulation

(e) Volume of business

(f) Type of Competition.

On the basis of geographical area

From the marketing perspective, the geographical area in which the product sales should be undertaken has vast implications for the -rm. On the basis of geographical area covered, markets are classified into:-

Local Markets:

When buyers and sellers are limited to a local area or region, the market is called a local market. Generally, highly perishable goods and bulky articles, the transport of which over a long distance is uneconomical' command a local market. In this case, the extent of the market is limited to a particular locality. For example, locally supplied services such as those of hair dressers and retailers have a narrow customer base.

Regional Markets:

Regional markets cover a wider area such as a few adjacent cities, parts of states, or cluster of states. The size of the market is generally large and the nature of buyers may vary in their demand characteristics.

National Markets:

When the demand for a commodity or service is limited to the national boundaries of a country, we say that the product has a national market. The trade policy of the government may restrict the trading of a commodity to within the country. For example Hindi books may have national markets in India, outside India one may not have market for Hindi books.

International markets:

A commodity is said to have international market when it is exchanged internationally. Usually, high value and small bulk commodities are demanded and traded internationally. For example Gold and Silver are examples of commodities that have international market. The above classification has become more or less outdated as we find that in modern days even highly perishable goods have international market.

On the basis of Time

Alfred Marshall conceived the 'Time' element in markets and on the basis of this, markets are classified into:

Very short period market:

Market period or very short period refers to a period of time in which supply is fixed and cannot be increased or decreased. Commodities like vegetables, flower, fish, eggs, fruits, milk, etc., which are perishable and the supply of which cannot be changed in the very short period come under this category. Since supply is fixed, very short period price is dependent on demand. An increase in demand will raise the prices vice versa

Short-period Market:

Short period is a period which is slightly longer than the very short period. In this period, the supply of output may be increased by increasing the employment of variable factors with the given fixed factors and state of technology. Since supply can be moderately adjusted, the changes in the short period prices on account of changes in demand are less compared to market period.

Long-period Market:

In the long period, all factors become variable and the supply of commodities may be changed by altering the scale of production. As such, supply may be fully adjusted to changes in demand conditions. The interaction between long run supply and demand determines long run equilibrium price or ‘normal price’.

Very long-period or secular period

Is one when secular movements are recorded in certain factors over a period of time. The period is very long. The factors include the size of the population, capital supply, supply of raw materials etc

On the basis of Nature of Transactions

Spot or cash Market:

Spot transactions or spot markets refer to those markets where goods are exchanged for money payable either immediately or within a short span of time.

Forward or Future Market:

In this market, transactions involve contracts with a promise to pay and deliver goods at some future date.

On the basis of Regulation

Regulated Market:

In this market, transactions are statutorily regulated so as to put an end to unfair practices. Such markets may be established for specific products or for a group of products. Eg. Stock exchange

Unregulated Market:

It is also called a free market as there are no stipulations on the transactions.

On the basis of volume of Business

Wholesale Market:

The wholesale market is the market where the commodities are bought and sold in bulk or large quantities. Transactions generally take place between traders.

Retail Market:

When the commodities are sold in small quantities, it is called retail market. This is the market for ultimate consumers.

On the basis of Competition Based on the type of competition markets are classified into

a) perfectly competitive market and

b) imperfectly competitive market.

We shall study these markets in greater detail in the following paragraphs.

12.3 TYPES OF MARKET STRUCTURES

For a consumer, a market consists of those -rms from which he can buy a well-de-ned product; for a producer, a market consists of those buyers to whom he can sell a single well-de-ned product. If a -rm knows precisely the demand curve it faces, it would know its potential revenue. If it also knows its costs, it can readily discover the pro-t that would be associated with different levels of output and therefore can choose the output level that maximizes profit. But, suppose the firm knows its costs and the market demand curve for the product but does not know its own demand curve. In other words, it does not know its own total sales. In order to - find this, the firm needs to answer the following questions. How many

competitors are there in the market selling similar products? If one firm changes its price, will its market share change? If it reduces its price, will other firms follow it or not? There are many other related questions that need to be answered.

Answers to questions of this type will be different in different circumstances. For example, if there is only one firm in the market, the whole of the market demand will be satisfied by this particular firm. But, if there are two large firms in the industry, they will share the market demand in some proportion. A firm has to be very cautious of the reactions of the other firm to every decision it makes. But if there are, say, more than 5,000 small firm in an industry, each -rm will be less worried about the reactions of other firm to its decisions because each -rm sells only a small proportion of the market. Thus, we find that the market behaviour is greatly affected by the structure of the market. We can conceive of more than thousand types of market structures, but we shall focus on a few theoretical market types which mostly cover a high proportion of cases actually found in the real world. These are:

Perfect Competition:

Perfect competition is characterised by many sellers selling identical products to many buyers.

Monopolistic Competition:

It differs in only one respect, namely, there are many sellers offering differentiated products to many buyers.

Monopoly:

It is a situation where there is a single seller producing for many buyers. Its product is necessarily extremely differentiated since there are no competing sellers producing products which are close substitutes.

Oligopoly:

There are a few sellers selling competing products to many buyers.

12.4 CONCEPTS OF TOTAL REVENUE, AVERAGE REVENUE AND MARGINAL REVENUE

Total Revenue: If a firm sells 100 units for Rs10 each, what is the amount which it realises? It realises Rs 1,000 (100 x 10), which is nothing but the total revenue for the firm. Thus, we may state that total revenue or the total expenditure incurred by the purchasers of the firm's product refers to the amount of money which a firm realises by selling certain units of a commodity. Symbolically, total revenue may be expressed as

TR = P x Q.

Where, TR is total revenue

P is price

Q is quantity of a commodity sold.

This may be represented by the following diagrams. In figure A, when the product of the price is ` 30, the quantity sold is 40 units. The total revenue is P x Q = Rs1200. Panel B shows the total revenue curve of a competitive firm having a perfectly elastic demand curve. Since the firm can sell any quantity at market determined prices, the TR curve is linear and starts from the origin. The TR curve of a firm which has a downward sloping

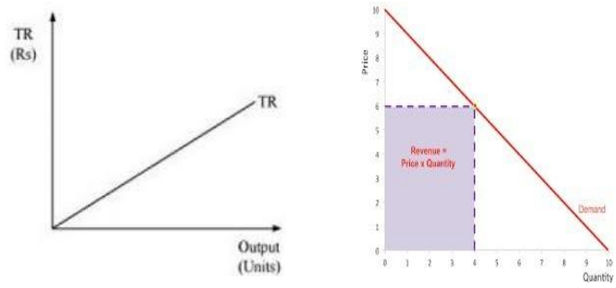

Figure 12.1: Total Revenue demand curve

Average Revenue:

Average revenue is the revenue earned per unit of output. It is nothing but price of one unit of output because price is always per unit of a commodity. For this reason, average revenue curve is also the firms demand curve. Symbolically, average revenue is:

AR =TR / Q

Where

AR is average revenue T

R is the total revenue

Q is quantity of a commodity sold

$$\text{Or AR} = \frac{PXQ}{Q}$$

Or AR = P

If, for example, a Firm realises total revenue of Rs 1,000 by the sale of 100 units, it implies that the average revenue is Rs 10 (1,000/100) or the firm has sold the commodity at a price of Rs 10 per unit. Marginal Revenue: Marginal revenue (MR) is the change in total revenue resulting from the sale of an additional unit of the commodity. Thus, if a seller realises Rs1,000 while selling 100 units and Rs 1,200 while selling 101 units, we say that the marginal

revenue is Rs 200. We can say that MR is the rate of change in total revenue resulting from the sale of an additional unit of output.

MR= ΔTR /Δ Q

Where MR is marginal revenue

TR is total revenue

Q is quantity of a commodity sold

Δ stands for a small change

For one unit change in output $MR_n = TR_n – TR_{n-1}$ Where TR is the total revenue when sales are at the rate of n units per period. TR_{n-1} is the total revenue when sales are at the rate of (n – 1) units per period. In the case of constant average revenue (or price) schedule, the marginal revenue is equal to average revenue (or uniform price). If TR stands for total revenue and q stands for output, marginal revenue (MR) can be expressed as:

MR = dTR/dq

dTR/ dq indicates the slope of the total revenue curve.

When the demand curve of the -rm is a normal downward sloping one, there is a well de-ned relationship between average revenue, marginal revenue and total revenue. This can be shown by the following figure presenting total revenue (TR), average revenue (AR) and marginal revenue (MR) curves. The average revenue curve in panel B is sloping downwards depicting the inverse relationship between price and quantity demanded. MR curve lies below AR curve showing that marginal revenue declines more rapidly than average revenue. Total revenue increases as long as marginal revenue is positive and declines (has a negative slope) when marginal revenue is negative. Total revenue curve initially increases at a diminishing rate due to diminishing marginal revenue

and reaches maximum and then it falls. When marginal revenue becomes zero, the total revenue is maximum and the slope of TR is zero.

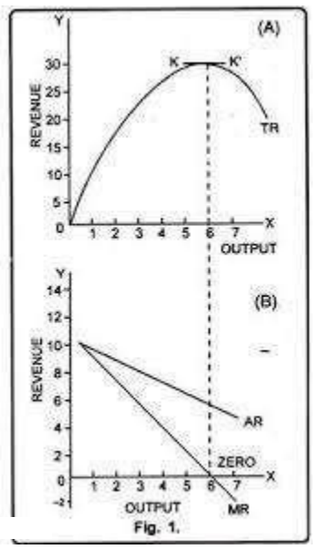

Fig:12.2Total Revenue, Average Revenue and Marginal Revenue Curves of a Firm which has downward Sloping Demand Curve

It may be noted that in all forms of imperfect competition, the average revenue curve of an individual firm slopes downwards as in these market forms, when a firm increases the price of its product, its quantity demanded decreases and vice versa. Under perfect competition, however, since the firms are price takers, the average revenue (or price) curve or demand curve is perfectly elastic. Perfectly elastic average revenue curve means that an individual firm has constant average revenue (or price). When price remains constant, marginal revenue will be equal to average revenue and thus AR curve and MR curve will coincide and will be horizontal curves as shown in figure below.

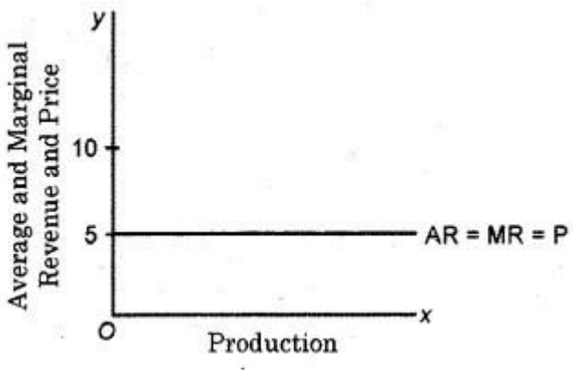

Fig 12.3: Average Revenue and Marginal Revenue Curves of a Perfectly Competitive Firm

RELATIONSHIP BETWEEN AR, MR, TR AND PRICE ELASTICITY OF DEMAND

It is to be noted that marginal revenue, average revenue and price elasticity of demand are uniquely related to one another through the formula:

$$MR = AR \times \frac{e - 1}{e},$$

Where e = price elasticity of demand

Thus if e = 1, MR = 0 and if

e >1, MR will be positive

and if e< 1 , MR will be negative

In a straight line downward falling demand curve, we know that the coefficient of price elasticity at the middle point is equal to one. It follows that the marginal revenue corresponding to the middle point of the demand curve (or AR curve) will be zero. On the upper portion of the demand curve, where the elasticity is more than one, marginal revenue will be positive and on the lower portion of the demand curve where elasticity is less than one, marginal revenue will be negative.

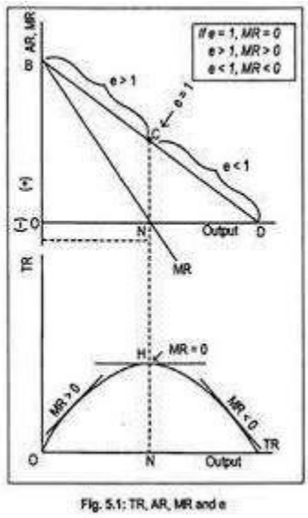

Fig. 5.1: TR, AR, MR and e

Fig 12.4: Relationship between AR, MR, TR and Price Elasticity of Demand

DD is the AR or demand curve. At point C, elasticity is equal to one. Corresponding to C on the AR curve, the marginal revenue is zero. Thus, MR curve is touching X-axis at N (corresponding to C on the AR curve). At a greater quantity than ON, the elasticity of the AR curve is less than one and the marginal revenue is negative. Negative marginal revenue means MR curve goes below the X-axis to the fourth quadrant. Marginal revenue being negative means that total revenue will diminish if a quantity greater than ON is sold. Total revenue will be rising up to ON output since up to this the marginal revenue remains positive. It follows that total revenue will be maximum where elasticity is equal to one. Thus, TR is shown to be at its highest level at ON level of output (corresponding to the point C on AR curve). Beyond ON Level of output, the TR curve has a negative slope

BEHAVIOURAL PRINCIPLES

Principle 1- A rm should not produce at all if its total variable costs are not met.

It is a matter of common sense that a firm should produce only if it will do better by producing than by not producing. The firm always has the option of not producing at all. If a firm's total revenues are not enough to make good even the total variable costs, it is better for the firm to shut down. In other words, a competitive firm should shut down if the price is below AVC. In that case, it will minimise loss because then its total cost will be equal to its fixed costs and it will have an operating loss equal to its fixed cost. The sunk fixed cost is irrelevant to the shutdown decision because fixed costs are already incurred. This means that the minimum average variable cost is equal to the shut-down price, the price at which the firm ceases production in the short run. Shutting down is temporary and does not necessarily mean going out of business.

If price (AR) is greater than minimum AVC, but less than minimum ATC, the firm covers its variable cost and some but not all of fixed cost. If price is equal to minimum ATC, the firm covers both fixed and variable costs and earns normal profit or zero economic profit. If price is greater than minimum ATC, the firm not only covers its full cost, but also earns positive economic profit or super normal profit.

Principle 2 – The firm will be making maximum profits by expanding output to the level where marginal revenue is equal to marginal cost.

In other words, it will pay the firm to go on producing additional units of output so long as the marginal revenue exceeds marginal cost i.e., additional units add more to revenues than to cost. At the point of equality between marginal revenue and marginal cost, it will earn maximum profits.

Check your progress

1. What is market

   ……

   ……

2. Explain different types of market?

   ……

   ……

3. Explain the relationship between total revenue , average revenue and marginal revenue?

   ……

   ……

12.5 DETERMINATION OF PRICES - A GENERAL VIEW

In an open competitive market, it is the interaction between demand and supply that tends to determine equilibrium price and quantity. In the context of market analysis, the term equilibrium refers to a state of market in which the quantity demanded of a commodity equals the quantity supplied of the commodity. In an equilibrium state, the aggregate quantity that all -rms wish to sell equals the total quantity that all buyers in the market wish to buy and therefore, the market clears. Equilibrium price or market clearing price is the price at which the quantity demanded of a commodity equals the quantity supplied of the commodity i.e. at this price there is no unsold stock or no unsupplied demand.

To analyse how equilibrium price is determined in a market, we need to bring together demand for and supply of the commodity in the market. With price on Y-axis and quantity demanded and supplied on X-axis, we get a figure as shown below:

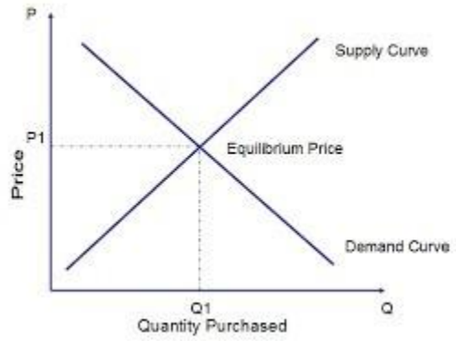

Fig. 12.5: Determination of Equilibrium Price

The market thus achieves a state of equilibrium at $Q_1$where the quantity that firms sell is equal to the quantity that the consumers desire to buy. At equilibrium price P_1 the supply decisions of the firms tend to match the demand decisions of the buyers

CHANGES IN DEMAND AND SUPPLY

The above analysis of market equilibrium was done by us under the ceteris paribus assumption. The facts of the real world, however, are such that the determinants of demand other than price of the commodity under consideration (like income, tastes and preferences, population, technology, prices of factors of production etc.) always change causing shifts in demand and supply. Such shifts affect equilibrium price and quantity.

The four possible changes in demand and supply are:

(i) An increase (shift to the right) in demand;
(ii) A decrease (shift to the left) in demand;
(iii) An increase (shift to the right) in supply
(iv) A decrease (shift to the left) in supply

We will consider each of the above changes one by one.

(i) An increase in demand:

In figure 12.6, the original demand curve of a normal good is DD and supply curve is SS. At equilibrium price OP, demand and supply are equal to OQ. Now suppose the money income of the consumer increases and the demand curve shifts to D_1D1 and the supply curve remains the same. With the higher price, supply will also shoot up generating an increase in the quantity supplied or an upward movement along the supply curve. Ultimately, a new equilibrium between demand and supply will be reached. At this equilibrium point, OP1 is the price and OQ1 is the quantity which is demanded and supplied

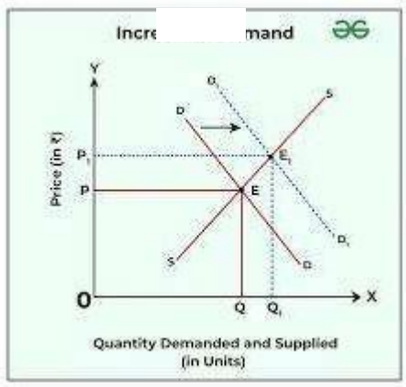

Fig. 12.6: Increase in Demand, causing an increase in equilibrium price and quantity

Thus, we see that, with an increase in demand, there is an increase in equilibrium price, as a result of which the quantity supplied rises. As such, the quantity sold and purchased also increases

(ii) Decrease in Demand: The opposite will happen when demand falls as a result of a fall in income, while the supply remains the same. The demand curve will shift to the left and become D_1D_1 while the supply curve remains as it is. With the new demand curve D_1D_1, at original price OP. As the supply exceeds demand, price will come down and quantity demanded will go up. A new equilibrium

price OP_2 will be settled in the market where demand OQ_2 will be equal to supply OQ_2.

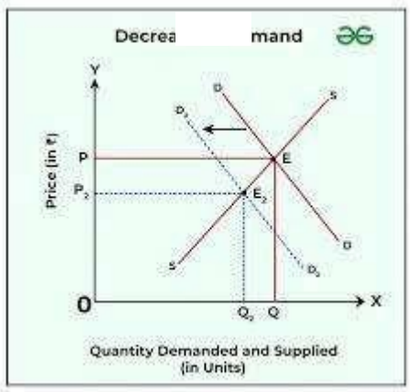

Fig. 12.7: Decrease in Demand Resulting in a Decrease in Price and Quantity Demanded

Thus, with a decrease in demand, there is a decrease in the equilibrium price and quantity demanded and supplied.

(iii) Increase in Supply: Let us now assume that demand does not change, but there is an increase in supply say, because of improved technology.

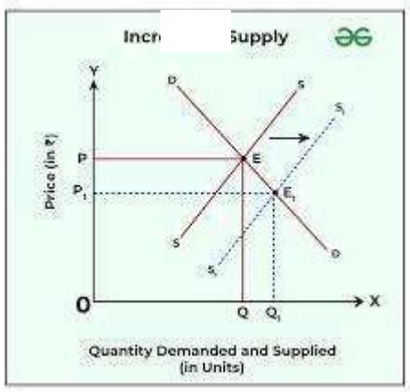

Fig. 12.8: Increase in Supply, Resulting In Decrease in Equilibrium Price and Increase in Quantity Supplied

The supply curve SS will shift to the right and become $S_1 S_1$. At the original price, a surplus now exists; as a result, the equilibrium price falls and the quantity demanded rises. A new equilibrium price OP_1 will be settled in the market where demand OQ_1 will be equal to supply OQ_1 . Thus, as a result of an increase in supply with demand remaining the same, the equilibrium price will go down and the quantity demanded will go up.

(iv) Decrease in Supply:

If because of some reason, there is a decrease in supply we will find that equilibrium price will go up, but the amount sold and purchased will go down

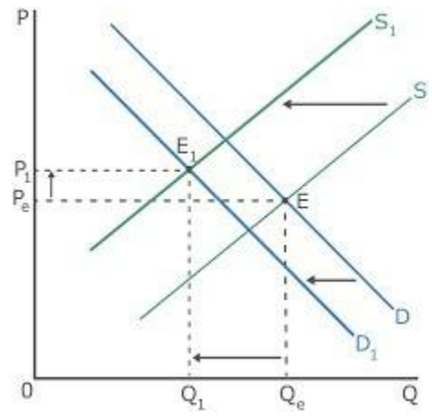

Fig.12.9: Decrease in Supply Causing an Increase in the Equilibrium Price and a fall in Quantity Demanded

Simultaneous Changes in Demand and Supply

Till now, we were considering the effect of a change either in demand or in supply on the equilibrium price and quantity sold and purchased. It sometimes happens that events shift both the demand and supply curves at the same time. This is not unusual; in real life, supply curves and demand curves for many goods and services typically shift quite often because of continuous change in economic environment. During a war, for example, shortage of goods will

often lead to decrease in their supply while full employment causes high total wage payments which increase demand. What happens when the demand and supply curves shift in the same direction? We may discuss the effect on equilibrium price and quantity when both demand and supply increase simultaneously with the help of the diagrams below:

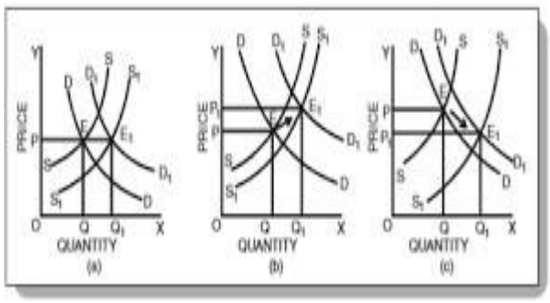

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Fig.12.10: Simultaneous Change in Demand and Supply

Fig. 12.10 shows simultaneous change in demand and supply and its effects on the equilibrium price. In the figure, the original demand curve DD and the supply curve SS meet at E at which OP is the equilibrium price and OQ is the quantity bought and sold.

Fig. 12.10(a) shows that increase in demand is equal to increase in supply. The new demand curve $D_1 D_1$ and $S_1 S_1$ meet at E_1 . The new equilibrium price is equal to the old equilibrium price (OP). However, equilibrium quantity is more.

Fig. 12.10(b) shows that increase in demand is more than increase in supply. Hence, the new equilibrium price OP_1 is higher than the old equilibrium price OP. The opposite will happen i.e. the equilibrium price will go down if there is a simultaneous fall in demand and supply and the fall in demand is more than the fall in supply.

Fig. 12.10(c) shows that supply increases in a greater proportion than demand. The new equilibrium price will be less than the original equilibrium price. Conversely, if the fall in the supply is more than proportionate to the fall in the demand, the equilibrium price will go up. What is the effect on equilibrium price and quantity when both demand and supply decrease? You can check it yourselves with the help of diagrams. We can summarise the two possible outcomes when the supply and demand curves shift in the same direction as follows:

When both demand and supply increase, the equilibrium quantity increases but the change in equilibrium price is uncertain.

When both demand and supply decrease, the equilibrium quantity decreases but the change in equilibrium price is uncertain.

Check your progress

1 Explain the equilibrium?

……..

……

2 Explain the shifts in the demand and supply curve?

……

……

LET US SUM UP

In this unit we have aimed at understanding market , types of market about total average and marginal revenue, their relationship. The pricing analysis of markets helps to understand how the equilibrium price is determined by the interaction of demand and supply. This forms the basis for analyzing the price-output decisions of firms under different competitive situations.

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UNIT 13: PERFECT, IMPERFECT AND MONOPOLY

STRUCTURE

13.0 OBJECTIVE

- After going through this unit, you should be able to:

- understand the concept of market structure and the impact it has on the competitive behaviour of the firms;

- classify different types of market structures;

- analyze the factors that influence the pricing decisions of a firm;

13.1 INTRODUCTION

In the preceding unit, you have been introduced to the concept of market structure and the impact it has on the competitive behaviour of firms. You must have noted that the number and size of the firms is an important determinant of the structure of the industry and/or market. In this unit, we shall analyze the behaviour of a firm under two different market structures, namely, pure/perfect competition and monopoly. The crucial parameter is the size of the constituent firms in relation to the total industry's output. Throughout this unit,

we go by the assumption that the firms are guided by profit maximization.

13.2 PERFECT COMPETITION

Perfect competition is a unique form of the marketplace that allows multiple companies to sell the same product or service. Many consumers are looking to purchase those products. None of these firms can set a price for the product or service they are selling without losing business to other competitors. There are no barriers to any firm that is looking to enter or exit the market. The final output from all sellers is so similar that consumers cannot differentiate the product or service of one company from its competitors.

13.2.1 CHARACTERISTICS OF PERFECT COMPETITION

Perfect competition is a form of market in which there are a large number of buyers and sellers competing with each other in the purchase and sale of goods, respectively and no individual buyer or seller has any influence over the price. Thus perfect competition is an ideal form of market structure in which there is the greatest degree of competition.

A perfectly competitive market has the following characteristics:

(i) There are large number of buyers and sellers who compete among themselves. The number is so large that the share of each seller in the total supply and the share of each buyer in the total demand is too small that no buyer or seller is in a position to influence the price, demand or supply in the market.

(ii) The products supplied by all firms are identical or are homogeneous in all respects so that they are perfect

substitutes. Thus, all goods must sell at a single market price. No firm can raise the price of its product above the price charged by other firms without losing most or all of its business. Buyers have no preference as between different sellers and as between different units of commodity offered for sale; also sellers are quite indifferent as to whom they sell. For example, most agricultural products, cooking gas, and raw materials such as copper, iron, cotton, and sheet steel etc. are fairly homogeneous. In addition, all consumers have perfect information about competing prices.

(iii) Every firm is free to enter the market or to go out of it. There are no legal or market related barriers to entry and also no special costs that make it difficult for a new firm either to enter an industry and produce, if it sees profit opportunity or to exit if it cannot make a profit. If the above three conditions alone are fulfilled, such a market is called pure competition. The essential feature of pure competition is the absence of the element of monopoly. Consequently, business combinations of monopolistic nature are not possible. In addition to the above stated three features of 'pure competition'; a few more conditions are attached to perfect competition. They are:

(iv) There is perfect knowledge of the market conditions on the part of buyers and sellers. Both buyers and sellers have all information relevant to their decision to buy or sell such as the quantities of stock of goods in the market, the nature of products and the prices at which transactions of purchase and sale are being entered into.

(v) Perfectly competitive markets have very low transaction costs. Buyers and sellers do not have to spend much time and money finding each other and entering into transactions. (vi) Under prefect competition, all firms individually are price

takers. The firms have to accept the price determined by the market forces of total demand and total supply. The assumption of price taking applies to consumers as well. When there is perfect knowledge and perfect mobility, if any seller tries to raise his price above that charged by others, he would lose his customers.

While there are few examples of perfect competition which is regarded as a myth by many, the agricultural products, financial instruments (stock, bonds, foreign exchange), precious metals (gold, silver, platinum) approach the condition of perfect competition. Price Determination under Perfect Competition

13.2.2 Equilibrium of the Industry: An industry in economic terminology consists of a large number of independent firms. Each such unit in the industry produces a homogeneous product so that there is competition amongst goods produced by different units. When the total output of the industry is equal to the total demand, we say that the industry is in equilibrium; the price then prevailing is equilibrium price. A firm is said to be in equilibrium when it is maximising its profits and has no incentive to expand or contract production. As stated above, under competitive conditions, the equilibrium price for a given product is determined by the interaction of the forces of demand and supply for it as is shown in figure

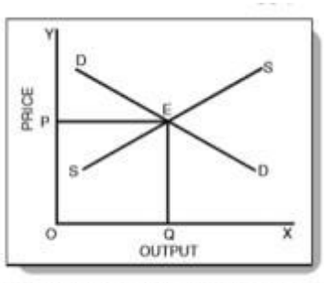

Fig.13.1: Equilibrium of a competitive industry

OP is the equilibrium price and OQ is the equilibrium quantity which will be sold at that price. The equilibrium price is the price at which both demand and supply are equal and therefore, no buyer who wanted to buy at that price goes dissatisfied and none of the sellers is dissatisfied that he could not sell his goods at that price. It may be noticed that if the price were to be fixed at any other level, higher or lower, demand remaining the same, there would not be equilibrium in the market. Likewise, if the quantities of goods were greater or smaller than the demand, there would not be equilibrium in the market

13.2.3 Equilibrium of the Firm:

The firm is said to be in equilibrium when it maximizes its profit. The output which gives maximum profit to the firm is called equilibrium output. In the equilibrium state, the firm has no incentive either to increase or decrease its output. Firms in a competitive market are price-takers. This is because there are a large number of firms in the market who are producing identical or homogeneous products. As such these firms cannot influence the price in their individual capacities. They have to accept the price determined through the interaction of total demand and total supply of the commodity which they produce.

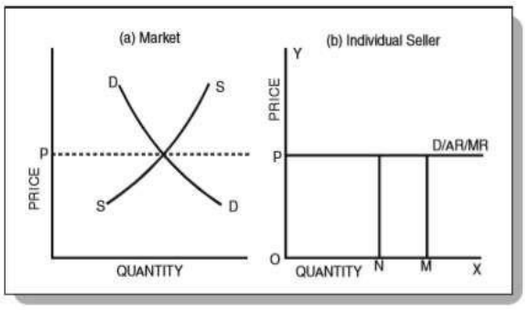

Fig. 2 : The firm's demand curve under perfect competition

Fig. 13.2: The firm's demand curve under perfect competition

The market price OP is fixed through the interaction of total demand and total supply of the industry. Firms have to accept this price as given and as such they are price-takers rather than price-makers. They cannot increase the price above OP individually because of the fear of losing its customers to other firms. They do not try to sell the product below OP because they do not have any incentive for lowering it. They will try to sell as much as they can at price OP.

As such, P-line acts as demand curve for the firm. Because it is a price taker, the demand curve D facing an individual competitive firm is given by a horizontal line at the level of market price set by the industry. In other words, the demand curve of each firm is perfectly (or infinitely) elastic. The firm can sell as much or as little output as it likes along the horizontal price line. Since price is given, a competitive firm has to adjust its output to the market price so that it earns maximum profit.

Conditions for equilibrium of a rm: As discussed earlier, a firm, in order to attain equilibrium position, has to satisfy two conditions as below: (Note that because competitive -rms take price as fixed, this is a rule for setting output, not price).

(i) The marginal revenue should be equal to the marginal cost. i.e. MR = MC. If MR is greater than MC, there is always an incentive for the firm to expand its production further and gain by selling additional units. If MR is less than MC, the firm will have to reduce output since an additional unit adds more to cost than to revenue. Profits are maximum only at the point where MR = MC. Because the demand curve facing a competitive firm is horizontal, so that MR = P, the general rule for profit maximization can be simplified. A perfectly competitive firm should choose its output so that marginal cost equals price.

(ii) The MC curve should cut MR curve from below. In other words, MC should have a positive slope.

13.2.4 Short-Run Profit Maximization by a Competitive Firm

We shall begin with the short-run output decision and then move on to the long run. In the short run, a firm operates with a fixed amount of capital and must choose the levels of its variable inputs so as to maximize profit

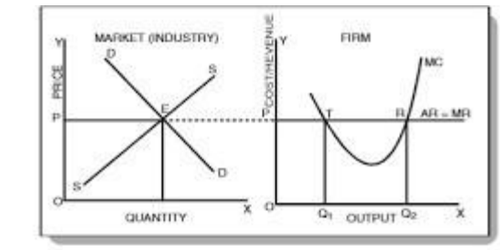

Fig. 13.3: Equilibrium position of a rm under perfect competition

DD and SS are the industry demand and supply curves which intersect at E to set the market price as OP. The -rms of perfectly competitive industry adopt OP price as given and considers P-Line as demand (average revenue) curve which is perfectly elastic at P. As all the units are priced at the same level, MR is a horizontal line equal to AR line. Note that MC curve cuts MR curve at two places T and R respectively. But at T, the MC curve is cutting MR curve from above. T is not the point of equilibrium as the second condition is not satisfied. The -rm will bene-t if it goes beyond T as the additional cost of producing an additional unit is falling. At R, the MC curve is cutting MR curve from below. Hence, R is the point of equilibrium and OQ_2 is the equilibrium level of output.

Short run supply curve of the firm in a competitive market One interesting thing about the MC curve of a firm in a perfectly

competitive industry is that it depicts the firm's supply curve. This can be shown with the help of the following figure:

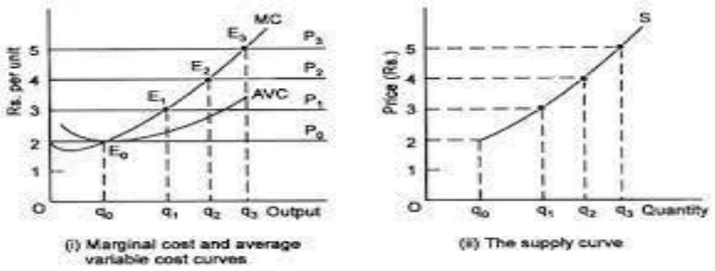

Fig. 13.4: Marginal cost and supply curves for a price-taking firm

Suppose the market price of a product is Rs 2 Corresponding to it we have D_1 as demand curve for the firm. At price Rs 2, the firm supplies Q_1 output because here MR = MC. If the market price is Rs 3, the corresponding demand curve is D_2 . At Rs 3, the quantity supplied is Q_2 . Similarly, we have demand curves D_3 and D_4 and corresponding supplies are Q_3 and Q_4 . The firm's marginal cost curve which gives the marginal cost corresponding to each level of output is nothing but firm's supply curve that gives various quantities the firm will supply at each price. For prices below AVC, the firm will supply zero units because the firm is unable to meet even its variable cost. For prices above AVC, the firm will equate price and marginal cost. When price is high enough to meet the AVC, a firm will decide to continue its production. In figure.13.4, at price Rs 2, the AVC of the firm is covered and therefore, firm need not shutdown. Thus, in perfect competition, the firm's marginal cost curve above AVC has the identical shape of the firm's supply curves the marginal cost

Can a competitive firm earn profits?

In the short run, a firm will attain equilibrium position and at the same time, it may earn supernormal profits, normal profits or losses

depending upon its cost conditions. Following are the three possibilities:

Supernormal Profits: There is a difference between normal profits and supernormal profits. When the average revenue of a firm is just equal to its average total cost, a firm earns normal profits or zero economic profits. It is to be noted that here a normal percentage of profits for the entrepreneur for his managerial services is already included in the cost of production. When a firm earns supernormal profits, its average revenues are more than its average total cost. Thus, in addition to normal rate of profit, the firm earns some additional profits. The following example will make the above concepts clear: Suppose the cost of producing 1,000 units of a product by a firm is Rs 15,000. The entrepreneur has invested Rs 50,000 in the business and the normal rate of return in the market is 10 per cent. That is, the cost of self owned factor (capital) used in the business or implicit cost is Rs 5000/-. The entrepreneur would have earned Rs5,000 (10% of Rs 50,000) if he had invested it elsewhere. Thus, total cost of production is Rs 20,000 (Rs 15,000 + `Rs ,000). If the Firm is selling the product at Rs 20, it is earning normal profits because AR (Rs 20) is equal to ATC (Rs20). If the firm is selling the product at Rs22 per unit, its AR (Rs 22) is greater than its ATC (Rs 20) and it is earning supernormal profit at the rate of Rs 2 per unit

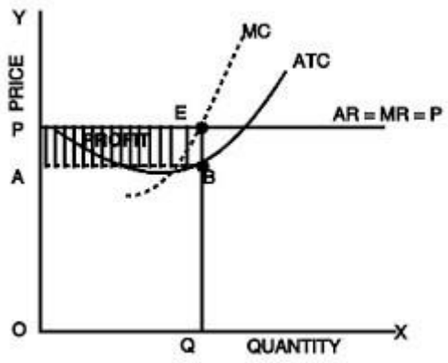

Fig. 13.5: Short run equilibrium: Supernormal profits of a competitive firm

Figure shows the revenue and cost curves of a firm which earns supernormal profits in the short run. MR (marginal revenue) curve is a horizontal line and MC (marginal cost) curve is a U-shaped curve which cuts the MR curve at E. The firm is in equilibrium at point E where marginal revenue is equal to marginal cost. OQ is the equilibrium output for the firm. At this level of output, the average revenue or price per unit is EQ and average total cost is BQ. The firm's profit per unit is EB (AR-ATC). Total profits are ABEP. (EB x OQ ; OQ =AB) . Applying the principle Total Profit = TR – TC, we find total profit by finding the difference between OPEQ and OABQ which is equal to ABEP.

Normal profits: When a -rm just meets its average total cost, it earns normal profits.

Here AR = ATC

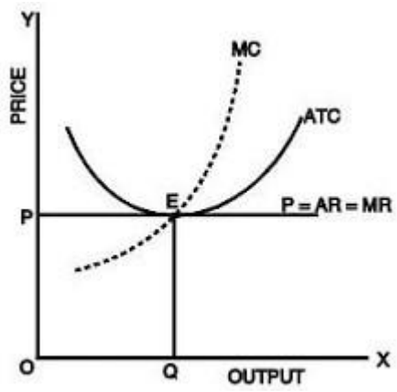

Fig. 13.6: Short run equilibrium of a competitive firm:

The figure shows that MR = MC at E. The equilibrium output is OQ. At this level of output, price or AR covers full cost (ATC). Since AR = ATC or OP = EQ, the firm is just earning normal profits.

Applying TR – TC, we find that TR – TC = zero or there is zero economic profit

Losses: The firm can be in an equilibrium position and still makes losses. This is the situation when the firm is minimising losses. For all prices above the minimum point on the AVC curve, the firm will stay open and will produce the level of output at which MR = MC. When the firm is able to meet its variable cost and a part of fixed cost, it will try to continue production in the short run. If it recovers a part of the fixed costs, it will be beneficial for it to continue production because -fixed costs (such as costs towards plant and machinery, building etc.) are already incurred and in such case it will be able to recover a part of them. But, if a firm is unable to meet its average variable cost, it will be better for it to shutdown. This shutdown may be temporary. When the market price rises, the -firm resumes production.

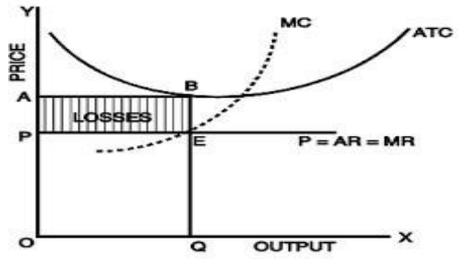

Fig. 13.7: Short run equilibrium of a competitive rm: Losses

In figure 13.7, E is the equilibrium point and at this point AR = EQ and ATC = BQ since BQ>EQ, the firm is having per unit loss equal to BE and the total loss is ABEP.

13.2.5 Long Run Equilibrium of a Competitive Firm

In the short run, one or more of the firm's inputs are fixed. In the long run, firms can alter the scale of operation or quit the industry and new firms can enter the industry. In a market with entry and exit, afirm enters when it believes that it can earn a positive long run

profit and exits when it faces the possibility of a long-run loss. Firms are in equilibrium in the long run when they have adjusted their plant so as to produce at the minimum point of their long run ATC curve, which is tangent to the demand curve defined by the market price. In the long run, the firms will be earning just normal profits, which are included in the ATC. If they are making supernormal profits in the short run, new firms will be attracted into the industry; this will lead to a fall in price (a down ward shift in the individual demand curves) and an upward shift of the cost curves due to increase in the prices of factors as the industry expands. These changes will continue until the ATC is tangent to the demand curve. If the firms make losses in the short run, they will leave the industry in the long run. This will raise the price and costs may fall as the industry contracts, until the remaining firms in the industry cover their total costs inclusive of normal rate of profit. In figure below, we show how firms adjust to their long run equilibrium position. As in the short run, the firm faces a horizontal demand curve. If the price is OP, the firm is making super-normal profits working with the plant whose cost is denoted by SAC_1 . If the firm believes that the market price will remain at OP, it will have incentive to build new capacity and it will move along its LAC. At the same time, new firms will be entering the industry attracted by the excess profits. As the quantity supplied in the market increases, the supply curve in the market will shift to the right and price will fall until it reaches the level of OP_1 (in figure 13.8a) at which the firms and the industry are in long run equilibrium.

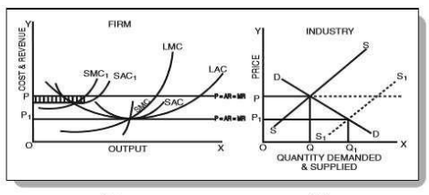

Fig. 1 : Long run equilibrium of the firm in a perfectly competitive market

Fig. 13.8: Long run equilibrium of the rm in a perfectly competitive market

The condition for the long run equilibrium of the firm is that the marginal cost should be equal to the price and the long run average cost i.e. LMC = LAC = P. The firm adjusts its plant size so as to produce that level of output at which the LAC is the minimum possible. At equilibrium, the short run marginal cost is equal to the long run marginal cost and the short run average cost is equal to the long run average cost. Thus, in the long run we have

SMC = LMC = SAC = LAC = P = MR

This implies that at the minimum point of the LAC, the corresponding (short run) plant is worked at its optimal capacity, so that the minima of the LAC and SAC coincide. On the other hand, the LMC cuts the LAC at its minimum point and the SMC cuts the SAC at its minimum point. Thus, at the minimum point of the LAC the above equality is achieved

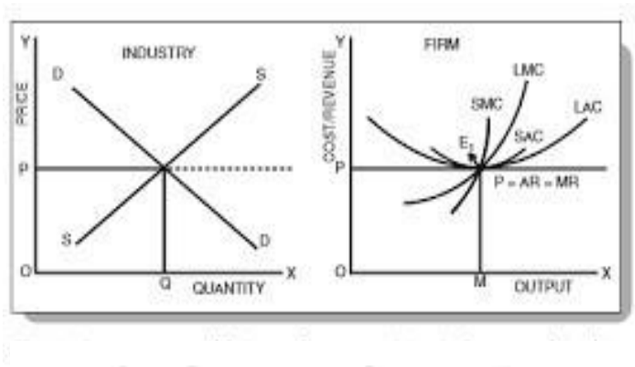

Fig. 13.9: Long run equilibrium of a competitive industry and its firms

Figure 13.9 shows that in the long-run AR = MR = LAC = LMC at E_1. In the long run, each firm attains the plant size and output level at which its cost per unit is as low as possible. Since E_1 is

the minimum point of LAC curve, the firm produces equilibrium output OM at the minimum (optimum) cost. A firm producing output at optimum cost is called an optimum firm. In the long run, all firms under perfect competition are optimum firms having optimum size and these firms charge minimum possible price which just covers their marginal cost. Thus, in the long run, under perfect competition, the market mechanism leads to optimal allocation of resources. The optimality is shown by the following outcomes associated with the long run equilibrium of the industry:

(a) The output is produced at the minimum feasible cost.

(b) Consumers pay the minimum possible price which just covers the marginal cost i.e. MC = AR. (P = MC)

(c) Plants are used to full capacity in the long run, so that there is no wastage of resources i.e. MC = AC.

(d) Firms earn only normal profits i.e. AC = AR.

(e) Firms maximize profits (i.e. MC = MR), but the level of profits will be just normal.

(f) There is optimum number of firms in the industry.

In other words, in the long run, LAR = LMR = P = LMC = LAC and there will be optimum allocation of resources. It should be remembered that the perfectly competitive market system is a myth. This is because the assumptions on which this system is based are never found in the real world market conditions.

Check your progress

1. What is perfect competition?

……

……..

2. Explain short run profit maximisation of competitive firm?

…….

……..

4. Explain long run equilibrium of competitive firm?

……

13.3 MONOPOLY

The word 'Monopoly' means "alone to sell". Monopoly is a situation in which there is a single seller of a product which has no close substitute. Pure monopoly is never found in practice. However, in public utilities such as transport, water and electricity, we generally find a monopoly form of market.

13.3.1 Features of Monopoly Market

The following are the major features of the monopoly market:

(1) Single seller of the product: In a monopoly market, there is only one firm producing or supplying a product. This single firm constitutes the industry and as such there is no distinction between firm and industry in a monopolistic market. Monopoly is characterized by an absence of competition.

(2) Barriers to Entry: In a monopolistic market, there are strong barriers to entry. The barriers to entry could be economic, institutional, legal or artificial.

(3) No close-substitutes: A monopoly firm has full control over the market supply of a product or service. A monopolist is a price maker and not a price taker. The monopolist generally sells a product which has no close substitutes. In such a case, the cross elasticity of demand for the monopolist's product and any other product is zero or very small. The price elasticity of demand for monopolist's product is also less than one. As a result, the monopolist faces a steep downward sloping demand curve.

(4) Market power: A monopoly firm has market power i.e. it has the ability to charge a price above marginal cost and earn a positive profit.

While to some extent all goods are substitutes for one other, there may be essential characteristics in a good or group of goods which give rise to gaps in the chain of substitution. If one producer can so exclude competition that he controls the supply of a good, he can be said to be 'monopolist' – a single seller.

How do monopolies arise?

The fundamental cause of monopoly is barriers to entry; in effect other firms cannot enter the market. A few reasons for occurrence and continuation of monopoly are:

1) Strategic control over a scarce resources, inputs or technology by a single firm limiting the access of other firms to these resources.

2) Through developing or acquiring control over a unique product that is difficult or costly for other companies to copy.

3) Governments granting exclusive rights to produce and sell a good or a service.

4) Patents and copyrights given by the government to protect intellectual property rights and to encourage innovation.

5) Business combinations or cartels (illegal in most countries) where former competitors cooperate on pricing or market share.

6) Extremely large start-up costs even to enter the market in a modest way and requirement of extraordinarily costly and sophisticated technical know-how discourage firms from entering the market.

7) Natural monopoly arises when there are very large economies of scale. A single firm can produce the industry's whole output at a lower unit cost than two or more firms could. It is often wasteful (for consumers and the economy) to have more than one such supplier in a region because of the high costs of duplicating the infrastructure. For e.g. telephone service, natural gas supply and electrical power distribution.

8) Enormous goodwill enjoyed by a firm for a considerably long period create difficult barriers to entry.

9) Stringent legal and regulatory requirements effectively discourage entry of new firms without being specifically prohibited.

10) Firms use various anti-competitive practices often referred to as predatory tactics, such as limit pricing or predatory pricing intended to do away with existing or potential competition.

In real life, pure monopolies are not common because monopolies are either regulated or prohibited altogether. But, one producer may dominate the supply of a good or group of

goods. Earlier, in public utilities, e.g. transport, water, electricity generation etc. monopolistic markets existed so as to reap the benefits of large scale production. But these markets have been deregulated and opened to competition over a period of time. In India, Indian Railways has monopoly in rail transportation. There is government monopoly over production of nuclear power.

13.3.2 Monopolist's Revenue Curves

In the absence of government intervention, a monopolist is free to set any price it desires and will usually set the price that yields the largest possible profit. Since the monopolist firm is assumed to be the only producer of a particular product, its demand curve is identical with the market demand curve for the product. The market demand curve, which exhibits the total quantity of a product that buyers will offer to buy at each price, also shows the quantity that the monopolist will be able to sell at every price that he sets. If we assume that the monopolist sets a single price and supplies all buyers who wish to purchase at that price, we can easily find his average revenue and marginal revenue curves.

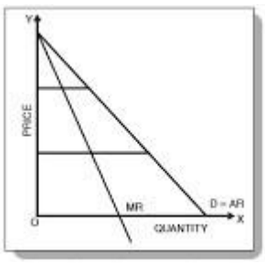

Fig. 13.10: A monopolist's demand curve and marginal revenue curve

Suppose the straight line in Fig. 13.10 is the market demand curve for a particular product 'A'. Suppose M/s. X and Co. is the only producer of the product A so that it faces the entire market demand. The firm faces a downward sloping demand curve, because if it wants to sell more it has to reduce the price of the product

The relationship between AR and MR of a monopoly firm can be stated as follows:

(i) AR and MR are both negatively by sloped (downward sloping) curves.

(ii) The slope of the MR curve is twice that of the AR curve. MR curve lies half-way between the AR curve and the Y axis. i.e. it cuts the horizontal line between Y axis and AR into two equal parts.

(iii) AR cannot be zero, but MR can be zero or even negative. Monopolies are mainly of two types: Simple monopoly where the monopolist charges uniform price from all buyers and discriminating monopoly where the monopolist charges different prices from different buyers of the same good or service. We shall look into equilibrium of a simple monopolist.

Profit maximisation in a Monopolised Market: Equilibrium of the Monopoly Firm

Firms in a perfectly competitive market are price-takers so that they are only concerned about determination of output. But this is not the case with a monopolist. A monopolist has to determine not only his output but also the price of his product. As under perfect competition, monopolists' decisions are based on profit maximisation hypothesis. Although cost conditions, i.e. AC and MC curves, in competitive and monopoly markets are generally

identical, revenue conditions differ. Since a monopolist faces a downward sloping demand curve, if he raises the price of his product, his sales will go down. On the other hand, if he wants to increase his sales volume, he will have to be content with lower price. A monopolist will try to reach the level of output at which profits are maximum i.e. he will try to attain the equilibrium level of output. Since firm and industry are identical in a monopoly setting equilibrium of the monopoly firm signifies equilibrium of the industry. We shall discuss how a monopoly firm decides its output and price in the short run and in the long run.

13.3.3 Short run Equilibrium Conditions for equilibrium:

The twin conditions for equilibrium in a monopoly market are the same as that of a firm in a competitive industry. Graphically, we can depict these conditions in figure 13.11.

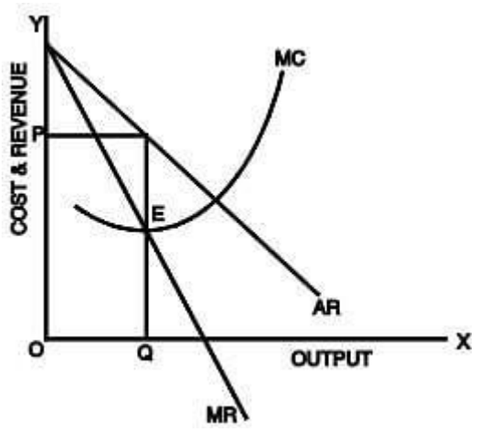

Fig. 13.11: Equilibrium of a monopolist (Short run)

The figure shows that MC curve cuts MR curve at E. That means, at E, the equilibrium output is OQ. The ordinate EQ extended to the demand curve (AR curve) gives the profit maximising equilibrium price OP. Thus the determination of output simultaneously determines the price which a monopolist

can charge. In order to know whether the monopolist is making profits or losses in the short run, we need to introduce the average total cost curve. The following figure shows two possibilities for a monopolist firm in the short run.

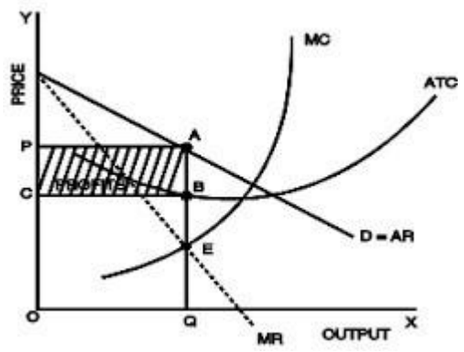

Fig. 13.12: Firm's equilibrium under monopoly: Maximisation of profits

Figure that MC cuts MR at E to give equilibrium output as OQ. At OQ, the price charged is OP. At output level OQ, the price per unit is QA (=OP) and the cost per unit is BQ. Therefore, the economic profit per unit given by AR – ATC is AB (AQ-BQ). The total profit is ABCP.

Can a monopolist incur losses? One of the misconceptions about a monopoly firm is that it makes profits at all times. It is to be noted that there is no certainty that a monopolist will always earn an economic or supernormal profit. It all depends upon his demand and cost conditions. If a monopolist faces a very low demand for his product and the cost conditions are such that ATC >AR, he will not be making profits, rather, he will incur losses

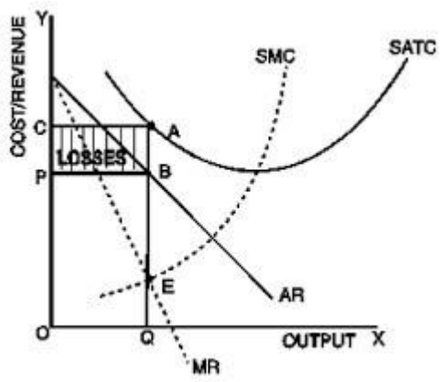

Fig.13.13: Equilibrium of the monopolist: Losses in the short run

In the above figure, MC cuts MR at E. Here E is the point of loss minimisation. At E, the equilibrium output is OQ and the equilibrium price is OP. The average total cost (SATC) corresponding to OQ is QA. Cost per unit of output i.e. QA is greater than revenue per unit which is BQ. Thus, the monopolist incurs losses to the extent of AB per unit or total loss is ABPC. Whether the monopolist stays in business in the short run depends upon whether he meets his average variable cost or not. If he covers his average variable cost and at least a part of fixed cost, he will not shut down because he contributes something towards fixed costs which are already incurred. If he is unable to meet his average variable cost even, he will shutdown.

13.3.4 **Long Run Equilibrium**: Long run is a period long enough to allow the monopolist to adjust his plant size or to use his existing plant at any level that maximizes his profit. In the absence of competition, the monopolist need not produce at the optimal level. He can produce at a sub-optimal scale also. In other words, he need not reach the minimum of LAC curve; he can stop at any point on the LAC where his profits are maximum.

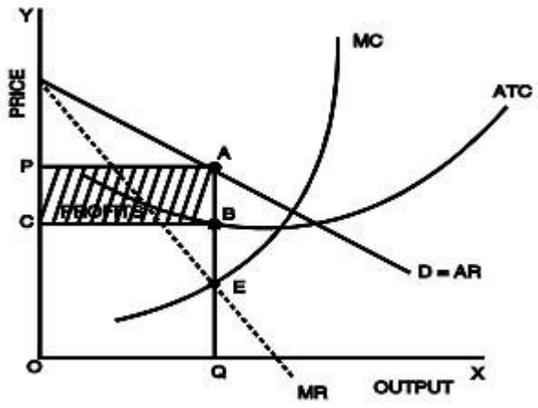

Fig. 13.14 Long run equilibrium of a monopolist

However, one thing is certain, the monopolist will not continue if he makes losses in the long run. He will continue to make super normal profits even in the long run as entry of outside firms is blocked.

13.3.5 Price Discrimination

Price discrimination is a method of pricing adopted by a monopolist in order to earn abnormal profits. It refers to the practices of charging different prices for different units of the same commodity. Further examples of price discrimination are:

- Railways separate high-value or relatively small-bulk commodities which can bear higher freight charges from other categories of goods.
- Some countries dump goods at low prices in foreign markets to capture them.
- Some universities charge higher tuition fees from evening class students than from other scholars.
- A lower subscription is charged from student readers in case of certain journals.
- Lower charges on phone calls at of peak time. Price discrimination cannot persist under perfect competition because the seller has no influence over the market determined price.

Price discrimination requires an element of monopoly so that the seller can influence the price of his product.

Conditions for price discrimination: Price discrimination is possible only under the following conditions:

I. The seller should have some control over the supply of his product i.e. the firm should have price setting power. Monopoly power in some form is necessary (not sufficient) to discriminate price.

II. The seller should be able to divide his market into two or more sub-markets.

III. The price-elasticity of the product should be different in different sub-markets. The monopolist fixes a high price for his product for those buyers whose price elasticity of demand for the product is less than one. This implies that, when the monopolist charges a higher price from them, they do not significantly reduce their purchases in response to high price

IV. It should not be possible for the buyers of low-priced market to resell the product to the buyers of high priced market i.e there must be no market arbitrage. Thus, we note that a discriminating monopolist charges a higher price in a market which has a relatively inelastic demand. The market which is highly responsive to price changes is charged less. On the whole, the monopolist benefits from such discrimination.

Objectives of Price discrimination:

(a) to earn maximum profit
(b) to dispose of surplus stock
(c) to enjoy economies of scale
(d) to capture foreign markets and
(e) to secure equity through pricing.

Price discrimination may take place for reasons such as differences in the nature and types of persons who buy the products, differences in the nature of locality where the products are sold and differences in the income level, age, size of the purchase, time of purchase. Price discrimination may be related to the consumer surplus enjoyed by the consumers.

Prof. Pigou classified three degrees of price discrimination.

Under the first degree price discrimination, the monopolist separates the market into each individual consumer and charges them the price they are willing and able to pay and thereby extract the entire consumer surplus. Doctors, lawyers, consultants etc., charging different fees, prices decided under 'bid and oer' system, auctions, and through negotiations are examples of first degree price discrimination

Under the second degree price discrimination, different prices are charged for different quantities of sold. The monopolist will take away only a part of the consumers' surplus. The two possibilities are:

a) Different consumers pay different price if they buy different quantity. Larger quantities are available at lower unit price. For example, a family pack of soaps or biscuits tends to cost less per kg than smaller packs.

b) Each consumer pays dierent price for consecutive purchases. For example, suppliers of services such as telephone, electricity, water, etc., sometimes charge higher prices when consumption exceeds a particular limit.

Under the third degree price discrimination, price varies by attributes such as location or by customer segment. Here the monopolist will divide the consumers into separate sub-markets and

charge different prices in different sub-markets. Examples: Dumping, charging different prices for domestic and commercial uses, lower prices in railways for senior citizens, etc.

13.3.6 Equilibrium under price discrimination

Under simple monopoly, a single price is charged for the whole output; but under price discrimination the monopolist will charge different prices in different sub-markets. First of all, the monopolist has to divide his total market into various sub-markets on the basis of differences in elasticity of demand. For the sake of making our analysis simple we shall explain a case where the total market is divided into two sub-markets. In order to reach the equilibrium position, the discriminating monopolist has to make three decisions:

1) How much total output should he produce?

2) How the total output should be distributed between the two sub-markets? and

3) What prices he should charge in the two sub-markets?

The same marginal principle will guide his decision to produce a total output as that which guides a perfect competitor or a simple monopolist. In other words, the discriminating monopolist will compare the marginal revenue with the marginal cost of the output. But he has to find out first, the aggregate marginal revenue of the two sub-markets taken together and compare this aggregate marginal revenue with marginal cost of the total output. Aggregate marginal revenue curve is obtained by summing up laterally the marginal revenue curves of the sub-markets.

In figure 13.15, MR_a is the marginal revenue curve in sub-market A corresponding to the demand curve D_a . Similarly, MR_b is the marginal revenue in sub-market B corresponding to the demand curve D_b . Now, the aggregate marginal revenue curve AMR, which

has been shown in Panel (iii) of figure 13.15 has been derived by adding up laterally MR_a and MR_b . The marginal cost curve of the monopolist is shown by the curve MC in Panel (iii) of figure 13.15. The discriminating monopolist will maximize his profits by producing the level of output at which marginal cost curve (MC) intersects the aggregate marginal revenue curve (AMR). It is manifest from the diagram (iii) that pro-t maximizing output is OM, for only at OM aggregate marginal revenue is equal to the marginal cost of the whole output.

Thus, the discriminating monopolist will decide to produce OM level of output. Once the total output to be produced has been determined, the next task for the discriminating monopolist is to distribute the total output between the two sub-markets. He will distribute the total output OM in such a way that the marginal revenues in the two sub-markets are equal. The marginal revenues in the two submarkets must be equal if the profits are to be maximized. If he is so allocating the output into two markets that the marginal revenues in the two are not equal, then it will pay him to transfer some amount from the sub-market in which the marginal revenue is less to the sub-market in which the marginal revenue is greater. Only when the marginal revenues in the two markets are equal, it will be unprofitable for him to shift any amount of the good from one market to the other.

For the discriminating monopolist to be in equilibrium it is essential not only that the marginal revenues in the two sub-markets should be the same but that they should also be equal to the marginal cost of the whole output. Equality of marginal revenues in the two markets with marginal cost of the whole output ensures that the amount sold in the two sub-markets will together be equal to the whole output OM which has been fixed by equalizing aggregate marginal revenue with marginal cost. It will be seen from figure (iii)

that at equilibrium output OM, marginal cost is ME. Now, the output OM has to be distributed in the two markets in such a way that the marginal revenue from them should be equal to the marginal cost (ME) of the whole output. It is clear form the diagram

(i) that OM_1 must be sold in the sub-market A, because marginal revenue M_1 E_1 at amount OM_1 is equal to marginal cost ME. Similarly, OM_2 must be sold in sub-market B, since marginal revenue M_2 E_2 of amount OM_2 is equal to the marginal cost ME of the whole output. To conclude, demand and cost conditions being given, the discriminating monopolist will produce total output OM and will sell amount OM_1 in sub-market A and amount OM_2 in sub-market B. It should be noted that the total output OM will be equal to $OM_1 + OM_2$. Another important thing which the discriminating monopolist has to discover is what prices will be charged in the two sub-markets. It is clear from the demand curve that amount OM_1 of the good can be sold at price OP_1 in sub-market A. Therefore, price OP_1 will be set in sub-market A. Like wise, amount OM_2 can be sold at price OP_2 in sub-market B. Therefore, price OP_2 will be set in sub-market B. Further, it should be noted that price will be higher in market A where the demand is less elastic than in market B where the demand is more elastic. Thus, price OP_1 is greater than the price OP_2 .

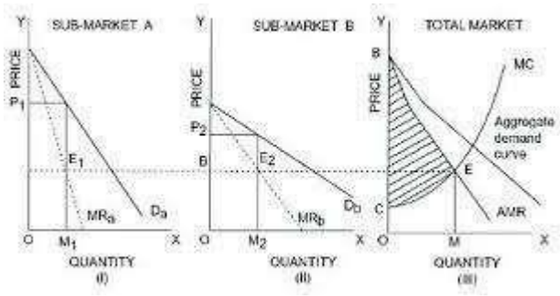

Fig. 13.15: Fixation of total output and price in the two sub-markets by the discriminating monopolist

Price discrimination is usually resorted to by a monopolist to secure higher profit and to acquire and sustain monopoly power. There is loss of economic welfare as the price paid is higher than marginal cost. Price discrimination also results in reduced consumer surplus. However, there are some favourable outcomes as well. The increase in revenue due to price discrimination will enable some firms to stay in business who otherwise would have made a loss. By peak load pricing, firms having capacity constraints will be able to spread its demand to of-peak times resulting in better capacity utilization and reduction in costs of production. Many essential services (e.g. railways) cannot be profitably run unless price discrimination is followed. Some consumers, especially, poor consumers, will benefit from lower prices as they would not have been able to purchase the good or service if uniform high prices are charged for all consumers.

Economic effects of monopoly

1) Monopoly is often criticized because it reduces aggregate economic welfare through loss of productive and allocative efficiency.

2) Monopolists charge substantially higher prices and produce lower levels of output than would exist if the product were produced by competitive firms.

3) Monopolists earn economic profits in the long run which are unjustifiable.

4) Monopoly prices exceed marginal costs and therefore reduces consumer surplus. There is a transfer of income from the consumers to the monopolists. Not only that consumers pay higher prices, but they would also not be able to substitute the good or service with a more reasonably priced alternative.

5) Monopoly restricts consumer sovereignty and consumers' opportunities to choose what they desire.

6) Monopolists may use unjust means for creating barriers to entry to sustain their monopoly power. They often spend huge amount of money to maintain their monopoly position. This leads increases average total cost of producing a product.

7) A monopolist having substantial financial resources is in a powerful position to influence the political process in order to obtain favourable legislation.

8) Very often, monopolists do not have the necessary incentive to introduce efficient innovations that improve product quality and reduce production costs.

9) Monopolies are able to use their monopoly power to pay lower prices to their suppliers.

10) The economy is also likely to suffer from 'X' inefficiency, which is the loss of management efficiency associated with markets where competition is limited or absent.

Since monopolies are exploitative and generate undesirable outcomes in the economy, a number of steps are taken by governments to prevent the formation of monopolies and to regulate them if they are already present

Check your progress

What is monopoly?

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What is price discrimination?

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Explain long run equilibrium under monopoly?

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13.4 IMPERFECT COMPETITION-MONOPOLISTIC COMPETITION

Consider the market for soaps and detergents. Among the well known brands on sale are Lux, Vivel, Cinthol, Dettol, Liril, Pears, Lifebuoy Plus, Dove etc. Is this market an example of perfect competition? Since all the soaps are almost similar, one might think that this is an example of perfect competition. But, on a close inspection we find that though these products are technically and functionally similar, each seller produces and sells a product which is different from those of his competitors. For example, whereas Lux is claimed to be a beauty soap, Liril is associated more with freshness. Dettol soap is placed as antiseptic and Dove claims to ensure young smooth skin. The practice of product and service differentiation gives each seller a chance to attract business to himself on some basis other than price. This is the monopolistic part of the market situation. Thus, this market contains features of both the markets discussed earlier – monopoly and perfect competition. In fact, this type of market is more common than pure competition or pure monopoly. The industries in monopolistic competition include clothing, manufacturing and retail trade in large cities. There are many hundreds of grocery shops, shoe stores, stationery shops,

restaurants, repair shops, laundries, manufacturers of women's dresses and beauty parlours in a medium sized or large city.

13.4.1 Features of Monopolistic Competition

(i) Large number of sellers: In a monopolistically competitive market, there are large number of independent -rms who individually have a small share in the market.

(ii) Product differentiation: In a monopolistic competitive market, the products of different sellers are differentiated on the basis of brands. Because competing products are close substitutes, demand is relatively elastic, but not perfectly elastic as in perfect competition. Firms use size, design, colour, shape, performance, features and distinctive packaging and promotional techniques to make their products different. Such differentiation may be true or fancied. Brands are generally so much advertised that a consumer starts associating the brand with a particular manufacturer and a type of brand loyalty is developed. Product differentiation gives rise to an element of monopoly to the producer over the competing products. Because of absence of perfect substitutability, the producer of an individual brand can raise the price of his product knowing that he will not lose all the customers to other brands. However, since all brands are close substitutes of one another; the seller who increases the price of the product will lose some of his customers to his competitors. Thus, this market is a blend of monopoly and perfect competition.

(iii) Freedom of entry and exit: Barriers to entry are comparatively low and new -rms are free to enter the market if they find profit prospects and existing firms are free to quit.

(iv) Non-price competition: In a monopolistically competitive market, firms are often in -fierce competition with other firms offering a similar product or service, and therefore try to compete on bases other than price, for example: they indulge in aggressive advertising, product development, better distribution arrangements, efficient after-sales service and so on. A key base of non-price competition is a deliberate policy of product differentiation. Sellers attempt to promote their products not by cutting prices but by incurring high expenditure on publicity and advertisement and other sales promoting techniques. This is because price competition may result in price – wars which may throw a few -rms out of market or reduce the profit margins.

13.4.2 Short run Price-output determination under monopolistic competition: Equilibrium of a firm

In a monopolistically competitive market, since the product is differentiated, each firm does not face a perfectly elastic demand for its products. Each firm makes independent decisions about price and output. Each firm is a price maker and is in a position to determine the price of its own product. As such, the firm is faced with a downward sloping demand curve for its product. Generally, the less differentiated the product is from its competitors, the more elastic this curve will be.

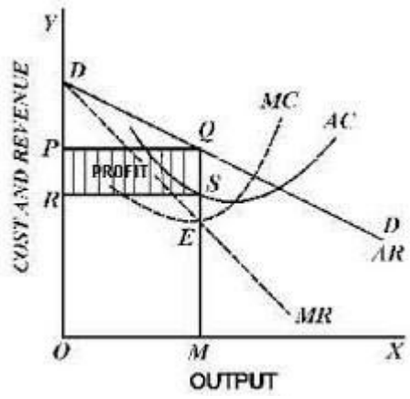

Fig.13.16: Short run equilibrium of a rm under monopolistic competition: Supernormal profits

The firm depicted in figure 13.16 has a downward sloping but flat demand curve for its product. The firm is assumed to have U-shaped short run cost curves. Conditions for the Equilibrium of an individual firm:

The conditions for price-output determination and equilibrium of an individual firm may be stated as follows:

(i) MC = MR

(ii) MC curve must cut MR curve from below.

Figure 13.16 shows that MC cuts MR curve at E. At E, the equilibrium price is OP and the equilibrium output is OM. Since per unit cost is SM, per unit supernormal profit (i.e. price - cost) is QS (or PR) and the total supernormal profit is PQSR. It is also possible that a monopolistically competitive firm may incur losses in the short run. This is shown in figure 13.17. The figure shows that per unit cost (HN) is higher than price OT (or KN) of the product of the firm and the loss per unit is KH (HN-KN). The total loss is GHKT. What about long run equilibrium of the firm? If the firms in a monopolistically competitive industry earn supernormal profits in the short run, there will be an incentive for new firms to enter the industry. As more firms enter, profits per firm will go on decreasing

as the total demand for the product will be shared among a larger number of firms. This will happen till all supernormal profits are wiped away and all firms earn only normal profits. Thus, in the long run all firms under monopolistic competition will earn only normal profits.

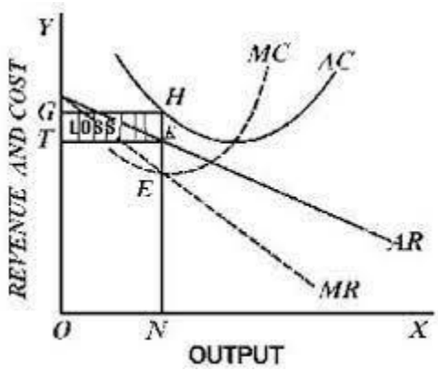

Fig. 13.17: Short run equilibrium of a rm under Monopolistic Competition – With losses

13.4.3 Long run Price-output determination under monopolistic competition: Equilibrium of a firm

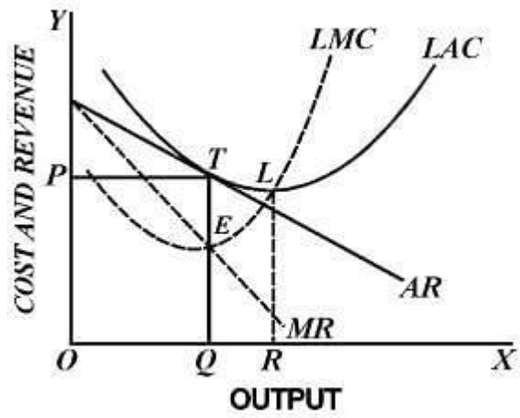

Fig. 13.18: The long-term equilibrium of a firm in monopolistic competition

The long run equilibrium of a firm in a monopolistically competitive market. The average revenue curve touches the average cost curve at point T corresponding to quantity Q and price P. At equilibrium (i.e. MC= MR) supernormal profits are zero, since average revenue equals average costs. All firms are earning zero economic profits or just normal profits. In case of persisting losses, in the long run, the loss making firms will exit from the market and this will go on till the remaining firms make normal profits only. It is to be noted that an individual firm which is in equilibrium in the long run, will be operating at levels at which it does not fully realize economies of large scale production. In other words, the plants are not used to optimum capacity. However, any attempt to produce more to secure the advantage of least cost production will be irrational since the price reduction to sell the larger output will exceed the cost reduction made possible. If output is increased up to R in the above figure, we find that average total cost will be greater than average revenue. Thus, a monopolistically competitive firm which is in equilibrium in the long run is at a position where it has excess capacity. That is, it is producing a lower quantity than its full capacity level. The firm in figure 13.18 could expand its output from Q to R and reduce average costs. But it does not do so because in doing so, the firm would reduce average revenue more than it reduces average costs. It implies that, firms in monopolistic competition are not of optimum size and there exists excess capacity (QR in our example above) of production with each firm.

Check your progress

What is monopolist competition ?

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Explain Long run Price-output determination under monopolistic competition: Equilibrium of a firm?

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LET'S SUM UP

Introducing the concept of perfect competition monopoly and monopolistic, has been explained how such a market structure is different from each other and what are there operational the requirements. The firm under perfect competition is a price-taker. When marginal revenue is equal to marginal cost: and the latter is rising, the firm reaches its equilibrium position. Equilibrium of the firm has been discussed for short run as well as long run situations. Equilibrium of industry has been discussed with reference to time. Here the time has been divided into short period and long period equilibrium.

Monopoly is an extreme form of imperfect competition with a single seller of a product which has no close substitute. Since the monopolist firm is the only producer of a particular product, its demand curve is identical with the market demand curve for the product. Since a monopoly firm has market power it has the ability to charge a price above marginal cost and earns a positive economic profit. The fundamental cause of monopoly is barriers to entry; in effect other firms cannot enter the market. In the long-run, the supernormal profit will be continued because entry is restricted. One of the important features of monopoly is price discrimination, i.e. charging different prices for the same product from different buyers. Price charged will be higher in the market where the demand is less

elastic and lower in the market where the demand is more elastic. Under the first degree price discrimination, the monopolist separates the market into each individual consumer and charges them the price they are willing and able to pay and thereby extract the entire consumer surplus. w Under the second degree price discrimination different prices are charged for different quantities of sold. w Under the third degree price discrimination, price varies by attributes such as location or by customer segment. In the absence of competition, the monopolist need not produce at the optimal level

Monopolistic Competition w It refers to the market situation in which many producers produce goods which are close substitutes of one another The essential feature of monopolistic competition is the existence of large number of firms, product differentiation, non price competition, high selling costs and freedom of entry and exit of firms. In monopolistic competition, the features of monopoly and perfect competition are partially present. Demand curve is highly elastic and a firm enjoys some control over the price. Firms in monopolistic competition are not of optimum size and there exists excess capacity with each firm

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UNIT 14: BREAK EVEN ANALYSIS; PROFIT PLANNING

STRUCTURE

14.0 OBJECTIVE

In this unit, we shall be telling you in some detail our firm's profit planning and break-even point.

At the end of the unit, you will be able to explain what is break-even- even point and why it is important for a firm to know about it before making a decision about a product.

14.1 OBJECTIVES

When a producer is able to sell that number of products in which he can recover his total manufacturing cost and then some more, he starts to make a profit. In other words, the difference between the sales income and the total manufacturing cost is the possible profit of a producer. Profit planning is a vital part of any business plan structure for a small or medium business. The goals of small business owners include ensuring that the business makes profits year-over-year and that it is sustained over a period of time for growth. Break-Even analysis is used to know the volume of sales necessary to achieve a given rate of return on capital given and helps

in appraising the effect of change in the volume of sales, sale price, cost of production, production mix and making choices of products from the alternatives available and is very important for profit planning. The break-even analysis and profit planning is explained in this unit.

14.2 BREAK-EVEN ANALYSIS

Traditionally, the basic objective of the firm is to maximise profits. Economic profit of the production of a commodity is the difference between its cost of production and the revenue earned by its sale. In Economics, the profit earned by a firm is divided into the following two parts.

(1) Economic or Super Normal Profit: The amount by which the total revenue earned by the sale of a given quantity of output exceeds its total cost i.e TR-TC (explicit cost + implicit cost) is called Economic or Super normal profit. For instance, if the total cost of making a chair is ₹400 and the total revenue earned by its sale is Rs. 500 than ₹ 100/- (₹500-400) will be called as super normal profit.

Thus, Economic profit AR > AC.

(2) Normal or Zero Economic Profit:

Normal Profit is that minimum amount which an entrepreneur must get so as to retain him in that occupation. It is the implicit cost of the functions of an entrepreneur. It is also called zero economic profit. This situation arises when the total revenue earned by the sale of a commodity is equal to its total costs. In other words, zero economic profit or normal profit =Total Revenue = Total cost. The point, at which the total cost of producing a commodity by the firm is equal to its total revenue, is called Break-even point. Thus, break-even point is that point at which a firm gets only zero economic profit or normal profit. Each firm desires to earn maximum economic profit

by rising above this point. The technique that a firm adopts to achieve this objective is called Break-even analysis.

Profit maximisation is not only the function of cost minimisation but can also be done by optimization of firm's output level. The profit is maximum at a specific level of output which is difficult to know in advance. Even if it is known, it cannot be achieved at the outset of the production. Firms started their business even at a loss with expectation of profits in future. However, the firm can plan their production in a better way by knowing the level of output where total cost is equal to total revenue or in break even. This can be done with a breakeven analysis. A Break-Even Analysis also known as cost volume & profit analysis or profit contribution analysis is an important profit planning technique that illustrates at what level of output in the short run, the total revenues just cover total costs.

In Break-Even analysis the mutual relations between the volume of production and cost of production, on the one hand and sale proceeds and profit i.e. Revenue, on the other are analysed.

"Break-Even Analysis is that technique which shows how to identify the level of output and sales of volume at which the firm 'breaks even', which revenues being sufficient to cover all its costs", Howard Devies.

The Relationship between cost and output and between price and output may be linear or non linear in nature but relationship can be analysis in both the case.

Break Even Point Break-even point is that point of output level of the firm where firms total revenues are equal to total costs (TR = TC). As discussed earlier economic profit is the excess of total revenue than the total costs i.e. (TR – TC) or (TR>TC), so at break-even point when TR = TC, the firm neither earns profit nor incurs loss or is a situation of zero economic profit.

In break even analysis Costs can be classified as either a fixed cost or a variable cost. A fixed cost is one that is independent of the level

of sales; rather, it is related to the passage of time. Examples of fixed costs include rent, salaries and insurance. A variable cost is one that is directly related to the level of sales, such as cost of goods sold and commissions. T

Thus; Total Costs (TC) = Total Fixed Costs (TFC) + Total Variable Costs (TVC)

Total Revenue (TR) = Total Output (Q) * Price per unit of output (P) = QP

Economic Profit or loss = Total Revenue (TR) - Total Costs (TC)

Break-even Point = TR = TC or TR - TC = zero

The firm will incurs loss if it operates below this point and will earn profit if it operates beyond this point. It may however be noted that by producing at the level of break-even point, a firm covers only its cost of production. Normal profit is included in the cost of production. Thus, at break-even point a firm gets only normal profit or zero economic profit

14.2.1 Assumptions of Break-Even Analysis

Break-even analysis is based on following assumptions;

(1) Total Costs can be classified in fixed cost or a variable cost and total fixed costs (TFC) remain constant at each level of output. Variable cost per unit remains constant at all level of output but the total variable costs (TVC) vary with the level of output.

(2) Technique of production and returns to a factor of production remains constant. Law of constant returns applies to firm's factor of production. In other words, variable costs change at a constant rate.

(3) Price of the output of the firm or sales price (AR) remains constant. Thus, change in total revenue and total output is at constant ratio.

(4) The volume of output of a firm and the volume of sales are identical.

14.2.2 Methods to calculate Break-Even Point

The break-even point can be computed mainly by following methods;

(1) Algebra or Mathematical Equation Method

(2) Graphic Method

(3) Contribution Margin Method

1. Algebra or Mathematical Equation Method As mentioned above;

Total Revenue (TR) = Total Output (Q) * Price per unit of output (P) = Q (P)

and Total Costs (TC) = Total Fixed Costs (TFC) + Total Variable Costs (TVC)

Total Variable Costs (TVC) = Total Output (Q) * Variable Costs per unit

(Average variable Cost i.e AVC) TC = TFC + Q (AVC)

Break-Even Point (B) = (TR =TC)

Or Q (P) =TFC+ Q (AVC)

Or Q (P) - Q (AVC) =TFC

Or Q (P-AVC) =FC

or

$$\text{Break Even Quantity (Q)} = \frac{\text{fixed cost}}{\text{Price} - \text{average variable cost}}$$

Example-1:

The fixed cost of producing Moto-E mobile is ₹1, 00,000 and variable cost per Moto-E mobile is ₹3,500 and the selling price of

the same is ₹4,500. Company's break event quantity (Q) as per equation -1 will be calculated as follow;

Q= fixed cost/ Price – average variable cost

= 1, 00,000/(4,500-3,500) = 100 units

If company produced 100 units of Moto-E than company's

TR (i.e. 100*4,500) =TC (i.e 1, 00, 000 + 100*3,500) or 4, 50,000 = 4, 50,000

Economic profit = TR-TC (i.e 4, 50,000 - 4, 50,000) =Zero

2. Graphic Method

Under graphic method efforts are made to explain Break-Even with the help of Break Even Chart. Break Even Chart is that graph which shows the extant of profit or loss to the firm at different levels of sales or production. Break Even chart is explained with the help of the following table and diagram

Fig 14.1 Break even point

Break Even Point is also explained with the help of Figure-14.1. Quantity of output is shown on OX axis and cost and revenue on OY-axis.TR represents total revenue curve, TC total cost curve and FC fixed cost curve. The vertical difference between TC and FC shows VC (Variable Cost). Point 'E' indicates Break Even Point and

at this point TR and TC curves intersect each other, i.e., TR=TC. Break Even Point 'E' Points out that the firm is producing 100 units of mobile sets and at this level of output total cost is equal to total sales. Prior to break-even point E, firm is running into loss and production after point E yields profit.

3 Contribution or P/V Ratio Method

In Contribution or P/V Ratio Method we use the contribution i.e. excess of firm's TR (total revenue) over TVC (total variable costs). The Ratio of Contribution to TR is known as P/V ratio.

P/V ratio = (TR-TVC or Contribution/ TR)*100

Break Even point (in volumes) Fixed costs / P/V ratio

In above example, if the total sale proceeds of 20 Units of Moto-E is ₹90 thousands and total variable cost is ₹70 thousands, then the total contribution of the firm is ₹20 thousands (₹90 - ₹70). P/V ratio is 22.22 percent (₹20/₹90 * 100). The fixed costs are ₹100 thousands and the breakeven point sales will be;

= Fixed costs / P/V ratio i.e. ₹100 /22.22 percent = ₹450 thousands or 100 units (i.e ₹450/₹4.5)

14.2.3 Applications of Break-Even Analysis in Managerial Decisions

Break-Even analysis helps the managers in taking following decision;

1. Calculation of Volume of Sales to Attain Target Profit: Break-Even analysis is used to know the volume of sales necessary to achieve a given profit. Required volume of sales is calculated with the help of the following formula:

   $$\text{Required Volume of Sales} = \frac{\text{fixed cost + target profit}}{\text{Contribution margin perunit}}$$

For Example: The fixed cost of producing Moto-E mobile is ₹1, 00,000 and variable cost per Moto-E mobile is ₹3,500 and the selling price of the same is ₹4,500. What should be the sales volume of the company to get ₹20,000 profits?

Required Volume of Sales = fixed cost + target profit / Contribution margin perunit

= (₹1, 00,000 + ₹20,000)/ ₹4,500-₹3,500 = 120 units or 120*₹4,500=₹5,40,000

2. Margin of Safety

The margin of Safety represents the difference between the sales at breakeven point and the total actual sales i.e Margin of Safety = Actual Sales- Break Even Sales It is the limit to which the sales may fall yet the firm may have no fear of loss. T hree method of measuring of margin of safety are as follow;

1. Margin of Safety = (Profit* sales)/ PV ratio
2. Margin of Safety = (Actual Sales- Break Even Sales)/ Actual Sales
3. Margin of Safety = Profit/ PV ratio

The margin of safety can be increased (i) by increasing the selling price in case the demand for the product is inelastic, (ii) by increasing the production or sales up to capacity of the plant or by reducing selling price in case demand is elastic and (iii) by reducing fixed costs or variable costs or having a product mix with greater share of one having relatively more contribution per unit or higher PV ratio.

3. Taking Make or Buy Decisions

Some time firms have the option to decide whether to manufacture itself, all the parts and components of the finished product, say, scooter, or to purchase the same from ancillary units. Break-even analysis helps the firm arrive at the above

decision. The variable cost or marginal costs are compared with the prices of that product, if the variable costs of a product is more than its buying price or contribution (S-VC) is negative than a decision as to buying it from the market is taken or vice versa.

4. Accepting of price below the total costs Sometimes process have to fixed below the total costs of the product especially during depression. Prices may be fixed at a level above the variable costs though it may not be enoughto cover the total costs. This is because in such periods any marginal contribution towards recovery of fixed cost is good enough rather than not to have any contribution at all. A price less than total cost is sometime accepted in case of additional order or export order. In this case additional revenue should be compared with additional costs (it will be only variable costs) and if the contribution is positive, the order should be accepted. It is done only in case company is operating below its capacity
5. Change in Production Capacity: Break Even analysis helps the firm in taking the decision whether to increase or reduce its existing production capacity. In this respect, several factors are taken into account, such as, possibility of change in profit; possibility of change in quantity for sale or sales price, etc. If any change has positive impact on contribution of the firm the change will accepted or vice versa.
6. Effect of Alternative Prices: The positions of profit at different price- levels under given conditions of demand and costs can be shown with the help of Break Even Chart.
7. Decision Regarding Adding of New Products or Dropping of Old Ones: Break-Even Analysis enables a firm to arrive at a final decision whether to introduce any new product or not. It also helps a firm to decide whether to continue the production of the existing goods or to discontinue it by comparing the

contributions in both the cases. Alternative having more contribution may be preferred. In case company wants to drop one of its products, break even analysis makes it easy to the firms to take this decision. Product with lowest contribution should be dropped and firm should concentrate on profitable ones.

8. Choosing Promotion Mix: In order to promote the sales of its product, a firm may take resort to different kinds of incentives; e.g., advertisement, prizes, after-sales-service, salesmanship, etc, in different proportions. The firms can find out from break-even analysis as to which of the promotion-mix they should choose so as to get maximum profit. The promotion mix that gives the maximum contribution may be adopted.
9. Choice of Most Profitable Alternate A firm may choose the most profitable alternative from among the different alternatives of the factors of production with the help of Break-Even analysis. It means that the firm can choose the most economical alternative on the basis of information regarding cost of two production techniques, two machines, two factors, etc. However, this choice is possible only when (i) fixed cost of the alternatives is different and (ii) the variable cost of the alternative with more fixed cost is less than the variable cost of the alternative with less fixed cost.
10. Inter firm Comparison The break even analysis also helps in inter- firm comparison of profitability. Firm having higher P/V ratio is better than the lower one.
11. Target Capacity It is with the help of break even analysis that a firm can determine target capacity to take advantage of minimum cost of production. The capacity at which firms earns maximum contribution will be the target capacity of the firm.

14.2.4 Limitations of Break Even analysis

Main limitations of break even analysis are as under:

(1) Ignores changes in input prices Prices of inputs like raw materials wages etc are liable to change constantly. Since break even analysis is based on past data it becomes necessary to adjust this data in the context of changes in the prices of inputs however, it is not so done. As a result , the use of break even analysis becomes limited.

(2) Ignores changes in product prices Break even chart is prepared on the bases of the current product prices. But, in real life, product prices undergo change regularly. However, in break even chart changes in product prices are not included because it becomes difficult to make the correct estimate of the quantity of sale at different prices. As a result, break even analysis is rendered unrealistic.

(3) Static Break even analysis is static in so far as it is based on the assumption of constant relationship between cost, quantity of production and sale proceeds. In real life, their relationship is never constant.

(4) Unrealistic Assumptions of Linear relationship The assumption of break even analysis that the relationship between cost and revenue is linear is unrealistic. In real life, their relationship is non-linear.

(5) Profit is not a Function of Output only: The assumption that profit is a function of output only is unrealistic. In Real life, profit is a function of many other factors like technological changes, efficient management, scale of production etc.

(6) Limitations of Accounting Data: Break even analysis depends upon Accounting Data. It therefore, suffers from all the limitations of this data, namely, ignoring of imputed costs calculating

depreciation in an arbitrary manner, etc. All this restricts the scope of break even analysis.

(7) Unsuitable for Long- term Analysis Break even analysis is not suitable for long term analysis. It has relevance for short term analysis only.

(8) Ignores imperfect competition In this analysis, revenue curve is drawn parallel to OX-Axis. According to this revenue curve, any amount of output can be sold at the prevailing price. Such a revenue curve is possible only under perfect competition. In real life, we are faced with imperfectly competitive market. As such, break-even analysis ignores the revenue curves under imperfect competition.

(9) Unsuitable for Multi-products: Break-even analysis is suitable for a few products. Simultaneous analysis of several products, several plants and several departments is very complex. Thus, this analysis is for from suitable for multi-products.

Check your progress

What is break even point?

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Explain the graphic method for calculation break even point?

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What are the managerial uses of break even analysis?

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14.3 PROFIT PLANNING

Profit is considered as a significant element of a business activity.

According to Peter Drucker, “profit is a condition of survival. It is the cost of the future, the cost of staying in a business.”

Thus, profit should be planned and managed properly. An organization should plan profits by taking into consideration its capabilities and resources. Profit planning lays foundation for the future income statement of the organization. The profit planning process begins with the forecasting of Les and estimating the desired level of profit taking in view the market conditions. steps involved in the profit planning process:

14.3.1 The steps involved in profit planning process are explained as follows:

1. Establishing profit goals: Implies that profit goals should be set in alignment with the strategic plans of the organization. Moreover, the profit goals of an organization should be realistic in nature based on the capabilities and resources of the organization.

2. Determining expected sales volume: Constitutes the most important step of the profit planning process. An organization needs to forecast its sales volume so that it can achieve its profit goals. The sales volume can be anticipated by taking into account the market and industry trends and performing competitive analysis.

3. Estimating expenses: Requires that an organization needs to estimate its expenses for the planned sales volume. Expenses can be determined from the past data. If an organization is new, then the data of similar organization in same industry can be taken. The expense forecasts should be adjusted to the economic conditions of the country.

4. Determining profit: Helps in estimating the exact value of sales. It is calculated as: Estimated Profit = Projected Sales Income – Expected Expenses After planning profit successfully, an organization needs to control profit. Profit control involves measuring the gap between the estimated level and actual level of profit achieved by an organization. If there is any deviation, the necessary actions are taken by the organization.

14.3.2 Benefits Profit Planning

Profit planning is a critical tool that businesses use to set financial goals, develop budgets, and allocate resources. Here are some of the ways in which profit planning is used in a business

1. Setting Financial Goals - Profit planning helps a business set financial goals that are specific, measurable, achievable, relevant, and time-bound (SMART). The financial goals could be revenue targets, profit margins, or cash flow projections that the business aims to achieve over a given period.

2. Creating a Budget - Profit planning helps a business create a budget that outlines its expected expenses and revenues over a given period. The budget helps the business allocate resources efficiently and identify areas where it can reduce costs or increase revenue.

3. Identifying Key Performance Indicators (KPIs) - Profit planning helps a business identify the KPIs that it needs to track to achieve its financial goals. KPIs could include revenue growth, profit margins, customer acquisition costs, or employee productivity.

4. Assessing Risk and Opportunities - Profit planning helps a business identify potential risks and opportunities that could impact its financial performance. By understanding these risks and opportunities, the business can take steps to mitigate risks and capitalize on opportunities.

5. Monitoring Performance - Profit planning helps a business monitor its financial performance against its goals and adjust its strategies as needed. By monitoring performance regularly, the business can identify areas where it is falling short and take corrective action.

14.3.3 What Makes Profit Planning Effective?

The major factors that make your profit plan effective are the seriousness and willingness to use it to manage your company's operation. A plan must address certain elements and be realistic to be effective.

- The plan must have commitment and involvement of your company's management
- Objectives and strategies must address all factors affecting performance
- There must be a forward-looking process on the trends and development in the market
- The goals must be consistent and provides a clear sense of direction
- Lastly, it must include an alternative course of action if the plan proves invalid.

Check your progress

What is profit planning?

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What are the advantages of profit planning ?

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LET US SUM UP

A Break-Even Analysis also known as cost volume & profit analysis or profit contribution analysis is an important profit planning technique that illustrates at what level of output in the short run, the total revenues just cover total costs. In Break-Even analysis the mutual relations between the volume of production and cost of production, on the one hand and sale proceeds and profit i.e. Revenue, on the other are analysed. Break-Even analysis is used to know the volume of sales necessary to achieve a given rate of return on capital given and helps in appraising the effect of change in the volume of sales, sale price, cost of production, production mix and making choices of products from the alternatives available. It helps in computing the breakeven point and effects of level of output on fixed costs, variable costs, total costs and total revenue of a firm.

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UNIT 15: OLIGOPOLY (COURNOT'S MODEL, KINKED DEMAND CURVE MODEL, PRISONER'S DILEMMA)

Structure

15.0 INTRODUCTION

After studying this unit, you shall be able to:

- state the meaning and features of oligopoly;
- discuss the causes of existence of oligopoly;
- throw light on different models that explain the oligopoly price and output determination

15.1 OBJECTIVES

Oligopoly refers to a market wherein only a few firms account for most or all of total production. Oligopoly is an important form of imperfect competition. Unlike other market forms, price and output under oligopoly is never fixed. Interdependence of firms led uncertainty always exists in the market. In such a situation, it

becomes difficult to determine the equilibrium price and output for an oligopolistic firm. An oligopolist cannot assume that its competitors will not change their price and/or output if it changes. Price change by one firm will be followed by other competitors, which will change the demand conditions facing this firm. Therefore, demand curve for any firm is not fixed like other markets. Demand curve for a firm keeps changing as firms change their prices. Therefore, in the absence of a fixed demand (Average Revenue) curve, it is difficult to determine the equilibrium price and output. However, economists have developed some price-output models to explain the behaviour of oligopolistic firms, like Cournot's model, kinked demand curve model, prisoner's dilemma

15.2 MEANING AND CHARACTERISTICS OF OLIGOPOLY

Oligopoly is often described as 'competition among the few'. Prof. Stigler defines oligopoly as that "situation in which a firm bases its market policy, in part, on the expected behaviour of a few close rivals". In other words, when there are few (two to ten) sellers in a market selling homogeneous or differentiated products, oligopoly is said to exist. Oligopolies mostly arise due to those factors which are responsible for the emergence of monopolies. Unlike monopoly where a single firm enjoys absolute market power, under oligopoly a few firms exercise their power to keep possible competitors out.

Consider the example of cold drinks industry or automobile industry. There are a handful firms manufacturing cold drinks in India. Similarly, there are a few firms in the automobile industry in India. Airlines industry, petroleum refining, power generation and supply in most of the parts of the country, mobile telephony and Internet service providers are other examples of oligopolistic

market. These industries exhibit some special features which are discussed in the following paragraphs.

15.3 TYPES OF OLIGOPOLY:

Pure oligopoly or perfect oligopoly occurs when the product is homogeneous in nature, e.g. Aluminium industry. This type of oligopoly tends to process raw materials or produce intermediate goods that are used as inputs by other industries. Notable examples are petroleum, steel, and aluminium. Differentiated or imperfect oligopoly occurs when goods sold is based on product differentiation, e.g. Talcum powder.

Open and closed oligopoly: In an open oligopoly market new -rms can enter the market and compete with the existing -rms. But, in closed oligopoly entry is restricted

Collusive and Competitive oligopoly: When few -rms of the oligopoly market come to a common understanding or act in collusion with each other either infixing price or output or both, it is collusive oligopoly. When there is absence of such an understanding among the firms and they compete with each other, it is called competitive oligopoly.

Partial or full oligopoly: Oligopoly is partial when the industry is dominated by one large firm which is considered or looked upon as the leader of the group. The dominating firm will be the price leader. In full oligopoly, the market will be conspicuous by the absence of price leadership.

Syndicated and organized oligopoly: Syndicated oligopoly refers to that situation where the firms sell their products through a centralized syndicate. Organized oligopoly refers to the situation

where the firms organize themselves into a central association for fixing prices, output, quotas, etc.

15.4 CHARACTERISTICS OF OLIGOPOLY MARKET

The oligopolistic industry is dominated by a small number of large firms, each of which is comparatively large relative to the total size of the market. These large firms exercise considerable control over the market. An oligopoly market may have a large number of firms along with very large firms, but most of the market share will be enjoyed by the few large firms and therefore they conquer and retain market control.

Strategic Interdependence:

The most important feature of oligopoly is interdependence in decision making of the few firms which comprise the industry. Since there are only few sellers, there will be intense competition among them. Under oligopoly, each seller is big enough to influence the market. A firm has to necessarily respond to its rivals' actions, and simultaneously the rivals also respond to the firm's actions. This is because when the number of competitors is few, any change in price, output or product by a firm will have direct effect on the fortunes of the rivals who will then retaliate by changing their own prices, output or advertising technique as the case may be. It is, therefore, clear that an oligopolistic firm must consider not only the market demand for its product, but also the reactions of other firms in the industry to any major decision it takes. An oligopoly firm that does not consider its rivals' behaviour or incorrectly assumes them is likely to suffer a setback in its profits.

Importance of advertising and selling costs:

A direct effect of interdependence of oligopolists is that the firms have to employ various aggressive and defensive marketing weapons to gain greater share in the market or to maintain their share. For this, firm have to incur a good deal of costs on advertising and other measures of sales promotion. Therefore, there is great importance for advertising and selling costs in an oligopoly market. It is to be noted that firms in such type of market avoid price cutting and try to compete on nonprice basis because if they start undercutting one another, a type of price-war will emerge which will drive a few of them out of the market as customers will try to buy from the seller selling at the cheapest price.

Group behaviour : The theory of oligopoly is a theory of group behaviour, not of mass or individual behaviour and to assume profit maximising behaviour on the oligopolists' part may not be very valid. There is no generally accepted theory of group behaviour. The firms may agree to pull together as a group in promotion of their common interest. The group may or may not have a leader. If there is a firm which acts as a leader, it has to get others to follow it. These are some of the concerns of the theory of group behaviour. But one thing is certain. Each oligopolist closely watches the business behaviour of the other oligopolists in the industry and designs his moves on the basis of some assumptions of how they behave or are likely to behave

Check your progress

What is oligopoly?

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What are various types of oligopoly**?**

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What are the characteristics of oligopoly ?

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15.5 PRICE AND OUTPUT DECISIONS IN AN OLIGOPOLISTIC MARKET

Oligopoly, in fact, describes the operation of a number of large corporations in the world. The operations of these markets are characterized by strategic behaviour of a small number of rival firms. As mentioned above, the extent of power as well as profits depends to a great extent on how rival firms react to each other's decisions. If the behaviour is less competitive, that is, if the rival firms behave in a cooperative manner, firms will enjoy market power and can charge prices above marginal cost.

An oligopolistic firm has to behave strategically when it makes a decision about its price. It has to consider whether rival firms will keep their prices and quantities constant, when it makes changes in its price and/or quantity. When an oligopolistic firm changes its price, its rival firms will retaliate or react and change their prices which in turn would affect the demand of the former firm. Therefore, an oligopolistic firm cannot have sure and determinate demand curve, since the demand curve keeps shifting as the rivals change their prices in reaction to the price changes made by it. Now when an oligopolist does not know his demand curve, what price and output he will fix cannot be ascertained by economic analysis.

However, economists have established a number of price-output models for oligopoly market depending upon the behaviour pattern of other firms in the market. Different oligopoly settings give rise to different optimal strategies and diverse outcomes. Important oligopoly models are:

(i) It is assumed by some economists that oligopolistic firms ignore their interdependence and make their decisions independently. When interdependence is ignored, the demand curve becomes definite and the equilibrium output is found out by equating marginal cost and marginal revenue.

(ii) Some economists assume that an oligopolist is able to predict the reaction pattern of his competitors and on the basis of his prediction; he makes decisions relating to price and quantity. In Cournot model, the firms' control variable is output in contrast to price. They do not collude. In Stackelberg's model, the leader commits to an output before all other firms. The rest of the firms are followers and they choose their outputs so as to maximize profits, given the leader's output. According to Bertrand model, price is the control variable for firms and each firm independently sets its price in order to maximize profits.

(iii) The third approach is that oligopolists enter into agreement and try to pursue their common interests. They jointly act as a monopoly organization and fix their prices in such a manner that their joint profits are maximized. They will then share the profits, market or output among them as agreed. Entering into collusion or forming a cartel is generally considered illegal because it restricts trade and creates situations which are close to monopoly. However, in reality, we find a number of cartels operating in the world economy who collude formally or in a tacit manner. Organisation of

Petroleum Exporting Countries (OPEC) is the best example of such type of agreement among oligopolists.

15.5.1 PRICE LEADERSHIP

Cartels are often formed in industries where there are a few firms, all of which are similar in size. A group of firms that explicitly agree (collude) to coordinate their activities is called a cartel. Most cartels have only a subset of producers. If the participating producers stick to the cartel's agreements, the cartel will have high market power and earn monopoly profits especially when the demand for the product is inelastic. But it is possible that there is a dominant or a large firm surrounded by a large number of small firms. If these firms are numerous or too unreliable, the large firm has to decide how to set its price, taking into account the behaviour of these fringe firms. One strategy is to adopt a 'live and let live philosophy'. Specifically, the dominant firm accepts the presence of fringe firms and sets the price to maximize its profit, taking into account the fringe firms' behaviour. This is called price-leadership by dominant firm. Another type of price leadership is by a low cost firm. Here, the price leader sets the price in such a manner that it allows some profits to the followers also. Then there could be barometric price leadership under which an old, experienced, largest or most respected firm acts as a leader and assesses the market conditions with regard to the demand, cost, competition etc. and makes changes in price which are best from the view point of all the firms in the industry. Whatever price is charged by the price leader is generally accepted by the follower firms.

Thus we find that fixing of price under oligopoly is very tricky affair and involves a number of assumptions regarding the behaviour of the oligopolistic group.

15.5.2 Kinked Demand Curve

It has been observed that in many oligopolistic industries prices remain sticky or inflexible for a long time. They tend to change infrequently, even in the face of declining costs. Many explanations have been given for this price rigidity under oligopoly and the most popular explanation is the kinked demand curve hypothesis given by an American economist Paul A. Sweezy. Hence this is called Sweezy's Model. The demand curve facing an oligopolist, according to the kinked demand curve hypothesis, has a 'kink' at the level of the prevailing price. It is because the segment of the demand curve above the prevailing price level is highly elastic and the segment of the demand curve below the prevailing price level is inelastic. A kinked demand curve dD with a kink at point P is shown in Figure

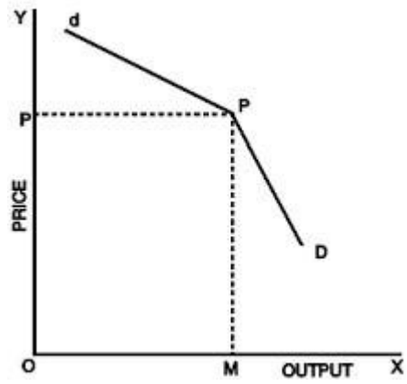

Fig. 15.1: Kinked Demand Curve under oligopoly

The prevailing price level is MP and the firm produces and sells output OM. Now the upper segment dP of the demand curve dD is relatively elastic and the lower segment PD is relatively inelastic. This difference in elasticities is due to the particular competitive reaction pattern assumed by the kinked demand curve hypothesis. This assumed pattern is : Each oligopolist believes that if it lowers

the price below the prevailing level its competitors will follow him and will accordingly lower prices, whereas if it raises the price above the prevailing level, its competitors will not follow its increase in price. This is because when an oligopolistic firm lowers the price of its product, its competitors will feel that if they do not follow the price cut, their customers will run away and buy from the firm which has lowered the price. Thus, in order to maintain their customers they will also lower their prices. The lower portion of the demand curve PD is price inelastic showing that very little increase in sales can be obtained by a reduction in price by an oligopolist. On the other hand, if a firm increases the price of its product, there will a substantial reduction in its sales because as a result of the rise in its price, its customers will withdraw from it and go to its competitors which will welcome the new customers and will gain in sales. These happy competitors will have therefore no motivation to match the price rise. The oligopolist who raises its price will lose a great deal and will therefore refrain from increasing price. This behaviour of the oligopolists explains the elastic upper portion of the demand curve (dP) showing a large fall in sales if a producer raises his price. Briefly put, the effect of a price cut on the quantity demanded of the product of an oligopolistic firm depends upon whether its rivals retaliate by cutting their prices. Similarly, the effect of a price increase on the quantity demanded of the oligopolistic firm's product depends upon whether its rivals respond by raising their prices as well. Each oligopolist will, thus, adhere to the prevailing price seeing no gain in changing it and a kink will be formed at the prevailing price. Thus, rigid or sticky prices are explained by the kinked demand curve theory. Oligopolistic firms often have a strong desire for price stability. Although costs or demand change, oligopolistic firms are reluctant to modify the price set by it.

15.5.3 Cournot's Model

Cournot’s Model of Oligopoly Augustin Cournot, a French economist, was the first to develop a formal oligopoly model in 1838 in the form of a duopoly model. Cournot developed his model with the example of two firms, each owning a well of mineral water and water being produced at zero cost. To illustrate his model, Cournot made the following assumptions. (a) There are two firms, each owning an artesian mineral water well; (b) Both the firms operate their wells at zero cost; (c) Both of them face a demand curve with constant negative slope; (d) Each seller acts on the assumption that his competitor will not react to his decision to change his output and price. This is Cournot’s behavioural assumption.

On the basis of this model, Cournot has concluded that each seller ultimately supplies one-third of the market and both the firms charge the same price. And, one-third of the market remains unsupplied

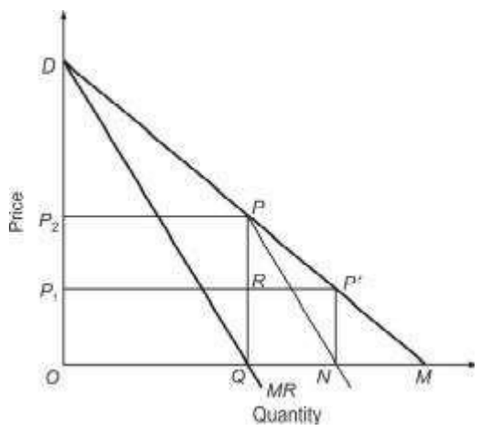

Fig 15.2: Price and Output Determination under Duopoly: Cournot’s Model

Cournots duopoly model is presented in fig: 15.2. the demand curve for mineral water is given by the AR and MR by the MR curves. to begin with, let us suppose that there are only two sellers A and B,

and that, initially, A is only seller of mineral water in the market. By assumption, his MC =0. Following the profit maximizing rule, he sells quantity OQ whereas MC=0=MR, at price OP_2 his profit is OP_2PQ.

Now let B enter the market. The market open to him is QM which is ½ of the total market. That is, he can sell his product in the remaining ½ of the market. B assumes that A will not change his price and output because he is making maximum profit, that is, B assumes that A will continue to sell OQ at prices OP2. Thus, the market available to B is QM and the relevant part of the demand curve is PM. When he draws his MR curve, PN, it bisects QM at point N where QN = NM. In order to maximise his revenue, B sells QN at price OP1. His total revenue is maximum at QRP'N which equals his total profit. Note that B supplies only QN =1/4= (1/2)/2 of the market

With the entry of B. price falls to OP1. Therefore, A's expected profit falls to OP'RQ. Faced with this situation, A adjusts his price and output to the changed conditions. he assumes that B will not change his output QN and price OP' as he is making maximum profit. Accordingly, A assumes that B will continue to supply ¼ of the market. Thus, A assumes that he has ¾ (=1-1/4) of the market available to him to maximise his profit, A supplies ½ of (3/4), i.e, 3/8 of the market. It is noteworthy that A's market share has fallen from ½ to 3/8 now it is B's turn to react. Following cournots assumption B assumes that A will continue to supply only 3/8 of the market and the market opened to him equals 1-3/8= 5/8. To maximize his profit under the new conditions B supplies 1/2x5/8=5/16 of the market it is now for A to reappraise the situation and adjust his price and output accordingly

This process of action and reaction continues in successive periods. in the process, A continues to lose his market share and B continues

to gain. Eventually, a situation is reached when their market share is equal 1/3 each. Any further attempt to adjust output produces the same result. the Firms, therefore, reach their equilibrium position where each one supplies 1/3 of the market and both charged the same price

15.5.4 Game theory (Prisoner's dilemma)

The story is something like this. Two KGB officers spotted an orchestra conductor examining the score of Tchaikovsky's Violin Concerto. Thinking the notation was a secret code, the officers arrested the conductor as a spy. On the second day of interrogation, a KGB officer walked in and smugly proclaimed, "OK, you can start talking. We have caught Tchaikovsky". More seriously, suppose the KGB has actually arrested someone named Tchaikovsky and the conductor separately. If either the conductor or Tchaikovsky falsely confesses while the other does not, the confessor earns the gratitude of the KGB and only one year in prison, but the other receives 25 years in prison. If both confess each will be sentenced to 10 years in prison; and if neither confesses each receives 3 years in prison. Now consider the outcome. The conductor knows that if Tchaikovsky confesses, he gets either 25 years by holding out or 10 years by confessing. If Tchaikovsky holds out, the conductor gets either 3 years by holding out or only one year confessing. Either way, it is better for the conductor to confess. Tchaikovsky, in a separate cell, engages in the same sort of thinking and also decides to confess. The conductor and Tchaikovsky would have had three-years rather than 10-year jail sentences if they had not falsely confessed, but the scenario was such that, individually, false confession was rational. Pursuit of their own self interests made each worse off

CONDUCTOR

TCHIKOVSK

	Cooperate	Confess
Cooperate	3.3	25.1
Confess	1.25	10.10

This situation is the standard prisoner's dilemma and is represented in the above matrix. This first payoff in each cell refers to Tchaikovsky's, and the second is the conductors. Examination of the payoffs shows that the joint profit maximizing strategy for both is (Cooperate-Cooperate).2 The assumption in this game is that both the parties decided their strategies independently. Let us assume both parties are allowed to consult each other before the interrogation. Do you think cooperation will be achieved? It is unlikely since each of them will individually be concerned about the worst outcome that is 25 years in jail. Cooperation in this prisoner's dilemma becomes even more difficult, because it is a one shot game. This scenario is easily transferred to the pricing decision of a company. Consider two companies setting prices. If both companies would only keep prices high, they will jointly maximize profits. If one company lowers price, it gains customers and it is thus in its interests to do so. Once one company has cheated and lowered price, the other company must follow suit. Both companies have lowered their profits by lowering price. Clearly, companies repeatedly interact with one another, unlike Tchaikovsky and the conductor. With repeated interaction, collusion can be sustained. Robert Axelrod, a well-known political scientist, claims a "tit-for-tat" strategy is the best way to achieve co-operation. A tit-for-tat strategy always co-operates in the first period and then mimics the strategy of its rival in each subsequent period. Axelrod likes the tit-for-tat strategy because it is nice, retaliatory, forgiving the clear. It is nice, because it starts by co-operating, retaliatory because it promptly punishes a defection, forgiving because once the rival returns to co-operation it is willing to rest o re co-operation, and finally its rules

are very clear: precisely, an eye for an eye. A fascinating example of tit-for-tat in action occurred during the trench warfare of the First World War. Front-line soldiers in the trenches often refrained from shooting to kill, provided the opposing soldiers did likewise. This restraint was often indirect violation of high command orders

Check your progress

Explain game theory?

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Explain kinked demand curve ?

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Explain Cournot's Model?

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15.6 LET US SUM UP

Oligopoly is the most prevailing form of markets. It is defined as a market structure in which there are a few sellers of the homogeneous or differentiated products. Oligopoly can be pure or differentiated. Characteristics of Oligopoly are: Few dominant firms, Mutual interdependence, Barriers to entry, Homogeneous or differentiated products. Factors causing oligopoly are: Huge capital investment, Absolute cost advantage to the existing firm, Product differentiation, Economies of large scale production, Mergers. Price and Output

determination in oligopoly is different from other three forms of market structure. Since there are few rival firms and there is mutual interdependence, the price and output policy of a firm will affect the price and quality sold by other firms. There is no general theory under oligopoly. Price and output indeterminateness is an essential feature of oligopoly. Among models of Non-Collusive Oligopoly, Cournot's Duopoly Model states that firms attain Nash equilibrium. In equilibrium each firm is doing the best it can given its competitor's behaviour. It is based on the assumption that each firm is attempting to maximise its total profits assuming that other firm holds its output constant.

The leader firm produces more output and earns more profit than the other firm. Sweezy's 'Kinked demand' Curve Model explains price rigidity in an oligopoly market by postulating that oligopolist's will match price decrease but not price increases.

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BLOCK – 5: MACRO ECONOMICS

UNIT 16 CONCEPT AND MEASUREMENT OF NATIONAL INCOME

Structure

16.0 INTRODUCTION.

This unit aims at discussing various methods of estimating national income and related aggregates. For that the unit discusses the basic concepts that are used in defining and distinguishing among various aggregate measures of economic activity. After going through this Unit, you would be able to:

• explain the meaning of economic territory; • define a resident unit; • define the term ‘factor income’;

• explain the meaning of national income at constant price;

• describe the production, income, and expenditure methods of estimating national income; and

• explain the considerations involved in choosing a method

16.1 OBJECTIVES

In this unit we take a closer and more detailed look at what constitutes national income and what the concept means. National income of a country equals the sum total of factor incomes accruing to the residents of economic territory of that country. This meaning of national income requires familiarity with at least three terms: (1) Economic territory, (2) Residents, (3) Factor incomes. Let us explain these terms

16.2 SOME BASIC CONCEPTS

1. Economic Territory

The concept of economic territory is carved out of geographical territory by adding some portions of the rest of the world and by subtracting some portions of geographical territory. This addition and subtraction is made strictly on the basis of some well defined economic criterion. We are taking here the criterion laid down in the System of National Accounts (SNA) developed by the United Nations. We will have occasion to study the SNA in greater detail a little ahead in the course.

According to the SNA, the economic territory of a country consists of geographical territory administrated by a government within which persons, goods and capital circulate freely. It includes: (a) the airspace, territorial waters, and continental shelf lying in the international waters over which the country enjoys exclusive rights; (b) territorial enclaves in the rest of the world such as embassies, consultants, military basis, etc. and (c) any free zones, or bonded warehouses or factories operated by offshore enterprises under customs control. It does not include (a) territorial enclaves used by

foreign governments such as foreign embassies, foreign consultants, etc. and (b) international organizations.

The implications of the above can be explained with the help of an illustration. To take an example, consider the British High Commission in New Delhi. It is taken as part of British Economic Territory. All economic activities of the British High Commission are taken to be taking place in the economic territory of Britain and are accounted for in the Britain's GDP. Similarly all economic activities of Indian embassy in Washington are accounted for as part of India's GDP.

2. Resident

The term resident is different from the term citizen. Citizenship of a country is linked with birth or some other non-economic criterion. The term 'resident' on the other hand is linked strictly with economic criterion. Accounting to SNA, a resident unit is one whose center of economic interest lies in the economic territory of the country in question. This unit may be an individual, a household, a government, a corporation, a non-profit institution etc. By centre of economic interest is meant that the institutional unit is located within economic territory and carries out its economic activities and transactions on a significant scale over a long period of time from that location.

As a working arrangement the term 'long period of time' is usually taken to mean a period of one year or more. On the basis the travellers or visitors who leave economic territory for less than one year continue to be resident of that economic territory. Similarly, workers working outside economic territory for a part of the year, border workers, locally recruited staff in international originations, in foreign embassies, staff working in ships, aircrafts etc operating on international routes are all residents. For example, an Indian

resident working in British embassy remains Indian resident. A Briton posted in New Delhi office of the British Airways remains the British resident. The time period rule does not apply to students studying abroad, medical patients abroad even if they stay for more than one a year in foreign countries.

3. Goods:

● In economics, goods are products and resources that meet people's needs and

demands. A good can be a physical object, a man-made object, a service, or a

mix of the three that can command a market price.

Types of goods:

a. Consumption Goods:

● Consumption goods are items that are utilised directly to satisfy human

demands. Consumption goods support the core goal of an economy, which is

to sustain the consumption of the economy's entire population.

● These are not used in the manufacturing of other goods.

● Consumption products, often known as final goods, are intended for final

consumption.

● For instance, a television, a pen, or a pair of shoes.

b. Capital Goods:

● Capital goods are goods used by one business to assist another in the production

of consumer goods.

● Capital goods can not be easily transformed into cash.

● They are long-lasting and do not degrade easily.

● Equipment, machinery, buildings, computers, are some common examples of capital goods.

c. Final Goods:

● Final goods are commodities produced by a corporation for subsequent consumption by the consumer.

● These commodities satisfy a consumer's demands or desires

. d. Intermediate Goods:

● Intermediate goods are utilised in the production of finished goods or consumer goods.

● They can also be considered to act as inputs in other commodities and to comprise the final goods as ingredients.

4. Investment:

● An investment is an asset or object purchased with the intention of earning income or increasing in value.

● When a person buys a good as an investment, the intention is not to consume the good but rather to use it to build wealth in the future.

Gross Investment:

● A company's capital investment before depreciation is referred to as its gross investment or gross capital investment.

● The absolute investment value made by the company in purchasing assets each year is shown by gross investment.

Net investment

● It is defined as gross investment minus depreciation on existing capital.

Net investment, in a nutshell, is the increase in productive stock.

Net investment = Gross Investment – Depreciation

5. Depreciation:

● Depreciation, in economic terms, is a way of dividing the cost of a tangible or physical asset over its usable life or life expectancy. Depreciation is a measurement of how much of the value of an asset has been diminished. Capital formation:

● Capital formation is the process of gradually increasing the stock of capital over time.

6. Factor Cost:

● These are the earnings obtained by the owners of factors of production in exchange for providing factor services to the producer.

7. Basic Prices:

● The basic price is the amount a producer receives from a purchaser for a unit of a thing or service provided as output, less any tax due and any subsidy due on that unit as a result of its production or sale. Basic price = Factor cost + Production taxes – Production subsidy

8. Market Prices:

● The market price of a commodity is the price at which it is sold on the open market. It comprises the costs of production such as wages, rent, interest, input prices, profit, and so on.

● It also includes government-imposed levies and government-provided producer subsidies. Market price = Basic price + Product taxes – Product subsidy

9. Transfer Payments:

● Transfer payment refers to payment received without the provision of any service or goods in exchange.

● These are one-time payments with no expectation of a return. These are unearned incomes for recipients.

● These are given to you for free, with no need to make any current or future payments in exchange.

● Transfer payments are essentially government welfare expenditures.

10. Stock Variable:

● A stock variable is a variable that is measured at a certain point in time.

● Stock does not have a temporal dimension.

● It influences the flow. ● Wealth, capital, etc are examples.

11. Flow Variable:

● A flow is a quantity that is measured over a specific timeframe.

● Flows are thus described in terms of a given period, such as hours, days, weeks, months, or years.

● It has a time dimension to it.

12. Gross Domestic Product at Market Price (GDP_{MP})

● It is the market value of all final products and services generated by all manufacturing units located on a country's domestic territory within an accounting year.

● Gross domestic product at market prices equals the sum of all resident producers' gross values added at market prices plus taxes and fewer import subsidies.

GDP_{MP} = Net domestic product at Factor Cost (NDP_{FC}) + depreciation + Net Indirect Tax or,

GDP = C + I + G + (X-M)

13. Gross Domestic Product at Factor Cost (GDP_{FC})

● It is the total worth of all final goods and services produced within a country's domestic territory excluding net indirect taxation.

GDP= GDP_{MP} - Indirect tax + Subsidy, or GDP_{FC} = GDP_{MP} - NIT

or GDP_{FC}= Compensation of Employees + Rent + Interest + Profit + Depreciation

14. Net Domestic Product at Market Price (NDP_{MP})

● It is the depreciation-free market value of final goods and services produced in the country's domestic area within a year.

● Hence, it is the monetary worth of all final goods and services produced within a country's domestic territory within an accounting year, excluding depreciation.

NDP_{MP}= GDP_{MP}- Depreciation

15. Net Domestic Product at Factor Cost (NDP_{FC})/ Domestic Income:

● It is the factor income received by owners of factors of production for providing factor services in domestic territory throughout a fiscal year.

● It is the total worth of all finished goods and services excluding depreciation and net indirect tax.

● Thus, it is equivalent to the sum of all factor incomes (compensation of employees, rent, interest, profit, and mixed income of self-employed) created in the country's domestic area.

NDP_{FC} = GDP_{MP}- Depreciation - Indirect tax + Subsidy

or NDP_{FC}= Compensation of Employees + Rent + Interest + Profit

16. Net National Product at Factor Cost or National Income (NNP_{FC})/ National Income:

● It is the aggregate of all factor earnings earned by ordinary people of a country in the form of wages. During an accounting year, rent, interest, and profit are calculated.

● It is the sum of all factor incomes earned by ordinary citizens of a nation throughout an accounting year, including employee pay, rent, interest, and profit.

NNP_{FC} =NDP_{FC} +Factor income earned by normal residents from abroad -Factor payments made to abroad. OR NNP_{FC}= NDP_{FC}+ NFIA = National Income

17. Gross National Product at Market Price (GNP_{MP}

● It is the market value of all finished goods and services generated by a country's normal citizens (both domestically and overseas) throughout an accounting year. GNP_{MP} (MNP_{FC}) =GDP_{MP} + NFIA Or GNP_{MP} = NNP_{FC} + Dep+ NIT

18. Net National Product at Market Price (NNP_{MP})

● It is the sum of the factor incomes earned by normal citizens of a country throughout an accounting year, including net indirect taxes.

NNP_{MP}= NNP_{FC} + Indirect tax -Subsidy Or NNPMP= NDPMP+ Net factor income from abroad

19. Gross National Product at Factor Cost (GNP_{FC})

● It is the sum of a country's normal people's factor earnings over the course of an accounting year, plus depreciation.

GNP_{FC}= NNP_{FC}+ Depreciation, or GNP_{FC}=GDP_{FC}+NFIA

20. GDP (GROSS DOMESTIC PRODUCT)

● It is a measure of the economic value of all final goods and services produced within a specific time period, which is typically annually or quarterly.

● A greater GDP suggests that more products and services are produced. It indicates the increased availability of goods and services, but this does not always imply that people were better off throughout the year.

GDP is classified into two categories-

● Real GDP: Real gross domestic product (real GDP) is an inflation-adjusted estimate of the value of all goods and services generated by an economy each year. It is also known as "constant-price" or "inflation-corrected" or "GDP at constant prices". It is exclusively affected by changes in physical output, not by changes in the price level. It's referred to as a true indication of economic advancement.

Real GDP = Nominal GDP/ Deflator

● Nominal GDP: The products and services produced by all producing units in a country's domestic territory during an accounting year and valued at the current year's prices or current prices are referred to as nominal GDP or GDP at current prices.

Changes in both physical output and the price level have an impact on it

. It is not regarded as a reliable indicator of economic advancement.

Nominal GDP = Real GDP x GDP Deflator

Conversion of Nominal GDP into Real GDP

Real GDP = Nominal GDP /Price Index x 100

Check Your Progress 1

1) Who is called a resident unit?

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2) . 2) Tick the correct alternative. Economic territory of a country:

a) Is same as geographical territory.

b) Is derived after subtracting some portions from geographical territory.

c) Is derived after adding some potions to geographical territory.

d) Is derived after adding and subtracting some portion to and from geographical territory.

3) Define intermediate consumption.

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4) Explain GDP, GNP, NNP?

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16.3 METHODS TO MEASURE NATIONAL INCOME

There are three methods to measure national income of an economy.

These are:

1) production method or value added method,

2) income method, and

3) expenditure method.

Each of these methods corresponds to a flow taking place in the economy. These three methods are, in fact, three ways of looking at the same variable, national income. The statistical data and tools to measure national income by each of the three methods may be different but conceptually each of these will give the same result. If the different methods do not give us the same estimate of national income, it will be primarily because of lack of relevant statistical data required to measure national income.

1. Production Method

Basically, three steps are involved in applying the production method to compute the national income of an economy. These steps are:

1) to identify the producing enterprises and to classify them into industrial sectors according to their activities

2) to estimate net value added at factor cost of each producing enterprise within the domestic territory of an economy and to add up net value added by all the sectors to arrive at net domestic product at factor cost

3) to estimate net factor income from abroad, which has to be added to net domestic product at factor cost to arrive at net national product at factor cost/ national income of an economy.

Classification of Industrial sectors

Broadly speaking, the industrial sectors are divided into three categories:

a) Primary Sector,

b) Secondary Sector, and

c) Tertiary or Services Sector.

Primary Sector: It includes agriculture and allied activities of forestry, fishing, mining and quarrying. This sector produces commodities by exploiting natural resources like coal, iron ore and other minerals. In India the primary sector is divided into: (i) agriculture, (ii) forestry and logging, (iii) fishing, and (iv) mining and quarrying

Secondary Sector: It consists of the manufacturing sector. In India, the secondary sector is divided into: (i) registered manufacturing, (ii) unregistered manufacturing, (iii) construction, (iv) electricity, gas and water supply.

Tertiary Sector: It consists of the services. In India this sector comprises: (i) railways, (ii) transport by other means and storage,

(iii) communications, (iv) trade, hotels and restaurants, (v) banking and insurance, (vi) real estate, ownership of dwellings and business services, (vii) public administration and defence and (viii) other services.

Estimation of Net Value Added

After the producing sectors of an economy are identified, the next step is to find out net value added of each of these sectors. The term value added refers to addition of value by a producing unit to raw materials and services (known as intermediate inputs) used in production. What a producer produces is termed as the output. Value added is the difference between the value of output and the cost of intermediate inputs.

Let us illustrate the concept of value added with the help of an example. Suppose there is a producing unit, X, which sold goods worth Rs. 48, 000 in a year and added to stocks of goods worth Rs. 2,000, such that the value of output of X is Rs. 50,000 (Rs. 48, 000 + Rs. 2000 = Rs. 50, 000). Suppose X bought raw materials and services worth Rs. 43, 000 from other producing units of the economy. In this case, value added of X is the value of output less value of raw materials and service used up in the process of production. Thus Rs. 50, 000 - Rs. 7, 000 = Rs. 43, 000 is value added by the producing unit X over the year in question. Gross domestic product of an economy is the sum of value added by all the producing units within the domestic territory of an economy

It is also important to note that :

i) sum of gross value added at market price of all producing units gives us gross domestic product at market price;

ii) sum of gross value added at factor cost of all producing units gives us gross domestic product at factor cost;

iii) net domestic product at factor cost is estimated by adding net value added at factor cost of all the producing units of an economy; and finally,

iv) net domestic product at market price is computed by summing up net value added at market price of all the producing units of an economy.

Net Factor Income from Abroad

The concept of net factor income from abroad has to be added to net domestic product at factor cost for getting the national income. It consists of

1) net compensation of employees,
2) net income from property and entrepreneurship, and
3) net retained earnings of resident companies abroad.

Net Compensation of Employees from Abroad

Net compensation of employees receivable from abroad is equal to the difference between compensation of employees received by resident employees who are living or employed abroad temporarily and compensation of foreign nationals working temporarily in the domestic economy. The clause temporary resident applies to those employees who stay abroad for less than one year. In case they stay for one year or more in a foreign country they would be treated as normal residents of that country and their income would be a part of the national income of the employer country. In such a situation, whatever remittances they send to their country would be treated as current transfers from abroad and will not form a part of the national income. Net compensation of employees, as it is defined, can be a positive or a negative value.

Net Income from Property and Entrepreneurship from Abroad

Net income from property and Entrepreneurship from abroad is the difference between the income received by way of interest, rent, dividend and profit by the resident producers of a country and payments of similar type made to the rest of the world. This also includes net interest received by the government on foreign loans.

Net Retained Earnings of Resident Companies Abroad

Retained earning refers to the undistributed profit of the companies. Resident companies abroad (i.e., companies belonging to one country and working in the domestic territory of some other country) retain a part of their profits for further investment abroad. Likewise, foreign companies and their branches retain a part of their profits in the countries of their operation. The difference between retained earning of the foreign companies located in a country and retained earning of resident companies located abroad is equal to net retained earnings from abroad.

Thus, net factor income from abroad is equal to net compensation of employees from abroad plus net property and entrepreneurship income from abroad plus net retained earning of resident companies abroad.

Let us state the definition of net factor income from abroad, given in a formal way, by Central Statistical Organization (CSO) of India. It is stated as, “Income attributable to factor services rendered by the normal residents of the country to the rest of the world less factor services rendered to them by the rest of the world. It also includes retained earnings of foreign-controlled rupee companies and branches of foreign companies in the domestic territory. Residents include both individuals and institutions. Tourists or commercial travelers of a given country traveling abroad are treated as residents of their home countries. The official diplomatic and consular

representatives of a given country including members of official missions and members of the armed forces stationed abroad are to be considered extra territorial by the country in which they are located and as residents of the given country. The factor incomes generated by such residents are domestic product of the resident country. Factor incomes of locally recruited staff of foreign diplomatic military establishments are included in factor incomes from abroad."

The concept of net factor income from abroad is employed to arrive at gross national product at market price, gross national product at factor cost, net national product at market price and net national product at factor cost (national income) of an economy. Thus, we have the following concepts:

a) Gross domestic product at market price + net factor income from abroad = gross national product at market price.

b) Gross domestic product at factor cost + net factor income from abroad = gross national product at factor cost.

c) Net domestic product at market price + net factor income from abroad = net national product at market price.

d) Net domestic product at factor cost + net factor income from abroad = net national product at factor cost (national income)

Normally, domestic product (gross or net, at market price or factor cost) is first computed and adjustments are made by including net factor income from abroad to arrive at national product (gross or net at market price or factor cost).

In estimating national income of an economy by the production method, the following points should be kept in mind.

1) Production for self-consumption has to be included in national income. In order to find out the value of production for self-consumption, the physical production has to be multiplied by market price to get imputed value of production for consumption.

2) Imputed rent in case of owner-occupied houses has to be included in national income. Imputation of rent has to be done such that it will be equal to the services rendered by owner-occupied dwellings.

3) Own-account production by the government, private enterprises and households has to be found out and added to other items for calculating national income of an economy.

4) Sale and purchase of second-hand goods by sectors do not constitute a part of current production and, therefore, are not included in national income in the year in which their sale or purchase takes place. But if sale and purchase of second hand goods take place through a broker, then the services rendered by these brokers are a part of national income of an economy. The services rendered by these brokers are expressed as equal to the commission and brokerage earned by them

2. Income Method

Net value added at factor cost of a producing unit is identical to the sum of factor incomes - compensation of employees and operating surplus or mixed income of the self-employed entrepreneurs. So, we can sum up compensation of employees and operating surplus or mixed income of the self-employed to estimate national increase. If factor incomes generated by all the producing units within the domestic territory of an economy are added up, net domestic product at factor cost is arrived at. Further, if net factor income from abroad is added to net domestic product at factor cost of an economy, net national product at factor cost or national income of an economy can be estimated.

Given net national product at factor cost if the depreciation provision is added to it, gross national product at factor cost is arrived at. If net indirect taxes are added to gross national product at factor cost, gross national product at market price can be calculated.

The main steps involved in estimating national income by the income method are:

1) to identify the producing enterprises, which use services of the factors of production
2) to classify various types of factor payments
3) to estimate various components of factor payments
4) to estimate net factor income from abroad, which has to be added to net domestic product at factor cost to arrive at net national product at factor cost or national income of an economy.

The classification of producing units that is adopted by the production method of estimating national income can be used for the income method also.

The factor payments are generally classified into the following categories:

a) Compensation of employee
b) Rent
c) Interest
d) Profits
e) Mixed income of the self-employed

Moreover, factor payments can be classified into: (a) compensation of employees, (b) operating surplus, (c) mixed income of the self-employed. There are a few points to be kept in mind while estimating national income by income method.

1) A distinction has to be made between factor and income transfer income. While factor incomes are earned by factors of production,

transfer incomes are enjoyed by various economic agents without supplying factor services. It is only factor incomes that constitute national income. Accordingly, transfer incomes are excluded from national income of an economy.

2) The services of owner-occupied dwellings are equal to imputed rent of the dwelling. Imputed rent adjusted for maintenance expenditure of dwellings is included in national income by production method.

3) Income earned by the act of smuggling or gambling as well as windfall gains like lotteries are not included in the estimation of national income.

4) National Income of an economy includes direct taxes like income tax and corporate tax. It may be useful to remember that compensation of employees includes income tax to be paid by them and are included in national income before deduction of corporate tax. Death duties, gift tax, wealth tax, etc., are supposed to be paid from the wealth or past savings of those persons who pay these taxes and not out of current income. Therefore, such taxes are not included in the estimation of national income. 5) Sale and purchase of second-hand goods are not included in national income of an economy. The sale proceeds of second-hand goods received by a person do not relate to any service rendered and, therefore, do not constitute a part of national income.

3. Expenditure Method

Income generated in the process of production is received by factors of production.

Such income can be divided into two parts viz., (a) income from work and (b) income from ownership of capital and entrepreneurship. Incomes from work are enjoyed by the workers

while those of ownership of entrepreneurship are enjoyed by their owners. The income earned by factors of production is either saving. Savings generated, in turn, are used for adding to the capital stock or what is called investment. If the final consumption and gross investment expenditure of all economic agents including the rest of the world are added up, this gives us the gross domestic product at market price for an economy. From the GDP at market price, we deduct depreciation provision and net indirect taxes to get net domestic product at factor cost. Add net factor income from abroad to net domestic product at factor cost to get net national product at factor cost (or national income) of an economy. Various components of final expenditures constituting gross domestic product at market price are:

1) private final consumption expenditure,
2) government's final consumption expenditure,
3) gross domestic fixed capital formation,
4) change in stock, and
5) net export of goods and services.

Private Final Consumption Expenditure

Private final consumption expenditure is defined as the expenditure on current account of resident and non-resident households in the domestic market and on profit-making bodies serving households. The expenditure, here, relates to outlays on new durable as well as non-durable goods (except land) and on services net of sales (sales less purchases) of second-hand goods, scrap and wastes. This definition is based on the concept of expenditure within the domestic territory of the country and is not in line with the concept of a national product. It is important to keep in mind that it is not possible to take account of the direct purchases made by the resident households from abroad and deduct the purchases of non-resident households in the domestic market to get the final expenditure of

resident households only. Therefore, the final private consumption expenditure also includes the purchases of goods from abroad or goods, which have been imported from abroad. Moreover, the figure of final private consumption expenditure includes the imputed gross rent of owner-occupied dwellings, consumption of own-account production and payment by households of wages and salaries in kind valued at cost, e.g., provision for food, shelter and clothing to the employees, wherever they exist.

We require two types of statistical data for the estimation of final private expenditure:

(a) total volume of sales in the market, and

(b) retail prices at which goods and services are purchased by the households. The volume of final sales is to be multiplied by the retail prices of goods and services.

Production for self-consumption is a part of production and hence an income and is also a part of final consumption expenditure. Accordingly, the volume of production for self-consumption has to be multiplied with the prices existing in the markets near the producing unit. Similarly, the imputed rent of owner-occupied dwellings is included in production and income and also in private final consumption expenditure in the domestic market.

Government Final Consumption Expenditure

Government final consumption expenditure is defined as the current expenditure on goods and services used up in providing services of government administrative departments less the sales by them. Here, we are considering the services rendered by general government which consists of all departments, offices, organizations and other bodies, which are agencies or instruments of the Centre, state or local public authorities, financed by budgets or extra budget funds.

Government enterprises, public corporations and departmental enterprises are excluded from it

The value of government final consumption expenditure is equal to the value of the services produced (such as public health, cultural services, defence, and law and order) by the government for collective use by the public. These services are valued at their cost to the government, since they are not normally sold to its citizens. The cost of these services is the sum of value of: (a) intermediate consumption, (b) compensation of employees (wages, salaries in cash and in kind), (c) the direct purchases of goods and services made by the government abroad for their embassies and consulates located abroad and, (d) less sale of goods and services produced by the general government. Examples of sales by general government are nominal money charged by government hospitals from individuals availing themselves of the hospital facilities or government publications sold by the government to the general public.

Gross Domestic Fixed Capital Formation

Gross fixed capital formation consists of the outlays of industries, producers of government services and producers of private non-profit services to households, on addition of new durable goods to the stocks of fixed assets less net sales of similar second-hand and scrapped goods. The outlays of government services on durable goods for military use are excluded from gross fixed capital formation. In it, outlays on the improvement of land, on the development and extension of timber tracts, plantations etc., are included, provided they take more than one year to become productive. Outlays by households on residential constructions are also included in gross fixed capital formation.

Gross fixed capital formation is inclusive of the consumption of fixed capital. Net fixed capital formation is defined as gross fixed capital formation less the consumption of fixed capital. Gross domestic fixed capital formation is the gross fixed capital formation with reference to the domestic territory of the country. It consists of acquisition of fixed assets by resident industries and the producers of government services and of private non-profit services to households. Gross fixed capital formation in India is divided into public, private and households sectors by the type of institutions. Gross fixed capital formation is divided into two groups, viz., construction and, machinery and equipment.

The expenditure on construction is calculated either by finding out the total money spent on new construction or by adding up the value of inputs used in construction. The expenditure on material inputs consists of expenditure on cement, steel, bricks, wood, fixtures and fittings. Besides, factor income payments to labour and capital are to be added with the expenditure on inputs to find out the value of construction. The value of inputs used in construction is calculated by multiplying the volume of material inputs with the prices paid by the builders at the site of construction. This way of calculating expenditure on construction is known as the commodity flow method. The expenditure on compensation of employees, rent, interest and profits is to be added to the value of inputs to work out the value of new construction.

Major alterations of the old buildings or addition to rooms of existing old buildings and work-in-progress at the site of construction and own-account production of fixed assets by all the producing sectors are also taken to be a part of the expenditure on new construction.

Similarly, final expenditure on machinery and equipment is found out by multiplying the volume of final sales and the retail prices

prevailing in the market. Own account production of machinery and equipment by producers is also to be included in the final expenditure on machinery and equipment.

Change in Stocks

Stocks consists largely of materials and supplies, work-in-progress (except in construction projects) and finished products in the possession of industries. Standing timber and crops are not included in stocks, but livestock raised for slaughter, logs and harvested crops are. Change in stocks is the difference between markets or book values of the stocks in the beginning and at the end of the year.

Stocks are classified according to the kind of economic activity of the owner or according to type of the items concerned. Classification also provides for (a) stocks of newly produced and imported goods classified according to industries which normally produce these goods, (b) stocks of second hand goods classified according to the type of goods, and (c) stocks of scrap and wastes, classified according to the type of material. The physical change in stocks has to be multiplied by the market prices to get the value of change in stocks.

Net Export of Goods and Services

Net export of goods and services is the difference between value of export and import of goods and services over a year. Accordingly, net export can be positive or negative, positive when exports are more than imports, and negative when reverse is the case.

In India, export of goods and services is defined as all transfers of the ownership of goods from residents of the country to non-residents and services provided by resident producers of the country to non-residents. If exports are recorded by the custom authorities, they may consist of the outward movement of merchandise across

the customs frontiers of country and of other goods across the boundaries of her domestic territory, including the direct purchases in the country of extraterritorial organizations and non-resident persons. Exports are recorded f.o.b. (i.e., free on board). Imports of goods and services are all transfers of the ownership of goods from non-residents to residents and services provided by non-resident producers to residents of the country. The customs authorities record imports of goods as inward movement of merchandise across the custom frontiers of a country and of other goods across the boundaries of her domestic territory, including the direct purchases in the country of extra-territorial organizations. Imports are recorded c.i.f. (i.e., cost, insurance and freight). They also include the charges of resident producers for transport and insurance services in respect of these imports. Since the imports of merchandise into a country are valued c.i.f., the exports of services of the country should also include the charges in respect of the imports for the transport and insurance services provided by resident producers of the given country.

Gross domestic product at market price seen through expenditure method is thus equal to private final consumption expenditure plus government's final consumption expenditure plus gross fixed capital formation plus change in stocks less net exports of goods and services (exports of goods and services minus imports of goods and services). Net domestic product at market price is equal to gross product at market price minus consumption of fixed capital or depreciation provision. Accordingly, net domestic product at factor cost is equal to net domestic product at market price minus net indirect taxes (indirect taxes minus subsidies). Net national product at factor cost (or national income) is equal to net domestic product at factor cost plus net factor income from abroad. It may seem confusing as to why imports should be deducted and exports added along with other components to arrive at gross domestic product.

The reason for including exports is very easy to understand. While production is done within the domestic territory, a part of it is purchased by foreign countries. These purchases by foreigners are in addition to purchases by households, government or capital sector.

Therefore, these should be included in expenditure on domestic products. Imports of goods and services are deducted from the sum of private final consumption expenditure, government final consumption expenditure and gross domestic capital formation since all these components include a part of the expenditure on goods and services imported from abroad. This is done to make these figures free of imports. So it would be wrong to say that national product is equal to domestic product plus net exports of goods and services. The relationship between national product and domestic product arises because of net factor income from abroad. More specifically, it can be stated that national product (gross or net, at market price or factor cost) is equal to domestic product (gross or net, at market price or factor cost) plus net factor income from abroad and domestic product includes net exports of goods and services.

There are a few points to be kept in mind while estimating national income by the expenditure method.

1) Expenditure on all intermediate goods and services is to be excluded. This is done primarily to avoid double counting. A good or service is said to be intermediate if a producing unit sells it to another producing unit for resale or for further processing. On the other hand, if the good or service is sold for final consumption or for capital formation or for exports, it is a final good or service. In practice, it is not always easy to distinguish between an intermediate and a final good because the same good can be intermediate or final depending on its use.

2) All government expenditure on transfer payments is excluded from national income. Some examples of such transfer payments are unemployment benefits, old age pensions and scholarships given to students for education purposes. Those who receive these transfers are not expected to render any service in exchange.

3) All expenditures on second-hand goods are excluded since they are not from the currently produced goods and services. Similarly, expenditure on the purchase of old shares or bonds or debentures from other people or new shares, bonds or debentures from producing units or the government are excluded since they are not payments for a good or service currently produced. There is only transfer of property from one person to another.

16.4 CHOICE OF METHOD

We have seen that there are three methods of estimating national income. Should national income be estimated from all the three methods simultaneously? If only one method is to be chosen, which one? What determines the choice? The choice, in practice, is determined by two main considerations. What is the purpose? What types of data are actually available?

i) Purpose

Each method serves a different purpose. Production method, by measuring values added by a sector, reveals the contribution of different industrial sectors to national income. Such an information is extremely useful in planning allocation of resources. Income method reveals as to how much equally or unequally is national income distributed. This information is useful in planning the reduction of inequalities. Expenditure method, by measuring consumption and investment expenditure reveals the

standard of living of the people. Distribution of consumption expenditure reveals standard of living of different groups. Investment expenditure indicates the potential of raising the standard of living in the future.

ii) Data Position The data availability position is more important than the purpose of estimation. It is a big constraint. Planners may have a particular purpose of national income in mind, but if the relevant data are not available, what one can do. So many times, in practical world, the purpose has to be sidelined in the absence of required data. National Income is estimated with the help of the method about which data can be conveniently collected. In Indian estimates, for example, data position is so acute that so far it has not been possible to apply a single method to all the sectors. Different methods have been sued for different sectors. The ideal position for any economy would be to estimate national income originating from each individual sector of the economy by all the three methods simultaneously to extract maximum out of national income data

Check Your Progress 2

1) What is the basis of the three methods of estimating national income?

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2) Name the two variants of the income distribution method. What is their meaning?

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3) Name the two variants of the expenditure method. What is their meaning?

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4) What is the purpose of estimating national income through the production method?

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LET US SUM UP

In this unit we have given an account of the basic concepts of national income and three methods to measure national income of an economy. These three methods, namely, production (or value added), income and expenditure have been explained in detail along with various points which should be kept in mind before employing each of them. In choice of the method the critera to be taken into consideration before adopting the method for calculating national income

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UNIT 17 INFLATION: THEORIES

Structure

17.0 INTRODUCTION

We come across the term inflation very often in newspapers. The reason why it holds such importance is because of its adverse effects on an economy as well as people. A question that could arise at this point is in what way does inflation affect our everyday life? Let us illustrate with the help of a single household. Inflation, in simple words, is a steady rise in the prices of various goods and services. Given the level of the money income, a household consumes a group of commodities at a given price level. With inflation, the price level

goes up. So with the same level of money income, the household could consume a smaller amount of the commodities than it was consuming earlier. Alternatively, to maintain the earlier level of consumption this household now needs to have more money.

17.1 OBJECTIVES

After going through this unit you should be in a position to

- explain the concept of inflation;
- identify the types of inflation;
- Inflation theories

17.2 INFLATION DEFINED

With the background of prices and price level in view we go on to the definition of inflation. We mentioned earlier that inflation is defined as a persistent rise or, a tendency towards persistent rise in the general level of prices. The adjective ‘persistence’ has to be taken note of. The reason is, if price level goes up today but falls tomorrow then it may not imply inflation, but only short-term fluctuations in prices. The term ‘general price level’ is also important since, over a period of time, prices of some commodities may have gone up while some others may have actually fallen. As a result, on the whole, the average of these prices may remain constant or even go down. Similarly if the price of a group of commodities, which constitute a small fraction of the total value of output of the economy, would go up, then again it might not be inflationary as such. That is, the effect of rise in prices of such commodities might be too small so as to affect the average price level of all the commodities. Thus we see that inflation is a macroeconomic phenomenon and is not concerned with the rise in the price of a particular commodity, or, a small group of commodities.

17.3 TYPES OF INFLATION

On the basis of the severity of inflation or, the rate of acceleration in prices we can divide inflation into three different types, viz., moderate, galloping and hyper-inflation. Further, there are some other related concepts which we discuss below.

1. Moderate Inflation

When the general price level increases slowly but steadily, it is known as moderate inflation. In the case of India, the Monetary Policy Committee (MPC) resorts to inflation targeting at a rate of 4 per cent per annum. The rate of inflation as per targets should not be outside the range of 2 per cent to 6 per cent per annum.

2. Galloping Inflation

   Steady and fairly high rate of increases in the general price level is known as galloping inflation. The rate of inflation runs into two digits (20 per cent, 40 per cent, etc.) and sometimes even as high as three digits (i.e., 200 per cent). Some Latin American countries like Brazil and Argentina had experienced inflation rates of over 100 per cent in the 1970s.

3. Hyper-Inflation

Hyper-inflation is a situation where the rate of inflation is very high. Thus the value of money gets eroded rapidly. In order to cope with such a situation, households minimize their holdings of local currency. Generally it happens in an economy which faces wars and their aftermath, socio-political upheavals or other crisis. In these situations it is very difficult to impose tax on the residents by the government, which leads to fiscal deficit and government has to finance it primarily through money creation rather than imposing taxes or borrowings. In a situation of hyper-inflation, certain functions of money such as ‘a store of value’ and ‘a medium of exchange’ are no more valid. There have been several instances of hyperinflation in various countries. Brazil had hyperinflation during the 1980s. A recent example of hyperinflation is Zimbabwe during 2008-09, where prices almost doubled from one day to the next day. The public used to spend money on food or whatever other

commodities they could, rather than holding on to money, as the value of money eroded rapidly. According to some reports, it was impossible to estimate the rate of inflation in 2008 – it was around 79.6 billion per cent in November 2008. As a consequence, the country abandoned its currency and allowed use of foreign currencies for transaction in 2009

4. Stagflation

   The term stagflation (stagnation plus inflation) refers to the situation where an economy grows very slowly or at zero rate (stagnant) and prices keep rising. The side effects of stagflation are increase in unemployment- accompanied by a rise in prices, or inflation. It raises economic dilemma as the actions designed to lower inflation may worsen unemployment and vice versa. This happened during the 1970s, when crude oil prices rose dramatically, fuelling sharp inflation in developed economies.

5. Deflation

   Deflation is a situation where there is a consistent decline in price level. Here again you have to notice the words ‘consistent’ and ‘price level’. Thus decline in price of a single commodity cannot be terms as deflation. A situation of deflation arises when aggregate demand is lower than aggregate supply. Thus, deflation is characterized by a decrease in output, increase in unemployment, and general slowing down of the economic activities. The Great Depression of 1930s is an example of an acute deflation when prices crashed, unemployment increased to a very high level, and GDP of the developed countries fell sharply. There are many adverse effects of deflation. Deflation in a modern economy is bad because it increases the real value of debt, and discourages production in the economy as prices keep falling

6. Core inflation:

The measurement of inflation after removing the transitory or temporary price volatility is known as 'core inflation'. If temporary price shocks are taken into account, they may affect the estimated overall inflation numbers, which may not match with the actual inflation number. To eliminate this possibility, core inflation is considered to assess actual inflation by removing the temporary shocks and volatility. In India core inflation is calculated on the basis of price increase in manufactured products excluding food products. Thus it does not include agricultural commodities, fuel and energy and food products

7 Demand-Pull Inflation

It emerges when the aggregate demand exceeds the level of full employment output. Consumers and investors seek to buy more than the total amount of output that can be produced. This type of inflation is also known as excess demand inflation. The demand-pull inflation may be caused by an increase in the quantity of money. An increase in the quantity of money would lower the rate of interest which would stimulate investment. This will also lead to an increase in consumption expenditure through the multiplier. The demand-pull inflation can also occur without an increase in money supply. This would occur when aggregate demand increases either because of rise in the marginal efficiency of capital or a rise in the propensity to consume.

Look at Figure 17.1 which illustrates the case of demand-pull inflation. In this figure curves marked D_1 to D_5 show aggregate demand and curve S represents the given supply. As aggregate demand curve moves higher and higher from D_1 to D_5 ,the price level rises higher and higher from P_1 to P_5. Shift of aggregate demand function from D_1 upto D_3 leads to increase both in the

price and the aggregate output because the full employment level is not yet reached. This is known as bottleneck inflation. Once full employment is reached at point C, further upward shift of D will raise only the price level. This is known as true inflation

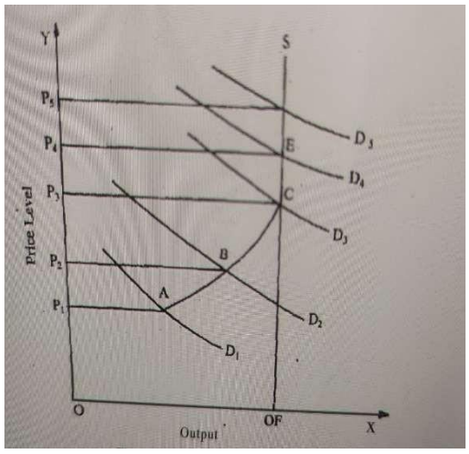

Figure 17.1 Demand-pull inflation

8 Cost-Push Inflation

Before 1950s, inflation was largely analysed in terms of the excess demand explained either in the classical quantity theory version or in terms of Keynesian theory. The supply or cost analysis of inflation attracted attention during the 1950s. The cost push inflation analysis, also known as the "new inflation" theory, asserts that inflation occurs due to increase in the cost or supply price of goods. It is caused mainly by three factors : i) an increase in wage rate, ii) an increase in profit margin, or iii) an increase in material costs. ; For example, rapidly rising money wages were not accompanied by corresponding increase in productivity in certain key sectors of the economy, results in higher pricesn these sectors. Martin Bronfenbrenner and F.D. Holzman observed, cost inflation has beer1 the layman's instinctive explanation of general price increases since the dawn

of the monetary system. We know of no inflationary movement that has not been blamed by some people on profiteers, speculators, hoarders, or workers and peasants living beyond their station. Stated in terms of the aggregate demand and aggregate supply functions, the cost -push inflation emerges in the economy due to the pressure of various factors which shift the aggregate supplly function upward. Look at Figure 17.2 which illustrates cost -push inflation.

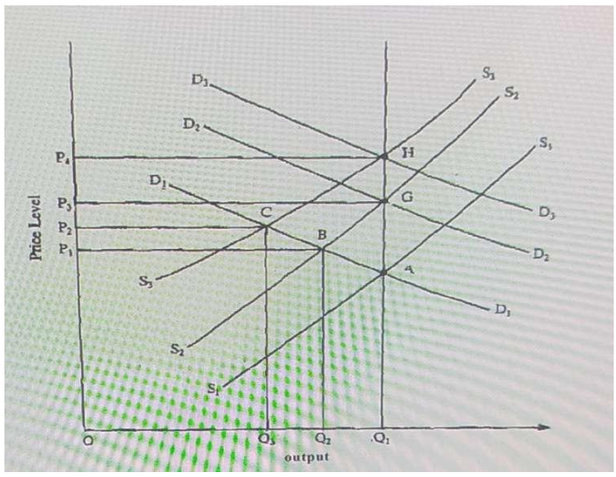

Figure 17.2 : Cost push inflation

Let the full employment equilibrium exist at point A where the demand curve D_I and the supply curve S_1 intersect each other. The equilibrium output is OQ_1 and price P_I. If the aggregate supply function shifts to S_2, output declines to OQ_2 and the price level rises to P_2 When the supply function further rises to S_3, output declines to $0Q_3$ and price level rises to P_3. Thus rise in price and fall in output will continue so long as upward shift in the supply function continues. As pointed out earlier, the main factors responsible for the upward shift in the aggregate supply functions are : 1) higher money wages secured by labour unions, 2) higher profit margins secured by business firms in monopolistic or oligopolistic

industries, and 3) higher prices of key raw materials for the production process of the economy. The inflation caused by these three factors is known as the wage-push inflation, the profit -push inflation, and the material -cost push inflation.

Check Your Progress 1

1) Define inflation.

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2) Explain different types of inflation

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17.4 INFLATION THEORY

1. The quantity theory of money

According to the quantity theory of money, the general price level of goods and services is proportional to the money supply in an economy. While this theory was originally formulated by Polish mathematician Nicolaus Copernicus in 1517, it was popularized later by economists Milton Friedman and Anna Schwartz after the publication of their book, "A Monetary History of the United States, 1867-1960," in 1963.

According to the quantity theory of money, if the amount of money in an economy doubles, all else equal, price levels will also double. This means that the consumer will pay twice as much for the same amount of goods and services. This increase in price levels will eventually result in a rising inflation level; inflation is a measure of the rate of rising prices of goods and services in an economy.

The same forces that influence the supply and demand of any commodity also influence the supply and demand of money: an increase in the supply of money decreases the marginal value of money–in other words, when the money supply increases, but with all else being equal or ceteris paribus, the buying capacity of one unit of currency decreases. As a way of adjusting for this decrease in money's marginal value, the prices of goods and services rises; this results in a higher inflation level.

The quantity theory of money (QTM) also assumes that the quantity of money in an economy has a large influence on its level of economic activity. So, a change in the money supply results in either a change in the price levels or a change in the supply of goods and services, or both. In addition, the theory assumes that changes in the money supply are the primary reason for changes in spending.

One implication of these assumptions is that the value of money is determined by the amount of money available in an economy. An increase in the money supply results in a decrease in the value of money because an increase in the money supply also causes the rate of inflation to increase. As inflation rises, purchasing power decreases. Purchasing power is the value of a currency expressed in terms of the amount of goods or services that one unit of currency can buy. When the purchasing power of a unit of currency decreases, it requires more units of currency to buy the same quantity of goods or services.

Throughout the 1970s and 1980s, the quantity theory of money became more relevant as a result of the rise of monetarism. In monetary economics, the chief method of achieving economic stability is through controlling the supply of money. According to monetarism and monetary theory, changes in the money supply are the main forces underpinning all economic activity, so governments

should implement policies that influence the money supply as a way of fostering economic growth. Because of its emphasis on the quantity of money determining the value of money, the quantity theory of money is central to the concept of monetarism.

Calculating QTM

The quantity theory of money proposes that the exchange value of money is determined like any other good, with supply and demand. The basic equation for the quantity theory is called The Fisher Equation because it was developed by American economist Irving Fisher. In its simplest form, it looks like this:

$((M)(V)=(P)(T)$

where:M=Money Supply$V$=Velocity of circulation (the number of times money changes hands)P=Average Price Level$T$=Volume of transactions of goods and services changes in spending.

2. Keynes's theory of inflation

This theory highlights other aspects of inflation. According to this theory, inflation occurs because a society wants to live beyond its economic capacity. The process of inflation according to this view, is nothing but the process of fighting over the portion of fortune among social groups who want a greater share than can be provided by the community. This process of struggle finally translates into a situation where the community's demand for goods always exceeds the amount of available goods (the emergence of what is called the inflationary gap).

This inflationary gap arises because those groups of society have succeeded in translating their aspirations into effective demand for goods. In other words, they succeeded in getting funds to change

their aspirations into a plan to purchase goods that were supported by funds. This group of society might be the government itself, which seeks to obtain a greater share of the community's output by running its spending financed by printing new money. This group may also be private entrepreneurs who want to make new investments and obtain funding from credit from banks. This group can also be in the form of labor stratification that is trying to get a salary increase for its members beyond the increase of labor productivity.

If the sum of the effective demands of all of those classes of society at the prevailing prices exceeds the maximum amount of goods that can be produced by the community, then an inflationary gap arises. Because total demand exceeds the amount of goods available, then prices will arise. An increase in prices means that some of the plans for purchasing goods from those groups cannot be fulfilled. In the next period, those groups will try to get more funds (from printing new money or credit from a bigger bank or from a bigger salary increase. Of course, not all of those groups have succeeded in getting the desired additional funds. Groups that can get more funds can get a share of more output. Those who cannot get funds will get a smaller share of output. Groups that categorizes "lost" in this process of struggle are those groups that the income is fixed or the income does not rise as fast as inflation (those groups include retirees, civil servants, farmers who must sell their produce at the price charged price stabilization, company employees who do not have trade union or who do not have effective channel to fight for their improvement) . The inflation process will continue as long as the number of effective requests from all classes of society exceeds the amount of output that society can produce. Inflation will stop if the total effective demand does not exceed at prevailing prices of the amount of output available.

FIGURE 17.3 below shows the circumstances in which the inflationary gap persists. Here we assume that all classes of society can obtain sufficient funds to finance at the current price, their purchasing plans. With the inflationary gap (for example, the government enlarges its expenditure by printing new money), the effective demand curve shifts from D_1 to D_2. Inflationary gap of Q_1 Q_2 arises and the price rises from P_1 to P_2. This price increase resulted in plans to buy groups of society (including the government itself) not fulfilled. Because the amount of goods available cannot be greater than QQ_1, what is happen only the reallocation of goods available from other groups in society to the government sector. If in the next period, those other groups of society could obtain funds to finance their old purchase plans with new higher prices, and the government would still try to obtain the amount of goods as planned in the previous period with new higher prices (and new money needs to be printed again), then the inflationary gap amounted Q_1 Q_2 will arise again. Prices will rise again from P_2 to P_3. If each group of society continues to try to obtain the same amount of goods and they succeed in obtaining funds to finance the plans at the prevailing price level, then the inflationary gap will still arise in further periods. In this case, price will continue to rise. Inflation will stop only if one of the community groups no longer (or can no longer) get funds to finance the plan of goods purchase at the prevailing price, so the effective public demand as a whole does not exceed the amount of goods available (inflationary gap is lost). Note that those who "win" in this race are the ones who are the easiest to get additional fund to finance their purchase plans. Those who cannot easily obtain funds to finance their goods purchase plans at new (higher) prices are forced to accept a smaller share of available goods than their share before the inflation process occurs. In general, those incomes (funds) do not rise as fast as prices rise that will miss the train and must receive a smaller share of goods.

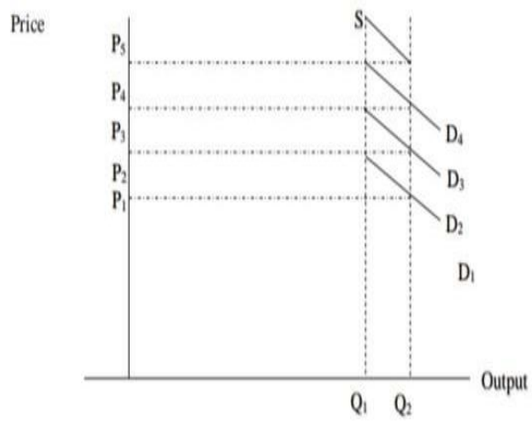

Figure17.3: the circumstances in which the inflationary gap persists.

FIGURE 17.4 showed the inflation process which finally stopped because the inflationary gap got smaller and finally disappeared in the 5th period. The price has stabilized at P_5. Behind this process, some groups of society received a smaller share of output. Inflation is always followed by income redistribution.

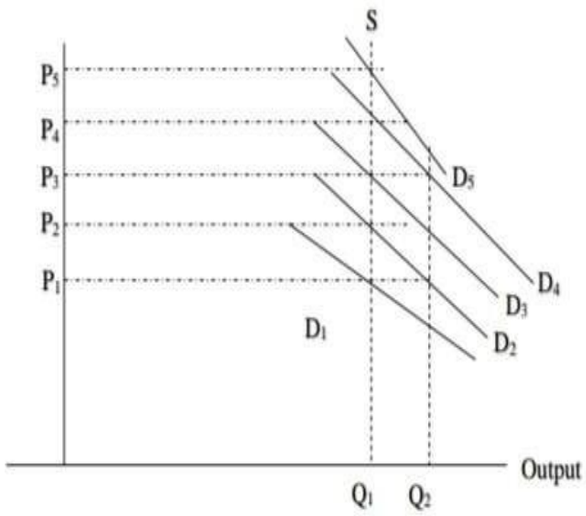

Fig17.4: the inflation process which finally stopped because the inflationary gap

2. Structuralism theory

It is a theory of inflation based on experience in Latin American countries. This theory puts pressure on the inflexibility of the economic structure of developing countries because inflation is associated with structural factors of the economy (which by definition, those factors can only change gradually and in the long run), this theory can be called "long-term" inflation theory. In other words, long-term factors can cause inflation (which lasts a long time)? According to this theory, there are 2 main rigidities in the economy of developing countries that can cause inflation.

a) The first rigidity is in the form of "inelasticity" of export revenues, namely exports which grow slowly compared to the growth of other sectors. This slowness is caused by:

1) Prices on the world market of the country's export goods are increasingly unprofitable. (Compared to the price of goods to be paid), or often referred as the terms of trade which are getting worse. It is often assumed that the prices of natural products, which are exports from developing countries, are rising more slowly than the prices of industrial goods, which are imports by developing countries.

2) Supply or production of export goods that is not responsive to increasing price (supply of export goods that are not elastic). This slow growth in export revenue means a slow growth in the ability to import the goods needed (for consumption or for investment). As a result, the country (which strives in accordance with its development plans to achieve certain growth targets) is forced to adopt a development policy that emphasizes promoting domestic production of goods that were previously imported (import-substitution strategy), although often this domestic production have

higher production costs (and often of lower quality) than similar imported goods. This higher production cost results in higher prices. And if the import substitution process is increasingly widespread, the increase in production costs will also expand to various goods (which were previously imported), so the prices of goods will increase. Thus inflation occurs.

b) The second rigidity relates to the "inelasticity" of the supply or production of foodstuffs in the country. It is said that domestic food production does not grow as fast as population growth and per capita income, so the price of foodstuffs in the country tends to increase beyond the price of other goods .

The next consequence is the emergence of demands from employees (in the industrial sector) to obtain salary / salary increase. An increase in wage means an increase in production cost, which also means an increase in the price of those goods. The increase in the price of goods subsequently results in demands for more wage increases. An increase in wages is then followed by increases in prices and the settings. This process will stop by itself if the price of food does not continue to rise but because of those structural factors, the price of food will continue to rise, so the process of pushing each other pushes or the process will continue to increase, so the process of pushing each other or the process of "spiral" between price and wage continues to get a new "bait" and not stop .The inflation process arising from two rigidities in practice clearly does not stand alone. Generally, the two processes are interrelated and often reinforce one another. For example, it is not usual for domestic food production to keep pace with rising domestic demand causing pressure to import food ingredients and subsequently making the balance of payments problem worse, further pushing for an excessive process of import substitution and rising prices. Regarding this structuralism theory, 3 things need to be emphasized:

1) This theory explains the long-term inflation process in developing countries.

2) Behind this structuralism "inflation story", there is an assumption (which is not explicitly stated) that the amount of money in circulation is increasing and passively follows and accommodates those prices. In other words, the inflation process can only take place only if the money supply continues to increase. Without an increase in the amount of money, the process will stop by itself! Here, and also in Keynes's inflation theory, it turns out that the Quantity Theory remains valid, even if only behind the scenes.

3) Not infrequently the "structural" factors that are said to be the most basic causes of the inflation process are not 100% "structural". It is often found that the tension is caused by the government's own price / monetary policy. For example, the inability of the production of foodstuffs in the country to grow is most likely caused by the suppression of foodstuffs price in the country so the enthusiasm of farmers' production decreases. It is also often found that the inability of the production of export goods to grow is caused by the foreign exchange rate being pushed too low with the intention to reduce inflation. Often this inelasticity is caused by extortion, so the prices of export materials that producers actually receive are low and not enough to stimulate production.

Check your progress

1. Explain Keynes's theory of inflation?

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2. Explain Structuralism theory ?

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LET SUM UP

Inflation is a situation of persistent rise in prices. Inflation exists, broadly speaking, when the quantity of money in the economy exceeds the supply of goods and services. According to Keynes true inflation sets in only after full employment. Inflation can be classified on the basis of speed, time, process and the extent of the price rise. There are two main types of inflation viz., demand-pull inflation and cost push inflation. Demand-pull inflation occurs when the aggregate demand exceeds the level of full employment output The demand pull inflation may be caused by an increase in the quantity of money. In case of cost-push inflation prices are pushed up by a rise in the cost of production. Cost of production can rise because of a rise in wages or cost of raw materials or simply rise in profit margins. In other words, inflationary pressures originate with supply rather than demand and spread rapidly throughout the economy.

Economic theories about inflation focus more on general propositions that are expected to apply in general. This does not mean that economists should not need to investigate deeper the socio-political factors of inflation. If it wants to be useful, in the sense of being able to determine the right policies to tackle the problem of inflation in a country, then it must be able to reach the "root" of the problem, which is not necessarily economic-objective.

But economic theories about inflation are useful as a starting point for any analysis of inflation.

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UNIT 18 INTRODUCTION TO BUSINESS CYCLE

Structure

18.0 INTRODUCTION

Rapid economic growth witnessed by many developed economies during the past two centuries has not been a smooth one. There have been periodical ups and downs in the GDP levels of these countries. Along with output, there have been fluctuations in various economic aggregates such as income, employment and prices and their long term trends. These economies have experienced phases of expansion and contraction in output and other economic aggregates alternatively. These alternating phases of upswings and downswings are known as business cycles. Theoretical explanations of business cycles evolved in the early 20th century. Periods of expansion and contraction in an economy exhibited a remarkable degree of regularity. The characteristics of these phases are carefully documented by economists like Wesley Mitchell, Simon Kuznets and Frederick Mills. Mitchell documented the co-movement of variables over the cycles; Mills documented the co-movement of prices and quantities over expansions and contractions, while Kuznets studied the patterns of both growth and fluctuations. The 1930s was a very active period of business cycle research as the National Bureau of Economic Research (NBER) continued its program (begun by Mills and Mitchell) of empirically documenting the features of business cycles. However, interest in business cycles waned after the publication of Keynes' General Theory which turned attention away from Business cycles to short run management of the economy. Interest in business cycles revived in the 1970s when the prevalent economic crisis in many countries could not be explained by Keynesian model.

18.1 OBJECTIVES

After going through the unit you will be able to

- explain the concept and features of Business cycle;
- identify the various phases of Business cycle;
- ascertain the theoretical framework which explains the occurrence of business cycle;
- distinguish between the monetary and real factors behind business cycle; and
- distinguish between the leading, lagging and coincident indicators.

18.2 FEATURES OF BUSINESS CYCLES

Business cycles are economy-wide fluctuations in output, unemployment, prices, revenue, profits, and interest rates, among other variables. These fluctuations occur across the economy and over a number of years. Fluctuations always take place in an economy. Business cycles, however, do not refer to fluctuations that are specific to one geographic region or industry within an economy. To identify business cycles, we must look at factors that can have an effect on the entire economy. Business cycles consist of recurrent alternating phases of expansions and contractions in a number of economic variables including employment, production, real income, and real sales. Business cycles involve multidimensional processes, in which quantities and prices, stocks and flows, outputs and inputs, real, monetary, and financial variables all tend to move together. These are asymmetric in the sense that expansions typically exceed contractions in size and duration. Business cycles can be distinguished from the other fluctuations in that they are usually larger, longer, and widely diffused.

The major features of business cycles are as follows:

1) Though business cycles do not show the same regularity, they have some distinct phases such as expansion, peak, recession, trough and recovery. The duration of cycle can vary between two years to twelve years.

2) Business cycles are synchronic. Depression or contraction occurs simultaneously in most industries or sectors of the economy. Recession passes from one industry to another and chain reaction continues till the whole economy is in the grip of recession.

Similarly, expansion spreads through various linkages between industries or sectors.

3) Fluctuations occur simultaneously in the level of output as well as employment, investment, consumption, etc.

4) Consumption of durable goods and investment are affected the most by cyclical fluctuations. As stressed by Keynes, investment is very unstable as it depends on profit expectations of private entrepreneurs. Any change in these expectations makes investment unstable. Thus the amplitude of fluctuation in the case of durable household effects is higher than that of GDP.

5) Consumption of non-durable goods and services do not vary much during the different phases of business cycles. Past data of business cycles reveal that households maintain a great stability in the consumption of nondurable goods. Thus the amplitude of fluctuations in the case of nondurable consumption goods is lower than that of GDP.

6) The immediate impact of recession or expansion is on the inventories of goods. When recession sets in, inventories start accumulating beyond the desired level. It leads to cut in production of goods. In contrast, when recovery starts, the inventories go below the desired level. It encourages business houses to place more orders for goods which boost production and stimulates investment.

7) Profits fluctuate more than any other type of income as the occurrence of business cycles causes lot of uncertainty for the businessmen and makes it difficult to forecast economic conditions. During depression, profits turn negative and many businesses go bankrupt.

8) Business cycles are international in character. That is, once started in one country, they spread to other countries through contagion effect. The downslide in financial market, for example, in one country spreads rapidly to other country as financial markets are linked globally through capital flows. Further, recessions in one country, say the United States can spread to other country as the imports of the U.S.A. will decline. Countries which are major exporter to the U.S will witness a decline in their exports and may witness recession.

18.3 PHASES OF BUSINESS CYCLES

Business cycles are characterized by expansion of economic variables in one period and contraction in the subsequent period. In Fig. 18.1 you can observe the upward sloping curve (expansion phase) there is acceleration in growth rate. The downward sloping segment of the curve indicates the 'contraction phase'.

In Fig. 18.1 the upward sloping straight line indicates the steady state growth path or the long run growth path of the GDP. The actual GDP fluctuates around the steady state growth path due to business cycles. According to some researchers there are four phases of a business cycle, viz., expansion, recession, depression and recovery. The four phases of a business cycle are also depicted in Fig. 18.1. In fact, the expansion phase comprises both recovery and expansion. Similarly, the contraction phase consists of both recession and depression. You should note that the difference between recession and depression is one degree. In the recession phase there is a deceleration in the growth rate. In the depression phase, economic growth is below its long run trend and the economy can witness negative growth rate also.

Similarly, the difference between recovery and expansion is one of degree and extent. After negative growth, the economy passes through the recovery phase and then through the expansion phase. The point at which the expansion ends and a recession begin is called ‘peak’ of a business cycle. The point at which a depression ends and recovery begins is called a ‘trough’. Thus peak and trough are ‘turning points’ in a business cycle

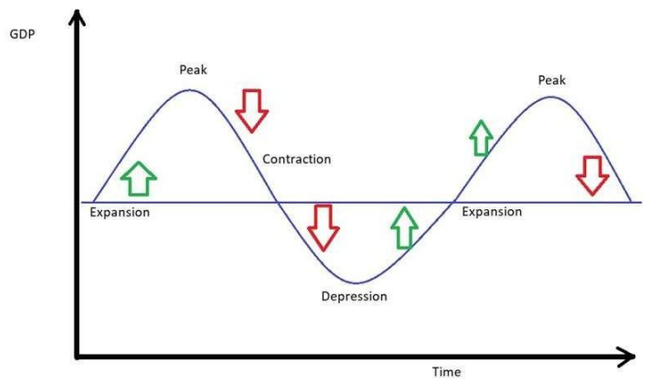

Fig. 18.1: Phases of a Business Cycle

1. Expansion Phase

In the expansion phase, there is an increase in various economic factors, such as production, employment, output, wages, profits, demand and supply of products, and sales. An expansion stage can begin as the result of many forces, including willingness of financial institutions to lend more and willingness of business Business Cycle houses to borrow more. There is overall optimism in the economy. The expansion phase continues till the economic environment is favourable. During the expansion phase, the economy often gets overheated in the sense that various constrains and frictions develop in the economy. Wage rate and prices increase much faster than output leading to hike in production cost and decline in profits. The central bank pursues a restrictive monetary policy so that inflation

is in under control. Economic growth in the expansion phase eventually slows down and reaches its peak. During the peak of a business cycle, economic variables such as production, profits, sales and employment are high; but do not accelerate further. There is gradual decrease in the demand for various inputs due to the increase in input prices. The increase in input prices leads to increase in production prices while real income of people does not increase proportionately. It leads consumers to restructure their monthly budget and the demand for products, particularly luxuries and consumer durables, starts falling. The peak also occurs before various economic indicators such as retail sales and the number of employed people falls. When the decline in the demand for products become rapid and steady, recession takes place

2 Contraction Phase

In recession phase, all the economic variables such as production, prices, saving and investment, starts decreasing. Generally, in the beginning of the downturn, producers are not aware of the decrease in the demand for their products and they continue to produce goods and services. In such a case, the supply exceeds demand and there is accumulation of inventories. Over the time, producers realize that there is an unwanted accumulation of inventories, escalation in production cost, and decline in profits. Such a condition is first experienced by few industries and slowly spreads to the whole economy. During the recession phase, producers usually avoid new investments which lead to the reduction in the demand for factors of production, and consequent decline in input prices and unemployment. Firms reduce levels of production and the number of people on their payrolls. A chain reaction starts, lower income, lower demand, lower output, lower employment, and so on. The adverse effects of recession extent beyond the purely economic realm and influence the social fabric of society as well. Social unrest

and crimes tend to rise during recession. When recession continues further, economic growth rate may be negative also. This phase is sometimes termed as ‘depression’. During depression, there is not just a decline in the growth rate; there is a decline in the absolute level of GDP. As sales declines, business houses find it difficult to repay their debts. As business sentiments are low enough to carry out new investments, demand for credit declines. Banks also become cautious in their lending as the chances of default on repayment increases. The economy however revives its growth rate over a period of time and optimism build up in certain sectors of the economy. This leads to reversal of the recession phase and the recovery phase starts. Individuals and organizations start developing positive attitude towards the various economic factors, such as investment, employment and production. In the recovery phase, there is an increase in consumer spending and demand for consumer goods. This provides incentive to firms to increase production, carry out new investments, hire more labour, etc. Further, there could be some investment during the recession phase due to replacement of obsolete machines and maintenance of existing capital stock. Price level plays a very important role in the ‘recovery phase’ of an economy. As pointed out earlier, during the recession phase decline in input prices is greater than the decline in product prices. This leads to a reduction in the cost of production and increase in profits. Apart from this, in the ‘recovery phase, some of the depreciated capital goods are replaced by producers and some are maintained by them. As a result, investment and employment by organizations increases. As this process gains momentum, an economy again enters into the phase of expansion. Thus, the business cycle gets completed.

Check Your Progress 1

1) What is meant by business cycle?

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2) Point out the important features of business cycle.

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3) What are the different phases of business cycle?

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18.4 BUSINESS CYCLE INDICATORS

As you already know, a major objective of macroeconomic policy is to maintain stability in economic growth and price level. An important part of the job of the central bank is therefore to gather information of the current and if possible, future economic conditions. The theoretical concept of measuring current business activities using economic series such as GDP, sales, investment, stock prices, etc. is rather simple though its practical application is difficult. Usually, the time pattern of these fluctuating economic series is diverse. While some economic series are expanding at a given point in time, others have already reached their upper turning point (peak) and still others are on the downswing; a few economic activities might even be at a lower turning point (trough). Thus the question is how to measure the overall state of the economy using these economic variables as they have diverse trends.

Economic indicators were conceived at the NBER originally by W.C. Mitchell and A. F. Burns in the 1930s. This approach requires monitoring of economic variables that tend to be sensitive to cyclical changes no matter what their cause. There could be three scenarios: (i) certain economic variables move ahead of business cycles (they 'lead' a business cycle), (ii) certain other economic variables lag behind a business cycle (the turning points in these variables take place later that with certain 'lag'), and (iii) there are still other economic variables which 'coincide' with business cycles. Burn and Mitchell studied a group of about 487 variables to see if the turning points in the variables persistently led, coincided with, or lagged behind the turning points in the U.S. business cycle. Seventy one series were chosen and arranged according to the average lead or lag with regard to the reference revivals. For example, six time series had no average lead or lag. On the average, the leading series were from one to ten months ahead of the reference revivals. The lagging series were on the average from one to twelve months behind.

According to Business Cycle Indicators Handbook 2020, a business cycle indicator should fulfil the following criteria:

(i) Conformity: the series must conform well to business cycles;
(ii) Consistent Timing: the series must exhibit a consistent timing pattern over time as a leading, coincident or lagging indicator;
(iii) Economic Significance: the cyclical timing of the series must be economically logical;
(iv) Statistical Adequacy: data on the variable must be collected and processed in a statistically reliable way;
(v) Smoothness: month-to-month movements in the variable must not be too erratic; and

(vi) Currency: Data on the variable must be available on a reasonable prompt schedule.

Those series are selected which are similar in timing at peaks and troughs with business cycles. Business cycle indicators are classified into three groups, viz., leading, roughly-coincident and lagging.

Leading Indicators

Leading economic indicators help us assess where the economy is headed. They foreshadow what is coming, such a turning point, before it actually happens. One of the most significant leading indicators is the stock market itself, gauged by an index such as the S&P 500. It will begin to rise before economic environment seems favourable, and it will begin to decline before economic conditions seem to warrant it. Another important leading indicator is interest rates. Low interest rate stimulates borrowing and buying, which favours the economy. An increase in interest rates shows the economy is doing well, but eventually rising interest rates lead to a slowdown because less people borrow money to start new projects.

Lagging Indicators

Unlike leading indicators, lagging indicators turn around after the economy changes. Although they do not typically tell us where the economy is headed, they indicate how the economy changes over time and can help identify longterm trends. Lagging economic indicators reveal past information about the economy. Gross Domestic Product (GDP) is how much a country is producing. There is significant lag time between when the data is compiled and when it is released, yet it is still an important indicator. Many consider a recession to be underway if two quarters see back-to-back declining GDP. Other indicators, such as the Consumer Price Index (CPI), are

also sometimes considered lagging indicators, since they reveal information that is already known to most consumers.

Coincident Indicators

Coincident indicators change (more or less) simultaneously with general economic conditions and therefore reflect the current status of the economy. They give consumers, business leaders, and policy makers an idea about where the economy is currently, right now. When the economy rises today, then coincident indicators are also rising today. Similarly if the economy declines today, then coincident indicators are also declining today. Typical examples of coincident indicators are industrial production or turnover.

Check Your Progress 2

1) What are the criteria that form the basis for selection of a business cycle indicator?

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2) What is the importance of a lagging indicator?
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18.5 LET US SUM UP

In this unit we focussed on three issues: characteristics of business cycle, indicators of business cycle, and some important theories of business cycle. Business cycle should be thought of as apparent deviations from a trend in which many economic variables move together. The fluctuations are typically irregularly spaced and of varying amplitude and duration. Nevertheless, the one very regular feature of these fluctuations is the way variables move together. Business cycle is characterised by four phases, viz., expansion, recession, depression and recovery. A major problem in empirical identification of business cycle is the lack of a single and consistent measure of aggregate economic activity. In view of this, movements in a number of indicators are considered for identification of turning points of a business cycle. Timing and amplitude of these variables are used to group them into leading, lagging and coincident indicators.

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