UNIT-II

This part is organised in two chapters :

Chapter 32. Managerial Economics
Chapter 33. Engineering Economics

Industrial & Business Management by Pelsang Marbaniel S. Chandel Sons

ME-6003 K.P.B

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MANAGERIAL ECONOMICS

• Introduction • Macro and Micro Economics • Managerial economics • Basic economic Concepts • Supply and Demand—Law of Diminishing Utility, Marginal and Total Utility, Law of equimarginal Utility • Demand Analysis—Demand Schedule and Demand Curve, Factors Influencing Demand • Demand Function • Equilibrium of Supply and Demand • Elasticity of Demand • Production Function • Factors of Production • Short run and Long run Production • Isoquants • Least Cost Input for a given Output • Cost Output Relationships • Theory of Firm • Profit maximisation under Perfect Competition, under Monopoly, • Return to Scale

32.1. INTRODUCTION

Problems of resource allocations are constantly faced by individuals, enterprises and countries. According to Paul Samelson "economics is the study of how societies use the scarce resources to produce valuable commodities and distribute them among different people" and economics is the science of choice. It studies how people choose to use the scarce and limited productive resources (labour, equipment and technology) to produce various commodities and to distribute these goods for consumption.

This definition encompasses various aspects like human choice, human behaviour, allocation of scarce resources, and alternative use of resources.

Human behaviour relate to the behaviour of people, firm. Allocation of scarce resources arises because of limited supply compared to demand. The scarcity of resources calls for optimal allocation of resources available.

Alternative use of resources refers to putting the resources to different uses e.g. electricity can be used for manufacturing steel, for running railway for lighting purposes. Choice of the resources will be easy in case of limited choices. Economic policy of a nation aims at—

- Full employment
- Better working conditions
- Reduced economic inequality
- Higher standard of living
- Social security
- Stable currency

32.2. MACRO AND MICRO ECONOMICS

Macro-economics studies the functioning of the economy as a whole and micro economics analyses the behaviour of individual components like industries, firms and households.

Micro-economics basically provides answers to the following questions—

(*i*) What goods should be produced and in what quantity?

(*ii*) Mode of their production (how they are produced)
(*iii*) How the goods should be distributed
(*iv*) How efficiently the resources are utilised

Micro-economic theory can be divided in to the three categories as shown in fig. 32.1

Thus, micro-economics deals with the theory of the firm and behaviour and problems of individuals and firms. It is concerned with pricing theory, demand concepts and theories of market structure. It has a relevance to managerial economics.

Macro-Economics is concerned with such economic variables as the aggregates output of an economy, extent to which the resources are employed, the level and determination of national

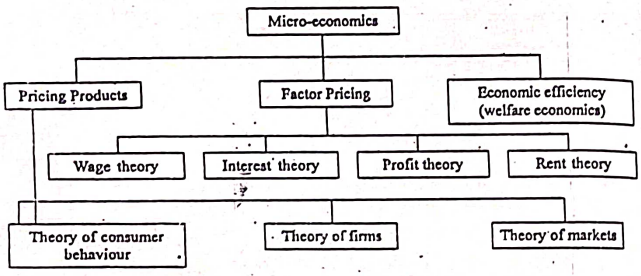

Fig. 32.1. Categorisation of Micro-economic Theory

income, balance of payment etc.

Macro-economics examines the aggregates and averages of economic variables which include study of money, banking and financial institutions, general price levels, inflation theory of employment, income distribution, monetary and fiscal policies, and problems of economic stabilisation.

The various aspects of macro-economics is shown in fig. 32.2.

32.3. MANAGERIAL ECONOMICS

Managerial economics can be viewed as an economics applied to problem solving at the firm level. Managerial economics deals with integration of economic theory with business practices for facilitating the decision making and planning process by management.

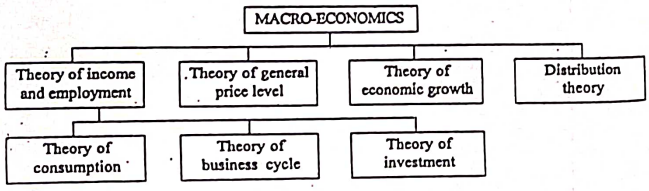

Fig. 32.2. Macro-economic Theories

Thus, managerial economics provides the link between economics and the decision science disciplines like mathe ics, statistics, operation research, econometrics etc in decision making. Role of managerial economics in decision making is represented as shown in fig. 32.3.

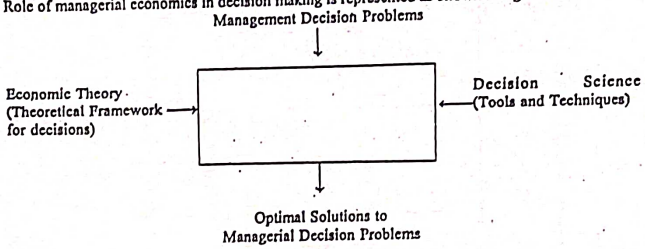

Fig. 32.3. Role of Managerial Economics in Decision Making

32.4. BASIC ECONOMIC CONCEPTS

1. Firm, inputs and outputs: A firm is understood as an organisation which converts inputs in to outputs. It hires the inputs and sells the output.

The inputs are called factors of production (FOP) which include-human resources (labour and entrepreneur) and capital resources like land, production facilities etc. The output of the firms consist of goods and services they produce .

2. Economic Goods: Economic goods are those which possess money value *i.e* they require human effort for their procurement. Examples are land, house, clothes, food etc.

Thus, the goods with the following characteristics can be called as economic goods.

- They have a utility *i.e* satisfy human needs and wants
- They are scarce—limited in supply
- They are marketable—If they have a money value or exchange value.

Economic goods can be classified as—

(*i*) Consumer Goods: Consumer goods can be used directly to satisfy needs of the end users ie food, clothes, furniture etc.

(*ii*) Producer goods: Producers goods are used to satisfy human needs indirectly e.g. coal, cotton, machines etc. These are used to produce consumer goods.

(*iii*) Material goods: Material goods which have a physical identity and either they are produced either by nature or manmade (tangibles)

(*iv*) Immaterial goods: These are the economic goods which satisfy human wants but which have no material existence (intangibles) e.g. goodwill, education and intelligence of a person.

3. Utility: Utility of a commodity is its value in use or its capacity to satisfy human needs. Utility differs from usefulness. The use to which a commodity is put may be good or bad. But its utility remains unaltered so long as it satisfys human needs. Utility of a commodity is not a constant quantity but it varies with place, time, and kind of consumer. *e.g.* Light from the lamp during daylight has no utility, but it has a considerable utility during right time.

4. Exchange Value: Value has two meanings, i.e., value in use and value in exchange. In economics, value in use is referred to as utility and the value word alone signifies exchange value.

Value of a commodity is its power of commanding other commodities in exchange. The value in exchange of a commodity depends on the degree of a scarcity and is independent on its utility.

5. **Commodity:** Commodity refers to any object which can be posessed by a person and service which may be given to a person which has a value in exchange. Thus, commodity is anything that satisfy human wants and has a value in exchange.

6. **Price:** There should be a common media to compare the values of different commodities. This common medium is money. The value of a commdity in terms of money is its price. In practice, all transactions are made in terms of money.

7. **Wealth:** Wealth is defined as any commodity which possesses money value and it is exchangeable. The three qualities to call it a wealth are (i) utility (ii) scarcity (iii) exchange value. Thus, all economic goods constitute wealth.

8. **Welfare:** Welfare signifies happy and contended state of mind. Such a condition partially results from possession and use of goods.

It is believed that welfare of a nation, in general, increases as the national wealth increases and for the same national wealth, national welfare increases as the economic inequality decreases *i.e* the wealth is transferred from rich to poor. In general, welfare increases with increase in production and productivity.

32.5. SUPPLY AND DEMAND

Every economy has to make decisions as to what is to be produced, how it is to be produced and for whom it is to be produced.

32.5.1 Law of Diminishing utility

This law states that, other things remaining the same, every unit of a commodity gives the consumer less utility than the previous unit. For example, to a hungry poor man, the first slice of a bread offers highest utility and the subsequent slices of bread gives him satisfaction but in reducing magnitude. A condition may be reached when he needs no more slices of bread and at this stage, the utility is zero (no utility). Any further condition to make him eat the bread slice will create a negative utility.

The law of diminishing utility is represented in the fig 32.4.

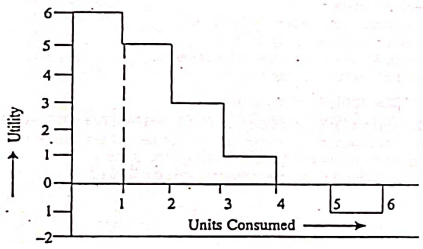

Fig. 32.4. Graphical Representation of Law of Diminishing Utility

Utility like satisfaction

Marginal utility

It is the editional satisfaction which you get if every consume one more editional unit is called margine utility.

Chocolate	Marginal chocolate	Total chocolate
0	0	70
1	70	80
2	10	85
3	5	

This is the editional chocolate (es) editional point

Referring to Fig. 32.4 utility has been plotted against units of commodity consumed. The first to fourth units are offering reduced but positive utility, where as the fifth and sixth units in this case offer zero and negative utility respectively.

The other things being the same in the definition refers to

(*i*) Units of commodity consumed are similar
(*ii*) Price of the commodity remains the same
(*iii*) During the consumption period, habit, income and the mental condition of the consumer remains unchanged.

32.5.2. Marginal utility and total utility

If 'N' number of units of a commodity are consumed at a time, the last unit consumed *i.e.*, N^{th} unit is called the marginal unit and the utility of this marginal unit is called the marginal utility.

The value of the marginal utility may be positive, zero or negative depending upon the satisfaction or dissatisfaction.

Thus, the law of diminishing utility can be stated that, "other things being same, the marginal utility of a commodity goes on diminishing with an increase in consumption.

Marginal utility means 2nd chocolate is the marginal utility only for 2nd chocolate

Total utility refers to the sum total of all the utilities derived by consumption of all the units at a given time. If 'N' units of a commodity are consumed at a given period of time. If U_1, U_2,...Un are the utilities derived by consuming first, second,.... N^{th} unit. The total utility is given by

$$\text{Total} \quad U = U_1 + U_2 + U_3 + ... + U_n$$

As the consumption goes on increasing, the total utility goes on increasing till the point of full satisfaction is reached. Beyond this point, marginal utility is negative and hence the total utility decreases. Thus, the total utility is maximum, when the marginal utility is zero.

Limitations of Law of Diminishing Utility

1. The law is true subjected to the conditions prescribed
2. Normally, in the beginning marginal utility increases and increasing marginal utility condition continues upto a certain stage beyond which the law of diminishing returns holds good.
3. There are some exceptions to this like the craze for money generally goes on increasing as the quantity consumed increases.

32.5.3. Law of Equimarginal Utility

If a large units of one commodity is purchased, the marginal utility of this commodity may become very small or even zero or negative. So, some other commodities are to be procured which may give a relatively higher utility. But the question here is how many different commodities should be purchased to derive maximum satisfaction with the given money.

The law of equimarginal utility states that maximum satisfaction may be derived when marginal utilities of all the commodities consumed are equal. This is represented in the fig 32.5.

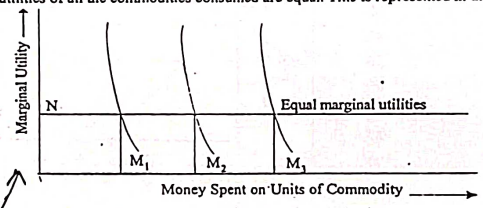

Fig 32.5. Representation of Equimarginal Utility

→ How the Customer allocate his limited money among different commodities such a way that he yeilds max. satisfaction.

The marginal utility is plotted against money spent on purchasing units of commodity considering three commodities X,Y and Z. and M_1, M_2 and M_3 represent the money spent on commodities in order to get the same marginal utility.

Thus, for the total expenditure of $M_1 + M_2 + M_3$, the best satisfaction may be obtained if each commodity is consumed upto marginal utility of 'N' units.

32.6. DEMAND ANALYSIS

Demand refers to an effective desire to buy backed by a purchasing power and willingness to buy for fulfilling the desire. Demand for the output is one of the crucial requirements for the existence of an enterprise. A firm is interested in its own profit and sales both of which partially depend on the demand.

The decisions which management makes with respect to production, advertising, cost allocation, pricing, inventory holdings etc call for an analysis of demand. How much a firm should produce depends heavily upon the demand for its products. If there is no demand for a product, its production is unwarranted. If demand falls short of production, one way to balance the two is to create new demand through more and better advertisement. Higher is the demand for the product, higher prices can be charged other things being equal.

A demand for a commodity implies-

(a) Desire to acquire and own the commodity
(b) Willingness to pay for it
(c) Ability to pay for it.

32.6.1. Demand Schedule and Demand Curve

The demand of an individual for any commodity at any time is given by the amount of that commodity which that individual is prepared to purchase at different prices. The amount of commodity demanded, by people depends upon price. The higher the price of the article, other things being equal, the less people are willing to buy it and lower the price, more people will buy it.

There exists a definite relationship between the market price of a good and quantity demanded of that good, other things being equal. This relationship between the price and quantity bought is called "Demand Schedule". The graphical representation of the demand schedule is called Demand Curve.

Demand Schedule and Demand Curve represented in fig. 32.6

Demand Schedule

Price (Rs.)	*Qty. demanded*
7	30
6	40
5	50
4	60
3	70
2	80
1	100

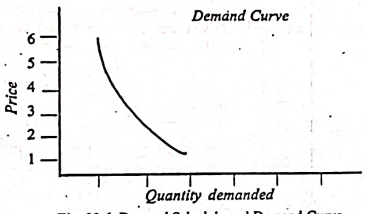

Fig. 32.6. Demand Schedule and Demand Curve.

Thus, the law of demand can be stated as "other things being equal, demand for a commodity varies inversely with its own price".

32.6.2. Factors Influenc Demand

The determinats of a demand are represented as shown in Table 32.1. for an automobile.

Table 32.1. Determinants of Demand

Elements affecting Demand	*Illustration*
1. Own price	Higher price reduces quantity demanded
2. Average income	Demand increases with increase in average income
3. Population	Larger population increases demand
4. Price of related goods	Lower prices of related goods increase demand.
5. Special influences	Tastes, preferences influence demand

32.6.3. Shift in Demand

There will be shift in demand curve because of the influences other than its own price e.g., there will be increase in demand for cars because of many non-price influences, like increase in average income, increase in population etc. This results in shift of demand curve to the right but without change in slope. The net effect here will be the increase in demand at all prices because of the influences. The shift in demand is shown in fig. 32.7

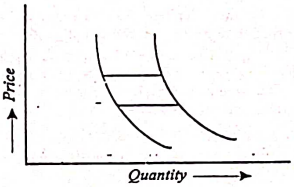

Fig. 32.7. Shift in demand

32.6.4. Demand Function

A demand function states the relationship between the quantity demanded of a commodity and various determinants of demand

Demand function can be expressed as-

$$Q_x = f(P_x, I, Ps, Pc, T, U)$$

where

Q_x = Quantity demanded of a commodity
P_x = Price of the commodity 'x'
I = Consumers income
P_s = Prices of substitutes for commodity 'x'
Pc = Prices of Complimentary goods of 'x'
T = A measure of consumers tastes and preferences
U = Other determinants of demand for 'x'

32.7. SUPPLY SCHEDULE AND SUPPLY CURVE

Supply means the quanty of good that business willingly Produce and sell. The Supply Schedule for a commodity shows the relationships between the market price and the amount of that commodity the producers are willing to produce and sell, other things being equal.

The Supply Schedule and Supply Curve are Represented in the fig 32.8.

Price (Rs.)	Qty. supplied
7	100
6	80
5	60
4	50
3	30
2	20
1	05

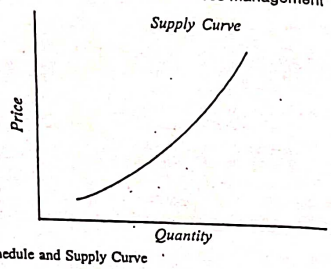

Fig. 32.8. Supply Schedule and Supply Curve

- Factors Influencing Supply Curve.

The fundamental logic behind supply behaviour is that the producers supply goods/ services for profits and the key decision is the cost of production which is again dependent upon technology and input prices.

The factors influencing supply are shown in Table 32.2.

32.8. EQUILIBRIUM OF SUPPLY AND DEMAND

Consumers demand different amounts of commodities as a function of their prices. Similarly, producers willingly supply different amounts of these and other products depending upon their prices. The forces of supply demand operate through the market to produce equilibrium price and quantity or market equilibrium.

The market equilibrium comes at that price and quantity where the demand and supply forces are in balance at this point, amount that sellers want to sell. The market equilibrium is represented in the fig. 32.9.

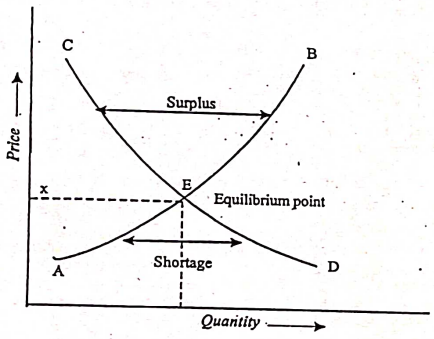

Fig. 32.9. Market equilibrium

Equilibrium comes at the intersection of demand and supply curve at a price corresponding to point 'E', at this point firms willingly supply what consumers willingly demand. When price is too low, quantity demanded exceeds the quantity supplied, resulting in shortages.

Table 32.2. Factors Influencing supply

Elements Determining Supply	*Illustrations*
1. Good's own price	Higher price increases and raises quantity supplied
2. Technology	Advanced technology lowers manufacturing costs and increases supply
3. Input prices	Decrease in input prices lowers manufacturing cost and increases supply
4. Prices of related goods	Higher prices of related goods increase supply
5. Market organisation	A good market organisation increase supply.
6. Special influences.	

32.9. ELASTICITY OF DEMAND

Elasticity shows the responsiveness of demand with respect to price *i.e.* Price elasticity of demand or the price elasticity is the responsiveness of the quantity demanded to changes in price of the commodity, other things being held equal. It is expressed as

$$\text{Price elasticity of demand} = \frac{\text{Percentage change in quantity demanded}}{\text{Percentage change in price}}$$

32.9.1. Elastic and Inelastic demand

A demand for the goods is elastic when the quantity demanded responds greatly to price changes *i.e* when one percentage change in price results in more than one percent change in quantity demanded.

The demand is inelastic, when its quantity demanded responds very little to changes in its price *i.e.* when one percentage change in price results in less than one percent change in demand.

The price elastic demand is shown in fig. 32.10

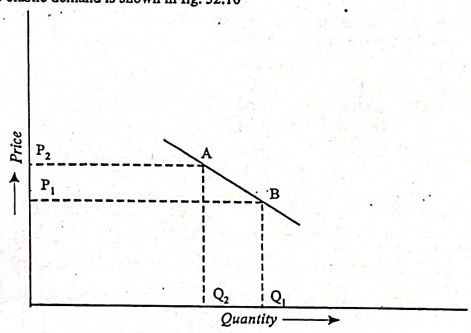

Fig. 32.10. Price-elastic Demand an Illustration

Illustration

At a price of Rs. 90, the quantity demanded = 240 units
At a price of Rs. 110, the quantity demanded = 180 units

$$\text{Percentage change in price} = \frac{110-90}{100} = 20\%$$

$$\text{Percentage change in quantity} = \frac{180-240}{100} = -40\%$$

$$\text{Price elasticity} = \frac{-40}{20} = -2$$

32.9.2. Significance of Price Elasticity of Demand

It is very much useful in fixing price of the product. If the demand for the product is elastic, the price may be used to maximise the profits. If the demand is reasonably elastic, then the price will be lowered to maximise the demand and thus, obtain overall larger share of the market.

32.10. PRODUCTION FUNCTION

Production refers to creation of utilities. These utilities which are created in the process of production may take one of the following forms;

1. Form utility - changing the form of the material *e.g.* changing a log of wood into a furniture.
2. Place utility - utility created by transferring a material to a new place *i.e.* water brought from river to city for public use.
3. Time utility - utility created by preservation of the material *i.e.* cold storage.
4. Possession utility - Utility created by causing transfer of possession ie transfer book from publisher to scientist.
5. Service utility - This includes all knids of services like transport etc.
6. Information utility - This creates utilities by advertisement, discussions and seminars etc.

The production function is the relationship between the maximum amount of output that can be produced and the inputs to make that output. It is defined for particular state of technical knowledge.

32.10.1. Factors of Production

The various resources which are necessary in production and which are the means of production are called Factors of Production (FOP)

Various factors of production are:

- Land-signifies all the objects provided by the nature *i.e.* actual land, water, air, light and climate
- Labour - Labour refers to human efforts either physical or mental
- Capital - Capital represents that part of wealth, other than the land which is utilised in prouduction. Thus it represents the capital goods/material stored which are meant for use in production
- Enterprise and organisation - It referes to human efforts put in organising the collective use of land, labour and capital.

Production function expresses the technological or engineering relationship between the output of the commodity and its inputs.

Production Function can be represented as,

$$Q = F(L, K, R, S, V, Y.)$$

where Q = the output quantity of a commodity
L = the labour input
K = the capital input
R = raw material input
S = Land required to prouduce output quantity 'Q'
V = returns to scale
Y = Efficiency parameter.

To make the analysis simpler, the assumption can be made to reduce the number of variables to a conventional minimum.

The production function with these assumptions can be written as

$$Q = f(L,K,V,Y)$$

Where 'V' refers to the long range analysis of the laws of production as it operates in a plant, Efficiency parameter refers to the particular aspect of production.

If labour and capital are the only two input factors for the output the production function reduces to

$$Q = F(L,K)$$

For a given output Q, there are alternative combinations of L and K. An increase in volume of output Q, will result from increase in either L on K or both.

32.10.2. Short Run and Long Run Production

The short run is the period of time in which variables *i.e.* inputs such as materials and labour can be adjusted. In the short run fixed factors such as plant and equipment cannot be fully modified or adjusted.

The long run production is the period in which all fixed and variable factors employed by the firm can be changed including land, labour, materials and capital.

The firm can increase its production (assuming labour as variable input) in the short run by increasing only the labour because of the availability of capital is fixed. Then production function is given by

$$Q = F(L, Ko)$$

where K = Ko = constant

In the long term, the firm may have more capital and manpower. Production Function takes the form

$$Q = F(L, K).$$

In general, both labour and capital are necessary for the production of the commodity and they are substitutes to each other for a given level of output, an entrepreneur will need to hire both labour and capital but he would have an option to apply any one combination of these factors for a given output level out of several combinations. The alternative combinations of factors for a if the use of one factor input is increased that of another will decrease and vice versa.

32.10.3. Isoquants (Equal Product Curve)

An isoquant is a locus of all those combinations of labour and capital which yield the same output. Isoquants makeup all possible combinations of labour and capital that can be employed to produce different outputs of a commodity. They are the geometric representation of a production function. The isoquants are falling curves and higher isoquant represent higher output and they do not intersect each other and they are convex from below.

Isoquants are shown in the fig. 32.10.

32.10.4. Least Cost Combination of Inputs for a given Output.

The production function indicates the alternative combinations of various combinations of input factors to produce a given output. Out of these, one would like to choose that combination