
UNIT 4 CONSUMER BEHAVIOUR: CARDINAL APPROACH

Structure

- 4.0 Objectives
- 4.1 Introduction
- 4.2 Concept of Utility
 - 4.2.1 What is Utility?
 - 4.2.2 Relationship between Want, Utility, Consumption and Satisfaction
 - 4.2.3 Measurement of Utility
- 4.3 Some Basic Assumptions about Preferences
 - 4.3.1 Assumptions about Consumer Preferences
- 4.4 Cardinal Utility Analysis
- 4.5 Law of Diminishing Marginal Utility
 - 4.5.1 Exceptions to the Law/Limitations of the Law
 - 4.5.2 Criticism of the Law
- 4.6 Consumer Equilibrium through Utility Analysis
 - 4.6.1 Determination of Consumer Equilibrium
- 4.7 Derivation of Demand Curve with the Help of Law of Diminishing Marginal Utility
- 4.8 Consumer Surplus
- 4.9 Critical Evaluation of Cardinal Utility Analysis
- 4.10 Let Us Sum Up
- 4.11 References
- 4.12 Answers or Hints to Check Your Progress Exercises

4.0 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 preferences.

4.1 INTRODUCTION

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

The concept of value creation is based on the concept of utility. Consumer values a product only if it has 'utility' for him. Thus, the concept of utility has become extremely relevant today. It is guiding marketing team across the globe in designing business and marketing the company in a way that is likely to attract the maximum number of customers and maximise sales revenues.

Let us begin to state the concept of utility and how has it evolved.

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

4.2.1 What is Utility?

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

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

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

4.2.2 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:



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.

$$\text{i.e. } TU_n = U_1 + U_2 + U_3 + \dots + U_n$$

- 3) **Marginal Utility**- It means addition made to total utility by consuming an additional unit.

It can be measured with the help of following formula:

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

Where: MU_n = Marginal utility of nth unit

TU_n = Total utility of n units

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

Let us understand the concept with the help of Table 4.1 and Fig. 4.1.

Table 4.1: Relationship between Total utility (TU) and Marginal utility (MU)

Units of a Good Consumed	Total Utility (TU)	Marginal Utility (MU)
1	6	6
2	10	4
3	12	2
4	12	0
5	10	-2
6	6	-4

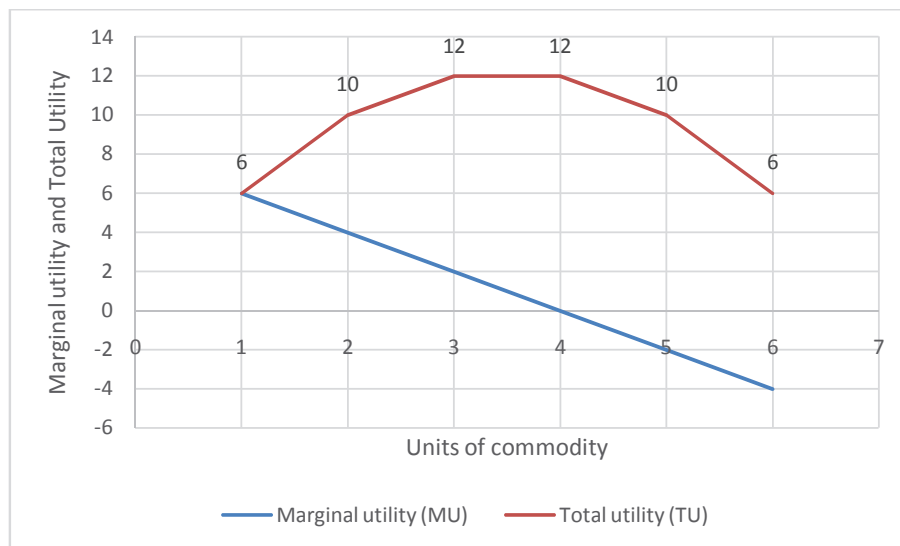


Fig. 4.1: Relationship between Total utility (TU) and Marginal utility (MU)

In Fig. 4.1, units of commodity are measured along x axis and utility is measured along y axis. Upto 3rd unit the total utility is increasing but marginal utility is diminishing but is positive. When a consumer consumes 4th roti, the total utility is maximum and the marginal utility is zero. Consumer is getting maximum satisfaction at this point. If a consumer consumes more than 4 units, total utility will diminish and the marginal utility will be negative. This is also called Law of diminishing Marginal Utility, which is discussed in detail in Section 4.4.

4.2.3 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 goods in respect

of size, that is, 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. This approach will be discussed in detail in Section 4.4. The modern economists like J.R Hicks, Allen are of view that utility is not quantitatively measurable but can be compared or ranked. This is known as **Ordinal concept of utility**. Modern Economists hold that utility being a psychological phenomenon, cannot be measured quantitatively, theoretically and conceptually. However, a person can introspectively express whether a good or service provides more, less or equal satisfaction when compared to one another. In this way, the measurement of utility is ordinal, i.e. qualitative, based on the ranking of preferences for commodities. For example, Suppose a person prefers tea to coffee and coffee to milk. Hence, he or she can tell subjectively, his/her preferences, i.e. tea > coffee > milk. Ordinal Utility approach of measurement of utility is discussed in detail in the next unit.

Check Your Progress 1

- 1) Explain the relationship between total utility and marginal utility.

.....

- 2) Calculate Marginal utility in following table:

Ice Creams Consumed	Total Utility	Marginal Utility
1	20	
2	36	
3	46	
4	50	
5	50	
6	44	

4.3 SOME BASIC ASSUMPTIONS ABOUT PREFERENCES

One of the basic questions addressed in microeconomics is how a consumer with limited income takes decision about which good/service to buy. As discussed above, consumer behaviour has gained great relevance today and companies are spending huge amount to understand consumer preferences. Success of business has always been dependent on its understanding of consumer behaviour. But now since the world is more connected than ever through internet, consumers have large number of options. It has become imperative for companies to analyse consumer choices, preferences and design their goods/services accordingly.

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 also. 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.

4.3.1 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, $(a_1, a_2) \geq (b_1, b_2)$ or
 $(a_1, a_2) \leq (b_1, b_2)$ 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?

.....
.....
.....

2) How does consumer preferences affect consumer behaviour?

.....
.....
.....

4.4 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.

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

Table 4.2: Diminishing Marginal Utility

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

LAW OF DIMINISHING MARGINAL UTILITY (MU)

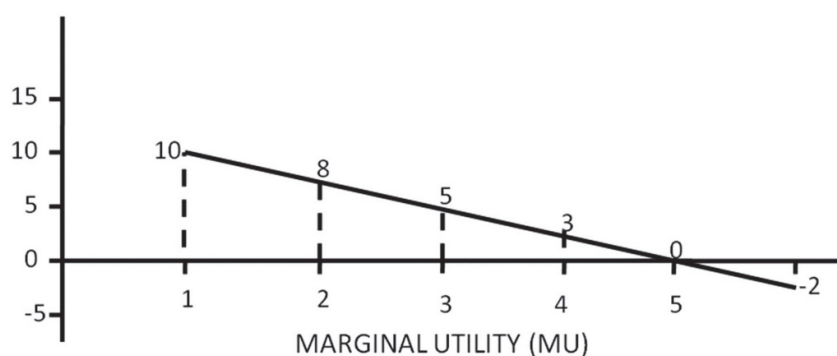


Fig. 4.2: Diminishing Marginal Utility

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

4.5.1 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.

4.5.2 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?
.....
.....
.....
- 2) What does happen to marginal utility at a point when total utility is maximum?
.....
.....
.....

4.6 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 **multi-commodity model**.

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

- 1) **Consumer is rational:** This is one of the basic assumption of the law. Consumer is rational i.e. he measures, compares and chooses the best option in order to maximise his utility.
- 2) **Cardinal measurement of utility:** Utility can be measured in quantifiable terms.
- 3) **Marginal utility of money is constant:** It is assumed that utility is measured in terms of money and utility of money does not change.
- 4) **Fixed income and prices:** It is assumed that income of the consumer and prices of goods remain constant.
- 5) **Constant tastes and preferences:** It is assumed that taste and preferences of the consumer remain same.

4.6.1 Determination of Consumer Equilibrium

As discussed above, 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 (MU_x) is greater than the marginal utility of money (MU_m), then a consumer will exchange his money for a commodity. Consumer will keep on consuming and spending his money so long as $(MU_x) > P_x(MU_m)$ where P_x is the Price of commodity x and MU_m is 1(constant), Thus a utility maximising consumer will be in equilibrium where

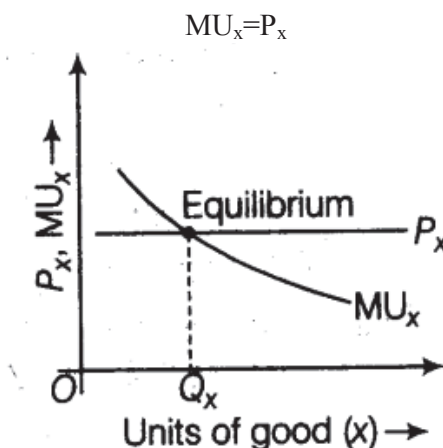


Fig. 4.3: Consumer equilibrium in case of single commodity

Let us understand the concept with the help of an example. Suppose, the consumer wants to buy a good x costing Rs. 10 per unit. Marginal utility derived from each successive unit (in utils) is determined and is given in Table 4.3 (It is assumed that 1 util = Re. 1, i.e. $MU_m = \text{Re. } 1$).

Table 4.3: Consumer Equilibrium in case of Single Commodity

**Consumer Behaviour :
Cardinal Approach**

Unit of 'x'	Price of 'x' (P _x)	Marginal Utility (MU) in Utils	Difference between MU and P _x	Remarks
1	10	18	8	Since MU _x >P _x Consumer will increase consumption
2	10	16	6	
3	10	12	2	
4	10	10	0	Consumer equilibrium MU _x =P _x
5	10	8	-2	Since MU _x <P _x Consumer will not buy any more units
6	10	0	-10	
7	10	-2	-12	

2) Consumer equilibrium in Multi-commodity case:

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

This case of multi-commodities is known as **Law of Equi-Marginal Utility**, a consumer having choices of multiple goods distribute their limited income in such a way that the last rupee spent on each commodity yields equal marginal utility. Suppose a customer consumes only two goods x (with price P_x) and y (with price P_y). Thus he will try to maximise his utility by equating his marginal utility and prices.

$$MU_x = P_x (MU_m)$$

$$MU_y = P_y (MU_m)$$

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

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

Or

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

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

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

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

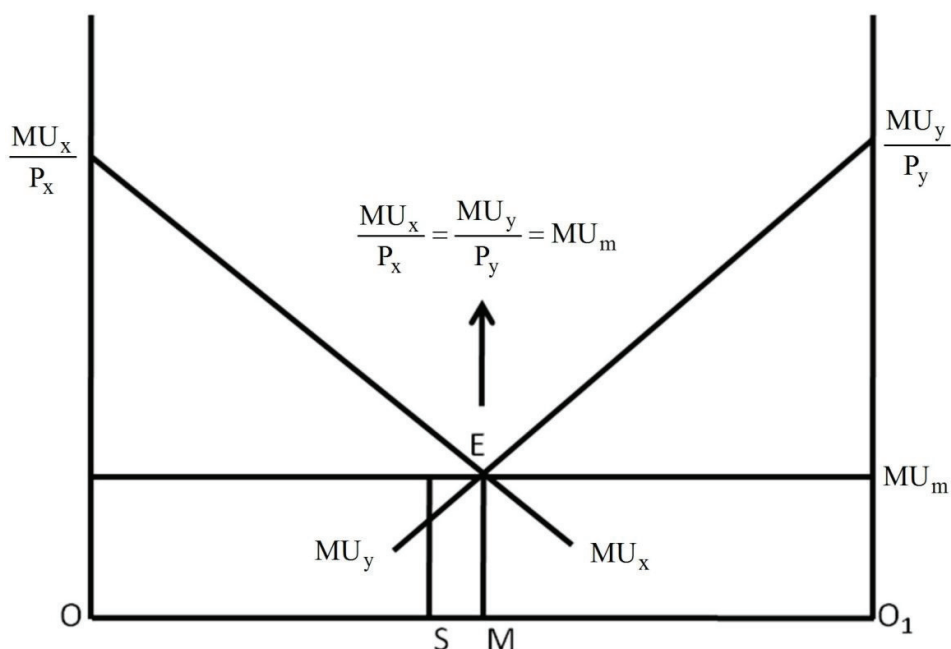


Fig. 4.4: Consumer equilibrium in multi commodity case

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

Table 4.4: Consumer Equilibrium in case of multi-commodity

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

It can be noted from Table 4.4 that the consumer will spend first and second rupee on commodity 'x', which will provide him utility of 12 and 10 utils respectively. The third rupee will be spent on commodity 'y' to get utility of 9 utils. Fourth and fifth rupee will be spent on X and Y respectively. To reach the equilibrium, consumer should purchase that combination of both the goods, when:

- a) MU of last rupee spent on each commodity is same; and
- b) MU falls as consumption increases.

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

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

The total satisfaction of 47 utils will be obtained when consumer buys 3 units of 'x' and 2 units of 'y'. It reflects the state of consumer's equilibrium. If the consumer spends his income in any other order, total satisfaction will be less than 47 utils.

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.

.....
.....
.....

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

.....
.....
.....

**4.7 DERIVATION OF DEMAND CURVE WITH
THE HELP OF LAW OF DIMINISHING
MARGINAL UTILITY**

We have learned in Unit 2 that the demand curve or law of demand shows the relationship between price of a good and its quantity demanded. Marshall derived the demand curves for goods from their utility functions.

Marshall assumed the utility functions of different goods to be independent of each other. In other words, 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 ($MU_x > P_x$), the consumer would demand more and more units of it till its marginal utility is equal to its price $MU_x = P_x$ 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. 4.5.

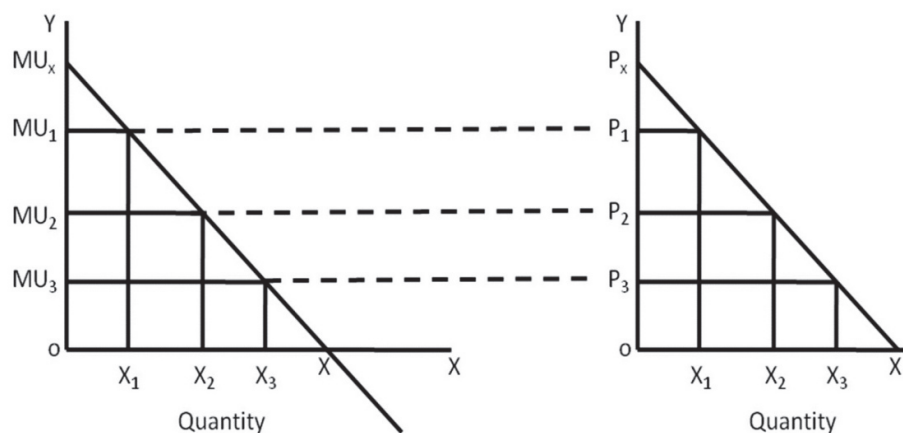


Fig. 4.5: Derivation of demand curve with the help of law of diminishing marginal utility

In Fig. 4.5, the MU_x is negatively sloped. 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 X_1 , quantity of the marginal utility of a good is MU_1 . This is equal to P_1 by definition. Thus, consumer demands OX_1 quantity of the commodity at P_1 price. In the same way X_2 quantity of the good is equal to P_2 . Here at P_2 price, the consumer will buy OX_2 quantity of commodity. At X_3 quantity the marginal utility is MU_3 , which is equal to P_3 . At P_3 , the consumer will buy OX_3 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 sloping demand curve that when price falls, other things remaining the same, the quantity demanded of a good increases and vice versa.

4.8 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 quintessence of the concept of consumer's surplus is that people generally get more utility from the consumption of goods than the price they actually pay

for them. This extra satisfaction, which the consumers obtain, from buying a good has been called consumer's surplus.

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

The measurement of consumer surplus from a commodity from the demand or marginal utility curve is illustrated in Fig. 4.6. 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.

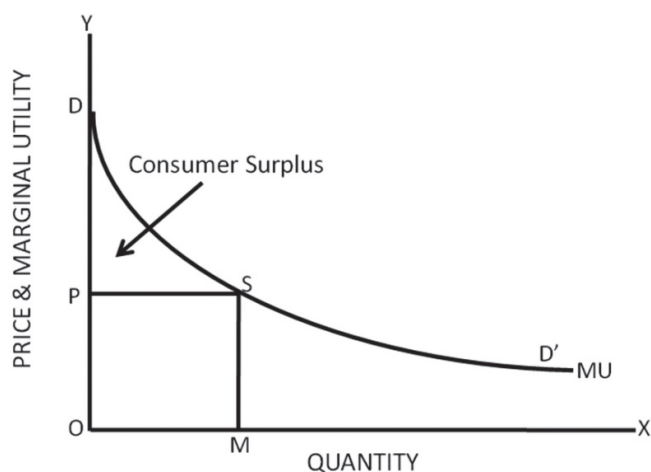


Fig. 4.6: Consumer Surplus

In Fig. 4.6, the total utility derived by the consumer from OM units of the commodity will be equal to the area under the demand or marginal utility curve up to point M. That is, the total utility of OM units in Fig. 4.6 is equal to ODSM.

In other words, for OM units of the good the consumer will be prepared to pay the sum equal to Rs. ODSM. But given the price equal to OP, the consumer will actually pay the sum equal to Rs. OPSM for OM units of the good. It is thus clear that the consumer derives extra utility equal to ODSM minus OPSM

= DPS, which has been shaded in Fig. 4.6. If market price of the commodity rises above OP, the consumer will buy fewer units of the commodity than OM. As a result, consumer's surplus obtained by him from his purchase will decline. On the other hand, if price falls below OP, the consumer will be in equilibrium when he is purchasing more units of the commodity than OM. As a result of this, the consumer's surplus will increase. Thus, given the marginal utility curve of the consumer, the higher the price, the smaller the consumer's surplus and the lower the price, the greater the consumer's surplus.

4.9 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 in 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) If price of good is Rs. 10 and marginal utility of a consumer is Rs. 12, how much will be the consumer surplus? Use utility analysis.

.....

- 2) Critically examine Cardinal utility approach.

4.10 LET US SUM UP

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

4.11 REFERENCES

- 1) Dwivedi, D.N.(2008). *Managerial Economics, 7th edition*, Vikas Publishing House.
- 2) Dornbusch, Fischer and Startz, *Macroeconomics*, McGraw Hill, 11th edition, 2010.
- 3) Hal R. Varian, *Intermediate Microeconomics, a Modern Approach, 8th edition*, W.W. Norton and Company/Affiliated East-West Press (India), 2010.
- 4) Kumar, Raj and Gupta, Kuldip (2011). *Modern Micro Economics: Analysis and Applications*, UDH Publishing House.
- 5) Samuelson, P & Nordhaus, W. (1st ed. 2010) *Economics*, McGraw Hill education.
- 6) Salvatore, D. (8th rd. 2014) *Managerial Economics in a Global economy*, Oxford University Press.
- 7) <http://www.learnbse.in/important-questions-for-class-12-economics-consumers-equilibrium-through-utility-approach/>
- 8) <https://www.meritnation.com/ask-answer/question/explain-the-conditions-of-consumer-s-equilibrium-in-case-of/theory-of-consumer-behaviour/2323428>
- 9) <http://economicsconcepts.com/derivation-of-the-demand-curve.htm>
- 10) <http://www.vourarticlelibrary.com/economics/consumer-surplus-meaning-measurement-critical-evaluation-uses-and-application/36842>

4.12 ANSWERS OR HINTS TO CHECK YOUR PROGRESS EXERCISES

Check Your Progress 1

- 1) Study Section 4.2 and answer
- 2) 1. 20 2. 16 3. 10 4. 4 5. 0 6. -6

Check Your Progress 2

- 1) Completeness, Transitivity and more is preferred to less.
- 2) Consumer preference are the first step for determining consumer behaviour. Consumer behaves according to his preferences and budget constraint.

Check Your Progress 3

- 1) Study Section 4.5 and answer
Marginal utility is zero when total utility is maximum

Check Your Progress 4

- 1) A consumer buys a quantity of commodity when Marginal utility is equal to price of that good.
- 2) Study Sub-section 4.6.1 and answer

Check Your Progress 5

- 1) Consumer Equilibrium is the difference between what customer is willing to pay and what he actually pays. So consumer surplus is Rs. 2
- 2) Study Section 4.9 and answer