2 Utility Analysis

Let's recall :

1) Want denotes a feeling of lack of satisfaction.
2) Wants are unlimited.
3) They are recurring in nature.
4) They differ with age, gender, seasons, habits and culture.
5) Utility is the capacity of a commodity to satisfy human wants. In other words, utility is the want satisfying power of a good.

Introduction :

You have been already introduced to the concept of utility in class XI. This unit gives a detailed explanation of consumer's behaviour.

In practice, every individual tries to satisfy his wants with available resources. It is true that all human wants cannot be satisfied fully at a specific time. Utility analysis explains a consumer's behaviour in relation to maximization of satisfaction.

Try this :

1) Make a list of 10 commodities which satisfy your wants.
2) Make a list of 10 commodities which satisfy the wants of particular individuals performing specific activities. For example, A chalk has utility for a teacher.

Features of Utility :

Following are the features of utility :

1) **Relative concept :** Utility is related to time and place. It varies from time to time and place to place. For example, (i) woollen clothes have a greater utility in the winter. (ii) sand has greater utility at the construction site than at the sea shore.
2) **Subjective concept :** It is a psychological concept. Utility differs from person to person. This is due to differences in taste, preferences, likes, dislikes, nature, habits, profession etc. For example, stethoscope has utility to a doctor but not to a layman.
3) **Ethically neutral concept :** The concept of utility has no ethical consideration. It is a morally colourless concept. The commodity should satisfy any want of a person without consideration of what is good or bad, desirable or undesirable. For example, a knife has utility to cut fruits and vegetables as well as it can be used to harm someone. Both wants are of different nature but are satisfied by the same commodity. Thus, utility is ethically neutral.
4) **Utility differs from usefulness :** Utility is the capacity of a commodity to satisfy human wants, whereas usefulness indicates value in use of the commodity. For example, milk has both utility as well as usefulness to a consumer, while liquor has utility only to an addict, but has no usefulness.
5) **Utility differs from pleasure :** A commodity may possess utility but it may not give any pleasure to the consumer. For example, injection for a patient has utility because it cures the ailment but it hardly gives any enjoyment or pleasure to him.
6) **Utility differs from satisfaction :** Utility is a cause of consumption, satisfaction is the end result of consumption. They are interrelated but still different concepts. For example, a thirsty person drinks a glass of water since water has the capacity to satisfy thirst. Utility of water is the cause of consumption and the satisfaction derived is the end result of consumption.

7) **Measurement of utility is hypothetical :** Utility is an abstract concept. Cardinal or numerical measurement of utility is not possible. For example, a thirsty person after drinking water, may derive higher or lower level of utility. Thus, utility can only be experienced and found either positive, zero or negative. Negative utility is called disutility.

8) **Utility is multi-purpose :** A commodity can satisfy the want of more than one person, it can also be put to several uses. For example, electricity can be used to serve many purposes and for many people at some point of time.

9) **Utility depends on the intensity of want :** Utility depends on the intensity of a want. More intense the want, greater will be the utility. As and when the urgency of want declines, utility diminishes. For example, a hungry person finds more utility in food, than a person who is not hungry.

10) **Utility is the basis of demand :** A person will demand a commodity only if it gives utility to him. For example, a sick person has utility in medicines hence, he demands medicines.

Types of Utility :

Following are some of the different types of utility

1) **Form utility :** When utility is created due to a change in the shape or structure of an existing material, it is called form utility. For example, toys made of clay, furniture from wood etc.

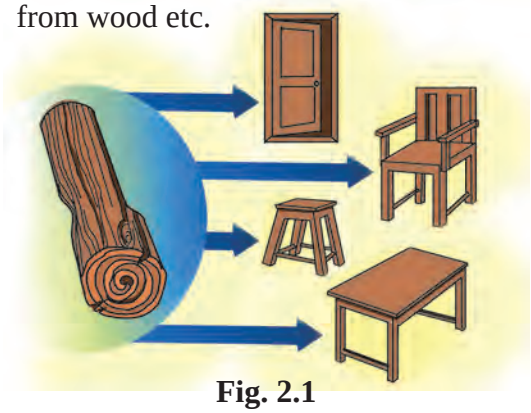


Fig. 2.1

2) **Place utility :** When utility of a commodity increases due to a change in its place, it is called place utilities. For example, woollen clothes have more utility at cold places than at warm places. Transport creates place utility.

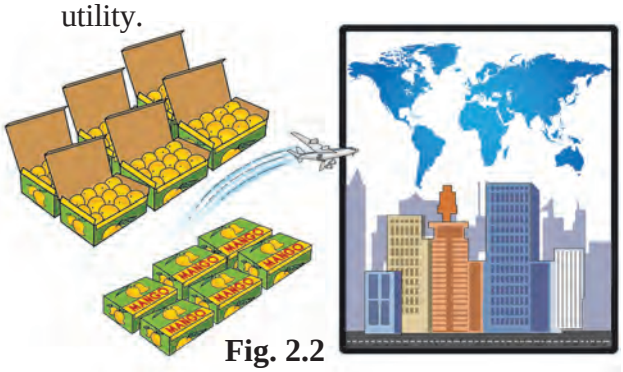


Fig. 2.2

3) **Service utility :** Service utility arises when personal services are rendered by various professionals. For example, services of doctors, teachers, lawyers etc.

Fig. 2.3

4) **Knowledge utility :** When a consumer acquires knowledge about a particular product, it is called knowled uitility. For example, utility of a mobile phone or a computer increases when a person knows about its various functions.

Fig. 2.4

5) **Possession utility :** Possession utility arises when the ownership of goods is transferred from one person to another. For example, transfer of goods from the sellers to the buyers.

Fig. 2.5

6) **Time utility :** When the utility of a commodity increases with a change in its time of utilization, it is called time utility. For example, a student has more utility for text books during examinations than in the vacations. Time utility is also observed when goods are stored and used at the time of scarcity. For example, Blood bank.

Fig. 2.6 A

Try this :

Following are the various types of utility and their respective examples. Arrange the information in the form of pairs:

Types of utility : Time utility, possession utility, service utility and place utility.

Examples : 1) A dentist giving dental treatment to a patient.

2) A mountaineer using oxygen cylinder at a high altitude.

3) A farmer selling rice stored in the warehouse at the end of the season.

4) A retail trader purchasing 100 chairs from the wholesale trader.

Concepts of Utility :

Following are the two main concepts of utility :

1) **Total Utility (TU) :** Total utility refers to the aggregate of utility derived by the consumer from all units of a commodity consumed. It is an aggregate of utilities from all successive units of a commodity consumed.

2) **Marginal Utility (MU) :** Marginal utility refers to the additional utility derived by a consumer from an additional unit of a commodity consumed. In other words, it is the addition made by the last unit of a commodity consumed.

Fig. 2.6 B

Fig. 2.6 C

Fig. 2.6 D

You should know :

Formulae explaining the relationship between total utility and marginal utility :

$TU = \Sigma MU$ or

$TU = MU_1 + MU_2 + MU_3 \ldots\ldots\ldots + MU_n$

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

Where TU = Total Utility

MU = Marginal Utility

MU_1, MU_2, MU_3 = Marginal Utility of each unit.

MU_n = Marginal Utility of n^{th} unit.

TU_n = Total Utility at n^{th} level.

$TU_{(n-1)}$ = Total Utility at previous level.

Relationship between Total Utility and Marginal Utility :

Marginal utility derived from various units of a commodity and its total utility are interrelated. This can be easily followed from the hypothetical example given in the table 2.1

Table 2.1 Utility Schedule

Units of *x*	Total utility	Marginal utility
1	10	10
2	18	8
3	24	6
4	28	4
5	30	2
6	30	0
7	28	–2

Table 2.1 explains the relationship between total utility and marginal utility.

On the basis of Table 2.1 Total utility and Marginal Utility curves (TU and MU) can be derived with the following diagram.

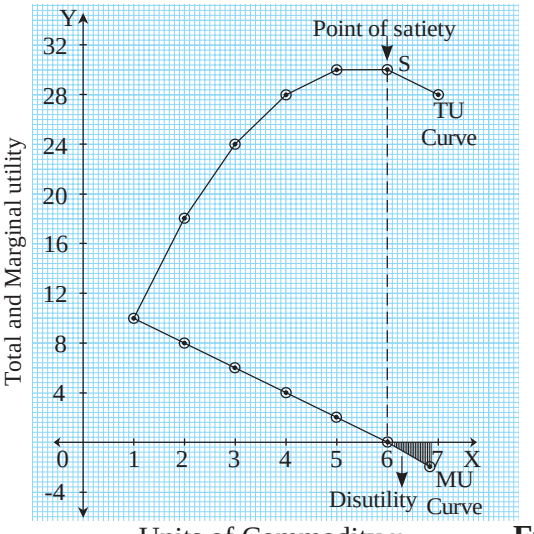


Fig. 2.7

TU Curve = Total Utility Curve

MU Curve = Marginal Utility Curve

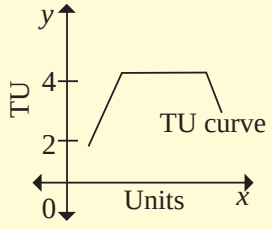
X axis measures the units of the commodity consumed while Y axis indicates the figures of total and marginal utility.

Fig. 2.7 shows that total utility curve slopes upwards whereas marginal utility curve slopes downwards. Marginal utility curve shows zero and negative levels of marginal utility whereas total utility curve shows maximum and constant total utility level.

1) Total utility and marginal utility of the very first unit of *x* consumed, are the same.
2) As the consumer consumes further units of *x*, the total utility increases at a diminishing rate and marginal utility goes on diminishing. (TU↑ MU↓)
3) At a particular stage, total utility reaches to its maximum and remains constant whereas marginal utility becomes zero. This is called the point of satiety. (TU highest, MU = 0)
4) After this point, any additional unit consumed further results in a decline in the total utility, while marginal utility becomes negative. (TU↓ MU negative)
5) After reaching the point of satiety, a rational consumer should stop his consumption since the maximum limit of satisfaction is reached and there is no addition to total utility by any further increase in the stock of a commodity.
6) Consumption beyond the point of satiety transforms satisfaction into dissatisfaction. In other words, a consumer starts experiencing ill effects of consumption.

Try this :

Complete the following chart with proper statement and bring about the difference between the two concepts i.e total utility and marginal utility.

Total Utility	Marginal Utility
1) Total utility is the sum total of the individual utilities derived from the consumption of a single unit of good.	1) Marginal utility is the addition made to the total utility from every additional unit consumed.
2) Total utility increases at a diminishing rate.	2)
3)	3) At the point of satiety MU = O
4) Total utility declines if consumption continues.	4)
5) Total utility determines value in use of a commodity.	5)
6)	6) Marginal utility can be positive, negative, zero.
7) Diagram : 	7) Diagram :

Law of Diminishing Marginal Utility :

Introduction :

This law was first proposed by Prof. Gossen but was discussed in detail by Prof. Alfred Marshall in his book 'Principles of Economics' published in 1890.

The law of diminishing marginal utility is universal in character. It is based on the common consumer behaviour that utility derived diminishes with the reduction in the intensity of a want.

Statement of the Law :

According to Prof. Alfred Marshall, "Other things remaining constant, the additional benefit which a person derives from a given increase in his stock of a thing, diminishes with every increase in the stock that he already has."

In other words, marginal utility that any consumer derives from successive units of a particular commodity goes on diminishing as his or her total consumption of that commodity increases. In short, the more of a thing you have, the less you want to have more of it.

Assumptions :

Following are the assumptions of the law of diminishing marginal utility :

1) **Rationality :** Consumer is assumed to be rational. It means that his behaviour is normal and he tries to maximize his satisfaction.

2) **Cardinal measurement :** The law assumes that utility can be cardinally or numerically measured. Hence, mathematical operations are easily possible to know and compare the utility derived from each unit of a commodity.

3) **Homogeneity :** All units of a commodity consumed are exactly homogeneous or identical in size, shape, colour, taste etc.

4) **Continuity :** All units of commodity are consumed in quick succession without any lapse of time.

5) **Reasonability :** All the units of a commodity consumed are of reasonable size. They are neither too big nor too small.

6) **Constancy :** All the related factors like income, tastes, habits, choices, likes, dislikes of a consumer should remain constant. Marginal utility of money is also assumed to be constant.

7) **Divisibility :** The law assumes that the commodity consumed by the consumer is divisible so that it can be acquired in small quantities.

8) **Single want :** A given commodity can satisfy a single want of a person. The law

assumes an experience of a single want which is completely satiable at a given point of time.

Table 2.2 explains the Law of Diminishing Marginal Utility.

Table : 2.2

Units of *x*	Marginal Utility (MU)
1	10
2	8
3	6
4	4
5	2
6	0
7	–2

The table shows that marginal utility keeps on diminishing with increase in consumption, further it becomes zero and then negative.

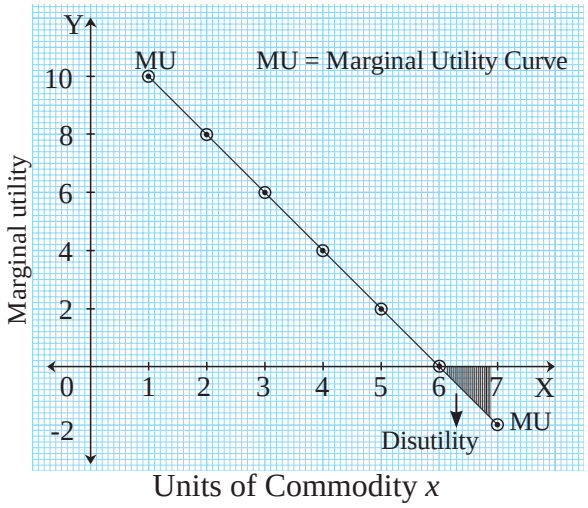


Fig. 2.8

Explanation of the Diagram :

In the above diagram, units of commodity *x* are measured on X axis and marginal utility is measured on Y axis. Various points of MU are plotted on the graph as per the given schedule. When the locus of all the points is joined, MU curve is derived.

MU curve slopes downwards from left to right which shows that MU goes on diminishing with every successive increase in the consumption of a commodity.

When MU becomes zero, MU curve intercepts the X axis. Further consumption of a commodity brings disutility (negative utility) which is shown by the shaded portion in the diagram.

Exceptions to the Law of Diminishing Marginal Utility :

Following are the exceptions to the law of diminishing marginal utility :

1) **Hobbies :** In certain hobbies like collection of various stamps and coins, rare paintings, music, reading etc., the law does not hold true because every additional increase in the stock gives more pleasure. This increases marginal utility. However, this violates the assumption of homogeneity and continuity.

2) **Miser :** In the case of a miser, every additional rupee gives him more and more satisfaction. Marginal utility of money tends to increase with an increase in his stock of money. However, this situation ignores the assumption of rationality.

3) **Addictions :** It is observed in case of a drunkard that the level of intoxication increases with every additional unit of liquor consumed. So MU received by drunkard may increase. Actually it is only an illusion. This condition is similar to almost all addictions. However, this violates the assumption of rationality.

4) **Power :** This is an exception to the law because when a person acquires power, his lust for power increases. He desires to have more and more of it. However, this again violates the rationality assumption.

5) **Money :** It is said that the MU of money never becomes zero. It increases when the stock of money increases. This is because money is a medium of exchange which is used to satisfy various wants. However, according to some economists, this law is applicable to money too. For example, marginal utility of money is more to a poor person than to a rich person.

However, these, exceptions are only apparent. Since they violate some or the other assumptions of the law and hence, they are not real exceptions.

Criticisms of the Law :

The law of diminishing marginal utility is criticised on the following grounds.

1) **Unrealistic assumptions :** The law of diminishing marginal utility is based upon various assumptions like homogeneity, continuity, constancy, rationality etc. but in reality it is difficult to fulfil all these conditions at a point of time.

2) **Cardinal measurement :** The law assumes that utility can be expressed cardinally so it can be added, compared and presented through a schedule. In reality cardinal measurement of utility is not possible because utility is a psychological concept.

3) **Indivisible goods :** The law is not applicable to indivisible and bulky goods like refrigerator, car, TV sets etc. which are normally purchased in single unit at a time.

4) **Constant marginal utility of money :** The law assumes that MU of each unit of money remains constant. However, critics argue that MU of money differs from person to person. It is influenced by changes in prices, stock of money etc.

5) **A single want :** The law is restricted to the satisfaction of a single want at a point of time. However, in reality, a man has to satisfy many wants at a point of time.

Significance of the Law :

In spite of the criticisms, the law of diminishing marginal utility is a very popular and an important law in Economics because of its universal application.

1) **Usefulness to the consumers :** This law creates awareness among the consumers. To obtain maximum utility from the limited resources, it is necessary to 'diversify' the consumption.

2) **Useful to the government :** The law is useful to the government in framing various policies such as progressive tax policy, trade policy, pricing policy etc.

3) **Basis of paradox of values :** The law of diminishing marginal utility helps us to understand the paradox of values. It includes goods that have more value-in-use and zero or less value-in-exchange such as air, water, sunshine etc. as well as goods that have more value-in-exchange and less value-in-use such as gold, diamonds etc.

4) **Basis of law of demand :** The law of demand is based on the law of diminishing marginal utility. According to the law of demand, the quantity demanded of a good rises with a fall in price and falls with an increase in price. When a consumer purchases more and more units of a good, its marginal utility steadily declines. Hence, he would buy additional units of a commodity only at a lower price.

Try this :

Write an informative note on paradox of values along with examples.

Relationship between Marginal Utility and Price :

Let us discuss the relationship between marginal utility and price in order to understand how the law of diminishing marginal utility forms the basis of law of demand. It is a perfect example of practical application of the law of Diminishing Marginal Utility (DMU).

To understand the relation, it is essential to convert marginal utility in terms of money so that it can be compared with market price.

Let us assume : One unit of marginal utility = ₹ 10.

Market price per unit of x = ₹ 50.

Table 2.3

No of units	MU/ units of *x*	MU in terms of money 1unit = ₹ 10	Market price/unit of *x* = ₹ 50	Comparison between MU and price
1	10	100 (10 × ₹10)	₹ 50	100 MU> ₹50
2	8	80 (8 × ₹ 10)	₹ 50	80 MU> ₹50
3	7	70 (7 × ₹ 10)	₹ 50	70 MU> ₹50
4	5	50 (5 × ₹ 10)	₹ 50	50 MU = ₹50
5	3	30 (3 × ₹ 10)	₹ 50	30 MU< ₹50
6	1	10 (1 × ₹ 10)	₹ 50	10 MU< ₹50

Table 2.3 explains the relationship between marginal utility (MU) and price.

The table shows that a consumer starts buying units of commodity *x* for his consumption, one after the other. Marginal utility which is added to his stock goes on diminishing with every further unit consumed. When MU is converted in terms of money, one can easily compare it with market price which is shown in the column 5 of the table 2.3

For the first three units consumed, it is found that marginal utility in terms of money is greater than the price paid. A rational consumer will willingly buy these units since the benefit derived is more than the price paid. At the 4^{th} unit marginal utility and price become equal. So the consumer can also think of buying the 4^{th} unit. In the case of 5^{th} and 6^{th} units, marginal utility derived is less than the market price paid. A rational consumer will not buy further once the equality between marginal utility and price is established.

From the given table 2.3, following inferences can be made with reference to marginal utility and price :

1) Units which a consumer willingly buys because MU is greater than price are called "Intra-marginal units" (MU*x*>P*x*)
2) Unit at which MU becomes equal with market price is "marginal unit". (MU*x*=P*x*) = Consumer's equilibrium
3) Units which a rational consumer is not willing to buy and consume where he has to pay more than the MU are called "Extra-marginal units." (MU*x*<P*x*)

Thus, a rational consumer attains equilibrium where MU*x*=P*x*. This relationship between marginal utility and price paved way for law of demand.

Do you know?

Two English Economists, J. R. Hicks and R. G. D. Allen were the main exponents of 'Indifference Method'. It was evolved to supersede cardinal utility analysis given by Prof. Alfred Marshall. Indifference curve analysis adopts the concept of ordinal utility.

J R Hicks

R.G.D Allen

An indifference curve is the locus of points indicating particular combinations of two goods from which the consumer derives the same level of satisfaction. As a result, he is indifferent to the particular combination that he consumes.

EXERCISE

Q. 1. A) Complete the following statements by choosing the correct alternatives.

1) In the law of diminishing marginal utility, Alfred Marshall assumes that marginal utility of money…….
   a) increases b) remains constant
   c) decreases d) rises and then falls

2) As per the law of diminishing marginal utility, measurement of utility is assumed to be …….
   a) ordinal
   b) cardinal
   c) both ordinal and cardinal
   d) none of the above

3) MU of the commodity becomes negative when TU of a commodity is ……
   a) rising b) constant c) falling d) zero

4) Point of Satiety means …….
   a) TU is rising and MU is falling
   b) TU is falling and MU is negative
   c) TU is maximum and MU is zero
   d) MU is falling and TU is rising.

5) When MU is falling, TU is…….
   a) rising b) falling
   c) not changing d) maximum

Q. 2. Choose the correct option :

1)

A	**B**
1) Time utility	a) Transport
2) Place utility	b) Blood Bank
3) Service utility	c) Mobile phone
4) Knowledge utility	d) Doctor

Options :

i) 1-d, 2-b, 3-a, 4-c ii) 1-b, 2-a, 3-d, 4-c
iii) 1-a, 2-b, 3-c, 4-d iv) 1-b, 2-c, 3-d, 4-a

2) Statments indicating consumer equilibrium :
   a) MU is greater than price
   b) MU is equal to price
   c) MU is less than price
   d) Price is less than one

Options :

i) a and b ii) a, b, c and d
iii) a, b and c iv) only b

Q. 3. Identify and explain the concepts from the given illustration :

1) Salma purchased sweater for her father in winter season.
2) Nilesh purchased ornaments for his sister.
3) Kavita consumed five units of oranges one after the other.
4) Bhushan refused to eat fifth chapati after eating four chapatis.
5) Lalita satisfied her want of writing on essay by using pen and notebook.

Q. 4. Observe the given table and answer the questions:

Unit of a commodity	TU units	MU units
1	6	6
2	11	5
3	15	4
4	15	0
5	14	–1

1) Draw total utility curve and marginal utility curve.
2) a) When total utility is maximum marginal utility is ☐
   b) When total utility falls, marginal utility becomes ☐

Q. 5. Answer in detail :

1) State and explain the law of diminishing marginal utility with exceptions.

❍❍❍