CHAPTER 1   **THEORY OF CONSUMER BEHAVIOUR**

Structure

1.0   Objectives

- To know the concept of utility
- To understand the relationship between total utility and marginal utility
- To analyse the law of diminishing marginal utility
- To comprehend the law of Equi-marginal utility

1.1 Introduction

There are three approaches to analyse consumer behavior.

1.   Marginal Utility Approach
2.   Indifference Curve Approach
3.   Revealed Preference Approach

1.2 Meaning of Utility

Utility is power of a commodity to satisfy human wants. It is subjective and introspective concept. It is subjective and relative concept. It varies with persons, time and places. It is not internal quality of a commodity rather the mental makeup of a person and intensity of wants that determine the amount of satisfaction a person derives from a commodity at particular place and at particular time period. For example, some people like cold drink while others do not like same way. Secondly, utility is different from usefulness. A commodity may not be useful; it may have utility for some people. For example, liquor is harmful for health; it may have high utility for alcoholic. Further, utility has no moral or legal significance. It is ethically neutral.

1.2.1 Cardinal and Ordinal Utility

There are two approaches to measure utility. Cardinalists (neo-classicists) assume that utility is measurable and quantifiable entity. It can be measured in numerical terms and hence can be compared. Prof. Asimakipulas said that cardinal utility function makes it possible to measure utility, at least conceptually, in the same manner that thermometers measures temperature or scales measure mass. The units of measurement are imaginary; they are called units or utils. If the utility of an apple is 40 utils and that of orange is 20 utils, then we can say that apple has twice as much utility as orange. Since utils is an imaginary unit, it may not be used for empirical purpose, Marshal suggested to measure utility in terms of money. He said that the amount of money a person is ready to pay to obtain a unit of a commodity is utility of that commodity.

The proponents of ordinal school like Allen and Hicks argue that utility derived from a commodity cannot be measured, much less compared. One can simply say that apple gives more utility than orange. One cannot say by how much amount, apple gives more utility than orange. Thus, according to this approach, we can order or rank utility derived from different commodities but cannot quantify it.

1.2.2 Total Utility and Marginal Utility

Total utility is the amount of utility derived from the consumption of all the units of a commodity. In other words, total utility is sum of utility derived from each unit of a commodity consumed. For example, if the consumer consumes n units of a commodity, total utility will be aggregate of utilities derived from all the n units of that commodity.

Total utility $= U_1 + U_2 + U_3 + \text{-------} + U_n$

Where U_1, U_2 etc are utilities derived from different units of commodity.

Marginal utility is utility derived from last unit of a commodity consumed. It refers to change in total utility brought about by one unit change in amount of that commodity. It is measured by difference between total utility of n units and total utility of n-1 units of a commodity.

Marginal Utility (MU) $=$ Total utility of n units of a commodity $-$ Total utility of $n-1$ units of a commodity

This definition or method of measurement is valid when amount of commodity is changed by one unit. However, if amount changes not by one unit but by different units, we define marginal unit as the rate of change in total utility caused by small given change in quantity of that commodity. It is measured as ratio of change in total utility and change in amount of commodity.
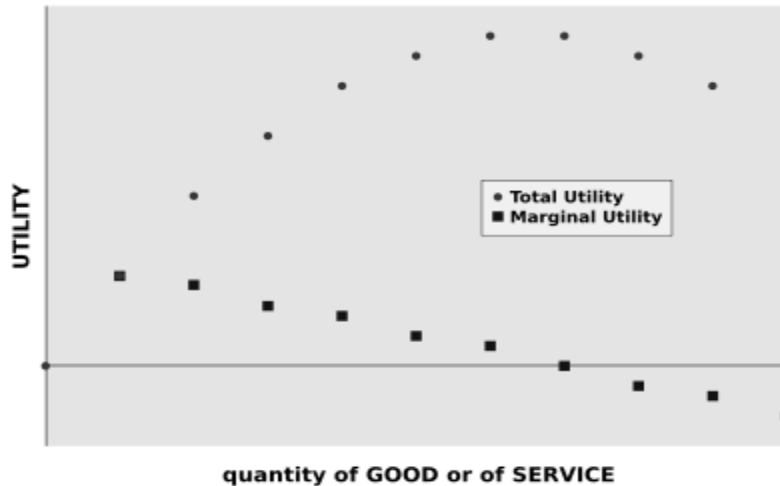
Marginal Utility (MU) $= \dfrac{\text{change in total utility}}{\text{change in amount of commodity}}$

$$MU_x = \frac{dU_x}{dQ_x}$$

Here MU_x represents the marginal utility of commodity x; dU_x represents change in total utility of x; and dQ_x stands for change in amount of commodity x.

Relationship between Total Utility and Marginal Utility

i.   So long as marginal utility is positive, total utility increases.

ii.   When marginal utility is zero, total utility reaches maximum. This is called point of satiety.

iii. When marginal utility is negative, total utility declines.

Figure: 1.1: Relationship between Total Utility and Marginal Utility

Table 1.1: Relationship between Total Utility and Marginal Utility

Units of commodity No. of mangoes	Total Utility (TU)	Marginal Utility (MU)
1	8	8
2	14	6
3	16	2
4	16	0
5	14	(-) 2

The relationship between total utility and marginal utility has been shown in the above table 1.1 and figure 1.1. The table shows that unit 3rd unit of commodity the marginal utility is positive and total utility increases from 3 to 16. At 4th unit, marginal utility is zero and total utility is maximum. After 4th unit, marginal unit becomes negative and total utility declines from 16 to 14. Same relationship has been shown in figure 1.1.

1.3   Law of Diminishing Marginal Utility

A psychological generalisation that the perceived value of, or satisfaction gained from, a good to a consumer declines with each additional unit acquired or consumed. Even the most delicious food, for example, will appeal less and less to its consumer when he or she has had enough, and if consumption continues, sickness (disutility) will result.

The law can be traced back to the writings of Gossen and Bentham. It was, however, William Stanley Jevons who for the first time projected its bearing on the determination of value.

According to this law, as a person purchases more and more units of a commodity, its marginal utility declines. According to Boulding, "As a consumer increases the consumption of any one commodity, keeping constant the consumption of of all other commodities, the marginal utility of variable commodity must decline." Thus the law says that as a consumer takes more units of a good, the extra extra utility or satisfaction that he derives from an extra unit of the good (marginal utility) goes on falling. Total utility increases but at a decreasing rate.

The law is based upon two important facts. Firstly, while the total wants of a man in unlimited, each single want is satiable. With increase in consumption of particular good, the intensity of that particular want diminishes, hence marginal utility of that good decrease. Secondly, different goods are not perfect substitute for each other in the satisfaction of various particular wants. When an individual consumes more and more units of a good, the intensity of his particular want for the good diminishes but if the units of that good could be devoted to the satisfaction of other wants and yielded as much satisfaction as they did initially in the satisfaction of first want, marginal utility of the good would not have diminished.

Assumptions:

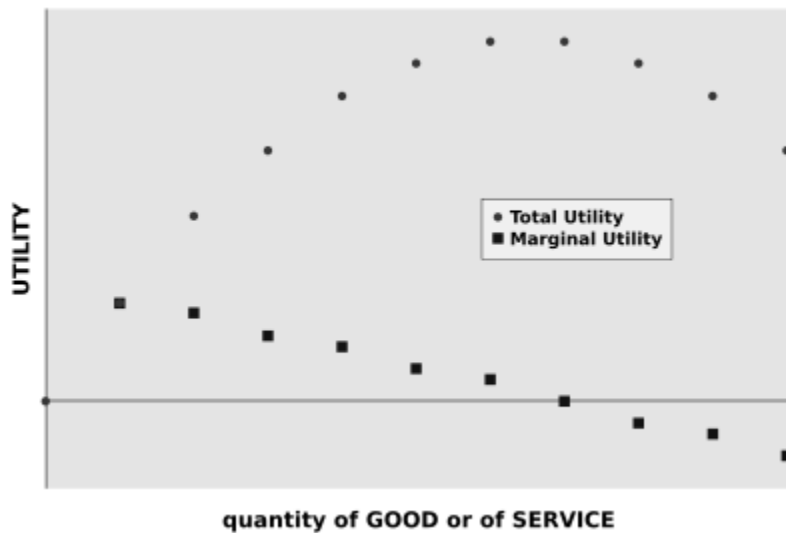The assumptions of the law of diminishing marginal utility are:

1. All the units of the given commodity are homogenous i.e. identical in size shape, quality, quantity etc.
2. The units of consumption are of reasonable size. The consumption is normal.
3. The consumption is continuous. There is no unduly long time interval between the consumption of the successive units.
4. The law assumes that only one type of commodity is used for consumption at a time.
5. Though it is psychological concept, the law assumes that the utility can be measured cardinally i.e. it can be expressed numerically.
6. The consumer is rational human being and he aims at maximum of satisfaction.
7. The mental condition of the consumer should remain same.
8. The taste, habits, fashion, temperament and income remain the same.

Illustration of the Law of Diminishing Marginal Utility

Consider table no. 1.2 in which total utility and marginal utility derived by a person from mangoes consumed have been presented. When first mango is consumed, total utility and marginal utility is 8. With the consumption of second mango, total utility rises to 14 but marginal utility declines to 6. As amount of mango increases, total utility rises but at a decreasing rate until fourth unit, when total utility reaches maximum. This point is called point of satiety. After that when a consumer consumes fifth unit, total utility declines and marginal utility becomes negative.

Table 1.2: Relationship between Total Utility and Marginal Utility

Units of commodity (No. of mangoes)	Total Utility (TU)	Marginal Utility (MU)
1	8	8
2	14	6
3	16	2
4	16	0
5	14	(-) 2

Figure: 1.2: Relationship between Total Utility and Marginal Utility

Above table has also represented in figure 1.2. With increase in amount of mango the total utility curve slopes upward up to certain point and then declines. The marginal utility curve goes on declining throughout and even falls below the X-axis showing that marginal utility declines with increase in amount of mangoes and reaches even negative. So long as the MU curve lies

above X-axis, total utility curve rises. When marginal utility curve touches X-axis showing zero marginal utility, total utility curve reaches maximum. When MU curve goes below X-axis, showing negative marginal utility, total utility declines.

Exceptions to the Law of Diminishing Marginal Utility

There is no real exception to the law of diminishing marginal utility.

1. **Hobbies:** It is pointed out that in case of certain hobbies like stamp collection or old coins, every addition unit gives more pleasure. MU goes on increasing with the acquisition of every unit. However careful analysis shows that the person does not like to spend more money on same type of coins etc.
2. **Drunkards:** It is believed that every dose of liquor increases the utility of a drunkard. And diminishing marginal utility does not apply. However, had the law not applied, the drunkard would have continued to drink.
3. **Miser:** In the case of miser, greed increases with the acquisition of every additional unit of money.
4. **Reading:** reading of more books gives more knowledge and in turn greater satisfactions.
5. **Money:** it is said that the law does not apply in the case of money also. But we find that a rich person has less utility for last one rupee than what the poor person has.

Importance of Law of Diminishing Marginal Utility

The marginal utility analysis has a good number of uses and applications.

1. Explanation of the Determination of Prices: The theory helps in explaining why the prices of some commodities are high and low of others and thus able to explain the water-diamond paradox or paradox of value which troubled Adam Smith. According to modern economists, it is marginal utility and not the total utility which determine the price of commodity. Water is available in abundant quantities and its relative marginal utility Is very low and even zero. Therefore, its price is very low or zero. On the other hand, the diamonds are scarce and therefore their marginal utility and hence their relative price is very high.

2. Explanation of Law of Demand: In order to maximize total utility consumer equates the marginal utility with its price. Since at larger amount the marginal utility is low. So consumer would like to pay less price and vice versa.

3. Fiscal Policy: In modern welfare state, in order to increase the social welfare the government tries to redistribute income of the society from rich to poor. This is based on the assumption that marginal utility of rich people is less than that of poor people. So government imposes progressive taxes on rich section of society and spends the tax proceeds on poor section of society.

1.4 Law of Equi-Marginal Utility Analysis

The Law of equi-marginal utility is another fundamental principle of Economics. This law is also known as the Law of substitution or the Law of Maximum Satisfaction. It is also known as Gossen's second law. We know that human wants are unlimited whereas the means to satisfy these wants (income) is limited. It, therefore, becomes necessary that he spends his income in such a way that gives a consumer maximum satisfaction. This law is one of the principles that gives a guideline to distribute his income on different uses so that he may maximize his total satisfaction.

The law has been stated by Marshall in following words: "If a person has a thing which can be put in different uses, he will distribute it among these uses in such a way that it has the same marginal utility, for it had a greater marginal utility in one use than in another he would gain by taking away some of it from the second use and applying it to the first.

Assumptions of the Law of Equi-Marginal Utility:

1. Consumer is rational so he tries to maximise satisfaction
2. The income of consumer is fixed
3. The prices of the goods remain constant
4. The marginal utility of money is constant
5. The utility is measurable in cardinal terms
6. Consumer has perfect knowledge of utility obtained from goods
7. Consumer has many wants

Explanation of the Law

      Suppose there are two goods X and Y on which a consumer has to spend a given income. The law of equi-marginal utility states that in order to maximize total satisfaction the consumer will distribute his income between the two goods in such a way that utility derived from last rupee spent on each good is equal. Now the marginal utility of money expenditure on a good is equal to the marginal utility of good divided by the price of the good. In symbols,

$$MU_e = \frac{MU_x}{P_x}$$

      Where MU_e is marginal utility of money expenditure; MU_x is marginal utility of good X and P_x is price of good X. The law of equi-marginal utility can therefore be stated thus: the consumer will spend his money income on different goods in such a way that marginal utility of each good is proportional to its price. That is a consumer is in equilibrium in respect of two goods X and Y when

$$\frac{MU_x}{P_x} = \frac{MU_y}{P_y}$$

      Now, if $\frac{MU_x}{P_x}$ is not equal to $\frac{MU_y}{P_y}$ and if $\frac{MU_y}{P_y}$ is less than $\frac{MU_x}{P_x}$ then the consumer will substitute good X for good Y. As a result of this substitution, the marginal utility of X will decrease and that of good Y will rise. The consumer will continue substituting X for Y until $\frac{MU_x}{P_x}$ and $\frac{MU_y}{P_y}$ will become equal. When this happens the consumer will be in equilibrium. But this equilibrium will not be unique in the sense that such equality will be achieved at various levels of expenditure. Which of these combinations of two goods he will purchase depends upon size of his income. With a given level of income a rupee has certain utility which is marginal utility of money. Since the law of diminishing marginal utility also applies on money income also, a given level of income will have a particular marginal utility of money (MU_m). Now, the consumer will go on purchasing goods till the marginal utility of money of expenditure becomes equal to marginal utility of money to him. Thus the consumer will be in equilibrium when the following equation holds good:
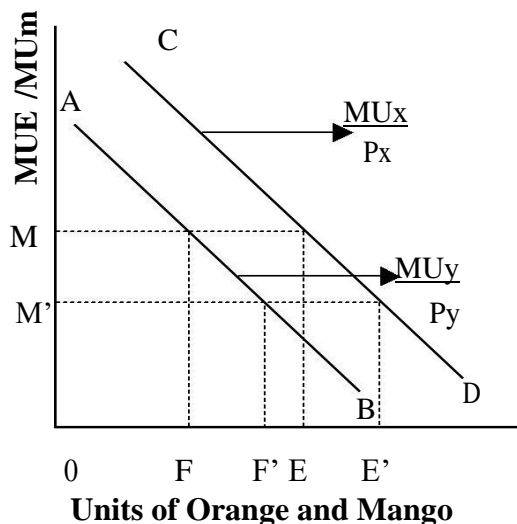
$$\frac{MU_x}{P_x} = \frac{MU_y}{P_y} = MU_m$$

      If consumer spends on more than two goods the above equations must hold for all of them.

Let us illustrate the law of equi-marginal utility with the help of a table given below: With a given income (Rs.19) of the consumer, suppose, his marginal utility of money is constant at Re.1 = 6 utils. Suppose the price of orange (X) is re 2 per unit and price of mango (Y) is re 3 per unit. By looking at Table 1.3, it is clear that, $\frac{MU_x}{P_x}$ is equal to 6 utils when the consumer buys 5 units of orange (X); and $\frac{MU_y}{P_y}$ is equal to 6 utils when he purchases 3 units of mango (Y). Thus, the consumer will be in equilibrium when he is buying 5 units of orange (X) and 3 units of mango (Y) and will be spending (Rs.2 x 5) + (Rs.3 x 3) = Rs.19 on them.

Table 1.3: Marginal Utilities of Goods X and Y and Money Expenditure on X and Y

Units	MU$_x$	MU$_y$	MU$_x$/P$_x$ (P$_x$= Re 2/unit)	MU$_y$/P$_y$ (P$_3$= Re 3/unit)
1	20	24	10	8
2	18	21	9	7
3	16	18	8	6
4	14	15	7	5
5	12	9	6	3
6	10	3	5	1

Units of Orange and Mango
Figure 1.3: Equilibrium under Law of Equi-Marginal Utility

Consumer's equilibrium is graphically given in Fig 1.3. Since marginal utility curves of goods slope downward, curves depicting and will also slope downward. Taking the income of the consumer as given, let his marginal utility of money be constant at OM units. $\frac{MU_x}{P_x}$ is equal to OM (the marginal utility of money) when OE (5) units of orange (X) are purchased. $\frac{MU_y}{P_y}$ is equal to OM when OF(3) units of mango (Y) is purchased. Thus, when the consumer is buying OE of X and OF of Y, then following conditions are fulfilled:

$$\frac{MU_x}{P_x} = \frac{MU_y}{P_y} = MU_m$$

No other allocation of money expenditure will yield greater utility than what he is buying, i.e., OE of X and OF of Y. If, now, the money income of the consumer increases, his marginal utility of money is equal to OM', then the consumer will increase the purchase of good X and Y to OE' and OF' respectively. If now money income of the consumer increases, the marginal utility of money will fall. Suppose it falls to OM' then the consumer will increase the purchases of goods X and Y to OF' and OE' respectively.

Limitations of the Law of Equi-Marginal Utility

1. For applying this law, a consumer has to calculate and compare the marginal utilities obtained from different commodities. But, consumers are generally governed by their habits and customs and they spend on different commodities regardless of whether the particular allocation maximizes their satisfaction or not.
2. The law assumes that all commodities are divisible into very small parts. But, there are goods like car, dairy animal etc., which are indivisible. In such cases, the law cannot be applied.
3. This law is based on the unrealistic assumptions such as absolute measurement of utility and constant marginal utility of money. Utility is a mental phenomenon and it is not absolutely measurable. Again, with every decrease in the stock of money with consumer, marginal utility of money will not remain constant but it will increase.

Application of the Law of Equi-Marginal Utility

1. **Consumption:** The consumer gets maximum satisfaction through the substitution of a commodity of greater utility for the one that has lesser utility.

2. **Production:** This law helps the farmer in optimum allocation of resources. He will produce a commodity most economically by substituting one factor for another till their marginal productivities become equal. For instance, if the marginal productivity of human labour is greater than that of capital, the farmer will substitute the former for the latter.

3. **Distribution of commodities:** The law of equi-marginal utility helps to bring about the optimum distribution of commodities among the members of the community. When a commodity is so distributed among the members of the community that transfer of any unit of it from one person to another person will reduce the total satisfaction, then the distribution is said to be optimum.

4. **Optimum allocation of general resources:** The optimum allocation of resources is one in which there is nothing to be gained by shifting marginal units of resources from one use to another. In other words, the ideal distribution of resources is that which the marginal social utility in each use is the same.

Critical Evaluation of Marginal Utility Analysis

Utility analysis of consumer behavior has been criticized on various grounds which are following:

1. **Unrealistic Cardinal Measurability of Utility**: Marginal utility analysis is based on the assumption that utility is measured in absolute, objective and quantitative terms. However, utility is subjective entity and one only feels about it. Therefore, it cannot be measured cardinally. One can only compare in the sense that satisfaction from one good is more less or equal to the other.

2. **Wrong Hypothesis of Independent Utilities**: The theory is based on the assumption that utility that a consumer obtains from a good depends upon quantity of that good only and is not affected by quantity of other goods consumed along with that commodity. Hence utility is additive in the sense that total utility is sum of utility of each commodity separately. However in reality, the utility is interdependent and it depends upon the combination with the commodities are consumed.

3. **Assumption of constant Marginal Utility of Money**: The theory is based on the assumption that marginal utility of money is constant. However, in practice, as amount left after spending decreases, the marginal utility of left over money rises. Further, as real income of consumer changes with change in price of the commodity, the marginal utility of money changes. This also affects the demand for money. This fact is ignored by cardinal analysis.

4. **Marshallian demand theorem cannot genuinely be derived except in the case of one commodity case**: Marshall's demand theorem and constant marginal utility of money are incompatible except in one commodity case. Due to change in price of the commodity X, consumer expenditure on the commodity X may also change except in rare cases. Marshallian theory breaks down if monetary expenditure on the commodity X after change in price of the commodity is different from before change in price. In that case there will adjustment in demand for another commodity also i.e. commodity Y. But this adjustment may take place only if there is change in marginal utility of money which Marshall assumes to be constant.

5. **Break up of Price Effcet into Income Effect and Substitution Effec**t: Marginal utility analysis does not split price effect into income effect and substitution effect of price change. When the price of a commodity falls, the consumer is left with some income after purchasing same of that commodity. With this income he may purchase more of that commodity. This is called income effect of price change. Further, with the decline in price, this product becomes relatively cheaper than the other product. As a result the consumer is induced to substitute that commodity for other. This is called substitution effect of price change. But Marshallian analysis fails to make distinction between income and substitution effect and does not explain how much change in demand is due to income effect and how much due to substitution effect.

6. **Explanation of Giffen Paradox**: Marshallian analysis could not explain the Giffen paradox. Because of ignorance about price effect and substitution effect of price change Marshall could not explain the reason of Giffen paradox. He merely treaed it as an exception to law of demand.

7. **Too much assumptions but too little explanation**: With the help of less restrictive assumptions of ordinal measurement of utility and without assuming constant

marginal utility of money, indifference curve analysis is able to arrive consumer's equilibrium, namely, equality of marginal rate of substitution (MRS) with price ratio which is similar to proportionality rule of Marshall. Further, indifference curve analysis is able to derive a valid demand theorem by not assuming constancy of marginal utility of money.

Because of above drawbacks, utility analysis is not preferred in modern economic theory and indifference curve analysis is preferred over it toexplain demand theory.

1.5   Exercises

1. Distinguish between total utility and marginal utility. Explain the relationship between the total utility and marginal utility.
2. State and explain the law of diminishing marginal utility. Why does the law operate?
3. How can the consumer reach his equilibrium in terms of utility analysis?
4. State and explain the law of equi-marginal utility.

1.6   Some Useful Books

1.   Stonier and Hague,   "A Text-Book of Economic Theory"

2.   Ahuja, H.L.   "Advanced Microeconomics"

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