The Cardinal utility theory

Cardinal utility approach was originally given by Marshall. According to him, utility can be measured in *utils* , where *utils* is a scale like 1,2,3,… where one can measure his level of satisfaction or utility.(*utils* was originally derived by Walrus)

Whereas, ordinal utility approach was given by Hicks where the utility cannot be measured in cardinal approach rather it could be measured in terms of ranks or orders. For instance, the highest satisfaction/utility level would be given the highest rank and the lesser satisfaction/utility could be given lesser rank in terms of measurement of utility and so on.

Theory of consumer behavior attempts to seek the consumption of goods which maximize consumer's utility. It also helps a consumer in his decision making about how to allocate his consumption expenditure on different goods so that his total utility could be maximized. But before moving ahead in the theory of consumer behavior based on cardinal approach it is important to know the assumption of this approach.

4. Assumptions

🎬 *Rationality:* A consumer is always rational i.e. he always prefers more of goods and services to derive maximum utility. Thus he always buys the commodity which gives him maximum utility first and then he buys the least utility giving commodity at the end.

🎬 *Finite money income:* The consumers have limited money income which they spend on the purchase of all the goods and services for their living. Thus they allocate this income as their consumption expenditure on all goods and services.

🎬 *Cardinal utility:* The utility derived from the consumption of each good is measureable in terms of utils which is in turn equal to the money a consumer is willing to pay for it i.e. 1 util= utility of 1 unit of money.

🎬 *Constant marginal utility of money:* The utility of each unit of money spent on buying the good remains the same i.e. one.

🎬 *Diminishing marginal utility:* According to this, utility derived from the consumption of each successive unit of the good diminishes. As we consume more of a good the utility derived from each successive unit of it decreases (although the total utility from the consumption of the total quantity of good increases). This is also known as 'Gossen's first law'. Note that here each successive unit of the good is homogeneous in nature.

📽 *Additive utility:* According to this, the utility derived from the consumption of all goods and services is additive in nature. Therefore, the utility function of a basket 'n', comprising of various goods and services, is represented as follows:

$U = f(x1, x2, x3, \ldots , xn)$

Here, x1, x2, x3, ….. , xn are the quantity of different goods and services consumed by the consumer with his limited money income.

Now based on this, the total utility function of n items is additive and can be written as:

$TU = U1(x1) + U2(x2) + U3(x3) + \ldots + Un(x4)$

5. Concept of total utility and marginal utility

Total utility refers to the sum of utility derived from the consumption of each unit of a good. Since as per the cardinal approach utility can be measured, hence Total utility can also be measured in utils and in monetary terms.

Algebraically: $TU = U1 + U2 + U3 + \ldots + Un = UN$

Marginal utility is defined as the utility derived from the last unit consumed. It is also defined as the utility derived from the consumption of each successive unit of the same good. More precisely, Marginal utility is the change in the total utility due to an additional unit consumed. Algebraically:

$MU = \Delta TU / \Delta Q$

Or, $MU = TUn - TUn-1$

Where, TUn is the total utility derived from the consumption of n units of a good and TUn-1 is the total utility derived from the n-1 unit of the same good. This can be explained with the help of the following table:

TABLE 1:

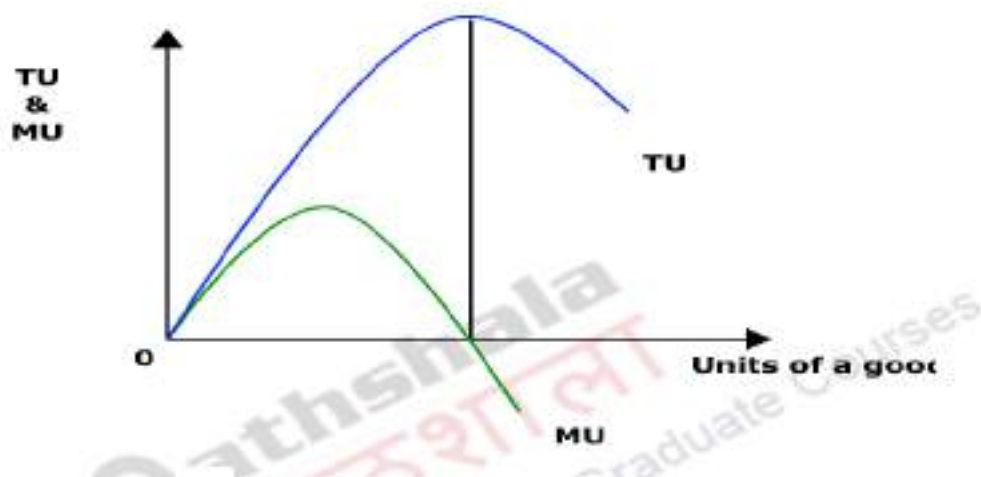| Quantity (in units)	Total utility (in utils)	Marginal utility (utils)
0	0	-
1	40	40
2	70	30
3	90	20
4	100	10
5	100	0
6	90	-10

Fig 1: Total utility and Marginal utility

The above table and the above figure clearly show that initially the total utility increases as we consume a good but as we consume more of a good it increases but at a diminishing rate as in we can see from the table and from the figure that initially the total utility increases to 40 and then to 70 to 90 to 100 but the marginal utility first increases by 40 and then by 30 (TUn – tun-1; 70-40=30) then by 20 and then by just 10.

However, when the total utility reaches to its maximum i.e. at 100 then it started falling as the consumer increases his consumption; correspondingly the marginal utility becomes zero and then negative. Note that the point where the total utility reaches its maximum is the point where the marginal utility becomes zero and thereafter when the consumer increases his consumption of the goods again then total utility decreases and marginal utility goes negative. Thus we can conclude that there exists the following relationship between the total utility and marginal utility:

🎬 Total utility increases initially at an increasing rate first and marginal utility also increases.

🎬 Thereafter total utility increases at a diminishing rate and marginal utility diminishes.

🎬 When total utility reaches to its maximum, marginal utility becomes zero

MU

P ——— E ——————————— Pₓ (MUₓ)

0

Q

Quantity of commodity X

MUₓ