Consumer Behaviour: Cardinal Utility Analysis

Who is a Consumer?

Definition: A consumer is an individual or entity that purchases and uses goods or services to meet personal needs and wants.

Significance: Consumers play a vital role in driving economic activity by influencing demand for products and services.

- **End User:** Consumers are the ultimate end-users of goods and services.
- **Decision Maker:** Consumers make purchasing decisions based on their preferences, needs, and budget.
- **Diverse:** Consumers vary in demographics, preferences, and personality traits.

What is Consumer behaviour

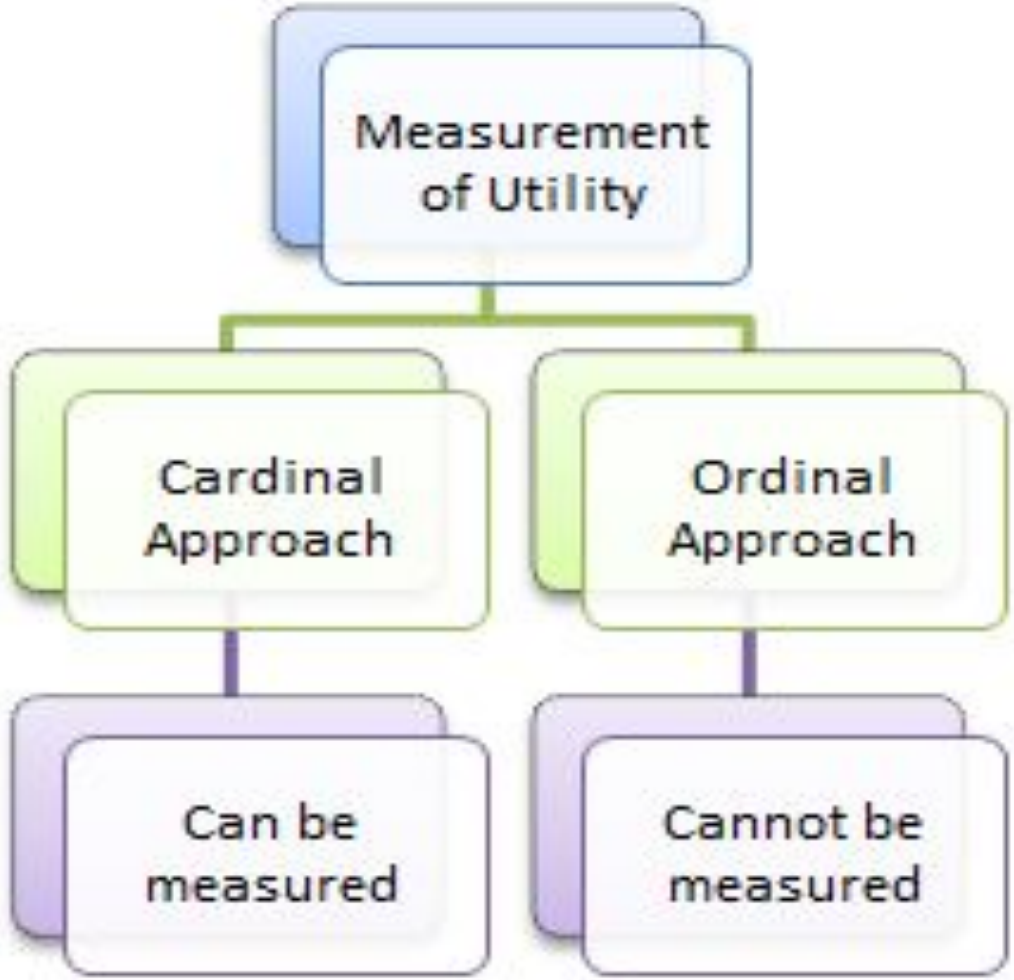
- Consumer behavior is the actions and decisions that people or households make when they choose, buy, use, and dispose of a product or service. Many psychological, sociological, and cultural elements play a role in how consumers engage with the market.

- It refers to the actions of the consumers in the market place and the underlying motives for those actions.

What is Utility

- The concept of utility in economics was introduced by the 18th-century philosopher and economist Jeremy Bentham.
- ‘Utility’ refers to the satisfaction (usefulness) received after the consumption of any good and service.
- It is the capacity of a commodity to satisfy human wants.
- Utility (level of satisfaction) is different from person to person.

Types of Utility



Cardinal Utility

- Acc. to cardinal approach, utility can be measured. This approach is quantitative in nature

- A chocolate ice- cream gives me a utility or satisfaction of 20 utils whereas ice-cream gives me utility of 10 units.

- Therefore, I can say that I am getting twice the utility from a chocolate than from an ice-cream

Total Utility and Marginal Utility

Total Utility

Total amount of satisfaction or pleasure a person derives from consuming some specific quantity of good and services (measured in UTILS)

$$TU = \sum MU = MU_1 + MU_2 + \ldots\ldots\ldots + MU_n$$

Where TU= Total Utility; MU_1= Marginal utility obtained from the consumption of 1^{st} unit of a particular commodity (so on.... Up to nth unit)

Marginal Utility

Extra amount of satisfaction a consumer realizes from an additional unit of that product. In other words, change in total utility that results from the consumption of one extra unit of the product.

$MU = \Delta TU / \Delta Q$

Where ΔTU= change in total utility; ΔQ = change in the unit of commodity consumed by consumer

Alternatively,

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

Where TU_n= total utility at n unit of consumption; TN_{n-1}total utility at the n-1 unit of consumption

Laws under Cardinal Utility Analysis

1. Law of Diminishing Marginal Utility

1. Law of Equi- Marginal Utility

Law of Diminishing Marginal Utility

- Concept developed by Alfred Marshall.
- It states that other things remaining the same, as more and more units of a commodity are consumed, marginal utility derived from every additional unit must decline in a given period of time.
- It is known as the fundamental law of satisfaction or fundamental psychological law.

Assumptions

- **Rationality**

Consumer is assumed to be rational. It means that his/her behaviour is normal and he tries to maximize his satisfaction.

- **Cardinal Measurement**

The law assumes that utility can be measured numerically and in monetary terms. Hence, mathematical operations can easily possible to know and compare the utility derived from each unit of the commodity.

- **Fixed Income and Prices**

It is assumed that the consumer's income and the price of the goods they want to purchase remain constant.

- **Homogeneity**

All units of the commodity consumed are exactly homogenous or identical in shape, size , colour, taste, etc,..

- **Continuity**

All units of commodity are consumed in quick succession without any lapse of time.

- **Reasonability**

All the units of a commodity consumed are of reasonable size. They are neither too big nor too small.

- **Constancy**

All the related factors like income, tastes, habits, choices, likes, dislikes of a consumer should remain constant.

- **Perfect Knowledge**

It is assumed that the consumer has knowledge of the different goods on which his income can be spent and the utility that he is likely to derive from such consumption. It indicates that the customer has perfect knowledge of all of the various choices available to him..

- **Divisibility**

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

- **Independent Utilities**

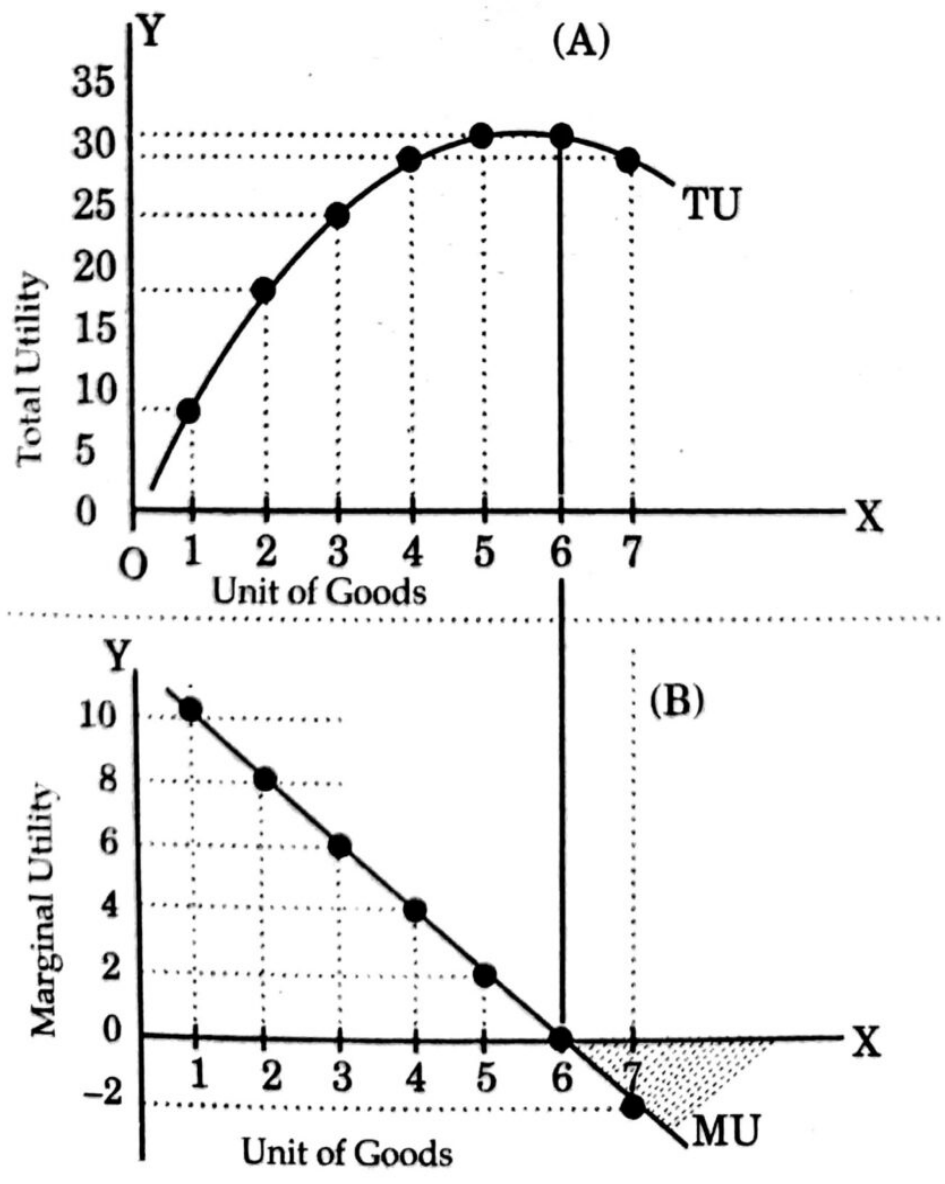
All of the commodities a consumer consumes are assumed to be independent. Hence, there is no relationship between the MU of one commodity and the MU of another. Furthermore, it is assumed that the utility of one person is unaffected by the utility of another person.

- **Marginal Utility of Money remains constant**

A consumer has less money to spend on other commodities after paying for the commodity. This process increases the MU of money for the consumer and makes the remaining cash dearer to them. However, such an increase in MU is ignored. It is assumed that the MU of money is constant since the MU of a commodity must be measured in monetary terms.

Relationship between Total Utility and Marginal Utility

Units of Good Consumed	Total Utility (TU) in Utils	Marginal Utility (MU) in Utils	Description
1	10	10	TU is increasing and MU is positive
2	18	18-10=8	
3	24	24-18=6	
4	28	28-24=4	
5	30	30-28=2	
6	30	30-30=0	TU is maximum and stable, and MU is zero
7	28	28-30=-2	TU is decreasing and MU is negative



- Positive Marginal Utility:

If total utility increases from consumption of additional units of a commodity, then marginal utilities of these units will be positive.

- Zero Marginal Utility:

If the consumption of an additional unit of a commodity causes no change in the total utility, then marginal utility of that unit is said to be zero.

- Negative Marginal Utility:

If the consumption of an additional unit of a commodity causes a fall in the total utility, it means that the marginal utility of that unit is negative.

Chart of difference between Total Utility and Marginal Utility

Basis of Difference	Total Utility	Marginal Utility
Meaning	It is the aggregate satisfaction derived from the consumption of a commodity by a consumer.	It is the additional satisfaction derived from consuming an extra unit of a commodity by a consumer.
General tendency	In the beginning, it increases but at a decreasing rate.	It tends to diminish as more and more units of a commodity are consumed.
Point of Satiety	The point of satiety arrives when it is maximum.	Point of satiety arrives where it is zero.
After Saturation	It tends to decrease after the point of saturation is reached.	It becomes negative after the point of saturation.
Calculation	It can be calculated as the summation of marginal utilities derived from all units of a commodity.	It can be calculated as the difference between the total utilities derived from two successive units of a commodity.
Expression	$TU_n = U_1+U_2+U_3+\ldots\ldots\ldots+U_n$	$MU_n = TU_n - TU_{n-1}$

Implication of the Law of Diminishing Marginal Utility

- The paradox of value (Water-Diamond Paradox) is the apparent contradiction that, although water is on the whole more useful in terms of survival than diamonds, still diamonds command higher price in the market.

- It is the additional satisfaction someone gets from using or purchasing an additional unit of a particular good or service.

- People are willing to pay a higher price for goods with higher marginal utility.

Consumer Equilibrium

- It means a state of maximum satisfaction. A situation where a consumer spends his given income purchasing one or more commodities so that he gets maximum satisfaction and has no urge to change this level of consumption, given the prices of commodities, is known as consumer equilibrium.
- Consumer buying decision depends upon:

a. The price of the commodity (Px)

b. Marginal utility of the commodity (MUx)

c. Marginal utility of money (MUm)

What is Marginal Utility of Money?

- Marginal utility of money refers to the additional satisfaction or value that an individual derives from having an additional unit of currency (money).

- It refers to utility that the consumer expects to obtain from a standard basket of goods which he or she can buy for a rupee.

- For example: If a rupee can buy 500 gm sugar and 200 gm rice; and Total utility derived from this consumption is 5 utils, then 5 utils is considered the MU of money.

- MUm is the measuring rod for a rupee worth of satisfaction.

- At the time of purchasing a unit of a commodity, a consumer compares the price of the given commodity with its utility. The consumer will be at equilibrium when marginal utility (in terms of money) equals the price paid for the commodity say ‘x’ i.e. MUx = Px. (Note that marginal utility in terms of money is obtained by dividing marginal utility in utils by marginal utility of one rupee).
- This is sometimes loosely called the ‘Marginal Utility = Price’ (MUx=Px) principle. It refers to Marginal utility of X in terms of money equals price of the good X.

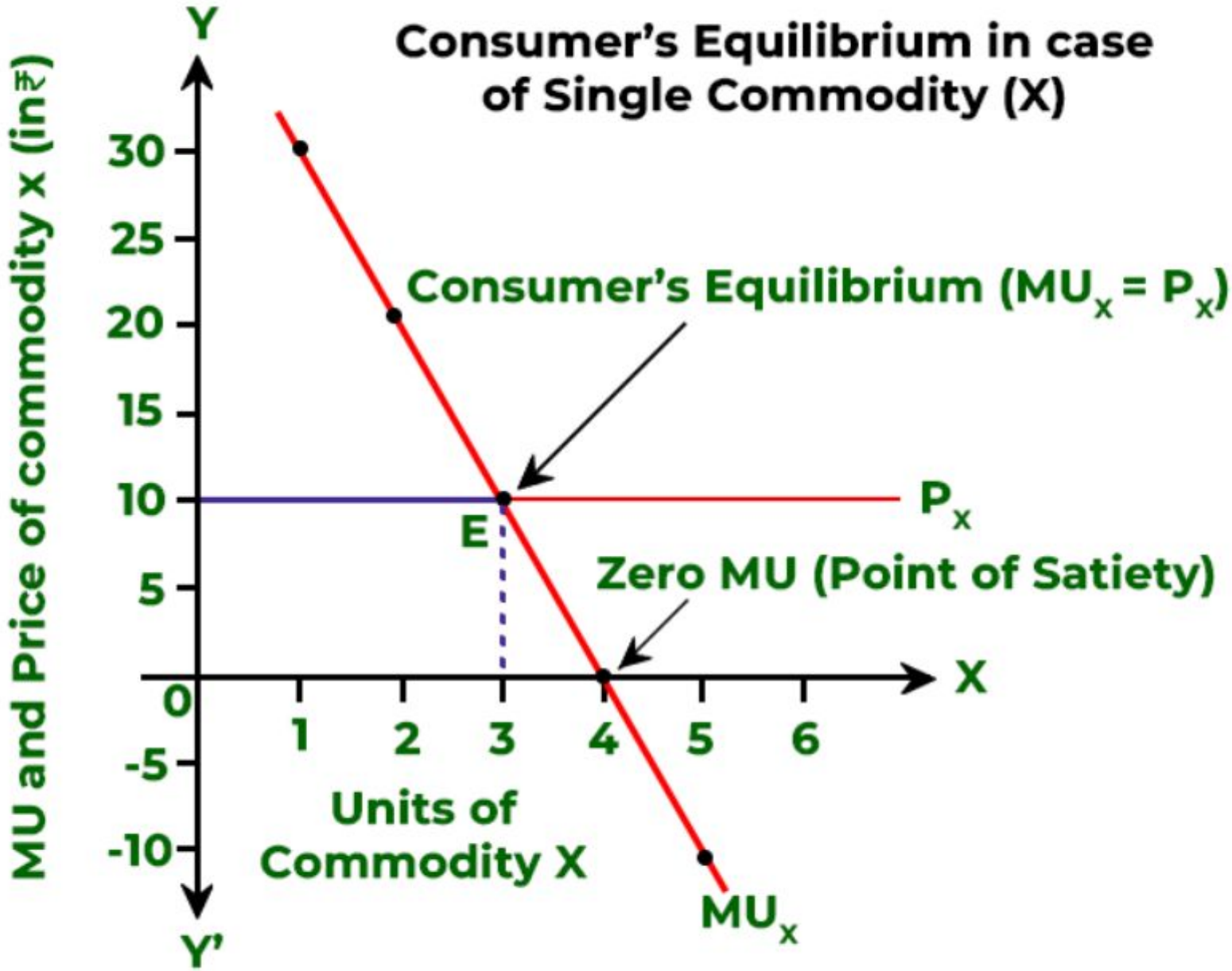
Equilibrium conditions in cardinal approach

- In case of a single commodity → (x)

  MUx = Px will be the consumer equilibrium

- If MUx > Px – Consumer can increase his welfare by purchasing more units of x
- If MUx < Px---- Consumer can increase his total satisfaction by cutting down the quantity of x and keeping more of his income unspent.

Units of x	Price (P_x) (₹)	Marginal Utility (Utils)	Marginal Utility in ₹ (MU_x) 1 util = ₹1	$MU_x - P_x$	Remarks
1	10	30	30/1 = 30	20	Here, $MU_X > P_X$, so the consumer will increase the consumption
2	10	20	20/1 = 20	10	
3	**10**	**10**	**10/1 = 10**	**0**	**Consumer's Equilibrium $MU_X = P_X$**
4	10	0	0/1 = 0	-10	Here, $MU_X < P_X$, so the consumer will decrease the consumption
5	10	-10	-10/1 = -10	-20	


Consumer's Equilibrium in case of Single Commodity (X)
Y
Y'
X
MU and Price of commodity x (in ₹)
30
25
20
15
10
5
0
-5
-10
1
2
3
4
5
6
Consumer's Equilibrium ($MU_x = P_x$)
P_x
E
Zero MU (Point of Satiety)
Units of Commodity X
MU_x

Law of Equi-Marginal Utility

- The law of diminishing marginal utility is applicable only to the want of a single commodity.

- Wants are unlimited and these wants need to be satisfied. Therefore, to analyze such situations the law of diminishing marginal utility is extended and is called “Law of equi-marginal utility”

- Also known as “Law of Substitution”, “The Law of Consumer Equillibrium”, “Gossen’s Second Law” and “Law of Maximum Satisfaction”, “Law of Proportionality”

CONSUMERS EQUILIBRIUM-
under two commodities

- Suppose a consumer consumes only two goods.
- Let these goods be X and Y
- Prices Px and Py.
- Consumer attains equilibrium only when the following condition is satisfied:

$$\frac{MU_X}{P_X} = \frac{MU_Y}{P_Y} = MUM$$

MUx = Marginal utility of good X

MUy = Marginal utility of a good Y

Px = Price of good X

Py = Price of good Y

M.U.M = Marginal utility of money

The assumption of consumer's equilibrium for one good is extended to two good also.

When Price of commodity A= rupee 1; Price of commodity B= rupee 1
Equilibrium quantity: A=4; B=4
When Price of commodity A= rupee 4; Price of commodity B= 2
Equilibrium quantity : A=2; B=4

Example of marginal utility for Goods A and B

Units	MU good A	MU Good B
1	40	22
2	32	20
3	24	18
4	**16**	**16**
5	8	14
6	0	12

- According to Law of Equi-Marginal Utility, the consumer will be in equilibrium at the point where the utility derived from the last rupee spent on each of the good is equal.

  If a person has a thing, which he can put to several uses, he will distribute it among these uses in such a way, that it has the same marginal utility in all. For, if it had greater MU in one use than another; he would gain by taking away some of it from the second use and applying it to the first.

$$\frac{\text{Marginal Utility of A}}{\text{Price of A}} = \frac{\text{Marginal Utility of B}}{\text{Price of B}}$$

Review Question

You are given the following marginal utilities of goods X and goods Y obtained by a consumer. Given that price of X= Rupee 5; price of Y= Rupee 2; Income = Rupee 22
Find out the optimal combination of goods.

Units	Mux (in utils)	Muy (in utils)
1	30	20
2	25	18
3	20	16
4	15	14
5	10	12
6	5	10
7	1	8

Weakness of Cardinal Utility Analysis

1. Cardinal measurability of utility is unrealistic.
2. Assumption of rational consumer is not correct
3. Hypothesis of independent utilities are wrong.
4. Assumption of constant marginal utility is wrong.
5. Marginal utility analysis assumes too much and explains too little.
6. Marshall could not explain Giffen paradox.
7. This hypothesis fails to explain the demand for indivisible good.