

# CHAPTER 4 Utility Theory

## INTRODUCTION

*The consumer is assumed to be rational when given his income. Also rational are the market prices of the various commodities, on which he plans to spend his income so as to attain the highest possible satisfaction. The theory of utility emphasizes how a consumer derives satisfaction from the consumption of a particular product. The theory shall be explained by discussing the concept of utility, average utility (AU), total utility (TU), utility maximization, the law of diminishing marginal utility (MU), ordinal and cardinal approaches of the utility theory.*

## OBJECTIVES

*At the end of this chapter, students should be able to:*

- ◆ Explain the concept of total, average and marginal utility;
- ◆ Demonstrate knowledge of the principles of utility maximization and diminishing marginal utility;
- ◆ Explain the assumptions of cardinal utility and ordinal utility analysis;
- ◆ Explain why the curve of the diminishing marginal utility is downward sloping.

### 4.1 Concept of Utility

The utility theory is also known as the theory of consumer behavior or household behaviour. It is concerned with how the consumer or the household tries to satisfy his wants by dividing his limited amount of income between the various commodities that gives him satisfaction.

#### 4.1.1 What is Utility

Utility is the ability of a commodity or service to satisfy wants. It is not fixed therefore, when a consumer derives satisfaction from the consumption of any commodity or services, it can be said that the commodity or service possesses utility. It is useful to the consumer that used it. It is necessary to understand that usefulness is a relative term because what may be useful to one person may not be useful to another.

#### 4.1.2 Types of Utility

There are different types of utility, namely;

**Form utility:** Some commodities do not possess the utility power in its original form. For example, flour does not satisfy the immediate want of consumers till when changed to bread or cake.

**Place utility:** Agricultural raw materials like cocoa, rubber and wool are produced in West Africa and transported to European nations where they satisfy industrial needs.

**Time utility:** This deals with storage and preservation of a commodity until the time it will satisfy a future need of the consumer.

#### 4.1.3 Approaches to Measuring Utility

There are two approaches to measuring utility. These are the Cardinal and Ordinal approaches.

#### 4.1.3.1 Cardinal Utility

This school of thought emphasizes that utility is measurable. That is after consuming a given quantity of commodity, the consumer can simply evaluate his satisfaction through the use of fingers which range from zero to infinity.

##### 4.1.3.1.1 Assumptions of Cardinal Approach to Utility

- a. **The consumer is rational:** The consumer aims at the maximization of his utility, subject to the constraint imposed by his given income.
- b. **Money utility:** The utility of each commodity is measurable in terms of money, it is measured by the monetary value that the consumer is prepared to pay for another unit of the commodity.
- c. **Diminishing marginal utility:** The utility gained from successive units of commodity diminishes.
- d. **Total utility:** Total utility is all the satisfaction a consumer derives from the consumption of a given set of commodities.
- e. **Money income of the consumer is held constant:** If the marginal utility of money changes as income increases, the measuring rod for utility looks inappropriate for measurement.

#### 4.1.3.2 Ordinal Utility

The ordinal school of thought said that utility is not measurable. The consumer needs not to know in specific units, the utility of various commodities to make his choice. The consumer should be able to rank the various baskets of goods according to the satisfaction that each bundle gives him. He should determine his order of preference among the different bundles of goods. The ordinal utility can be represented on the indifference curves.

##### 4.1.3.2.1 Assumptions of Ordinal Utility Analysis

**Rationality:** The consumer is assumed to be rational. He aims at the maximization of his utility given his income and market prices.

**Utility order:** It is assumed that the consumer will rank his preference according to the satisfaction of each basket. He needs not know the amount of satisfaction.

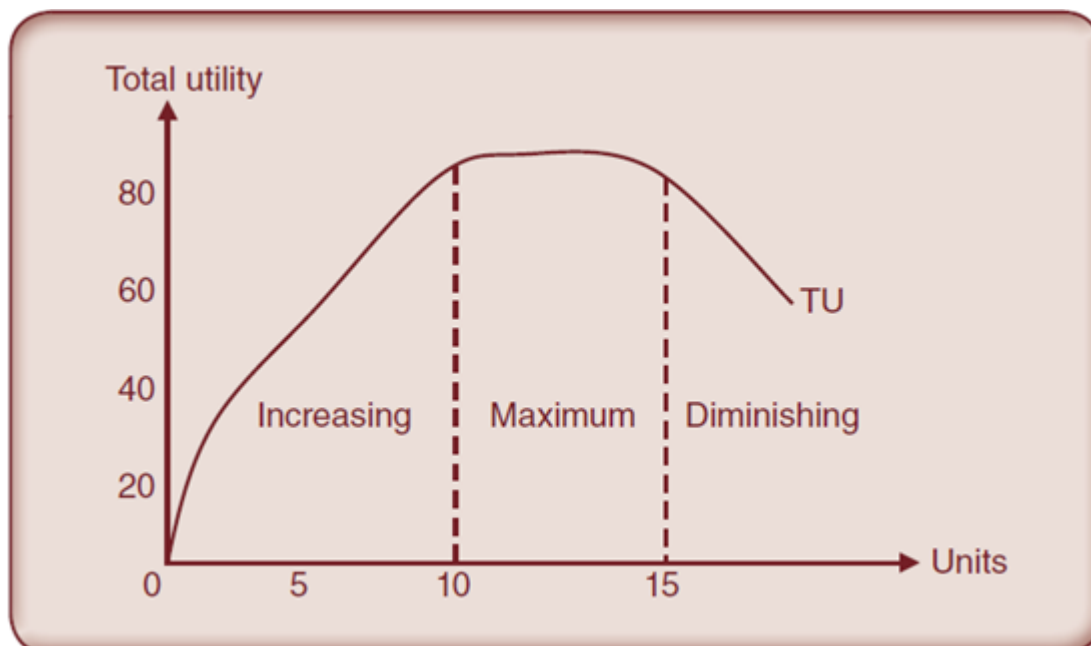
**Diminishing marginal rate of substitution:** Preferences are ranked in terms of indifference curves, which are assumed to be convex to the origin.

**Total utility:** This depends on the quantities of the commodity consumed.

## 4.2 Concepts of Total, Marginal and Average Utility

### 4.2.1 Total Utility

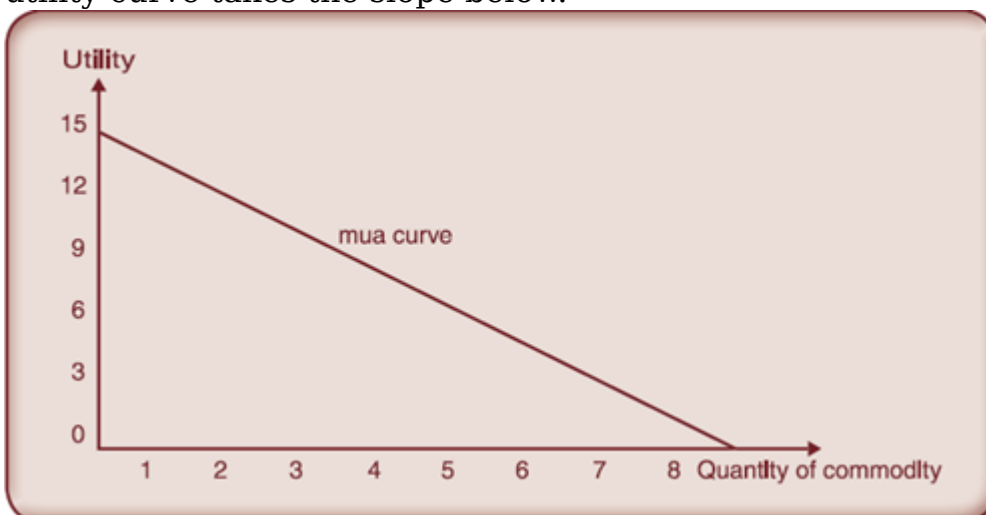
This is the total amount of satisfaction a consumer derives from the consumption of a particular commodity at a point in time at different rates. The more commodities a consumer consumes, the more satisfaction or utility he derives. At some rates of consumption, the utility will reach a maximum satisfaction beyond which the consumer derives less satisfaction from additional units of commodity. The total utility derived from the consumption of a given commodity at various rates undergoes three different stages: it increases, reaches a maximum point and then diminishes as illustrated in Fig. 4.1.



**FIG. 4.1 Total Utility (TU)**

### 4.2.2 Marginal Utility (MU)

The term marginal utility refers to the additional satisfaction a consumer derives from the consumption of additional units of a particular commodity. It is the change in total utility as a result of the consumption of additional unit of a commodity. The consumption of more commodities may yield less or more marginal utility. It may be defined as the rate of change of total utility caused by a unit change in the total quantity of a product. The marginal utility curve takes the slope below.



**FIG. 4.2 Marginal utility curve**

**Note:** The curve is downward sloping meaning that each additional unit of consumption adds less to total utility. At the consumption of commodity 1 satisfaction derived was 15 units. From the graph it can be seen that additional consumption of the commodity leads to a decline in the satisfaction. It is called the principle of diminishing marginal utility.

### 4.2.3 Average Utility

This is the amount of satisfaction a consumer derives from the consumption of a unit of commodity. It is the total utility divided by the total units of commodity consumed, thereby producing average utility.

## Note:

- $TU = \text{average utility} \times \text{quantity consumed}$
- $MU = \frac{\text{change in } TU}{\text{change in consumption}} = \frac{\Delta TU}{\Delta Q}$
- $AU = \frac{TU}{\text{quantity consumed}}$

This can be illustrated with the table below:

**TABLE 4.1 Total, Average and Marginal Utility Schedules**

Quantity of Goods Consumed	Total Utility	Average Utility	Marginal Utility
1	20	20	
2	28	14	8
3	36	12	8
4	40	10	4
5	50	10	10
6	60	10	10

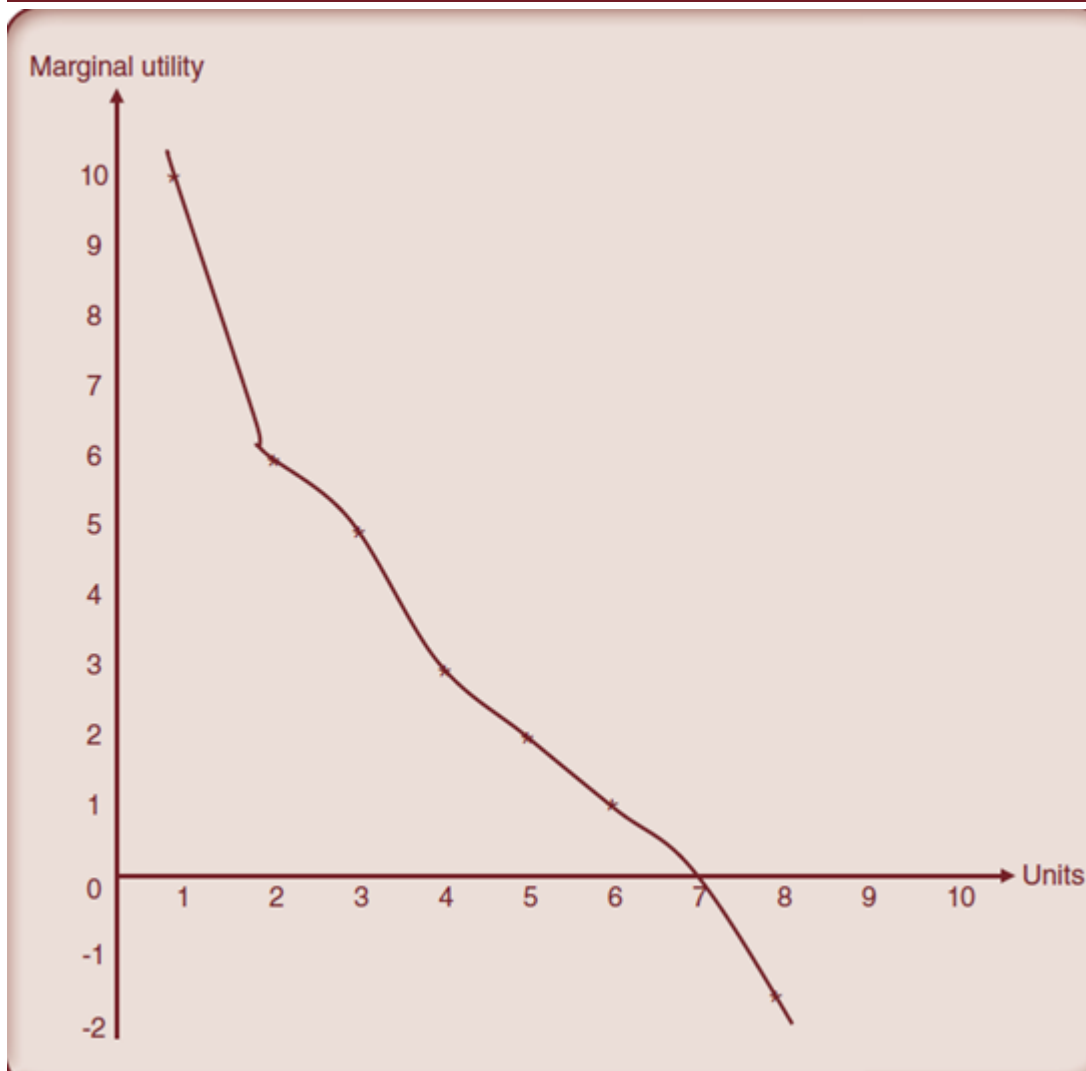
### 4.2.4 The Law of Diminishing Marginal Utility

The law states that as the consumer consumes more and more units of a particular commodity, utility will increase up to a certain point when decrease in satisfaction will set in as a result of continuous consumption of the same commodity. For instance, a very thirsty person may derive maximum satisfaction in the first two bottles of water, after which a decrease in satisfaction may set in as more and more water is consumed until when he may be unable to consume more.

The utility derived from water diminishes, when the consumer reaches a point of satiety. Marginal utility will be zero and the consumer is perfectly satisfied. The diminishing marginal utility is shown in table 4.2 below.

**TABLE 4.2 Diminishing Marginal Utility Schedule**

Bottles of Water	Total Utility	Marginal Utility	Average Utility
1 <sup>st</sup>	10	10	10
2 <sup>nd</sup>	16	6	8
3 <sup>rd</sup>	21	5	7
4 <sup>th</sup>	24	3	6
5 <sup>th</sup>	26	2	5.2
6 <sup>th</sup>	27	1	4.5
7 <sup>th</sup>	27	0	3.9
8 <sup>th</sup>	29	-2	3.8



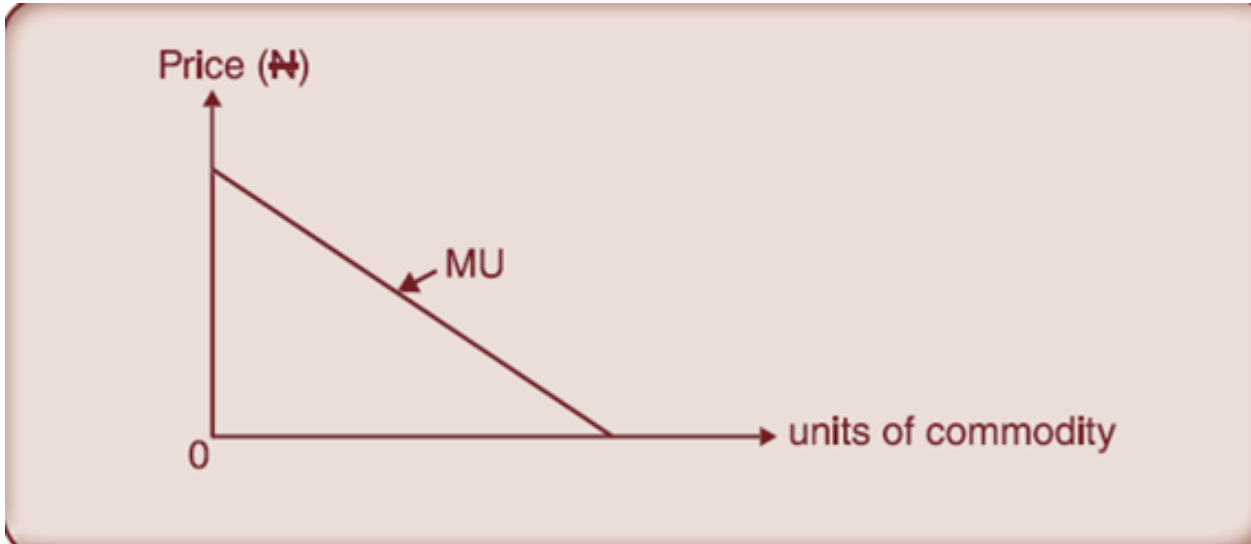
**FIG. 4.3 Diminishing utility**

### 4.3 Utility Maximization

Utility maximization of the consumer is known as consumer equilibrium point. It is a point where the consumer derives maximum satisfaction from the consumption of a particular product. At this point, marginal utility equates the price of the commodity consumed. The additional utility derived from the consumption of additional commodity is equal to the price of that commodity. Utility maximization explained here is limited to economic goods. Economic goods are goods that have price value such as sugar, bread, bournvita, and so on. However, free commodity like air is not an economic good.

### 4.3.1 Derivation of Demand Curve from Utility Theory

A demand for a product exists because it provides someone, somewhere with satisfaction or utility. Marginal utility is the key concept underlying the demand. The height of the demand curve reflects marginal utility as can be seen in the curve below.



**FIG. 4.4 Marginal utility curve**

The marginal utility curve resembles the demand curve. It shows the extra amount of satisfaction which a consumer derives from consuming more units of a commodity. The price he pays represents the additional amount of satisfaction he derives from consuming more units of that commodity. Marginal utility diminishes as more units of commodity are consumed. The price per unit he will pay for the commodity depends on the marginal utility of the product. Marginal utility is related to the current prices and current level of consumption. The greater the level of an individual's current consumption of a commodity, the lower will be its marginal utility. Similarly in demand theory, the lower the price of a commodity, the higher the quantity demanded of it. In deriving a demand curve from marginal utility, we equate price to marginal utility and equate quantity demanded to quantity consumed.



**FIG. 4.5 A demand curve**

## Summary

This chapter has discussed:

- ❖ Utility which is the ability of a commodity or service to satisfy consumers wants.
- ❖ Types of utility: There are three types of utility, namely:
  - i. Time utility.

- ii. Form utility.
  - iii. Place utility.
- ❖ The two major approaches to measuring utility and these are:
  - i. Cardinal Approach.
  - ii. Ordinal Approach.
- ❖ Assumptions of the Cardinal Utility approach which are as follows:
  - i. Utility is measurable.
  - ii. The consumer is rational.
  - iii. There is diminishing marginal utility.
  - iv. Total utility depends on quantity consumed.
  - v. Money income of the consumer is held constant.
- ❖ Assumptions of the Ordinal Utility approach which are as follows:
  - i. Rationality.
  - ii. Utility order, that is ranking or preference.
  - iii. Diminishing marginal rate of satisfaction.
  - iv. Total utility.
  - v. Consistency and transitivity of choice.
- ❖ Utility Concepts
  - i. Total utility which is the total satisfaction derived from the consumption of a given quantity of goods.
  - ii. Marginal utility which is the additional or extra utility derived from the consumption of an additional unit of the commodity.
  - iii. Average utility which is the satisfaction derived from the consumption of one unit of goods or services.
- ❖ The law of diminishing marginal utility which states that as consumer consumes more and more units of a particular commodity, utility will increase up to a certain point when decrease in satisfaction will set in as a result of continuous consumption of the same commodity.

## Class Activities

Students should be able to:

- (a) Calculate total, average and marginal utility from hypothetical utility table.
- (b) Demonstrate the principle of diminishing marginal utility with drinking of water or soft drinks.

## Revision Questions

### Objective Questions

1. A point along a consumer indifference curve shows:
  - (a) The different commodities he can consume
  - (b) Combination of all commodities he is willing to buy
  - (c) A combination of two commodities from which he derives the same satisfaction
  - (d) The quantities of commodities demanded by him
  - (e) The difference between quantity supplied and quantity demanded **(SSCE 1995)**
2. The entire satisfaction that a consumer derives from a successive consumption of a particular commodity is known as:
  - (a) Marginal utility
  - (b) Total utility
  - (c) Average utility
  - (d) Diminishing utility **(SSCE 2000)**
3. Creation of utility can be referred to as:
  - (a) Value added

(b) Profit maximization

(c) Entrepreneurship

(d) Production

4. The law of diminishing marginal utility states that, the more a commodity is consumed the

(a) Higher the satisfaction derived from an additional unit

(b) Higher the price to be paid

(c) Lower the quantity supplied

(d) Lower the rate of increase in the total utility derived

5. The entire satisfaction that a consumer derives from a successive consumption of a particular commodity is known as:

(a) Marginal utility

(b) Total utility

(c) Average utility

## Essay Questions

1. Below is a utility schedule for total and marginal utility of some certain goods consumed. Use the given information to answer the questions that follow:

Quantity of Goods Consumed	Total Utility	Marginal Utility
0	0	0
1	10	10
2	16	7
3	?	4
4	?	1
5	23	1
6	23	?

a. Complete the above utility schedule.

b. Draw the Marginal Utility curve from the above utility schedule.

i. At what quantity does TU equal MU?

ii. What is the value of MU when TU reaches maximum?

iii. What happens to the values of TU as the quantity consumed increases?

iv. What happens to the values of MU as the quantity consumed increases? **(SSCE 1996)**

Oranges	Total Utility	Mangoes	Total Utility
1	100	1	50
2	190	2	95
3	270	3	135
4	340	4	170
5	400	5	200
6	450	6	225
7	490	7	245
8	520	8	260

2.



The table above shows Mr Y's schedule of total utility for oranges and mangoes. The prices of oranges and mangoes are at \$1.00 each. Mr Y has \$10.00 to spend on the goods. Use the information contained in the table to answer the questions that follow:

- a. Calculate the marginal utility for all the levels of consumption for the goods
  - b. At equilibrium, how many (i) oranges (ii) mangoes, will the consumer buy?
  - c. (i) State the law of diminishing marginal utility  
(ii) State the marginal condition for utility maximization (**SSCE 2007**)
3. The table below represents a traveller's consumption of bottles of Coca-Cola. Study the table carefully and answer the questions that follow:

No of Bottles	Total Utility	Marginal Utility
1	15	15
2	29	F
3	42	13

No of Bottles	Total Utility	Marginal Utility
4	D	12
5	65	G
6	75	H
7	E	0

a)

Complete the missing figures D, E, F, G and H

- b) Draw the demand curve for the traveller's consumption of Coca-Cola
  - c) Explain the law of diminishing marginal utility as the basis for the slope of the traveller's demand curve
4. a) (i) Explain the cardinal approach to the utility theory  
(ii) What are the assumptions that guide the cardinal utility approach  
(iii) Explain three of these assumptions
- b) (i) What is the Ordinal Approach to the measurement of Utility  
(ii) What are the assumptions behind the successful workability of this approach?

## Glossary

**Utility:** It is the pleasure or [HYPERLINK "http://www.businessdictionary.com/definition/satisfaction.html"](http://www.businessdictionary.com/definition/satisfaction.html)satisfaction ([HYPERLINK "http://www.businessdictionary.com/definition/value-for-money-VFM.html"](http://www.businessdictionary.com/definition/value-for-money-VFM.html)value for money) derived by a [HYPERLINK "http://www.businessdictionary.com/definition/person.html"](http://www.businessdictionary.com/definition/person.html)person from the [HYPERLINK "http://www.businessdictionary.com/definition/consumption.html"](http://www.businessdictionary.com/definition/consumption.html)consumption of a good or [HYPERLINK "http://www.businessdictionary.com/definition/final-good-service.html"](http://www.businessdictionary.com/definition/final-good-service.html)service or from being in a particular place.

**Cardinal utility:** This school of thought emphasizes that utility is measurable.

**Ordinal utility:** The ordinal school of thought said that utility is not

measurable.

**Total utility:** This is the total amount of satisfaction a consumer derives from the consumption of a particular commodity at a point in time.

**Marginal utility:** refers to the additional satisfaction a consumer derives from the consumption of additional units of a particular commodity.

**Average utility:** This is the amount of satisfaction a consumer derives from the consumption of a unit of commodity.

**Utility maximization:** It is the consumer equilibrium point.