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SCHOOL OF MANAGEMENT SCIENCES

COURSE CODE: BFN 201

COURSE TITLE: ECONOMIC THEORY (MICRO)

COURSE CODE

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COURSE TITLE

ECONOMIC THEORY (MICRO)

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COURSE GUIDE

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1.0 INTRODUCTION

You are welcome to BFN 201: Economic Theory (Micro). BFN 201 is a three credit unit course at 200 level, B.Sc. in Banking and Finance. It is an introduction to the study of microeconomics and the course has twenty one (22) units.

This course guide is intended for the distant learners enrolled in the B.Sc. Programme of National Open University of Nigeria (NOUN). The guide is one of the diverse resource tool made available to the learner to facilitate timely completion of the programme.

The guide provides quite useful information on the course aims, objectives, what the course is all about, the course materials that the learner will be using, available support services for learning, information guidelines on assignments and examination, such as planning of the timing on the assignments and each unit. This guide also provides answers to several questions that you may ask. Thus, it is strongly recommended that the learner go through this course guide.

The learner is however advised to contact his/her study centre if there are further questions. I wish you all the very best in your experience and successful completion of this study.

Course Aims

The course applies analytical approach, aim at developing the economic way of thinking, makes the careful step-by-step introduction of different analytical models in microeconomics. The primary aim of this course is to acquaint you with the basic theoretical, principles, concepts and practical knowledge of microeconomics

2.0. Course Objectives

At the end of this course, you should be able to:

- Discuss the concept of microeconomics.
- Discuss the basic concepts of microeconomics
- Analyse the theories of demand and supply.
- Analyse the concept of elasticity
- Discuss the basic market structures
- Discuss the theory of production and consumption.
- Discuss linear programming.
- Discuss Money
- Discuss Financial Institution

3.0. Course Materials and Structure

The learner is admonished to read through this course guide to familiarize him/herself with the structure of the course. This is to be done by reading the study units properly and attempting all self-assessments exercises, completing and submitting all tutor marked assignments for the course and consulting recommended sources for further reading.

Each unit contains self-assessment exercises and in appropriate places you are required to submit assignments for assessment purposes. There will be a final examination at the end of the course. Each unit should take you about four (4) hours to complete, giving you a total of about sixty (60) hours to complete the course. In order to successfully complete the course on time, you are advised to draw up a personal time schedule that will enhance the achievement of this goal.

Below are the components of this course.

Study Units

MODULE 1

NATURE OF ECONOMICS

- UNIT 1: Meaning, Scope, Methods and Importance of Microeconomics
- UNIT 2: Basic Concepts of Economics
- UNIT 3: The Theory of Demand
- UNIT 4: The Theory of Supply
- UNIT 5: The Theory of Market Price
- UNIT 6: The Concept of Elasticity

MODULE 2

THEORY OF THE MARKET

- UNIT 1: Perfect Competition
- UNIT 2: Pure Monopoly
- UNIT 3: Monopolistic Competition
- UNIT 4: Oligopoly
- UNIT 5: Natural Monopoly

MODULE 3

PRODUCTION AND CONSUMPTION THEORY

- UNIT 1: Theory of Consumer Behaviour
- UNIT 2: Theory of Production
- UNIT 3: Theory of Cost
- UNIT 4: Linear Programming I
- UNIT 5: Linear Programming II

MODULE 4

MONEY AND FINANCIAL INSTITUTIONS

UNIT 1	Money, Types and Functions
UNIT 2	Demand for Money
UNIT 3	Supply of Money
UNIT 4	Types of Financial Institutions
UNIT 5	Functions of Financial Institutions
UNIT 6	Control of Financial Institutions

Summary

Module 1 introduces you to the meaning and introductory microeconomic analysis. Module 2 discusses consumer behaviour and production analysis and Module 3 discusses market structure.

There are eighteen study units in the course and each unit consists of one week's work which requires about three to four hours (3-4 hrs.) to complete. There are specific objectives, guidance for the study, reading materials, self-assessment exercises and tutor marked assignments to assist you in achieving the learning objectives in each individual study unit and the course in general.

4.0. STUDY PLAN

Find below the presentation of the course and how long it takes you to complete each study unit and the assignment that accompany each unit. This is to help you plan your own personal timetable.

Unit/Modul	Title of Study Unit	Week/Activity	Assignment
	Course guide	1	Course guide form
MODULE 1			
Unit 1	Meaning, Scope and Importance of Microeconomics	2	Tutor-marked Assignment
Unit 2	Basic concepts of Microeconomics	3	Tutor-marked
Unit 3	The Theory of Demand	4	Tutor-marked
Unit 4	The Theory of Supply	5	Tutor-marked
Unit 5	The Theory of Market Price	6	Tutor-marked
Unit 6	The Concept of Elasticity	7	Tutor-marked
MODULE 2			
Unit 1	Perfect Competition	8	Tutor-marked
Unit 2	Pure Monopoly	9	Tutor-marked
Unit 3	Monopolistic Competition	10	Tutor-marked
Unit 4	Oligopoly	11	Tutor-marked
Unit 5	Natural Monopoly	12	Tutor-marked
MODULE 3			
Unit 1	Theory of Consumer Behaviour	13	Tutor-marked
Unit 2	Theory of Production	14	Tutor-marked

Unit 3	Theory of Cost	15	Tutor-marked
Unit 4	Linear Programming I	16	Tutor-marked
Unit 5	Linear Programming II	17	Tutor marked
MODULE 4			
Unit 1	Money, Types, Functions	18	Tutor-marked
Unit 2	Demand for Money	19	Tutor-marked
Unit 3	Supply for Money	20	
Unit 4	Types of Financial Institutions	21	Tutor-marked
Unit 5	Functions of Financial Institutions	22	Tutor-marked
Unit 6	Control of Financial Institutions	23	Tutor-marked
	Revision	24	
	Examination	25	

References/Further Readings:

Although the course material is the main text for this course, you are however encourage to consult other sources as provided in the list of references and further readings blow;

Aboyade, O. (1983): Intergrated Economics, a Study of Developing Economies (Addison-Wesley London).

Ahuja, H. L. (2006): Advanced Economic theory; Microeconomic Analysis (15th Ed). S. Chand & Company Ltd. New Delhi, India.

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Barndis, R (1972): Principles of Economics (Irwin, Homewood)

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Clifton, J. A. (1977): “Competition and the Evolution of Capitalist Mode of Production.” Cambridge Journal of Economics, Vol. 1, No. 2, Pp. 137 – 151.

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John Black (2002) : A Dictionary of Economics (2nd Ed). Oxford University Press.

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Mai-Lafia, D. I. (2005): Understanding Economics 2nd ed. Data Quest Publishers, Lagos, Nigeria.

Osagie, E. (1978): Elements of Economics, Principles, Policies and Essays (Ogios, Ibadan).

Oyeniyi, T. A (1988): Micro-economics (Challenge, Jos).

Petri, F. (2004): General, Equilibrium, Capital and Microeconomics. Cheltenham: Edward Elgar.

Samuelson, P. A. (1947): Foundations of Economic Analysis. Cambridge, Mass. P. 257.

Samuelson, P. A. (1980): Economics, 11th Ed. (Mac Graw-Hill Tokyo).

Train, K. E. (1991). Optimal Regulation: The Economic Theory of Natural Monopoly. Cambridge, MA, USA: MIT Press. ISBN 978-0262200844.

Waterson, M (1988). Regulation of the Firm and Natural Monopoly. New York, NY, USA: Blackwell. ISBN 0-631-14007-7.

5.0 HOW TO GET THE MOST FROM THIS COURSE

In distance learning, the study units replace the lecturer. There is the advantage of reading and working through the course material at the pace that suits the learner best. You are advised to think of it as reading the lecture as against listening to the lecturer. The study units provide exercises for you to do at appropriate periods instead of receiving exercises in the class.

Each unit has common features which are designed purposefully to facilitate your reading. The first feature being an introduction to the unit, the manner in which each unit is integrated with other units and the entire course. The second feature is a set of learning objectives which let the learner to know what should be done by the time the unit is completed. These objectives should guide your study. After completing the unit, you should go back and check whether you have achieved the objectives or not. The next feature is self assessment exercises, study questions which are found throughout each unit.

The exercises are designed basically to help you recall what you have studied and to assess your learning by yourself. You should do each self-assessment exercise and the study question as you come to each in the study unit. The next features are conclusion and summary at the end of each unit. These help you to recall all the main topics discussed in the main content of each unit. There are also tutor-marked assignments at the end of appropriate units. Working on these questions will help you to achieve the objectives of the unit and to prepare for the assignments which you will submit and the final examination.

It should take you between three to four hours (3-4 hrs) to complete a study unit including the exercises and assignments. Upon the completion of the first unit, you are advised to note the length of period it took you and use this information to draw up a timetable to guide your study of the remaining units. The margins on either sides of each page are meant for you to make notes on main ideas or key points for your usage when revising the course. These features are for your usage to significantly increase your chances of passing the course.

Course Delivery

There are many ways of learning as an open distant learner. You learn when you interact with the content in your course material just as a student interacts with the teacher in a conventional institution. You also learn when you are guided through the course. Though you are not taught the course, your course material is however your teacher and as such you will not be able to get answers to any questions which may arise from your study of the material. For this reason, apart from the course material which you have received, the delivery of this course is aided by tutorial, facilitation and counselling support services. These services are not compulsory but you are encouraged to maximally take advantage of them.

Tutorial Sessions

A total of eight (8) hours are set aside for this course and they form a part of your learning process as you have an opportunity to receive face-to-face interaction with your informal facilitator and to receive answers to questions or classifications which you may have. Also, you may contact your tutorial facilitator by telephone or e-mail.

As an open and distant learner, you are expected to prepare ahead of time by studying the relevant study units, write your questions so as to gain maximum benefit from tutorial sessions. Information about the location and time schedule for facilitation will be available at your study centre.

Note that tutorial sessions are flexible arrangements between you and your tutorial facilitator. You will need to contact your study centre to arrange the time schedule for the sessions. You will also need to obtain your tutorial facilitator's phone number and e-mail address.

Tutorial sessions are optional however; participating in them provides tremendous benefits because they provide a forum for interaction and group discussions which will maximise the isolation you may experience as an open and distant learner.

Facilitation

This is a learning process that takes place both within and outside of tutorial sessions. Your tutorial facilitator guides your learning by doing the following things.

- Providing answers to your questions during tutorial sessions on phone or by e-mail
- Coordinating group discussions providing feedback on your assignments
- posing questions to confirm learning outcomes
- Coordinating, marking and recording your assignments/examination score(s)
- Monitoring your progress.

English language is the language of instruction for this course. The course material is available both in print and in CD. It is also on the National Open University of Nigeria website. However, on your part, you are to prepare ahead of time by studying and writing your questions so as to maximally benefit from facilitation.

Information about the location and time of facilitation will be available at your study course. This is a flexible arrangement between you and your tutorial facilitator. You should contact your tutorial facilitator whenever:

- a. You do not understand any part of the study unit

- b. You have difficulty with the self-assessment exercises
- c. You have a question or a problem with an assignment, with your tutorial facilitator's comments on an assignment or with the grading of an assignment.

Counselling

Counselling is your part of learning which helps to facilitate the learning process. This service is available to you at two levels-academic and personal. At the study centre, student counsellors are available to provide guidance for personal issues that may affect your studies. In addition, your tutorial facilitators and study centre manager can assist you with questions on academic matters such as course materials, grades, facilitation, etc. Endeavour to have the telephone numbers and e-mail addresses of your study centre and these different individuals who provide counselling services to you at an open and distant learning study centre.

Assessment

The self-assessment exercise assignments at the end of each unit, the tutor-marked assignments and the final written examination form three components of assessment for this course. In doing these assignments, you are required to use the information gathered during your study of the course. Find below detailed explanations on how to do each assignment.

Self Assessment Exercises (SAEs)

There are several self-assessment exercises spread through your course material; you are expected to attempt each immediately after reading the section that precedes it. Possible answers to the exercises are sometimes given at the end of the course book. Nevertheless, you are advised to refer to them only after you must have attempted the exercises. This is because the exercises are meant to evaluate your learning. They are not to be submitted. There are also study questions spread through the study units. You are expected to attempt these questions after reading a study unit. These questions are to aid you assess knowledge of the contents of the unit only. You are not required to submit the answers to them too.

6.0. Tutor-Marked Assignments (TMAs)

There are twelve selected tutor-marked assignments for this course. These TMAs are designed to cover areas treated in the course. You will be assessed on all twelve, but only the best three will constitute your continuous assessment. Each of these three carries 10% and altogether will court for 30% of your total score for the course. You will be given these assignments and the dates for submitting them at the study centre. The assignments must be submitted to your tutorial facilitator for formal assessment on or before the stipulated dates for submission.

You are to contact your study centre manager and tutorial facilitator if for any reason you cannot complete your work on time before the assignment is due to discuss the possibility of any extension. Remember that no extension will be granted after the due date unless under exceptional circumstances.

7.0. Final Examination and Grading

The final examination for BFN 201 will be for 3 hours duration and will carry 70% of to the total course grade. The examination will be made up of questions which reflect the kinds of self-assessment exercises, study questions and tutor marked assignments which you have previously encountered. Remember that all areas of the course will be assessed. The period between finishing the last unit and taking the examination should be used to revise the entire course. You are advised to review your answers to the self-assessment exercises and the tutor marked assignments before the commencement of the examination. You are to note that the following determine your eligibility to sit for the final examination.

Your submission of all the tutor-marked assignments

Your registration to sit for the examination. The dateline for this registration will be provided at your study centre. Where you sit for the examination without having met these conditions means you will not have a score for the course.

Course Marking Scheme

The marks that make up the total score for this course are as shown in the table below:

Assessment	Marks
Assignments (four submitted but the best three will be selected)	10% of the selected marked assignments, totalling 30%
Final examination	Examination score 70%
Total	Overall course score 100%.

8.0. CONCLUSION

All the features of this course guide have been designed to facilitate your learning process in order that you achieve the aims and objectives of this course. There features include the aims, objectives, course summary, course overview, self-assessment exercises and study questions. You should endeavour to make maximum use of them in your study to achieve maximum results.

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UNIT 5:	The Theory of Market Price - - - - -	23
UNIT 6:	The Concept of Elasticity - - - - -	30

MODULE 2

THEORY OF THE MARKET

UNIT 1:	Perfect Competition - - - - -	71
UNIT 2:	Pure Monopoly - - - - -	82
UNIT 3:	Monopolistic Competition - - - - -	92
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UNIT 5:	Natural Monopoly - - - - -	- 105

MODULE 2

PRODUCTION AND CONSUMPTION THEORY

UNIT 1:	Theory of Consumer Behaviour - - - -	40
UNIT 2:	Theory of Production - - - - -	47
UNIT 3:	Theory of Cost - - - - -	50

UNIT 4:	Linear Programming	-	-	-	-	-	-	55
UNIT 5:	Linear Programming	-	-	-	-	-	-	

MODULE 4

MONEY AND FINANCIAL INSTITUTION

UNIT 1:	Money, Types and Functions	-	-	-	-	-	-	60
UNIT 2:	Demand for Money	-	-	-	-	-	-	65
UNIT 3:	Supply of Money	-	-	-	-	-	-	68
UNIT 4:	Types of Financial Institutions	-	-	-	-	-	-	70
UNIT 5:	Functions of Financial Institutions	-	-	-	-	-	-	75
UNIT 6:	Control of Financial Institutions	-	-	-	-	-	-	80

UNIT 1 MEANING, SCOPE, METHODS AND IMPORTANCE OF MICROECONOMICS

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- 1.0 Introduction
- 2.0 Objectives
- 3.0 Main Content
 - 3.1 Meaning of microeconomics
 - 3.2 Scope of Microeconomics
 - 3.3 Methodology of economics
 - 3.4 Uses of Microeconomics
 - 3.5 Importance of Microeconomics to businesses
- 4.0 Conclusion
- 5.0 Summary
- 6.0 Tutor – Marked Assignment
- 7.0 References/Further Readings

1.0 INTRODUCTION

The subject - matter of economics has been divided into two parts: Microeconomics and Macroeconomics. These terms were first coined and used by Ragnar Frisch and have now been adopted by economists all over the world. Microeconomics deals with the analysis of small individual units of the economy while macroeconomics concerns itself with the analysis of the economy as a whole and its large aggregates such as national output and income, total employment, total consumption and aggregate investment. We will confine ourselves to microeconomics.

In this unit therefore, we shall examine the concept of microeconomics, scope of microeconomics, methodology of economics, uses of microeconomics and the importance of microeconomics to businesses.

2.0 OBJECTIVES

At the end of this unit, you should be able to;

- Explain the concept of microeconomics
- Discuss the scope of microeconomics
- Discuss the methodology of microeconomics
- Discuss the use of microeconomics
- Explain the importance of microeconomics to businesses.

3.0 MAIN CONTENT

3.1 The Meaning of Microeconomics

The term microeconomics is derived from the Greek word “micros” meaning ‘Small’. Thus, microeconomics deals with the analysis of small individual units of the economy individual consumers, individual firms and small aggregates of individual units such as various industries and markets. In microeconomic theory, we discuss how the various cells of economic organism, that is, the various units of the economy such as, many

consumers, many producers or firms, various workers and resource suppliers in the economy do their economic activities and reach their equilibrium.

In other words, microeconomics makes a microscopic study of the economy. We discuss equilibrium of the innumerable units of the economy piecemeal and their interrelationship to each other. For instance, in microeconomic analysis, we study the demand of an individual consumer for a good and from there go on to derive the market demand for the good (i.e demand of a group of individuals consuming a particular good). It also study's the behavior of firms in regard to the fixation of price and output and their reactions to changes in market conditions. From there, we proceed to price-output fixation by the entire industry (a group of firms producing the same product).

SELF- ASSESSMENT EXERCISE

What is microeconomics?

THE SCOPE OF MICROECONOMICS

There has been a lot of controversy among economist about the true scope of economics or the subject - matter. In general, the scope and subject matter of economics (be it microeconomics or macroeconomics) can be better known by spelling out the questions economist have been asking and the basic economic problems they have concerned with. The fundamental questions are;

- (i) What goods to be produced and the quantity that will be produced with scarce resources.
- (ii) What production methods to employ
- (iii) How is the total output distributed in the economy
- (iv) Are the use of productive resources economically efficient
- (v) Whether all productive resources are fully utilized
- (vi) Is the economy's productive capacity increasing, decreasing or static over time.

All these problems arise from the fundamental problem of scarcity. Thus, microeconomics study's how decisions are taken, at the micro level, on solving the above basic problems. Microeconomics seeks to determine the mechanism by which the different economic units attain the position of equilibrium proceeding from the individual units to a narrowly defined group as follows;

- (i) ***The Study of Resource Allocation, Product and Factor Pricing:*** It takes the total quantity of resources as given and seeks to explain how they are allocated to the production of particular goods. It is this allocation that determines what goods shall be produced and how they shall be produced. Also, in a free market economy, the prices of the various goods and the prices of the various factors of production determines the allocation of resources to the production of various goods. Prices of the goods and factors of production in turn depends on the forces of demand and supply which microeconomics study's.
- (xiv) ***A Study of Economic Efficiency:*** Besides analysing pricing and the allocation of resources, it seeks to explain whether the allocation of resources is efficient. Efficiency is attained when the resources are so allocated that

maximizes the satisfaction of the society. Economic efficiency involves three efficiencies; Efficiency in production, Efficiency in the distribution of goods or consumption and allocate efficiency, that is, efficiency in the direction of production. Efficiency in production involves minimization of cost and the maximization of profits. Efficiency in consumption involves distributing goods in such a way as to maximize the total satisfaction of the society. Efficiency of allocation involves producing those goods, which are most desired so as to maximize total welfare.

- (xv) ***Microeconomics and the Economy as a Whole:*** Microeconomics is concerned with the discussion of the problem of the allocation of resources in the society and judging the efficiency of the same. Both microeconomics and macroeconomics analyse the economy in two different ways. Microeconomics examines the economy as a whole ‘microscopically’, that is, it analysis the behaviour of individual economic units, their interrelationships and equilibrium adjustment to each other, which determines the allocation of resources in the society. This is known as general equilibrium analysis.

SELF-ASSESSMENT EXERCISE

Discuss the scope of microeconomic analysis.

3.3 Methodology of Economics

There are certain methodologies, principles and assumptions employed in economic analysis. They are:

- (i) ***Deductive or abstract method:-*** The deductive method deduces conclusions from certain fundamental axioms or assumptions established through other methods by logical process of reasoning. Using this method, economist proceed from reasoning to the study of facts and verifications of conclusions arrived at. This method is referred to as hypothetical because some assumptions may not correspond to facts. They may however, be so near to facts that they may be used as premises for reasoning and deriving conclusions. It is called “abstract” because the problem is simplified, removing call irrelevant facts.

The advantages of the deductive method include;

Useful mathematical techniques can be used to develop economic theories through the process of deduction.

Economic theories can be derived without the tedious and detailed data collection under inductive method.

Controlled experiment is not possible in economics hence deduction is useful.

The use of mathematical methods in this approach makes economists introduce exactness and accuracy in economic theories and principles.

A disadvantage of this method is that it is difficult to test results obtained in economic science through deductive reasoning. At times, the problems are so complex that confirmation is almost impossible. Finally, one advantage of this method is that it is very useful in mathematics particularly geometry; but what is useful in geometry cannot be at all times applied to economics.

- ii. ***The inductive or Historical method:-*** The inductive method is based on prior examination of facts. The concrete, realistic, historical or inductive method start with facts

or collected data and on their basis attempt at a generalization. Inductive involves three steps. They are: (a) Experimentation, (b) Observations, (c) Statistical or econometric method. The advantages of this method include:

It is used to check and verify the conclusions of old “deductive” economists. This method emphasizes the fact that any generalization will have validity only under certain conditions, in certain places and at a particular period of time.

It stresses the importance of relativity.

However, it has some disadvantages, one of which is the absence of hypothesis, that is, a working explanation to guide and direct the enquirer in his study. Though later writers of this school of thought avoided this difficulty by using hypothesis. Although arbitrary assumptions should be avoided but some hypothesis and some general ideas will be necessary to guide the economist, otherwise he will find facts difficult to handle.

- i. ***Integration of the two methods:-*** The controversy existing among the earlier economist have been resolved that both inductive and deductive methods are complementary rather than competitive in developing economic theories. The modern economists first derive economic hypothesis through the process of logical deduction and then empirically test them through statistical or econometric methods. However, empirical studies made through statistical or inductive method without a theoretical hypothesis to serve as a guide for the selection of data are quite useless. If the predictions on the hypothesis are tested through inductive method and it is found out that they are consistent with facts, the hypothesis or theory (based on deduction) stands proved, and if the predictions of the theory are found to be inconsistent with facts, it stands rejected.

SELF ASSESSMENT EXERCISE

Differentiate between the deductive and the inductive methods. How is the controversy resolved?

3.4. Uses of Microeconomics

The importance and uses of microeconomics include;

- i. It is helpful for the formulation of economic policies that promotes the welfare of the masses. It tells us how free market economy works to decide about the allocation of productive resources among goods and services. It further tells us how these goods and services are distributed in the economy through price mechanism.
- ii. Again, it explains the conditions of efficiency in production and consumption and highlights the factors, which are responsible for the departure from the efficiency or economic optimum. It suggests suitable policies to promote economic efficiency and the welfare of the people.

Importance of Microeconomics

- i. Modern economy is so complex that a central planning authority will find it too difficult to get all the information required for the optimum allocation of resources. Micro economics reveals how a decentralised system of a free private enterprise economy functions without any central control.

- ii. It shows how monopoly leads to misallocation of resources resulting to loss of efficiency and welfare and also shows how perfect competition in the product and factors markets leads to optimum welfare.
- iii. Externalities exist when the production and consumption of a commodity affects other people than those who produce, sell or buy it. Microeconomics reveals that when externalities exist, free working of the price mechanism fails to achieve economic efficiency.

SELF ASSESSMENT EXERCISE

Discuss the uses of microeconomics

3.5 Importance of Microeconomics to businesses

The importance of microeconomics to businesses include;

- i. It studies resource allocation which determines what goods shall be produced and how they shall be produced. Therefore it helps businesses decide the good to produce and how they are to be produced to meet the needs of consumers and for optimal gains for the firms.
- ii. The theory of product pricing falls within the domain of microeconomics. This helps business in setting the prices of their products for their optimal benefit and that of the society.
- iii. The theory of factor pricing also falls under the domain of microeconomics. The theory of distribution or factor pricing explains how wages, rent, interest and profits are determined. These payments to factors of production are crucial for every business.
- iv. Demand depends on behaviour patterns of consumers and supply depends on production cost and the behaviour patterns of firms. Thus, demand and supply analysis is needed to explain the determination of prices of goods and factors.
- v. Microeconomic analysis helps businesses in minimization of cost and maximization of profits.

SELF- ASSESSMENT EXERCISE

Discuss the importance of microeconomics to business.

4.0. CONCLUSION

In conclusion, microeconomics is the study of how the various cells of economic organization, that is, the various units of the economy such as consumers, producers, workers and resource suppliers in the economy do their activities and reach equilibrium states. It is therefore, not only vital for policy formulation by the government but crucial for the welfare of individual consumers and maximization of profits for business.

5.0. SUMMARY

This unit examined the concept of microeconomics and its scope. It further looked at its methodology and its importance to the economy.

6.0. TUTOR – MARKED ASSIGNMENT

- 1 What is microeconomics?
- 2 Brief discuss the scope of microeconomics
- 3 Brief discuss the uses of microeconomics

7.0. REFERENCES/ FURTHER READINGS

Mai-Lafia, D. I. and Goshit G. G. (2009) BHM 200 Business Economics. Lagos: NOUN Publishers

Ahuja, H. L. (2006). Advanced Economic theory: Microeconomic Analysis (15th Ed.). New Delhi: S. Chand & Company Ltd.

Samuelson, P. A. (1947). Foundations of Economic Analysis. Cambridge, Mass. P. 257.

Mai-Lafia, D. I. (2005). Understanding Economics (2nd Ed.). Lagos: Data Quest Publishers.

UNIT 2 BASIC CONCEPTS IN MICROECONOMICS

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 - 3.2. Resources
 - 3.3. Utility
 - 3.4. Factors of Production
 - 3.5. Costs
 - 3.6. Inputs and outputs
 - 3.7. Short – run and long – run
 - 3.8. Equilibrium
 - 3.9. Firms and industry
- 4.0. Conclusion
- 5.0. Summary
- 6.0. Tutor – Marked Assignment
- 7.0. References/Further Readings

1.0. INTRODUCTION

There are so many concepts involved in the discipline of economics hence, microeconomics cannot be an exception. Some of these concepts are so important that their understanding serves as a beginning to the study of economics.

In this unit therefore, we shall examine such concepts in microeconomics as, scarcity, resources, factors of production and utility. Other concepts to be considered are, costs inputs and outputs, firms and industry, short run and long run and the concept of equilibrium.

2.0. OBJECTIVES

At the end of this unit, you should be able to;

Theoretically explain these concepts

Graphically demonstrate these relationships if they exist

Mathematically demonstrate how these relationship works in case they exist.

3.0. MAIN CONTENT

3.1. The Concept of Scarcity and Choice

Scarcity refers to the relative unavailability of resources in terms of defined catalogue of wants. Choice is on the other hand is an act of choosing between two or more possibilities. An economy exists because of two basic facts. First, human wants. For goods are unlimited, and secondly, productive resources with which to produce goods and services are scarce. With our wants unlimited and resources to satisfy all our wants by producing everything we desire hence the choice of utilization of scarce resources for the maximum possible satisfaction of the society.

Since resources are relatively scarce in relation to numerous wants, the society is faced with the problem of choice among the vast array of wants that are to be satisfied. The scarcity of resources relative to human wants gives rise to the struggle of man for substance and efforts by him to promote his well - being. Thus, the problem of scarcity gives rise to some problems generally known as “basic economic problems” which a society has to solve so as to promote material well – being of its people.

SELF- ASSESSMENT EXERCISE

Discuss the concepts of scarcity and choice

3.2. The concept of resources

A resource refers to anything, which can contribute to economic activity. They are means or instruments for the production of goods and services for human consumption. They include natural resources, including both those located on land and those in or under the sea; human resources, including labour of various skills and qualifications, and capital goods or man – made means of production. In fact, economics can be defined as the study of how resources are allocated or utilized.

The characteristics of resources include;

- i. Unavailability i.e. are limited
- ii. Usage in the production of a wide variety of goods
- iii. They can be combined indifferent proportions to produce a given good.

SELF ASSESSMENT EXERCISE

What are resources?

3.3. Utility

The concept of utility is used to represent the satisfaction an individual derives from consuming a given good or service. It is a synonym for individual welfare. Economics have differenced to whether utility should be regarded as cardinal (measurable) or ordinal can only be ordered. There are two basic concepts of utility; Total utility and marginal utility. Total utility and marginal utility. Total is the measure of total satisfaction resulting from a given amount of goods. As we increase the amount of goods consumed, total utility increases but at a decreasing rate. It is a measure of the total welfare of an individual on the other hand, marginal utility is the increment to total utility resulting from a unit increase in quantity. It measures how much utility a consumer derives as a result of the consumption of an additional unit of a commodity.

SELF ASSESSMENT EXERCISE

What is Utility?

3.4. Factors of production

A factor production refers to any resource used in the production of goods or services. They are broad categories of economic resources enumerated as follows:

- i. **Labour:** It refers to human beings as factors of production. It encompasses human physical and mental effort used in the production of goods and services. It can be either skilled or unskilled.

- ii. **Land:** This may be defined to include all natural resources such as water, mineral deposits and soil for cultivation of crops. They are used in the production of goods and services.
- iii. **Capital:-** It is manmade means of production. They are designed to be used in production such as machinery, equipment, factory buildings and transport facilities. They also include a stock of financial assets, which can be used to provide an income.
- iv. **Entrepreneurship:-** It is the human ability to organize the combination of other factors of production in the process of producing goods and services, to take business decisions, introduce innovation and to risk funds.

SELF ASSESSMENT EXERCISE

What are factors of production?

3.5. The concept of costs

Cost (s) generally refers to the value of the inputs (usually in monetary terms) needed to produce any good or service. When economists talk of cost, they in most cases, refer to opportunity cost which refers to the cost of the alternative foregone. The accountant regards explicit costs which are outlays made by a firm or company such as wages and salaries, raw materials etc. on the other hand, the cost of the best alternative use of owners time or the cost of self owned resources in production i.e. implicit costs are ignored by the accountant. Cost to an economist includes both explicit and the implicit costs of production.

SELF ASSESSMENT EXERCISE

What is cost?

3.6. Inputs and Outputs

Inputs refer to economic resources combined and used in the production process. They are intermediate products used in the production of goods and services such as capital, raw materials and labour. On the other hand, outputs are the final results of the production process. Where a process produces goods, measurement of output is straight forward, but where a process produces services, measurement of output raises problems. Therefore inputs are used in the production process as intermediate products in producing the final goods and services (Output).

SELF-ASSESSMENT EXERCISE

Differentiate between inputs and outputs?

3.7. Short – run and long – run

In the short – run, a firm employs a given (fixed) amount of some resources known as fixed cost (FC), and also other resources that can be varied or are variable referred to as variable cost (VC). Therefore, in the short – run total cost of production (TC) is equal to fixed cost (FC) plus variable cost (VC) i.e. $TC = FC + VC$. In this regard, the short – run is a production period where a firm cannot vary the utilization of its fixed cost.

The long – run represents a period within which a firm can vary the utilization of all its productive resources. Hence in the long – run, there are no fixed costs, all costs are variable. This implies that total cost (TC) is equal to variable cost (CV) i.e. $TC = VC$

SELF ASSESSMENT EXERCISE

Differentiate between the short – run and long – run periods

3.8. The concept of equilibrium

The concept of equilibrium was derived from the Latin Words, *acqus Libra*.

‘Acqus’ means equal and ‘Libra’ means balance, thus the term equilibrium means equal balance. It is a position of rest. It is the most cosy position toward which every economic; firm, resource owner industry, the economy has a tendency to move or from which it has no incentive to deviate from. Thus, the attainment of equilibrium is the ultimate goal of all economic activities in the economy.

In spite of the fact that it is a position of rest, it is not characterized by absence of activity. There are economic activities in a state of equilibrium. In this state, consumers purchase goods and services and producers supply goods and services. A system therefore, is in equilibrium when the various determinant forces behave in such a fashion that the system shows no tendency towards any change. Different types of equilibrium include; short and long-run equilibrium, stable, unstable, neutral, single, multiple, static, dynamic, partial and general equilibrium.

SELF-ASSESSMENT EXERCISE

What is equilibrium?

3.9 Firms and industry

A firm is the basic unit of decision taking in a decentralized economy. It is an organization or a company that specializes in the production of a good or service. An example is Zenith Bank which is a firm supplying banking services, and Ashaka Cement supplying building materials (Cement).

On the other hand, an industry is the collection of firms producing same or identical goods or services. It is a sector of the economy in which firms use similar factor inputs to make a group of related products. An example is the Banking Industry.

SELF ASSESSMENT EXERCISE

Differentiate between a firm and an industry.

4.0 CONCLUSION

In conclusion, the various basic concepts in microeconomics are important in the study of microeconomics. These concepts are among concepts that understanding them serves as the beginning of the study of microeconomics.

5.0 SUMMARY

This unit basically looked at some of the basic concepts in microeconomics. Concepts such as; Scarcity and Choice, Utility, Resources, Factors of Production and Costs were

examined. Others include, inputs and output, Short-run and Long-Run, Firms and Industry, and the concept of equilibrium.

6.0 TUTOR-MARKED ASSIGNMENT

- (1) Differentiate between the following;
 - (a) Firms and Industry
 - (b) Inputs and Output
 - (c) Short-run and Long-run
- (2) What is Equilibrium?
- (3) Write short notes on the following;
 - (a) Resources
 - (b) Factors of Production
 - (c) Costs

7.0 REFERENCES/FURTHER READINGS

Mai-Lafia, D. I. and Goshit G. G. (2009) BHM 200 Business Economics. Lagos: NOUN Publishers

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UNIT 3 THE THEORY OF DEMAND

CONTENTS

- 1.0. Introduction
- 2.0. Objectives
- 3.0. Main content
 - 3.1. The concept of demand
 - 3.2. Demand schedule and the demand curve
 - 3.3. Reason for the downward sloping demand curve
 - 3.4. The determinants of demand
 - 3.5. Shift in demand and change in quantity demanded
- 4.0. Conclusion
- 5.0. Summary
- 6.0. Tutor – marked assignment
- 7.0. Reference /further readings

1.0. INTRODUCTION

The market price of a commodity is influenced by the demand of consumers or their ability to purchase a product, and by the supply of the commodity that firms offer for sale. The demand schedule shows the quantities of a good or service that people want to buy at different prices. Therefore, the demand function relates demand to factors determining it.

In this unit, we shall examine the concept of demand, the demand schedule and the demand curve the reasons for the downward sloping demand curve, the determinants of demand and the difference between shift in demand and change in quantity demanded.

2.0. OBJECTIVES

At the end of this unit, you should be able to;

Explain the concept of demand

Explain demand schedule and the demand curve

Discuss the reason for the downward sloping demand curve

Discuss the determinants of demand

Differentiate between shift in demand and change in quantity demanded

3.0. THE THEORY OF DEMAND

3.1. The Concept of Demand

The demand for a commodity is the quantity of that commodity, consumers are willing and able to buy at a given point in time and at a given price. This implies that consumer purchases are linked with various commodity prices. However, the purchase of a commodity does not depend, on price alone. Other factors do affect the demand for a commodity.

The law of demand states that, “The higher the price, the lower the quantity demand and vice versa, all other factors affecting demand remaining constant”. The assumption of *ceteris paribus* (all other factors remaining constant) is important. This is due to the fact that consumer demand can change even if the price of the commodity remains unchanged.

SELF- ASSESSMENT EXERCISE

Define demand and state the law of demand

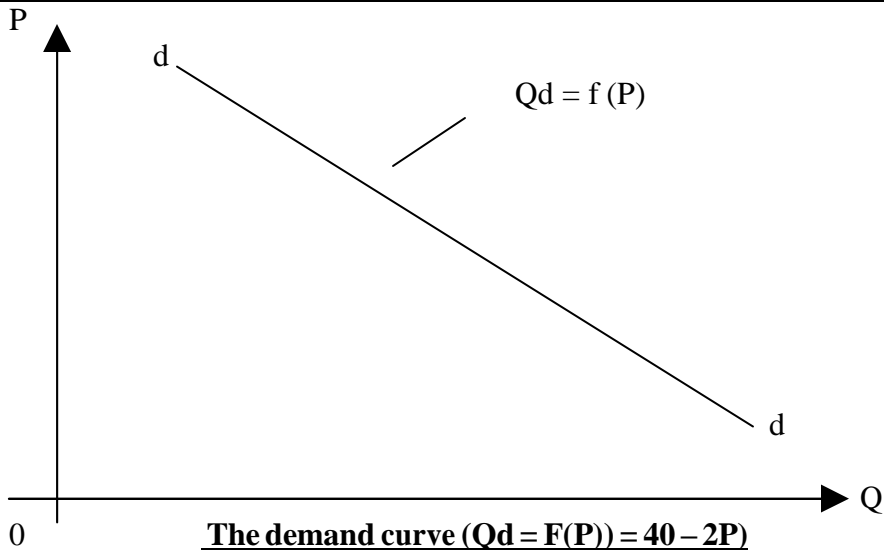
3.2. DEMAND SCHEDULE AND THE DEMAND CURVE

Demand schedule means the relationship between the market prices and the amount of goods that consumers are willing and able to buy. In line with the law of demand, there exist a negative relationship between quantity demanded and the price of that commodity. When price increases, the demand will reduce (all other factors affecting demand remaining constant). Hence the demand function is $Q_d = F(P)$, where the coefficient of P is negative.

The demand curve is the geometrical representation of the demand schedule. It is a negative function of price i.e. the curve slopes downward from left to right. Assuming the following demand function $Q_d = 40 - 2p$, when price is equal to N1.00, quantity demanded is $Q_d = 40 - 2(1) = 40 - 2 = 38$ units

Example of the demand schedule

Price of good (x)	1	2	3	4	5	6
Quantity demand of good (x)	38	36	34	32	30	28



SELF ASSESSMENT EXERCISE

- 1 What is demand schedule and demand curve?
- 2 Given the demand function for a commodity as $Q_d = 20 - 6P$ with P as 7, 8, 9, 10, 11,
- 3 Draw the demand curve.

3.3. Reasons For The Downward Sloping Demand Curve

According to the law of demand, the higher the price, the lower the quantity demanded and vice versa (*ceteris paribus*). When the price of a commodity reduces, more people can afford it hence those new buyers will increase the total demand for the product. Again, each extra reduction in price may be met by extra

purchases from existing consumers and when the price goes up, a consumer can afford fewer quantities of that commodity.

SELF-ASSESSMENT EXERCISE

What causes the downward sloping demand curve?

3.4. The determinants of demand

There are several factors that affect the demand for a commodity. They include;

- i. **Price of the commodity:-** In line with the law of demand, when the price of a commodity is high, it lowers the quantity demanded of that commodity due to the fact that the consumer doesn't just lower the quantity he buys but look to alternatives he can switch to. But in case of luxury and inferior goods, the situation becomes different because they are not normal goods.
- ii. **Price of related commodities:-** There are two major categories of commodities; complements and substitutes in the case of complementary goods (X and Y), an increase in the price of X results in a decrease in the quantity demanded of Y and vice versa.

On the other hand, if X and Y are substitutes, an increase in the price of "X" results in an increase in the quantity demanded of "Y" because people will switch their demand or substitute X for Y. therefore, beside the price of the commodity, the demand for that commodity will largely depend on the price of related commodities.

- iii. **Consumers income:** Income refers to the sum total of earnings of a given consumption unit. These earnings are usually made up of salaries and wages, dividends and interest earned. For almost all commodities and individuals, the greater the income, the greater the demand for a particular commodity. In the case of inferior goods, a rise in income of the consumer leads to a reduction in the demand for that commodity.
- iv. **Consumers taste and preferences:-** At a given price and income level, the demand for a commodity depends upon the taste and preference of consumers. The tastes and preference are in turn influenced by advertisement, brand quality, religion and customs. When these change in favour of a commodity, the demand for that commodity will increase.
- v. **Availability of credit facilities:-** The availability of credit facilities means the possibility of purchasing commodities and payments for them to be made later. If there exist easy access to credit, the demand for commodities will increase. Indeed, consumers who could not afford goods and services with cash can purchase them later.
- vi. **Changes in distribution of income:-** There are usually these three income groups in any economy. High income group, middle income group and low income group. If income is evenly distributed, it will affect demand for commodities different from the way it would be if distribution were skewed.
- vii. **Government Policies:-** Government policies change from time to time. The government may issue a policy advising consumers against the consumption of certain goods due to certain reasons. Taxes can be imposed on certain items to make them dearer and reduce their demand.

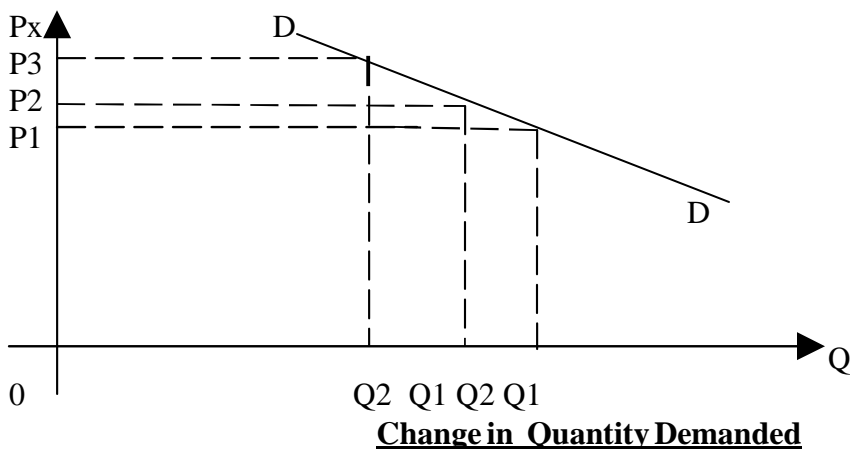
- viii. **Seasonal/Geographical factors:-** Season or geographical factors affect the demand for commodities. Consumers are compelled to demand certain goods due to climatic or weather conditions of certain areas or regions.

SELF-ASSESSMENT EXERCISE

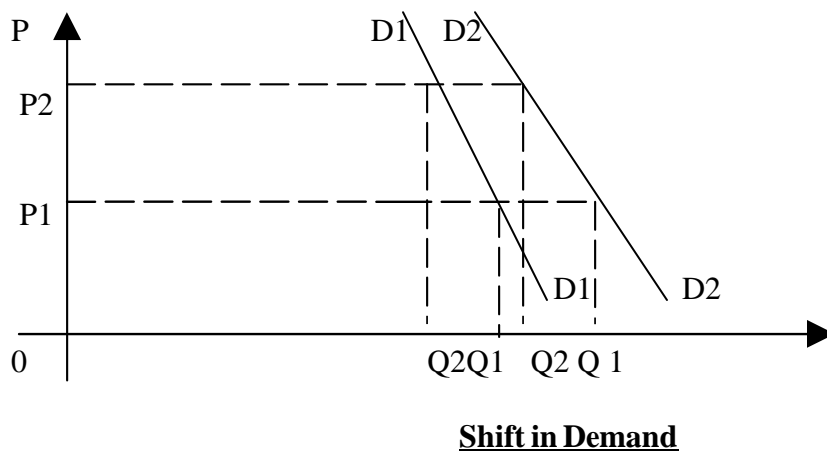
Discuss the determinants of demand

3. Shifts in Demand and Change in Quantity Demanded

Change in quantity demanded refers to a situation where more quantities of a commodity are demanded for at lower prices. This price – quantity relationship will result in a movement along the demand curve.



On the other hand, shift in demand refers to situations when demand changes even without a change in price. A shift in demand occurs when there is a bodily shift of the demand curve either to the left or to the right. It arises when a different quantity is demanded at each and every price. The change in the quantity demanded at each and every price may be due to changes in other factors that affect demand apart from price such as income.



SELF- ASSESSMENT EXERCISE

Differentiate between shifts in demand and change in quantity demanded

4.0. CONCLUSION

Demand is not want because human wants are unlimited. Demand is then want backed by the ability to pay. Therefore, there should be willingness to buy and the ability to pay before demand can be executed.

5.0. SUMMARY

This unit examined the concept of demand, the law of demand and the factors affecting demand. It also examined the reason for downward sloping demand curve and the differences between shifts in demand and change in quantity demand.

6.0. TUTOR - MARKED ASSIGNMENT

- 1 Define demand and the law of demand.
- 2 What are the determinants of demand
- 3 Differentiate between shifts in demand and changes in quantity demanded

7.0. REFERENCES / FURTHER READINGS

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UNIT 4 THE THEORY OF SUPPLY

CONTENTS

- 1.0. Introduction
- 2.0. Objectives
- 3.0. Main content
 - 1.1. The concept of supply
 - 1.2. Supply schedule and the supply curve
 - 1.3. Shift in supply and change in quantity supplied
- 4.0. Conclusion
- 5.0. Summary
- 6.0. Tutor – marked assignment
- 7.0. Reference /further readings

1.0. INTRODUCTION

The market price of a commodity is influenced by the demand of consumers or their ability to purchase a product, and by the supply of the commodity. The supply schedule shows the quantities of a good or service that suppliers are willing and able to supply at different prices. Therefore, the supply function relates supply to factors determining it.

In this unit, we shall examine the concept of supply, the supply schedule and the supply curve, the determinants of supply and the difference between shift in supply and change in quantity supplied.

2.0. OBJECTIVES

At the end of this unit, you should be able to;

Explain the concept of supply

Explain supply schedule and the supply curve

Discuss the determinants of supply

Explain the differences between shifts in supply and changes in quantity supplied

3.0. MAIN CONTENT

3.1. The Concept of Supply

The supply of a commodity refers to the quantity of that commodity a producer is willing and able to offer for sale at a given point in time and at a given price. It indicates the relationship between price and quantities offered for sale at a given period of time.

The law of supply states that “the higher the price, the higher the quantity supplied and vice versa (all other factors affecting supply remaining constant i.e. *ceteris paribus*). Therefore, unlike demand, a negative relationship exists between quantity supplied and price.

SELF- ASSESSMENT EXERCISE

Define supply and state the law of supply

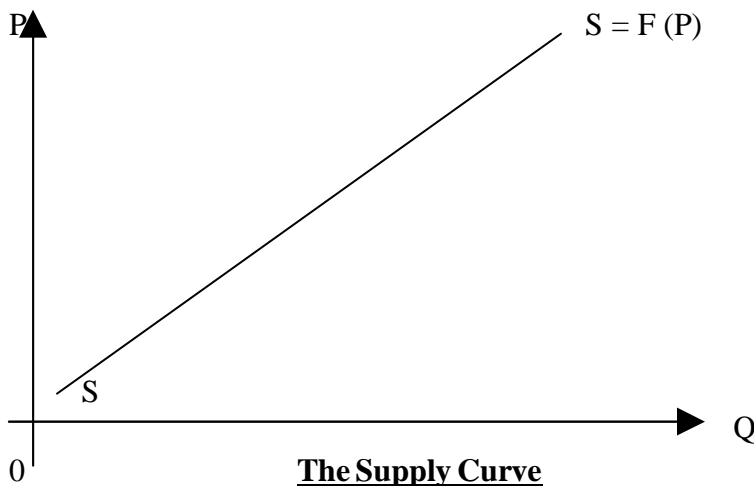
3.2. The Supply Schedule and Supply Curve

Supply schedule means the relationship between the market prices and the amount of goods that producers are willing to offer for sale. In line with the law of supply, there exist a positive relationship between the price of a commodity and its quantity supplied.

On the other hand, the supply curve is the geometrical representation of the supply schedule. It is a positive function of price i.e. the curve slopes upwards from left to right indicating an increase in amount supplied as price increase.

Example of a supply schedule

Price of X	1	6	12	24	30
Quantity supplied	5	20	30	70	80



SELF ASSEMENT EXERCISE

Differentiate between a supply schedule and a supply curve

3.3. The determinants of supply

The factors influencing the supply of a product include;

- Price of the commodity:-** In line with the law of supply, the higher the price, the higher the quantity supplied (*Ceteres paribus*). Therefore, the quantity supplied is a positive function of price.
- The prices of other related goods:-** The law of supply obviously assumes the case of one commodity. If the price of goods the producer can otherwise produce rise indicating an increase in the profitability of selling them, then the firm may transfer some of its resources to the production of those goods. The implication of the is that the supply of the original commodity will fall.
- The prices of factors of production:-** The price of a commodity must cover the cost of its production since the goal of every producer is profit maximization.

This means that the price must at least equal to the money outlays spent for its production. Thus, a rise in the cost of production will be reflected in a higher supply price.

- iv. **Goals of the firm:-** If the aim of producers is to sell as much as possible to capture the market, even if it cost some profits more, will be produced than if the aim is to maximize profit.
- v. **State of technology:-** In economics, technology is classified into two main categories, labour intensive and capital intensive. While labour intensive lays emphasis on the use of labour, capital intensive lays emphasis on the use of machinery and other advanced method of production. A change in production technique from a less efficient one to a more efficient or advanced technique increases supply.
- vi. **Government Policies:-** A government policy may boost or frustrate the supply of a commodity. If the government subsidizes the factors of production, it reduces cost and boost supply. On the other hand, when there is a ban or tariff on certain factors of production, it increases the cost of production and reduces production hence supply reduces.
- vii. **Extraneous factors:** Natural disasters, wars and ecosystem affect the supply of goods. The occurrence of any of these factors reduce the supply of goods and for agricultural products, certain weather conditions are not favorable for their production hence reducing the supply of these products.

SELF- ASSESSMENT EXERCISE

What are the determinants of supply

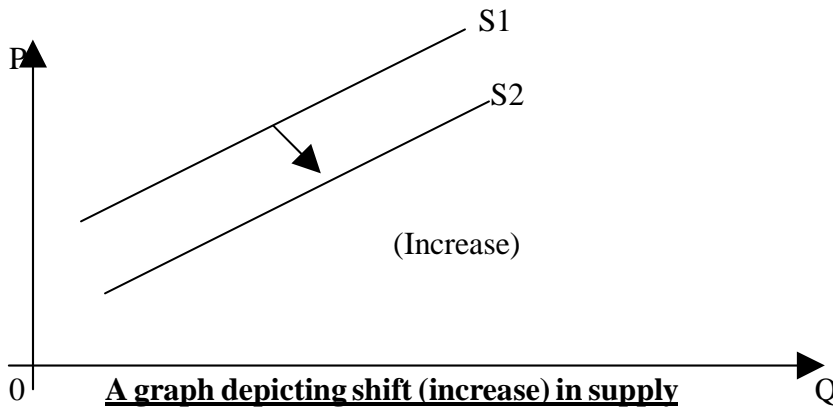
3.4. Shift in Supply and Change in Quantity Supplied

A change in the price of a given commodity – other factors remaining constraint, will change the quantity supplied of that commodity in the same direction with price. This is a situation of movement along the supply curve (i.e. change in quantity supplied). This situation is in line with the law of supply hence $Q_{Sx} = F(P_x)$ i.e. quantity supplied of good 'X' is a function of price of good 'X'.

On the other hand, a change in any of the components of supply other than the price of that particular commodity will cause a bodily shift of the supply curve either to the left or to the right of the original curve. A shift to the right indicates an increase in supply with a shift to the left indicating a decrease in supply. Therefore, there is not just one quantity for a particular price but different quantities for a given price and so the change is not due to price changes but they occur within the same price.

SUPPLY SCHEDULE FOR GOOD 'X'

PRICE OF X IN N	3	4	4.4	4.6	5	5.6
ORIGINAL QUANTITY SUPPLIED	10	16	24	30	40	50
NEW QUANTITY SUPPLIED	16	24	30	40	50	80



SELF- ASSESSMENT EXERCISE

Differentiate between shift in supply and change in quantity supplied

4.0. CONCLUSION

In establishing the market price, not just the demand is important, supply of that particular commodity is also important as market conditions need provide incentive for producers to produce or supply.

5.0. SUMMARY

This unit examined the concept of supply and the law of supply. It also examined supply schedule and supply curve and then concluded by looking at the determinants of supply and the difference between shift in supply and movement along the supply curve.

6.0. TUTOR MARKED ASSIGNMENT

- 1 Define supply and the law of supply?
- 2 Discuss the determinants of supply?
- 3 Differentiate between shift in supply and change in quantity supplied

7.0. REFERENCES / FURTHER READINGS

- Mai-Lafia, D. I. and Goshit G. G. (2009) BHM 200 Business Economics. Lagos: NOUN Publishers
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UNIT 5 THEORY OF MARKET PRICE

CONTENTS

- 1.0. Introduction
- 2.0. Objectives
- 3.0. Main content
 - 3.1. The concept of Market Price
 - 3.2. Market Demand and Market Supply
 - 3.3. The Determinant of Equilibrium Price
 - 3.4. Changes in Market Equilibrium
- 4.0. Conclusion
- 5.0. Summary
- 6.0. Tutor – Marked Assignment
- 7.0. References / Further Readings

1.0. INTRODUCTION

In the two previous chapters, we looked at the analysis of demand and supply. In this chapter, we extend the analysis to include the fact that price will function to equalize the quantity demanded by consumers and the quantity supplied by producers, resulting in an economic equilibrium of price and quantity.

In the unit therefore, we shall examine the concept of market price, the determination of equilibrium price and finally look at changes in market equilibrium.

2.0. OBJECTIVES

At the end of this unit, you should be able to;

Explain the concept of market price,

Discuss the determination of market equilibrium, and,

Discuss changes in market equilibrium.

3.0 MAIN CONTENT

3.1 The concept of market price,

Price refers to the amount of money paid per unit for a good or serves. In any ordinary shop, customers will find displayed a price at which as many or few units as they wish can be purchased. For some goods and services, however, price is less easy to observe. Special terms may be available for large orders, for repeat orders, or for particular types of customers. In some markets buyers and sellers haggle over the price of each item. The price of similar goods vary over time and place, and goods with the same name vary in quality.

The theories of demand and supply are used in understanding the behaviour of market agents in determining the market price. The interaction between demand and supply help in setting the market price, hence equilibrium price refers to the price at which the quantity of a good supplied is equal to the quantity demanded. It is the price that clears the market, the situation when supply and demand are equal.

SELF ASSESMENT EXERCISE

What is market price.

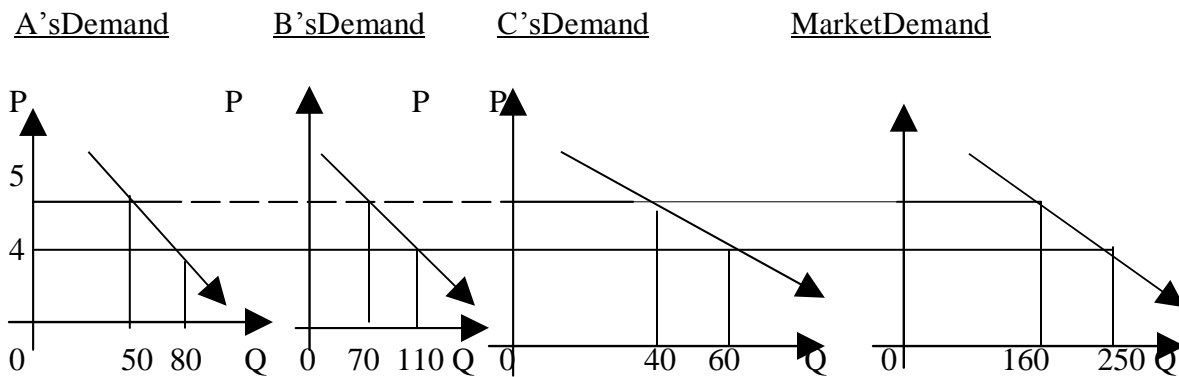
3.2 Market demand and market supply

Market demand refers to the summation or the addition of individual or household demand at a given point in time and at a given price. Suppose there are three consumers A, B and C with a demand schedule for a product (x) as follows;

The demand schedule for good (x) at two different periods

Per unit price (₦)	Quantity Demanded by consumers			Market Demand
	A	B	C	
5	50	70	40	160
4	80	110	60	250

This information can be expressed geometrically as follows;

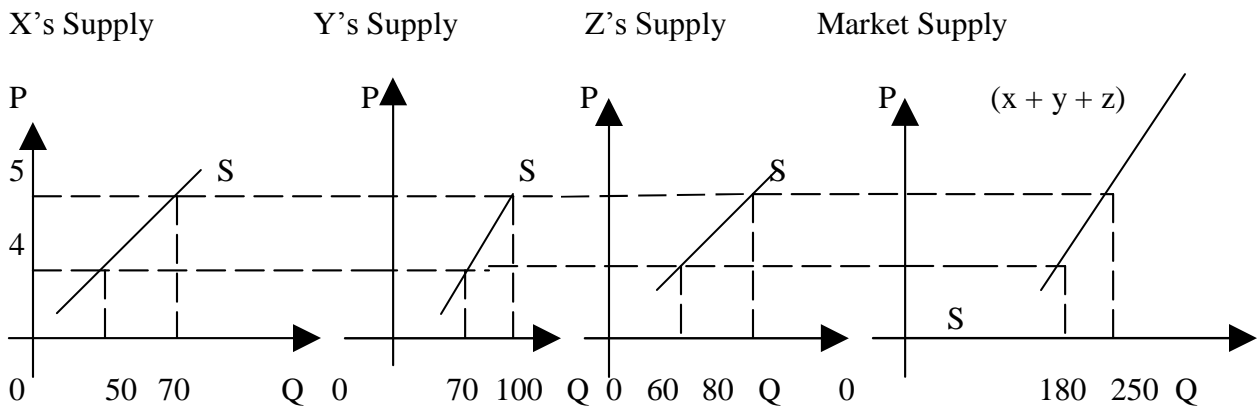


This can be estimated using econometric techniques in the form $Q_d = fp$ where quantity demand is expressed as a function of price ($Q_d = a - bp$).

On the other hand, market supply is the aggregate supply individual firm is willing and able to produce and offer for sale at a given period and a given price. Suppose there are three firms X, Y, and Z with the following supply schedule;

Per unit price (₦)	Quantity Demanded by consumers			Market Demand
	X	Y	Z	
5	70	100	80	250
4	50	70	60	80

This can be represented diagrammatically as follows; X's supply Y's supply Z's supply market supply.



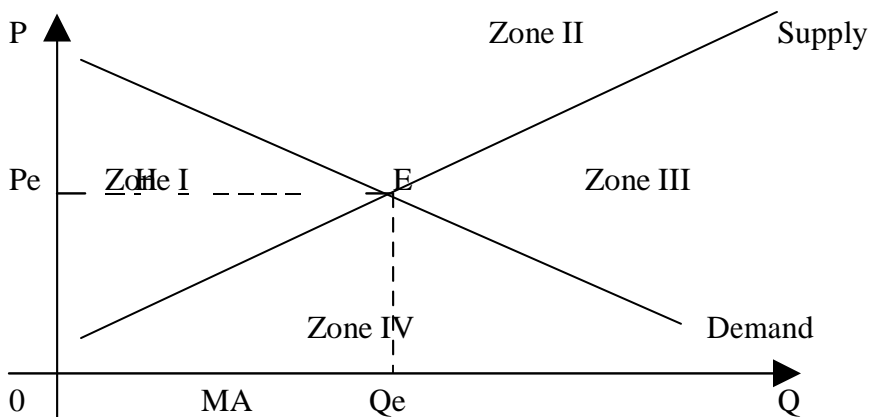
It can be estimated using econometric technique in the form $Q_S = F(P) = a + bP$.

SELF ASSESMENT EXERCISE

Differentiate between market demand and market supply.

3.3 The determination of market equilibrium.

Market equilibrium is the situation when supply and demand in a market are equal at the prevailing price. The equilibrium price is determined by supply and demand.



MARKET EQUILIBRIUM

The market demand curve slopes downwards from left to right while the market supply curve slopes upwards from left to right. The two curves intersect at point E where market demand is equal to market supply (Equilibrium point). At any other point, there exists some form of disequilibrium. The following points can be deduced from the graph above;

In zone I, there is an excess of price which consumers are willing to pay over the price at which producers are willing to provide supplies, this leads to an increase in quantity.

In zone II, an excess of supply over demand at a given price leads market makers to cut price.

In zone III, an excess of the price at which producers are willing to provide supplies over the price which consumers are willing to pay leads to a fall in quantity.

In zone IV, an excess of demand over supply leads markets to increase prices.

The above discussion can be summarized mathematically as follows;

- iv. When the price is less than the equilibrium price ($P_E < P_e$) then $Q_d > Q_s$ (Excess supply)
- v. When $P_E > P_e$, then $Q_d < Q_s$ (Excess Supply)
- vi. When $P_E = P_e$, then $Q_d = Q_s$ (No excess demand or excess supply)

Example;

Assuming the market demand function for a particular product is $Q_d = a - bP$ function and the supply as $Q_s = c + dP$. Determine the equilibrium price and quantity.

Solution; At equilibrium, $Q_d = Q_s$

$$\begin{aligned} \text{Therefore } a - bP &= c + dP \\ a - c - dP + bP & \\ a - c &= (d + b)P \end{aligned}$$

$$\text{Hence; } P = \frac{a-c}{d+b}$$

Substitute in any of the equations

$$Q_d = a - b \left[\frac{a-c}{d+b} \right] = \frac{ad+ab-ba+bc}{d+b}$$

$$= \frac{ad+ab-ba+bc}{d+b} = \frac{ad+bc}{d+b}$$

$$Q_s = c + d \left[\frac{a-c}{d+b} \right] = \frac{cd+cb+ad-dc}{d+b} = \frac{cd+cb+ad-dc}{a+b}$$

$$Q_s = \frac{cb+ad}{d+b} = Q^d -$$

SELF ASSESSMENT EXERCISE

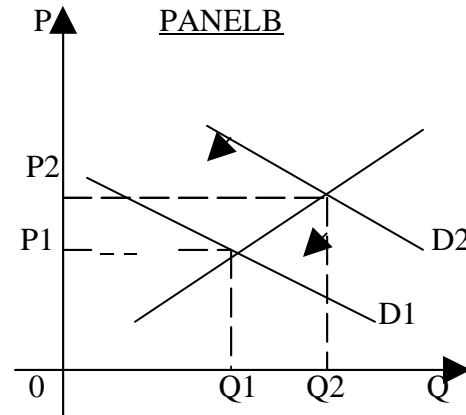
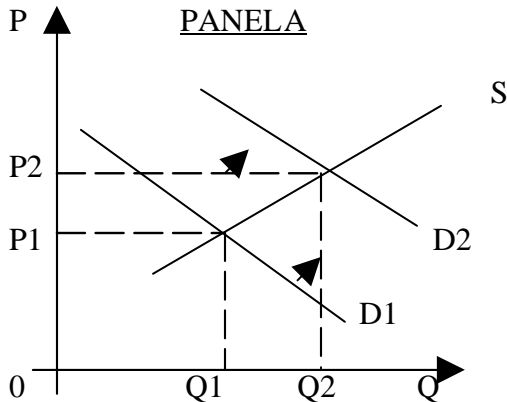
How is market equilibrium determined?

3.4. Change in market equilibrium

We earlier looked at excess demand and excess supply. We will now concentrate on how shifts in the demand and supply curves affect equilibrium price and quantity.

- (i) Shift in demand curve; there are two types of shifts in demand curves, to the left (decreased) or to the right (increase in demand), with the supply curve remaining constant, there will be an increase in both equilibrium price and

quantity. On the other hand, when there is a left ward shift of the demand curve with supply remaining constant, there will be a decrease in both equilibrium price and quantity.

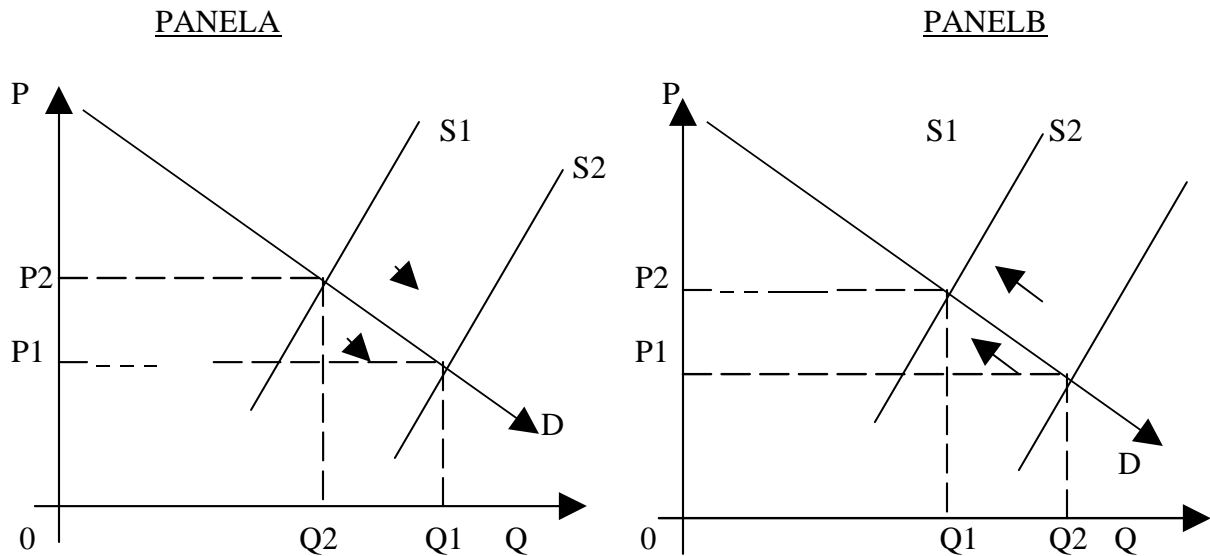


Effects of Shifts in Demand When Supply is Constant

From panel A, original demand curve was D1 when equilibrium price and quantity as P1 and Q1 respectively. With a shift in the demand curve to the right (increase in demand) i.e. D2, equilibrium price and quantity increased to P2 and Q2 respectively. This is because the supply curve remains constant.

On the other hand, in panel B, a shift in the demand curve to the left i.e. from D2 to D1 reduces both equilibrium price and quantity from P2 to P1 and Q2 to Q1 respectively.

- ii. **Shift in supply curve:-** There are two types of shifts in the supply curve i.e. shift to the left (decrease in supply) shift to the right (increase in supply). When there is a shift in the supply curve to the right with the demand curve remaining constant, the equilibrium price will decrease while the equilibrium quantity will increase. On the other hand, when the supply curve shifts to the left, with the demand curve remaining constant, there will be an increase in price but a decrease in equilibrium quantity.



Effects of Shifts in Supply When Demand is Constant

From Panel A, original supply curve was S_1 , and equilibrium price & quantity as P_2 and Q_1 . With an increase in supply to S_2 price dropped to P_1 and quantity increased to Q_2 . On the other hand, when there is a decrease in supply (Panel B) from S_2 to S_1 , equilibrium price increased to P_2 and quantity reduced to Q_1 .

SELF ASSEMENT EXERCISE

Briefly discuss the changes in market equilibrium due to the interaction between demand and supply.

4.0. CONCLUSION

From the above analysis, equilibrium is a point of rest. At this point, there is no incentive to deviate. It is arrived at as a result of the interaction between market agents.

5.0. SUMMARY

In this unit, we examined the concept of market price and how it is determined (equilibrium). We further looked at the effects of changes in both the demand and the supply curve on equilibrium price and quantity.

6.0. TUTOR-MARKED ASSIGNMENT

1. What is market price?
2. (a) Given the demand and supply functions for a commodity as $Q_d = 100 - 3p$ and $Q_s = 80 + 2p$ respectively, determine the equilibrium price and quantity.
- (b) If the price of the commodity is decreased by 25%, explain whether this will lead to excess demand or supply.

3. Briefly discuss the effects of changes in the demand and supply curves on market equilibrium.

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UNIT 6: CONCEPT OF ELASTICITY

CONTENTS

- 1.0 Introduction
- 2.0 Objectives
- 3.0 Main Content
 - 3.1 Measurement of Elasticity
 - 3.2 Elasticity of Demand
 - 3.2.1 Price Elasticity of Demand
 - 3.2.2 Cross-Price Elasticity of Demand
 - 3.2.3 Income Elasticity of Demand
 - 3.3 Elasticity of Supply
- 4.0 Conclusion
- 5.0 Summary
- 6.0 Tutor-Marked Assignment
- 7.0 References / Further Reading

1.0. INTRODUCTION

The relationship between prices of commodities and the quantities demanded of these commodities is a very important one in the field of economics. From the consumer who makes decisions on how much less of a commodity he should buy given a rise in the price of that commodity, to the producer who tries to see the impact of changes in the price of his output on its demand, the concept of elasticity helps in the process of economic decision making.

Elasticity seeks to measure the degree of the relationship existing between two variables. It measures the responsiveness of a dependent variable to a change in the independent variable. By this, elasticity measures to what extent a dependent variable would change following a change in the independent variable that brought about the change in the dependent variable. Elasticity is therefore defined as “the percentage change in a dependent variable resulting from a one percent change in the value of an independent variable.”

2.0. OBJECTIVES

At the end of this unit, you should be able to:

- Explain the term “elasticity”

- Measure elasticity

Explain the different types of elasticity

3.0 MAIN CONTENT

3.1 MEASUREMENT OF ELASTICITY

The equation for calculating elasticity is

$$\varepsilon_x = \frac{\text{Percentage change in the dependent variable, } Y}{\text{Percentage change in the independent variable, } X}$$

$$\varepsilon_x = \frac{\frac{\Delta Y}{\text{Initial } Y} \times 100}{\frac{\Delta X}{\text{Initial } X} \times 100}$$

$$\varepsilon_x = \frac{\left(\frac{\Delta Y}{Y}\right)}{\left(\frac{\Delta X}{X}\right)}$$

$$\varepsilon_x = \frac{\Delta Y}{Y} \times \frac{X}{\Delta X}$$

$$\varepsilon_x = \frac{\Delta Y}{\Delta X} \times \frac{X}{Y}$$

$$\varepsilon_x = \frac{\partial Y}{\partial X} \times \frac{X}{Y}$$

This formula measures the responsiveness of the dependent variable, Y, to a very small (infinitesimal) change in the independent variable, X. It is called the *point elasticity*.

To measure the responsiveness of the dependent variable, Y, to a larger change in the independent variable, X, we make use of the *arc elasticity* formula which is given as

$$\epsilon_x = \frac{\left(\text{Change in the dependent variable, } Y / \text{Average } Y \right)}{\left(\text{Change in the independent variable, } X / \text{Average } X \right)}$$

$$\epsilon_x = \frac{\left(\frac{Y_2 - Y_1}{\left(Y_2 + Y_1 / 2 \right)} \right)}{\left(\frac{X_2 - X_1}{\left(X_2 + X_1 / 2 \right)} \right)}$$

$$\epsilon_x = \frac{\Delta Y}{Y_2 + Y_1} \div \frac{\Delta X}{X_2 + X_1}$$

$$\epsilon_x = \frac{\Delta Y}{Y_2 + Y_1} \times \frac{X_2 + X_1}{\Delta X}$$

$$\epsilon_x = \frac{\Delta Y}{\Delta X} \times \frac{X_2 + X_1}{Y_2 + Y_1}$$

For the purpose of this course, we shall restrict our study to the elasticity of demand and the elasticity of supply.

3.2 Elasticity of Demand

Elasticity of demand measures the degree of responsiveness of quantity demanded of a commodity to changes in the price of the commodity, income or prices of other commodities and so on. The measures of elasticity of demand are as varied as the determinants of demand. The most important of these are the price elasticity, the income elasticity and the cross-price elasticity of demand.

3.2.1 Price Elasticity of Demand

The theory of demand postulates an inverse relationship between the price of a commodity and the quantity of it that is demanded. The question that arises is: By how much would the quantity demanded of a commodity change given that its price has changed by one unit? Price elasticity of demand measures the responsiveness of the quantity demanded (dependent variable) to changes in the price of the commodity (independent variable), holding constant the values of all other variables in the demand function. It is the most widely used measure of elasticity.

The point elasticity of demand takes account of the effect of infinitesimal (very small) changes in price on the quantity demanded, and is given as

$$\epsilon_p = \frac{\text{Percentage change in the quantity demanded, } Q}{\text{Percentage change in price, } P}$$

$$\epsilon_p = \frac{\frac{\Delta Q_x^d}{\text{Initial Qty } dd} \times 100}{\frac{\Delta P_x}{\text{Initial Price}} \times 100}$$

$$\epsilon_p = \frac{\left(\frac{\Delta Q}{Q}\right)}{\left(\frac{\Delta P}{P}\right)}$$

$$\epsilon_p = \frac{\Delta Q}{Q} \times \frac{P}{\Delta P}$$

$$\epsilon_p = \frac{\Delta Q}{\Delta P} \times \frac{P}{Q}$$

Using the ∂ -notation, we have

$$\epsilon_p = \frac{\partial Q}{\partial P} \times \frac{P}{Q}$$

The arc price elasticity of demand which measures elasticity over a wider range is given by

$$\epsilon_p = \frac{\left(\text{Change in the quantity demanded, } Q / \text{Average quantity} \right)}{\left(\text{Change in the price, } P / \text{Average price} \right)}$$

$$\epsilon_p = \frac{\left(\frac{Q_2 - Q_1}{(Q_2 + Q_1)/2} \right)}{\left(\frac{P_2 - P_1}{(P_2 + P_1)/2} \right)}$$

$$\epsilon_p = \frac{\Delta Q}{\Delta P} \times \frac{P_2 + P_1}{Q_2 + Q_1}$$

Example

The price of a loaf of bread changed from N180 to N200 while the quantity demanded per week fell from 1000 units to 950 units. Determine the price elasticity of demand for bread and comment on your answer.

We proceed by the use of the formula for arc elasticity of demand.

$$\epsilon_p = \frac{\left(\text{Change in the quantity demanded, } Q / \text{Average quantity} \right)}{\left(\text{Change in the price, } P / \text{Average price} \right)}$$

$$\epsilon_p = \frac{\left(\frac{Q_2 - Q_1}{(Q_2 + Q_1)/2} \right)}{\left(\frac{P_2 - P_1}{(P_2 + P_1)/2} \right)}$$

$$\epsilon_p = \frac{\left(\frac{950 - 1000}{(950 + 1000)/2} \right)}{\left(\frac{200 - 180}{(200 + 180)/2} \right)}$$

$$\epsilon_p = \frac{-50}{20} \times \frac{200 + 180}{950 + 1000}$$

$$\epsilon_p = \frac{-50}{20} \times \frac{380}{1950}$$

$$\epsilon_p = -2.5 \times 0.195$$

$$\epsilon_p = -0.487$$

The absolute value of the price elasticity (0.487) is greater than zero but less than one. Demand is therefore inelastic. Also, the inverse relationship between price and the quantity demanded, as depicted by the negative sign (-), shows that bread is a normal good.

Determinants of Price Elasticity of Demand

The factors which determine the price elasticity of demand for a commodity include:

1. Availability of close substitutes

The demand for a commodity tends to be more elastic when close substitutes are available. When the price of the commodity rises, consumers easily move their demand to its substitutes leading to a fall in the demand of the original commodity. Examples include the demand of tea and coffee or between brands of tea such as *Lipton Tea* and *Top Tea*.

Where close substitutes do not exist, the demand for a commodity tends to be inelastic. Common salt is an example in this case.

2. The proportion of the consumer's income spent on the commodity

When the proportion of a consumer's income spent on a particular commodity is very small, its demand tends to be inelastic. The demand for matches, pens and salt tend to be inelastic. The demand for clothing and furnishings are however more elastic as a larger proportion of income is spent on these commodities and the consumer tries to cut-back on expenditure as prices rise.

3. The number of uses of a commodity

The greater the number of uses to which can be put, the greater will be its price elasticity of demand. When the price of such a commodity rises, consumers would tend to put it to its most important uses leading to a fall in its demand. Milk is used for feeding children, baking, cream and sweets. If the price milk were to rise, the consumer, depending on the most important need, may restrict its use to feeding children.

4. Complementarily between goods

Demand is usually inelastic for goods which are used as complements to other commodities. Changes in price therefore result in less proportionate changes in the quantity demanded. An increase in the price of petrol would lead to a fall in its demand and this would imply a reduction in driving hence a fall in the demand of complements like engine oil.

5. Time for adjustment

Generally, demand in the short-run tends to be inelastic and it usually takes a longer time before consumers manage to economize on the commodities they use and also discover substitutes. In the long-run however, consumers are able to adjust by finding new ways of using commodities economically and also finding substitutes. Demand eventually tends to be elastic in the long-run.

SELF-ASSESSMENT EXERCISE 1

What is elasticity of demand?

3.2.2 CROSS-PRICE ELASTICITY OF DEMAND

The demand for a commodity may be influenced by the prices of other commodities. The direction of that influence may however depend on whether the commodities involved are substitutes or complements.

When an increase in the price of commodity X (chicken) leads to an increase in the quantity demanded of commodity Y (beef), the direct relation between the price of chicken and the quantity demanded of beef shows that the commodities are substitutes. The increase in the price of chicken makes the commodity relatively more expensive leading to a fall in its demand and a rise in the demand for beef, its substitute.

On the other hand, an increase in the price of commodity A (camera) may lead to a fall in the demand for commodity B (film). The inverse relation between the price of camera and the demand for film shows that the two commodities are complements; they are used together rather than in place of each other.

Cross-price elasticity is used to determine the degree of responsiveness of demand for one commodity to changes in the price of another. Point cross-price elasticity of demand for commodity X is given as

$$\varepsilon_{px} = \frac{\text{Percentage change in the quantity demanded of Y}}{\text{Percentage change in the price of X}}$$

$$\varepsilon_{px} = \frac{\left(\frac{\partial Q_y}{Q_y}\right)}{\left(\frac{\partial P_x}{P_x}\right)}$$

$$\varepsilon_{px} = \frac{\partial Q_y}{\partial P_x} \times \frac{P_x}{Q_y}$$

The arc cross-price elasticity of demand is given as

$$\epsilon_{px} = \frac{\text{Percentage change in the quantity demanded of Y}}{\text{Percentage change in the price of X}}$$

$$\epsilon_{px} = \frac{\left(\text{Change in the quantity demanded of Y} / \text{Average quantity of Y} \right)}{\left(\text{Change in the price of X} / \text{Average price of X} \right)}$$

$$\epsilon_p = \frac{\left(\frac{Q_{y2} - Q_{y1}}{(Q_{y2} + Q_{y1})/2} \right)}{\left(\frac{P_{x2} - P_{x1}}{(P_{x2} + P_{x1})/2} \right)}$$

$$\epsilon_{px} = \frac{\Delta Q_y}{\Delta P_x} \times \frac{P_{x2} + P_{x1}}{Q_{y2} + Q_{y1}}$$

Cross-price elasticity for substitutes is always positive, while it is negative for complements. Also cross-price elasticity is zero for unrelated goods where the variations in the price of one commodity have no effect on the demand for the second.

The classifications with regard to inelastic, unitary, elastic and infinitely elastic are similar to those of price elasticity of demand.

SELF-ASSESSMENT EXERCISE 2

Cameras and films are complementary goods. What sign is their cross-price elasticity expected to take (positive or negative)?

3.2.3 INCOME ELASTICITY OF DEMAND

Income is an important determinant of demand. Changes in consumer income normally lead to changes in the demand for some commodities. 'Normal goods', for example, are said, in economic theory, to have a direct relationship with income. However the degree of that relationship is not given. Luxury goods and items like expensive cars and golf club membership tend to be more income elastic than basic commodities like salt and bread, as changes in the prices of the former usually bring about a larger change in the quantity demanded, than would be the case with the latter.

Income elasticity of demand measures the responsiveness of demand to changes in income, holding constant the effects of all other determinants of demand. Point income elasticity of demand is given as

$$\epsilon_y = \frac{\text{Percentage change in the quantity demanded, } Q}{\text{Percentage change in income, } Y}$$

$$\epsilon_y = \frac{\partial Q}{\partial Y} \times \frac{Y}{Q}$$

Arc income elasticity of demand is given as

$$\epsilon_y = \frac{\left(\text{Change in the quantity demanded, } Q / \text{Average quantity} \right)}{\left(\text{Change in income, } Y / \text{Average income} \right)}$$

$$\epsilon_y = \frac{\Delta Q}{\Delta Y} \times \frac{Y_2 + Y_1}{Q_2 + Q_1}$$

There is usually an inverse relation between income and demand for inferior goods while for normal goods, the relation is direct.

SELF-ASSESSMENT EXERCISE 3

Mrs. Dung's demand for 'Kuli-kuli' per week was 40 units when her income was N2,000. At presently, her income is N5,000 and she demands 10 units of the product per week. Determine Mrs. Dung's income elasticity of demand for 'kuli-kuli' and state whether 'kuli-kuli' is a normal good or an inferior good.

3.3 ELASTICITY OF SUPPLY

Just as much as a change in the price, for example, of a commodity would have an effect on the quantity demanded of that commodity, that change in price would simultaneously have an effect on the quantity of the commodity that the producer (or supplier) would be willing to offer for sale. Economic theory holds that price has a direct relationship with the quantity of commodity supplied; the degree of that relationship is the object of elasticity. The elasticity of supply is the degree of responsiveness of supply to changes in the price of a good. It is the relative change in quantity supplied of a good to a relative change in the price of the good.

Point elasticity of supply is given as

$$\epsilon_s = \frac{\text{Percentage change in the quantity supplied, } Q}{\text{Percentage change in price, } P}$$

$$\epsilon_s = \frac{\partial Q}{\partial P} \times \frac{P}{Q}$$

Arc or mid-point elasticity of supply is given as

$$\epsilon_s = \frac{\left(\text{Change in the quantity demanded, } Q / \text{Average quantity} \right)}{\left(\text{Change in price, } P / \text{Average price} \right)}$$

$$\epsilon_s = \frac{\Delta Q}{\Delta P} \times \frac{P_2 + P_1}{Q_2 + Q_1}$$

4.0 CONCLUSION

It should be clear by now that the concept of elasticity is very important in economics. You should have been able to understand the concept of elasticity and the need for it. Also, its application in determining variations in demand and supply should have become clear to you.

5.0 SUMMARY

The concept of elasticity provides us with a tool for the measurement of the degree of relationship between economic variables. Measurements for the elasticity of demand are as varied as the determinants of demand, the most important of which are the own-price elasticity, cross-price elasticity and income elasticity of demand. They respectively

measure the degree of change in the quantity demanded of a commodity resulting from changes in the price of the commodity, prices of related commodities or the income of the consumer.

The elasticity of supply measures the degree of change in the quantity demanded of a commodity resulting from a change in the price of the commodity, holding other determinants constant.

The results from these measurements can be classified as perfectly inelastic, inelastic, unitary elastic, elastic or infinitely elastic.

6.0 TUTOR-MARKED ASSIGNMENT

1. What are the factors that determine price elasticity of demand?
2. The demand for bread in a month by a consumer was 25 units when the price per unit was ₦50. However, when the price rose to ₦100, her demand fell to 20 units a month. Determine the elasticity of demand. Comment on your answer.
3. Two goods have a cross-price elasticity of demand of -1.2. Would you describe the goods as substitutes or complements? If the price of one of the goods were to rise by 5 per cent, what will happen to the demand of the other good, holding other factors constant?

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MODULE 3 THEORY OF THE MARKET

UNIT 1 PERFECT COMPETITION

CONTENTS

- 1.0. Introduction
- 2.0. Objectives
- 3.0. Main content
 - 3.1. Concept of Perfect Competition
 - 3.2. Assumptions and characteristics of perfect competition
 - 3.3. Equilibrium under perfect competition
 - 3.4. Shut-down point
- 4.0. Conclusion
- 5.0. Summary
- 6.0. Tutor – Marked Assignment

1.0. INTRODUCTION

In economics, market structure describes the state of a market with respect to competition. Competition is useful because it reveals actual customer demand and induces the seller (Operator) to provide service quality levels and price levels that buyers (Customers) want, typically subject to the sellers' financial needs to cover its costs. In other words, competition can align the sellers' interest with the buyers' interests and can cause the seller to reveal his true costs and other private information.

In the absence of perfect competition, three basic approaches can be adopted to deal with problems related to the control of market power and an asymmetry between the government and the operator with respect to objectives and information: (a) Subjecting the operator to competitive pressures, (b) Gathering information on the operator and the market, and (c) Applying incentive regulation.

In this unit therefore, the concept of perfect competition and its assumptions shall be examined. Also, equilibrium and shut – down point shall be examined.

2.0. OBJECTIVES

At the end of this unit, you should be able to;

- Explain the concept of perfect competition and its assumptions/characteristics
- Explain equilibrium and shut – down point.

3.0. THEORY OF PERFECT COMPETITION

3.1. Concept of perfect competition

Perfect competition refers to a market structure with many small firms, all producing homogenous goods. It is an ideal market situation in which buyers and sellers are so numerous and well informed that each can act as a price-taker, able to buy or sell any desired quantity without affecting the market price. Although very few real world markets are like this, perfect competition is often regarded by economists as a bench-mark with which to compare actual market situations.

What is perfect competition?

3.2 Assumptions/Characteristics of Perfect Competition

Perfect competition, as is generally understood, is said to prevail when the following conditions are found in the market.

1. **Large number of buyers and sellers:-** The first condition of perfect competition is that there must be numerous firms in the industry and many buyers. This condition is necessary so that the position of a buyer or seller in the market is like a drop in the ocean. As a result, no individual buyer or seller is in a position to influence the price of the product by changing the output demanded or supplied.
2. **Homogenous Products:-** This means that the product of various firms are indistinguishable from each other i.e. they are perfect substitutes for one another. In other words, cross elasticity between the products of the firms is infinite. In this case, trade marks, patents, special brand labels etc. do not exist since these things make the products differentiate. Again, any thing which makes buyers prefer one seller to another, be it personality, reputation, convenient location or the tone of his shop, differentiates the product to that degree, since what is bought is really a bundle of utilities of which these things are a part. Therefore, for the products to be homogenous, utilities offered by all sellers to buyers must be identical.
3. **Perfect information about the prevailing price:-** Sellers and buyers must have complete knowledge of the conditions of the market. Because only when all buyers know fully the current price of the product in the market, sellers cannot charge more than the prevailing price. If any seller tries to charge a higher price than that ruling in the market, the buyers will shift to some other sellers to buy at a lower price. Similarly, no seller can charge a price lower than the ruling price since they know the prevailing market conditions.
4. **Free Entry and exit:-** It requires that there must be complete freedom for the entry of new firms and the exit of existing firms from the industry in the long run. Since in the short run, firms can neither change the size of their plants nor new firms can enter or old firms can leave the industry. The condition of free entry and free exit therefore applies only to the long-run equilibrium under perfect competition.
5. **Firms aim to maximize profit:-** The goal of firms under perfect competition is to maximize profit. They aim to sell where marginal costs meet marginal revenue, where they generate the most profit.
6. **Transactions are costless:-** Buyers and sellers incur no costs in making an exchange.
7. **Perfectly elastic demand curve:-** The assumption of large number of buyers and sellers and that of product homogeneity implies that the individual firm is a price taker. Its demand curve is perfectly elastic indicating that the firm can sell any amount of output at the prevailing market price but with any increase in market price, buyers do not buy anything from that particular firm that increased the price.

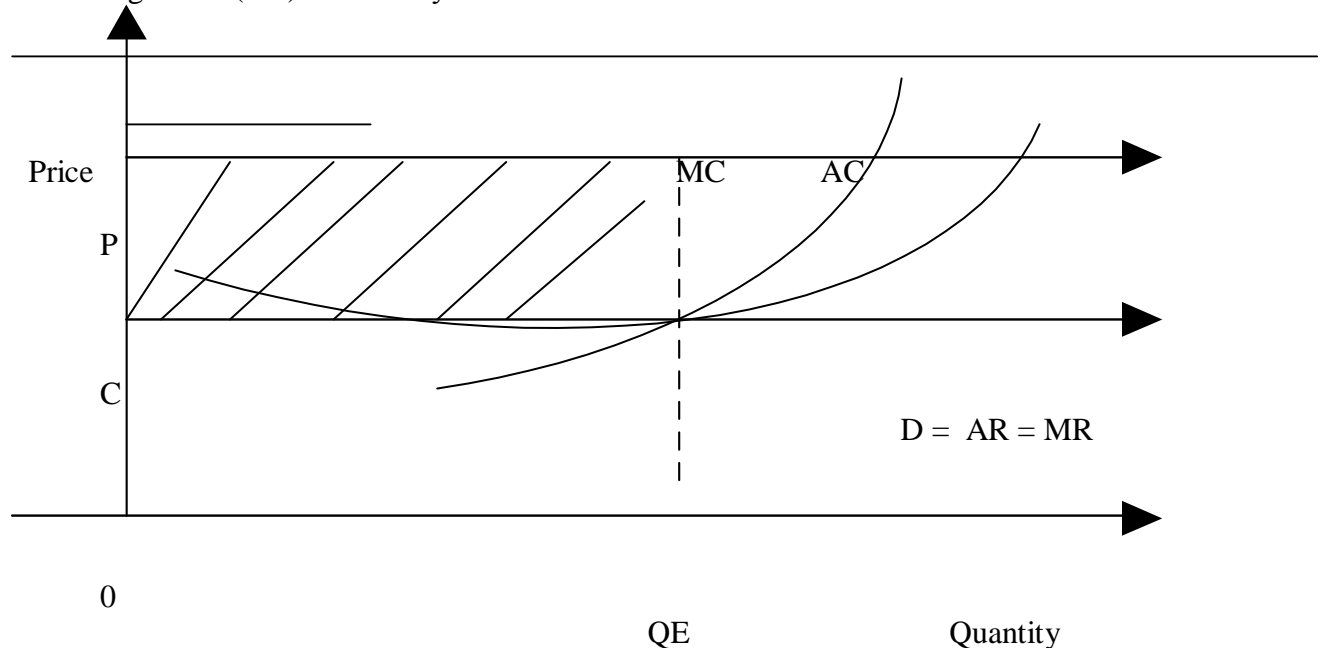
SELF ASSESSMENT EXERCISE

Discuss the assumption/characteristics of perfect competition.

3.3. EQUILIBRIUM UNDER PERFECT COMPETITION

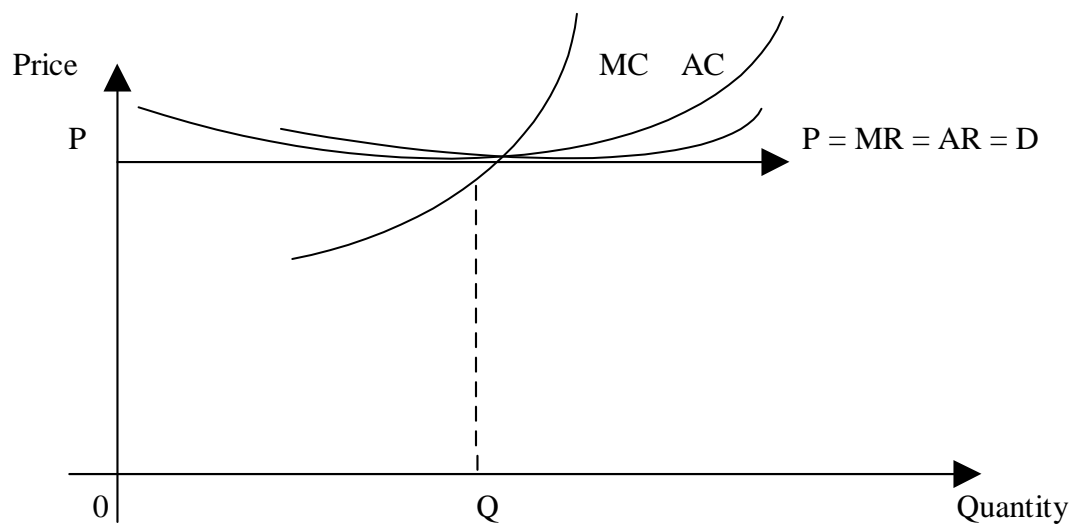
As stated earlier in the assumptions, in a perfectly competitive market, a firm's demand curve is perfectly elastic. Profit maximization requires that marginal cost (MC) must be equal to marginal revenue (MR). And so also, at the point of equilibrium, the slope of the MC curve must be greater than the slope of MR. These two conditions are the necessary and sufficient conditions of profit maximization.

In the short-run, it is possible for an individual firm to make profit. This situation is shown in the figure below as the price or average Revenue (AR), denoted by 'P' is above the Average Cost (AC) denoted by "C".



A graph depicting the short-run equilibrium of a firm making profit under perfect competition

However, in the long period, positive profit cannot be sustained. with the assumption of free entry, the arrival of new firms or expansion of existing firms (if returns to scale are constant) in the market causes the (horizontal) demand curve of each individual firm to shift downward, bringing down at the same time the price, the average revenue and average revenue. The final outcome is that, in the long – run, the firm will make only normal profit (Zero economic profit). In the case of short – run loses, firms will exit the market. This scenario is demonstrated in the figure below.



Firms Adjustment to long – run positions of normal profit under perfect competition

That a competitive firm will maximize its total profits when marginal cost (MC) equals to marginal revenue (MR) can be easily proved by differential calculus. Note that both the total cost (TC) and the total revenue (TR) are functions of output (Q). This implies that total profits are also function of output. Thus;

$$\bar{\Lambda} = F(Q)$$

$$\bar{\Lambda} = TR - TC \quad \text{But } TR = P \cdot Q$$

Hence
$$\bar{\Lambda} = P \cdot Q - TC$$

For the maximization of profits, the first derivative of the profit function has to be set equal to zero. Thus, for maximum profits,

$$d\bar{\Lambda} / dQ = 0$$

Since $d\bar{\Lambda} = d(P \cdot Q) - dTC$, for maximization of profits,

$$\frac{d\bar{\Lambda}}{dQ} = \frac{d(P \cdot Q)}{dQ} - \frac{d(TC)}{dQ} = 0$$

but $d(P \cdot Q) / dQ = MR$ and $d(TC) / dQ = MC$

hence $MR = MC$

but since $MR = P$, it then follows that price (P) = MC

Example;

For a perfectly competitive firm, the following short – run cost function is given, $TC = 2 + 4Q + Q^2$. If the price of the product prevailing in the market is N8.00, at what level of output will the firm maximize profit?

Solution :

$$\begin{array}{rclcl} TR & = & P \cdot Q & = & 8Q \\ TC & = & 2 + 4Q + Q^2 & & \end{array}$$

Using the TR – TC approach,

$$\begin{aligned} \text{Profits } \Lambda &= TR - TC \\ &= 8Q - (2 + 4Q + Q^2) \\ &= 8Q - 2 - 4Q - Q^2 \\ \therefore \text{II} \quad &= 4Q - 2 - Q^2 \end{aligned}$$

Profits are maximized at the output level at which the derivative of the profit function with respect to output (Q) equals to zero. Hence $d\Lambda/dQ = 4 - 2Q = 0$

$$4 = 2Q$$

$$\therefore Q = 2$$

Using the MR – MC approach, profits are maximized at the output level where $MR = MC$

$$TR = 8Q$$

$$MR = d(TR)/dQ = 8$$

$$TC = 2 + 4Q + Q^2$$

$$MC = d(TC) / dQ = 4 + 2Q$$

In order to maximize profit, set $MR = MC$. Hence $8 = 4 + 2Q$

$$4 = 2Q$$

$$\text{Therefore } Q = 2$$

SELF ASSESSMENT EXERCISE

1 Explain the short–run and long–run equilibrium under perfect competition.

2 Suppose a firm is operating under perfectly competitive conditions in the market. It faces the following revenue and cost conditions.

$$TR = 12Q$$

$$TC = 2 + 4Q + Q^2$$

Determine the equilibrium level of output and total profits made.

3.4. SHUT – DOWN POINT

When a firm is making a loss, it will have to decide whether to continue production or not. This decision will, in fact, depend on the different total costs levels and whether the firm is operating in the short run or in the long-run. If the firm is in the short run, and is making a loss whereby;

-Total Costs (TC) is greater than Total Revenue (TR),

- And Total Revenue is greater or equal to Total Variable Cost (TVC),

It is advisable for the firm to continue production. If it fails to achieve these conditions, it is advised to close down so that the only costs the firm will have to pay will be the Fixed Costs (FC). Even if the firm stops producing, it will have to continue to meet the level of Fixed Costs (FC). Since whether the firm produces or not, it will have to pay fixed costs, it is better for it to continue production in an attempt to decrease total cost and increase total revenue, thus making profit. This can be done by;

- **Increasing Productivity:-** The most obvious methods involve automation and computerization which minimize the tasks that must be performed by employees. All else constant, it benefits a business to improve productivity, which over time lowers cost and (hopefully) improves ability to compete and make profit.
- **Adopting new methods of production like just in time or lean manufacturing:-** In an attempt to reduce costs and wastages.

In the long run, the condition to continue producing requires the price (P) to be higher than Average Cost (AC) i.e. the line representing market price should be above the minimum point of Average Cost (AC) curve. If price (P) is equal to Average Cost (AC), the firm is indifferent between shutting down and continuing to produce. This case is different from the short run shut down case because in the long run, there is no longer a fixed cost (everything is variable).

Example: A firm producing a product is operating in a perfectly competitive market. The firm's variable cost function is given by: $TVC = 150Q - 20Q^2 + Q^3$ where Q is level of output. Determine the price that below it the firm should shut – down production in the short – run.

Solution : In the short run, the firm will shut down production if the price falls below the level of minimum average variable cost. To determine the minimum average cost;

$$AVC = TVC/Q = 150 Q/Q - 20Q^2/Q + Q^3/Q$$

$$AVC = 150 - 20Q + Q^2$$

To determine the level of output at minimum AVC, take the first derivative of the AVC function and set equal to zero.

$$d(AVC)/dQ = -20 + 2Q = 0$$

$$2Q = 20$$

$$\therefore Q = 10 \text{ units}$$

Substitute Q into AVC therefore

$$AVC = 150 - 20(10) + (10)^2$$

$$= 150 - 200 + 100$$

$$\therefore AVC = N50.00 \text{ per unit}$$

Therefore, if the price falls below N50.00 per unit, the firm will shut down.

SELF ASSESMENT EXERCISE

1 Discuss the shut down point under perfect competition

2 A firm's total variable cost is given by the following:

$$TVC = 75Q - 10Q^2 + Q^3$$

Will the firm produce the product if the price of the product is below N40.00?

4.0. CONCLUSION

The above analyses show that a firm operating in a perfectly competitive market can enjoy normal profits in the long run at the prevailing market price. In an event of short run losses, so long as revenue covers average variable cost, the firm should continue production hoping that in the long run, its activities will decrease total cost and increase total revenue.

5.0. SUMMARY

This unit has thrown light on the concept of perfect competition and its assumptions. Also, the equilibrium position and shut down point under perfect competition were highlighted.

6.0. TUTOR – MARKED ASSIGNMENT

1 Discuss the concept of perfect competition and its assumptions.

2 Suppose a firm is operating under perfectly competitive conditions in the market. It faces the following revenue and cost conditions;

$$TR = 12Q$$

$$TC = 2 + 4Q + Q^2$$

Determine the equilibrium level of output and total profits made.

3 A firm's total variable cost is given by the following: $TVC = 75Q - 10Q^2 + Q^3$. Will the firm produce the product if the price of the product falls below N40.00.

7.0. REFERENCE /FURTHER READING

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UNIT 2 PURE MONOPOLY

CONTENTS

- 1.0. Introduction
- 2.0. Objectives
- 3.0. Main content
 - 3.1. Concept of Monopoly
 - 3.2. Causes /Characteristics of Monopoly
 - 3.3. Demand curve, Marginal Revenue curve, and Equilibrium of the Monopolist
 - 3.4. Price discrimination
- 4.0. Conclusion
- 5.0. Summary
- 6.0. Tutor- marked assignment
- 7.0. References / Further Readings
- Answers to Questions

1.0. INTRODUCTION

Another important form of market structure is monopoly. Some decades ago, it was thought that the existence of monopoly was an exceptional case. But nowadays, monopoly form of market structure extensively prevails in capitalist economies of the world and in mixed developing economies like Nigeria. Monopolistic market structure prevails in many large – scale manufacturing industries and public utility services. Therefore, the analysis of price and output determination under monopoly has assumed vital importance.

In this unit, we shall analyze the concept of monopoly, its causes and characteristics. We shall also discuss the equilibrium and price discrimination under monopoly.

2.0. OBJECTIVES

At the end of this unit, you should be able to:

- Explain the concept of monopoly, its causes and characteristics.
- Derive the demand curve and marginal revenue curve and equilibrium under monopoly.
- Discuss price discrimination as practiced by the monopolist.

3.0. MAIN CONTENT

3.1. Concept of Monopoly

Monopoly is said to exist when one of firm is the sole producer or seller of a product that has no close substitutes. Three points are worth noting in this definition, first, there must be a single producer or seller of a product if there is to be monopoly. This single producer may be in the form of an individual owner or a single partnership or a joint stock company. Secondly, there are no close substitutes for the product of that firm because monopoly implies absence of competition. Thirdly, there must be strong barrier to the entry of new firms wherever one firm has a sole control over the production of a commodity.

In other words, a monopoly exists when a specific individual or an enterprise has sufficient control over a particular product or service to determine significantly the terms on which other individuals shall have access to it. Monopolies are thus characterized by a lack of economic competition for the good or service that they provide and a lack of viable substitute goods. The verb “monopolize” refers to the process by which a firm gains persistently greater market share than what is expected under perfect competition.

SELF-ASSESSMENT EXERCISE

QUESTION: What do you understand by the term Monopoly?

3.2. Causes and Characteristics Monopoly

There are five major reasons or sources of monopoly. These sources relate to the factors, which prevent the entry of new firms in an industry. These major sources are:

1. ***Patents or copyright:*** First important source of monopoly is that a firm may possess a patent or copyright which prevents others to produce the same product or use a particular production process. When a firm introduces a new product, they get patent right from the Government so that others cannot produce them. This patent right will be granted for a certain period of time.
2. ***Control over the essential raw material:-*** If a firm gains control over an essential raw material or input used in the production of a commodity, it gains monopoly power. It is just denying others the use of the material (s) thus becoming a monopoly.
3. ***Grant of Franchise by the Government:-*** A firm may be granted exclusive legal right to produce a given product or service in a particular area or region. The government on its part keeps the right to regulate its price and quality.
4. ***Economies of Scale (Natural Monopoly):-*** When significant economies of scale are present over a wide range of initial output, long – run average cost of production goes on falling over a wide range of output and reaches a minimum at an output rate that is large enough for a single firm to meet the entire market demand at a price that is profitable. If other firms are unable to reach the long – run average cost, they are forced out resulting in a situation of natural monopoly.
5. ***Advertising and Brand Loyalties of the established firms:-*** Huge advertising campaigns and customer service programmes are often undertaken to enhance the market power of the producer and prevent the entry of potential competitors. Besides, if well established firms are expecting new potential competitors, they cut prices of their products so that potential competitors find it unprofitable to enter the industry.

After examining the causes of monopoly, it is imperative to briefly look at the characteristics of monopoly. They are:

1. There is a single seller (i.e. one firm) and the firm is the industry. The firm is the only firm producing such good or service and since no any other firm produces such a good or service, the firm is also the industry.
2. There are no close substitutes for the commodity produced under monopoly.
3. There are barriers to entry this means that other firms cannot produce the same commodity either because they are not allowed or because of monopolistic conditions that make entry into the industry difficult.
4. It is faced with a negatively down – ward sloped demand curve. This means that the monopolist is a price setter, that is, the monopolist sets price but quantity demanded is dictated by the buyers (consumers). Under this, the demand curve of the monopolist is not equal to its marginal revenue.

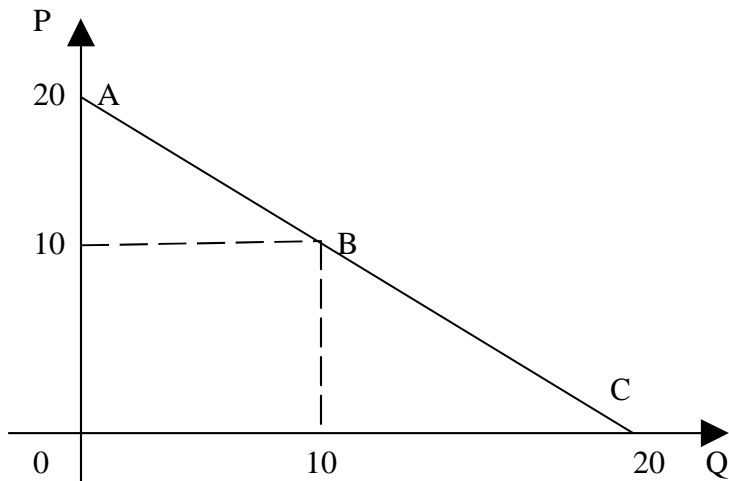
SELF-ASSESSMENT EXERCISE

Discuss the causes and characteristics of Monopoly.

3.3. Demand Curve, Marginal Revenue Curve and Equilibrium of the Monopolist

It is important to understand the nature of the demand curve facing a monopolist. Whereas the demand curve facing an industrial firm under perfect competition is a horizontal straight line, the demand curve facing the whole industry under perfect competition is sloping downwards. This is so because the demand is of the consumers and the demand curve of consumers for a product usually slopes downward. The downward sloping curve of the consumers faces the whole competitive industry. But an individual firm under perfect competition does not face a downward sloping demand curve. In the case of monopoly, one firm constitutes the whole industry. Therefore, the entire demand of the consumers for a product faces the monopolist and since the demand curve of the consumers for a product slopes downwards, the monopolist faces a downward sloping demand curve.

The monopolist demand curve is a linear curve with; $Q = a - bP$. This is the same as the industry demand curve because he is the only producer in the industry. From the function $Q = a - bP$, we can derive the slope by taking the derivative of the function; slope $= dQ / dP = - b$



Price elasticity of demand is given as;

$$\begin{aligned} e_p &= dQ/dP \times P/Q \\ &= -b P/Q \end{aligned}$$

Here, the same demand curve produces different elasticities. At point A where price is highest and quantity is zero, the elasticity of demand tends to infinity;

$$\begin{aligned} e_p &= -b - (P/Q) = \infty (\text{infinity}) \\ &= -1 (20/0) = -\infty \text{ (Anything divide by zero is infinity)} \end{aligned}$$

At point B which is the midpoint of the demand curve, the price elasticity of demand is unity:

$$\begin{aligned} e_p &= -1 (10/10) = -1 \\ /e_p/ &= 1 \end{aligned}$$

At point C, where price is zero and quantity is highest, the price elasticity of demand is zero.

$$e_p = -1 (0/20) = 0$$

Thus, though the slope is the same, the elasticity differs.

It is important to know the relationship between marginal revenue and price under monopoly, which faces a downward sloping demand curve (i.e. average revenue curve).

Total revenue

$$TR = P \cdot Q, \quad Q = a - bP. \text{ Make } P \text{ the subject}$$

$$P = a/b - 1/bQ$$

$$\text{Let } a/b = a_0 \text{ and } 1/b = b_1$$

$$\therefore P = a_0 - b_1Q$$

$$TR = (a_0 - b_1Q) Q = a_0 Q - b_1Q^2$$

$$AR = TR/Q = \frac{a_0 Q - b_1Q^2}{Q} = a_0 - b_1Q$$

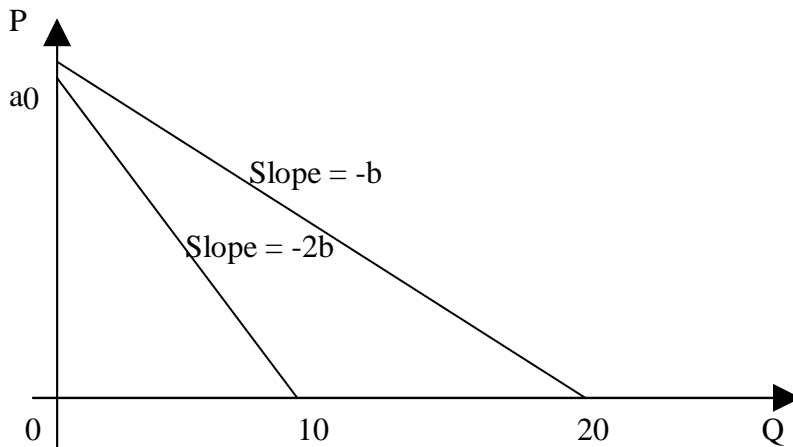
Average Revenue (AR) is the same as the demand curve.

$$\text{Marginal Revenue (MR)} = dTR/dQ$$

$$= \frac{d(a_0 Q - b_1Q^2)}{dQ}$$

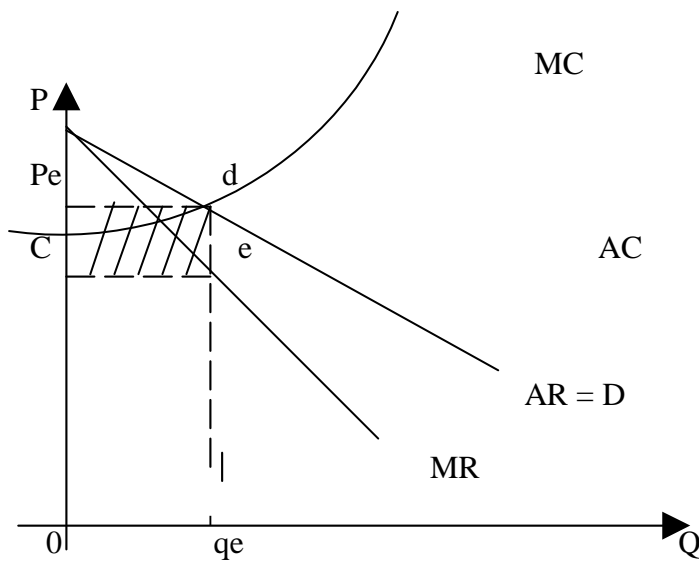
$$= a_0 - 2b_1Q$$

MR Curve has the same intercept as the AR curve but has twice the slope of the AR curve.



For the equilibrium of the monopolist, there are generally two (2) conditions;

1. The point where $MR = MC$
2. At the point where $MR = MC$, MC must cut the MR from below or the slope of the MC curve must be greater than the slope of the MR curve at the point of equilibrium.



A monopolist making excess profit

In the diagram above, the monopolist attained equilibrium at point 'e' where $MR = MC$. Also, the MC curve cuts the MR curve from below and is rising or the slope of MC is greater than that of MR at that point, hence the two conditions are met. At any output level below 'qe', MR is greater than MC hence it pays the producer to increase output. Any output level above 'qe' implies $MC > MR$ hence it pays to reduce the level of output. P_e and q_e are equilibrium price and quantity respectively. Since unit price is greater than unit cost, the monopolist is making excess profit as given by the shaded area $PeDEC$. Because there are barriers to entry, the monopolist can make excess profit even in the long run.

Example:

Given the following demand and total cost functions of a monopolist;

$$Q = 50 - 0.5p$$

$$C = 50 + 40Q$$

1. Find the equilibrium price and quantity
2. Determine whether this is the profit maximizing or profit maximizing output level.

SOLUTION Q1

$$Q = 50 - 0.5p \dots\dots\dots(1)$$

$$C = 50 + 40Q \dots\dots\dots(2)$$

From equation (1) we make 'P' the subject

$$0.5P = 50 - Q$$

$$P = 100 - 2Q \dots\dots\dots(3)$$

$$TR = P \cdot Q = (100 - 2Q) Q$$

$$= 100Q - 2Q^2$$

$$MR = dTR/dQ = 100 - 4Q$$

From equation (2) where $C = 50 + 40Q$

$$MC = dc/dQ = 40$$

At equilibrium, $MR = MC$

$$100 - 4Q = 40$$

$$100 - 40 = 4Q$$

$$60 = 4Q$$

$$Q = 60/4 = 15 \text{ units}$$

Substitute the value of $Q = 15$ into equation (3)

$$P = 100 - 2Q = 100 - 2(15)$$

$$= 100 - 30 = 70$$

$$\therefore P = \text{N}70.00$$

$$Q = 15 \text{ units}$$

$$\text{Profit } (\Lambda) = TR - TC$$

$$\Lambda = (P \cdot Q) - C$$

$$\Lambda = PQ - C = (70 \times 15) - (50 + 40(15))$$

$$\Lambda = 1050 - (50 + 600) = 1050 - 650 = 400$$

$$\therefore \Lambda = \text{N}400.00$$

The second order condition for profit maximization, the slope of MC is greater than the slope of MR.

$$\text{i.e. } \frac{d^2TR}{dQ^2} < \frac{d^2TC}{dQ^2}$$

$$\frac{dMR}{dQ} < \frac{dMC}{dQ}$$

$$MR = 100 - 4Q$$

$$\frac{dMR}{dQ} = \frac{d^2TR}{dQ^2} = -4$$

$$MC = \frac{dC}{dQ} = 40$$

$$\frac{dMC}{dQ} = \frac{d^2C}{dQ^2} = 0$$

$$\therefore -4 < 0$$

$$\frac{dMC}{dQ} = \frac{d^2C}{dQ^2} = 0$$

$$\frac{dMC}{dQ} = \frac{d^2C}{dQ^2} = 0$$

$$\therefore -4 < 0$$

Hence $P = \text{N}70$ and $q = 15$ units are the profit maximizing price and quantity respectively.

SELF- ASSESSMENT EXERCISE

Suppose the following demand and total cost function of a monopolist are given;

$$Q = 360 - 20P \text{ (demand function)}$$

$$TC = 6Q + 0.05Q^2 \text{ (Cost function)}$$

- i. Determine the output he will produce and the price he will charge to maximize profit?
- ii. What will be the amount of profit made by him?

3.4. PRICE DISCRIMINATION

Price discrimination refers to the practice of charging different prices to different customers for the same good or service. This is possible only if the supplier has some monopoly power, and can identify the customer, and if the customer cannot resell the good, or it is expensive to do so. A seller will only make price discrimination between different buyers when it is both possible and profitable for him to do so.

Price discrimination is not a very common phenomenon as it is very difficult to charge different prices for the identical good from the different buyers. More often, the product is slightly differentiated to successfully practice price discrimination. Thus, the concept of price discrimination can be broadened to include the sale of the various varieties of the same good at prices, which are not proportional to their marginal costs. Thus, Prof Stigler defines price discrimination as “the sales of technically similar products at prices which are not proportional to marginal cost”.

Price discrimination may be **personal** when a seller charges different prices from different persons. It is **local** when a seller charges different prices from people of different localities or places. And it is **according to use or trade** when different prices of a commodity are charged according to the uses to which the commodity is put. However, Prof. A. C Pigou has distinguished between the following three types of price discrimination;

- i. ***Price discrimination of the first Degree:-*** First degree price discrimination defines an upper limit to what producers can gain. It occurs when the monopolist is able to sell each separate unit of the product at a different price. Under this, every buyer is forced to pay the price which is equal to the maximum amount he is willing to pay rather than do without the good altogether. In other words, it is known as “perfect price discrimination” because it involves maximum possible exploitation of each buyer in the interest of the seller’s profits, leaving no consumer surplus to any buyer.
- ii. ***Price Discrimination of the second degree:-*** It occurs when producers cannot tell which group customers belong to, but offer alternative contracts which include consumers to identify themselves. In this case, buyers are divided into different groups and from each group a different price is charged which is the lowest demand price of that group. In this way, from each group of buyers, he charges a different price and the price which he charges from each group is that which a marginal individual of that group is just willing to pay.
- iii. ***Price discrimination of the third degree:-*** It occurs when sellers can identify different groups of customers, and offer different prices to each group or sub-market. The price charged in a sub-market need not be the lowest demand price of that sub-market or group, in contrast to price discrimination of the second degree. It is the most common and an example being a producer who charges a lower price abroad than in a home (local) market.

SELF -ASSESSMENT EXERCISE

Explain Price Discrimination and the Degrees of Price Discrimination.

4.0. CONCLUSION

In conclusion, monopoly is an extreme form of imperfect competition and with perfect competition, they serve as the two extreme opposite market structures and between them, the various intermediate market situations lie. Monopolies don't just exist, the presence of some factors make it inevitable, the existence of monopolies. And finally, from the point of view of expansion in output, as well as for making the distribution of real incomes equitable, price discrimination, a practice by monopolist, is socially justified.

5.0. SUMMARY

This unit explained the concept of monopoly, its characteristics and the factors that cause the emergence of monopolies. It further examined the derivation of the demand curve, marginal revenue and the equilibrium under monopoly. The unit concluded by examining price discrimination as practiced by the monopolist and the different degrees of price discrimination.

6.0. TUTOR – MARKED ASSIGNMENT

- 1 Brief discuss monopoly and the causes of monopoly.
- 2 Suppose the following demand and total cost function of a monopolist are given:
 $Q = 360 - 20P$ (Demand function)
 $TC = 6Q + 0.05Q^2$
 - i. Determine the monopolist's output and price that will maximize profit.
 - ii. What will be the profit made by him?
- 3 Explain price discrimination and discuss what you understand by the degrees of price discrimination

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UNIT 3

MONOPOLISTIC COMPETITION

CONTENTS

- 1.0. Introduction
- 2.0. Objectives
- 3.0. Main content
 - 3.1. Concept of Monopolistic Completion
 - 3.2. Characteristics of Monopolistic Competition
 - 3.3. Equilibrium under Monopolistic Competition
 - 3.4. Effects of Monopolistic Competition
- 4.0. Conclusion
- 5.0. Summary
- 6.0. Tutor – marked assignment
- 7.0. Reference /further reading

1.0. INTRODUCTION

In the previous units, we have analysed the price and output equilibrium under perfect competition and monopoly. But the perfect competition is rarely found in the real world and thus it does not represent, for the most part, the actual market situations. The urgent need was therefore felt to reformulate the theory of price so as to bring it nearer to the actual world. This was accomplished by Prof. E. H. Charnberlin and Joan Robinson who worked quite independently and brought out simultaneously, "The theory of monopolistic competition" and "the economics of imperfect competition" respectively.

In this unit, we shall examine the concept of monopolistic competition, its characteristics, equilibrium and its effects.

2.0. OBJECTIVES

At the end of this unit, you should be able to;

Explain the concept of monopolistic competition

Discuss its characteristics and the equilibrium (in both short – run and long – run)

Discuss the effects of monopolistic competition

3.0. MAIN CONTENT

3.1. Concept of Monopolistic Competition

Monopolistic competition is a market structure where many competing producers sell products that are differentiated from one another (i.e. the products are substitutes, but are not exactly alike). It's a market situation with a limited number of sellers, where each believes that the price that can be charged is a decreasing function of the quantity sold. Monopolistic competitors believe they face downward – sloping demand curves, but do not attempt to anticipate the reactions of individual competitors, as opposed to the case of oligopoly which we shall see in the succeeding unit.

Chamberlin's concept of monopolistic competition is a blending of competition and monopoly. He says, "monopolistic competition is a challenge to the traditional view point of economics that competition and monopoly are alternatives. By contrast, most economic situations are composites of both competition or monopoly. The distinguishing feature of

monopolistic competition which makes it blending of competition and monopoly is the differentiation of the product. This means that the products of various firms are not homogenous but different though they are closely related to each other.

Product differentiation does not mean that the products of various firms are altogether different. They are only slightly different so that they are quite similar and serve as close substitutes of each other. When there is any degree of differentiation of products, monopoly element enters into the situation. The greater the differentiation, the greater the monopoly element involved in the market situation. Thus, products are not identical as the case with perfect competition, but neither are they remote substitutes as the case with monopoly. We thus find that in monopolistic competition, there are various monopolists competing with each other.

SELF -ASSESSMENT EXERCISE

What is monopolistic competition?

3.2. Characteristics of monopolistic competition

Monopolistically competitive markets have the following characteristics;

There are many producers (Sellers) and many consumers in a given market and no business has total control over the market price.

The products of the sellers are differentiated, yet they are close substitutes of one another, product differentiation takes the form of labeling, Brand names, colour etc.

There are few barriers to entry and exit.

The firm is faced with downward sloping demand and marginal revenue curves.

The goal of the firm is profit maximization.

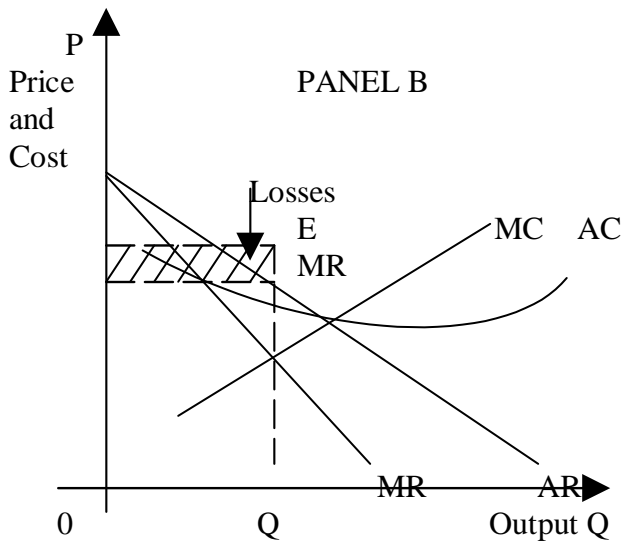
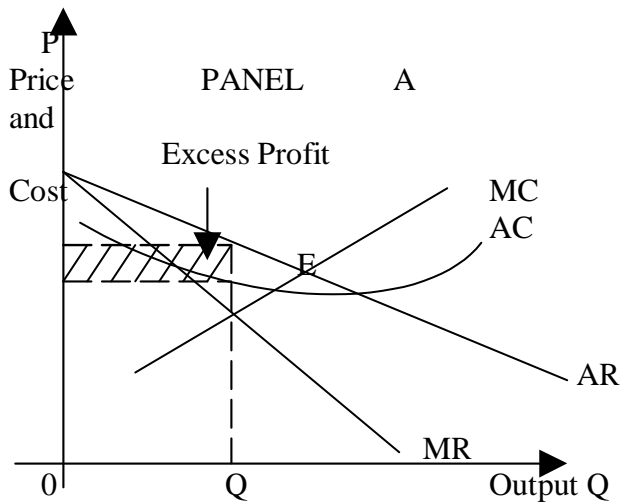
An industry with the above types of arrangement is referred to as monopolistic competition. It is monopolistic because each producer specializes in the production of a particular good and will not allow another producer to engage in the production of the same product. It is competitive because each producer is actively competing with one another to capture a wider market.

SELF -ASSESSMENT EXERCISE

Discuss the characteristics of monopolistic competition

3.3. Equilibrium under Monopolistic Competition

The short – run equilibrium of the firm under monopolistic competition is the same with that of the monopoly in terms of the curves. The only difference being that a firm under monopolistic competition can make a loss.



Short – Run Equilibrium of a Firm under Monopolistic Competition

In panel A, the firm is making profit while in panel B, the firm is making losses. The conditions for profit maximization are the same with those of monopoly and perfect competition. The conditions for profit maximization are:

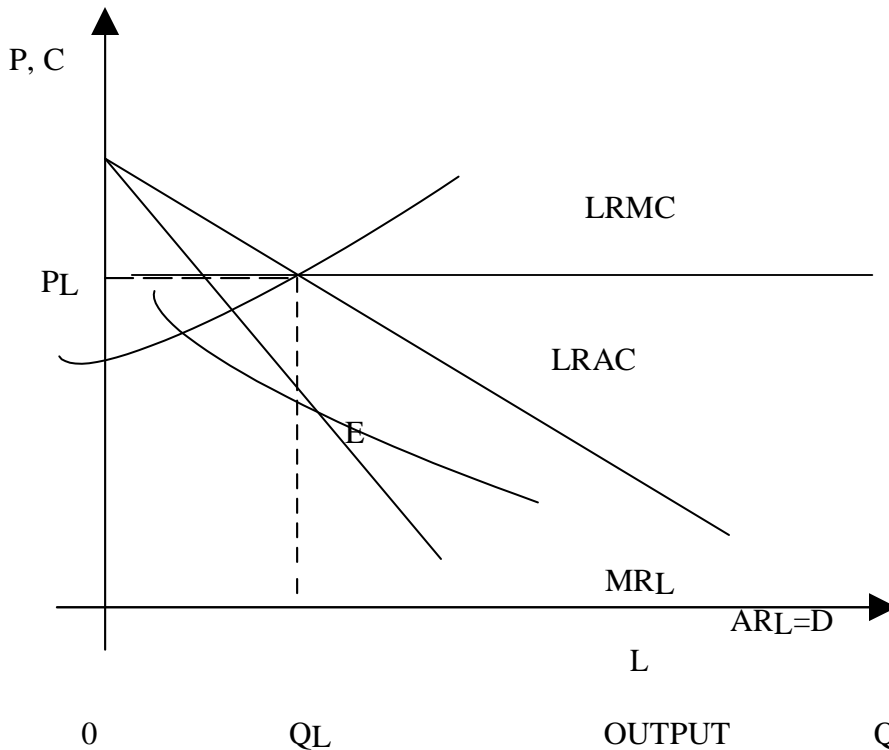
- (1) $MC = MR$
- (2) At the point of equilibrium, MC must cut MR from below or the slope of MC must be greater than the slope of MR at that point (Point E on A and B).

The demand curve is downward sloping because of the relationship between changes in price and quantity demanded. The demand though downward – sloping is highly elastic because of the fact that there are a large number of sellers. If it reduces its price,

there will be increase in its sales which are more or less equal to the loss of sales distributed over all the other firms.

In the long run, if firms are enjoying profits, other firms will be attracted into the industry thereby increasing the industry's cost of production. This situation will wipe-off excess profits and all firms will enjoy normal profits. On the other hand, if firms are making losses, some firms will exit the market thereby reducing pressure on cost hence wiping the losses and all firms enjoy normal profits. At the long – run;

- i. Average Cost (AC) is tangent to the demand curve
- ii. There is normal profit
- iii.



Long run equilibrium under monopolistic competition

SELF ASSESSMENT EXERCISE

Briefly discuss the equilibrium under monopolistic competition

3.4. Effects of Monopolistic Competition

The effects of monopolistic competition include:

1. Resources are wasted in advertising and in differentiating a firm's product from others. These costs are added to the production cost thus making the prices higher.
2. Firms produce at costs higher than minimum average cost (AC) thus, production is not efficient.
3. In monopolistic competition, firms offer a wider variety of products in the market thereby enhance the utility of consumers.
4. It ensures quality of products to meet up with competition.

SELF ASSESSMENT EXERCISE

Discuss the effects of monopolistic competition

4.0. CONCLUSION

As perfect competition and monopoly were found to be inapplicable to the behavior of business firms in the actual world, monopolistic competition offers a more realistic form of market structure. It is a blending of perfect competition and monopoly and provides explanation to relationship between business firms in the real world.

5.0. SUMMARY

This unit throws light on the concept of monopolistic competition. This was done through examining its characteristics, equilibrium and its effects.

6.0. TUTOR – MARKED ASSIGNMENT

- 1 Explain monopolistic competition and its characteristics
- 2 Discuss equilibrium under monopolistic competition
- 3 What are the effects of monopolistic competition

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UNIT 4 OLIGOPOLY

CONTENTS

- 1.0. Introduction
- 2.0. Objectives
- 3.0. Main content
 - 3.1. Concept of Oligopoly
 - 3.2. Characteristics of Oligopoly
 - 3.3. Collusive Oligopoly
 - 3.4. Non collusive Oligopoly
- 4.0. Conclusion
- 5.0. Summary
- 6.0. Tutor – Marked Assignment
- 7.0. References / Further Readings

1.0. INTRODUCTION

In the earlier units, we have studied price and output determination under three market forms, namely, perfect competition, monopoly, and monopolistic competition. However, in the real world, we find that many of the markets or industries are oligopolistic. Oligopoly is an important form of imperfect competition. It is said to prevail when there are few firms or sellers in the market producing or selling a product.

In this unit therefore, we shall consider the concept and characteristics of oligopoly. Also, the two types of oligopoly; collusive and non collusive oligopoly, shall be considered.

2.0. OBJECTIVES

At the end of this unit, you should be able to;
Explain the concept of oligopoly
Discuss the characteristics of oligopoly
Explain collusive and non collusive oligopoly

3.0. MAIN CONTENT

3.1. The Concept of Oligopoly

Oligopoly is a market structure where there exist few sellers of a commodity. The simplest form is ‘duopoly’ i.e. two sellers of a product which may be homogenous or differentiated. If the product is not differentiated e.g. steel, cement, transport etc. it is referred to as pure oligopoly. If however, the product is differentiated, it is called differentiated oligopoly.

Oligopoly arises as a result of the same general reasons as monopoly. They include control over the source of raw materials by few firms, technological factors, high initial cost of entry, economics of large scale of production limit pricing policy of existing few firms and patent rights and other factors policies which tend to limit the number of firms that enter the industry.

In some cases, oligopolistic firms are interdependent or tend to cooperate with each other. This makes it difficult for a new firm to enter the industry and compete with them in other cases, they tend to act independently or react differently to the actions of each other. Each firm has a sufficiently large share of the market to need to consider the individual reactions of the others to changes in its price or output. Equilibrium thus depends on how each oligopolist forecasts the others reactions.

SELF- ASSESSMENT EXERCISE

What is oligopoly?

3.2. Characteristics of Oligopoly

The characteristics of oligopoly are;

- i. **Interdependence:-** Interdependence in the decision – making of the few firms in the industry is the most important feature of oligopoly. This is because when the number of competitors is few, any change in price, output, product etc. by a firm will have a direct effect on the fortune of its rivals, which will then retaliate in changing their own prices, output or products as the case may be. It is therefore clear that the oligopolistic firm must consider not only the market demand for the industry's product but also the reactions of the other firms in the industry to any action or decision it may take.
- ii. **Importance of advertising and selling costs-** A direct effect of interdependence of oligopolists is that the various firms have to employ various aggressive and defensive marketing. Weapons to gain a greater share in the market or to prevent a fall in the share. For this reason, various firms have to incur a good deal of costs on advertising and on other measures of sales promotion. Unlike the previous market structures, under oligopoly, advertising can become a life – and death matter where a firm which fails to keep up with the advertising budget of its competitors may find its customers drifting off to rival products. To an oligopolist, true competition consists of the life of constant struggle, rival against rival, which can only be found under oligopoly (or on a smaller scale, under conditions of monopolistic competition).
- iii. **Group Behaviour:-** Unlike others forms of market structure, oligopoly is a theory of group behavior not of mass or individual behavior and to assume profit maximizing behavior on his part may not be very valid. In oligopoly, there are few firms in a group which are very much interdependent. Given the present state of our economic and social science, there is no generally acceptable theory of group behavior. Do the members of a group agree to pull together for a common interest or will they fight to promote their individual interests? Does the group possess any leader? If so, how does he get the others to follow him? These are some of the questions that need to be answered by the theory of group behavior.
- iv. **Indeterminateness of demand curve facing an oligopolist:-** Under the previous market structures, the demand curve for a firm is definite.

Under oligopoly, because of interdependence, of the firms, a firm cannot assume that its rivals will keep their prices unchanged when it makes changes in its own price. As a result, the demand curve for a firm under oligopoly loses its definiteness and determinateness. Since it goes on constantly shifting as the rivals change their prices in reaction to price changes by a firm.

SELF-ASSESSMENT EXERCISE

Discuss the characteristics of oligopoly

3.3. Collusive Oligopoly

In order to avoid the uncertainty arising out of interdependence and to avoid price wars and cut-throat competition, firms under oligopolistic conditions often enter into agreement regarding a uniform price – output policy to be pursued by them. The agreement may be either formal (open) or tacit (Secret). But since formal or open agreements to form monopolies are illegal in most countries, agreements reached between oligopolists are generally tacit or secret. When the firms enter into such collusive agreements formally or secretly, collusive oligopoly prevails. Collusions are of two types;

- a) Cartels and
- b) Price leadership

CARTELS

In a cartel type of collusive oligopoly, firms jointly fix a price and output policy through agreements. Formal collusion or agreement among the oligopolists may itself take various forms. An extreme form of collusion is found when the member firms agree to surrender completely their rights of price and output determination to a “central administrative agency” so as to secure maximum joint profits for them. Such a formal collusion is generally designated as perfect cartel. Thus, under perfect cartel, the price and output determination of the whole industry as well as of each member firm is determined by the common administrative authority so as to achieve many joint profits for the member firms. The total profits are then distributed among the member firms in a way already agreed between them.

The central authority determines the separate outputs to be produced by the various members and the price and also produce at a level where total cost is made minimum. Total cost will be minimized when the various firms in the cartel produce such separate outputs that their marginal costs are equal.

PRICE LEADERSHIP

Under price leadership, one firm sets the price and others follow it. The one who sets the price is the leader and the others are his followers. The follower firms adopt the price of the leader, even though they have to depart from the profit – maximizing position, as they think that it is to their advantage not to compete with their leader and between themselves. Price leadership is of various types;

- ii. **Price leadership by a low cost firm:** The low cost firm sets the price below the profit maximizing price for the high cost firm. Since they cannot sell their product at a higher price, they are forced to agree to the low price but the price leader sets a price which must yield some profits to his follower(s).
- iii. **Price leadership by the dominant firm:-** Few firms in an industry may dominate because they produce a large proportion of the total output in the industry. The dominant firm wields a great influence hence estimates its own demand curve and fixes a price which maximizes its own profits. The other firms which are small, having no individual influence accept the price set and adjust their output accordingly.
- iv. **Barometric price leadership:-** Under this, an old, experienced, largest or most respected firm assumes the role of a custodian who protects the interest of all. He assesses changes in market conditions and makes changes in price which are best from the view point of all the firms in the industry. Naturally, other firms follow him willingly.
- v. **Exploitative or Aggressive price leadership:-** Under this, a dominant firm establishes its leadership by following aggressive price policies and thus compels the other firms in the industry to follow him. Such a firm threatens to compete others out of the market if they don't follow him in setting the price.

SELF ASSESSMENT EXERCISE

1. What is a cartel?
2. Discuss the various types of price leadership

3.4. Non Collusive Oligopoly

It refers to a situation where firms in an oligopolistic industry behave independently of each other and therefore tend to compete or react to each other. Models of non collusive oligopoly include; Cournot model, Edgeworth model, and Sweezy kinked demand model. In this unit, we shall concentrate on the Cournot model and the kinked demand model.

COURNOT'S DUOPOLY MODEL

An American mathematician put forward a concept of equilibrium known after his name as Nash Equilibrium. According to Nash, firms reach their equilibrium state when they are doing their best, given what its competitors are doing. In Cournot's model, equilibrium is achieved when each firm produces an output that maximizes its profits, given the output produced by the rival firm and hence neither firm has any incentive to change its output. Hence Cournot's equilibrium is an example of Nash equilibrium.

Assume the linear demand function;

$P = a - bQ$, where Q is output of both firms. The above demand function can be written as; $P = a - b(Q_a + Q_b)$ where Q_a and Q_b are the outputs of firm A and B respectively. Since Total Revenue $TR = P \times Q$, then $TR_a = P \times Q_a$ and $TR_b = P \times Q_b$. Therefore, $TR_a = P \times Q_a$, then $TR_a = P \times Q_a$ and $TR_b = P \times Q_b$. Therefore, $TR_a = P \times Q_a = (a - bQ_a - bQ_b) \times Q_a$ $TR_a = aQ_a - bQ_a^2 - bQ_aQ_b$.

The marginal revenue function for A corresponding to the demand function is $MR_a = dTR_a/dQ_a = a - 2bQ_b - bQ_a$. To maximize profits, firm A will set marginal revenue (MR) equal to marginal cost (MC). Assume $MC = K$

$$a - bQ_b - 2bQ_a = K$$

$$Q_a = \frac{a - k - bQ_b}{2b}$$

It states that the profit maximizing output Q_a of firm A depends on what other firm is producing that is, Q_b . It describes how firm A will react to a rate of output produced by the rival firm. Therefore, the equation is called reaction function. Similarly, reaction function of firm B can be derived as follows.;

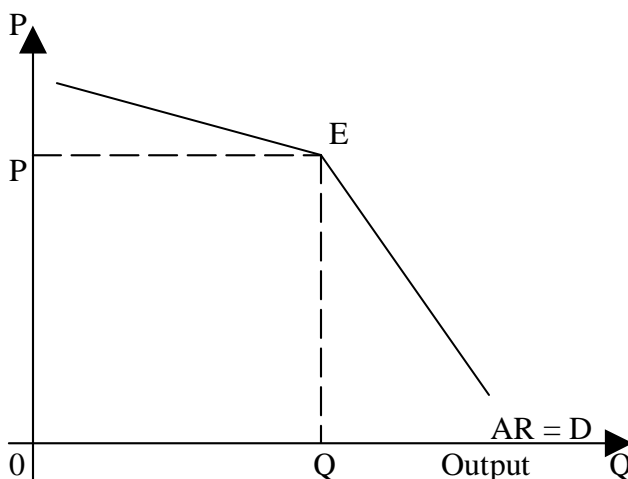
$$Q_b = \frac{a - k - bQ_a}{2b}$$

Equilibrium can then be determined by solving the two reaction functions simultaneously.

THE KINKED DEMAND CURVE THEORY OF OLIGOPOLY

It has been observed that many oligopolistic industries exhibit an appreciable degree of price rigidity and stability. In other words, in many oligopolistic industries, prices remain sticky or inflexible, that is, there is no tendency on the part of the oligopolist to change price of the commodity produced by them even if the economic condition undergo a change. The kinked demand curve hypothesis is an explanation of this price rigidity. Economists often use the kinked demand curve hypothesis in explaining price and output especially under oligopoly with product differentiation.

The demand curve facing an oligopolist, according to the kinked demand curve hypothesis has a 'kink' at the level of the prevailing price. The kink is formed at the prevailing price level because the segment of the demand curve below the prevailing price level is less elastic. This difference in elasticities is due to the particular competitive reaction pattern assumed by kinked demand hypothesis. Each oligopolist believes that if he lowers the price below the prevailing level, his competitors will follow him and will accordingly lower their prices, whereas if he raises the price above the prevailing level, his competitors will not follow his increase in price.



The best option for the oligopolist is to produce at point E which is the equilibrium point and the kink point. This is due to the fact that above the kink, demand is relatively elastic because all other firms' prices remain unchanged. Below the kink, demand is relatively inelastic because all other firms will introduce a similar price cut, eventually leading to a price war. Following the fierce price competitiveness created by this sticky-upward demand curve, firms use non-price competition in order to accrue revenue and market share.

The motivation behind this kink is, that in an oligopolistic market, firms will not raise their prices because even a small price increase will result in loss of customers. This is because competitors with comparatively lower prices will gain larger market share. However, even a large price decrease will gain only a few customers because such an action will trigger a price war with other firms. This curve is therefore more price – elastic for price increases and less for price decreases. Firms will often enter the industry in the long – run.

SELF- ASSESSMENT EXERCISE

Discuss the Cournot Duopoly model and the Kinked Demand model of non-collusive Oligopoly.

4.0. CONCLUSION

In conclusion, the simplest case of oligopoly is duopoly which prevails only when there are only two producers or sellers of a product. Analysis of duopoly raises all those basic problems which are confronted in explaining oligopolies with more than two firms.

5.0. SUMMARY

This unit started by explaining the concept of oligopoly and its characteristics. It further examined the two types of collusive oligopoly i.e. cartel and price leadership. The unit ended with examining the Cournot model and the kinked demand model of oligopoly.

6.0. TUTOR – MARKED ASSIGNMENT

- 1 What is oligopoly? Discuss its characteristics.
- 2 Discuss the types of price leadership under oligopoly
- 3 Suppose the market demand curve for a homogeneous product is given by $P = 100 - Q$. And suppose there are two firms each with a constant marginal cost N10.00. Find if these two firms behave as Cournot duopolists and determine the equilibrium price and total industry output.

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UNIT 5 NATURAL MONOPOLY

CONTENTS

- 1.0. Introduction
- 2.0. Objectives
- 3.0. Main content
 - 3.1. Concept of natural monopoly
 - 3.2. Industries with a natural monopoly and historical example of natural monopolies
 - 3.3. Regulation of natural monopoly
- 4.0. Conclusion
- 5.0. Summary
- 6.0. Tutor – marked assignment
- 7.0. Reference /further readings

1.0. INTRODUCTION

Natural monopolies arise where the largest supplier in an industry, often the first supplier in the market, has an overwhelming cost advantage over other actual or potential competitors. This tends to be the case in industries where capital cost predominates, creating economies of scale, which are large in relation to the size of the market, hence high barriers to entry. Some free – market – oriented economists argue that natural monopolies exist only in theory and not in practice, or that they only exist as transient state.

This unit will examine the concept of natural monopoly, historical example and industry with natural monopoly and the regulation of natural monopolies.

2.0. OBJECTIVES

At the end of this unit, you should be able to;

- Analyse the concept of natural monopoly
- Discuss industries with natural monopoly and historical example of natural monopoly
- Discuss the regulation of natural monopoly

3.0. MAIN CONTENT

3.1. The Concept of Natural Monopoly

Natural monopoly occurs when, due to the economies of scale of a particular industry, the maximum efficiency of production and distribution is realized through a single supplier. It arises where the largest supplier in an industry, often the first supplier in a market, has an overwhelming advantage over other actual or potential competitors. It normally predominates in industries where firms require large capital investment to enter the market. This creates economies of scale which are large in relation to the market, and hence high barriers to entry, e.g. water service and electricity.

In other words, it is a monopoly based on an overwhelming cost advantage for the incumbent firm. This may be because it possesses some unique natural resource e.g. a mine

tapping the only known deposits of a particular mineral, or because of past capital installations which would have to be duplicated by a competitor e.g. domestic electricity supply. This is contrasted with a statutory monopoly where the incumbent's position is based on laws to exclude possible rivals.

SELF -ASSESSMENT EXERCISE

What is Natural Monopoly

3.2. Industries with a Natural Monopoly and Historical Example of Natural Monopoly

Utilities are often natural monopolies. In industries with a standardized product and economies of scale, a natural monopoly will often arise. In the case of electricity, all companies provide the same product, the infrastructure required is immense, and the cost of adding one more customer is negligible, up to a point. Adding one more customer may increase the company's revenue and lowers the average cost of providing for the company's customer base. So long as the average cost of saving customers is decreasing, the larger firm will more efficiently serve the entire customer base. Of course, this might be circumvented by differentiating the product making it no longer pure commodity. For example, firms may gain customers who will pay more by selling "green" power, or non-polluting power, or locally – produced power.

Such a process happened in the water industry in the nineteenth century Britain. Up until the mid – nineteenth century, parliament discouraged municipal involvement in water supply; in 1851 private companies had 60% of the market. Competition among the companies in larger industrial towns lowered profit margins, as companies were less able to charge a sufficient price for installation of networks in new areas. In areas with direct competition (with two sets of mains), usually at the edge of company's territories, profit margins were lowest of all. Such situations resulted in higher costs and lower efficiency, as two networks, neither used to capacity, were used. With a limited number of households that afford their services, expansion of networks slowed, and many companies were barely profitable. With a lack of water and sanitation claiming thousands of lives in periodic epidemics, municipalisation proceeded rapidly after 1860, and it was municipalities who were able to raise the finance for investment, which private companies in many cases could not. A few well – run private companies which worked together with their own towns and cities (Gaining legal monopolies and thereby the financial security to invest as required) did survive, providing around 20% of the population with water even today. The rest of the water industry in England and Wales was reprivatized in the form of 10 regional monopolies in 1989.

SELF -ASSESSMENT EXERCISE

Discuss any industry with natural monopoly. Any Historical example?

3.3. Regulation of Natural Monopoly

As with all monopolies, a monopolist who has gained his position through natural monopoly effects may engage in behavior that abuses his market position, which often leads to calls from consumers for government regulation. Government regulation may also come about at the request of a business hoping to enter a market otherwise dominated by a natural monopoly. Common arguments in favor of regulation include the desire to control market power, facilitate competition, promote investment or system expansion or stabilize markets. In general though, regulation occurs when the government believes that the operator, left to his own devices, would behave in a way that is contrary to the government's objectives. Regulatory responses include;

- i. ***Doing nothing:-*** Because the existence of a natural monopoly depends on an industry's cost structure, which can change dramatically through new technology (both physical and organizational/ institutional), the nature or even existence of natural monopoly may change over time. Noble economist, Milton Friedman, took a strong stance that "over time I have gradually come to a conclusion that antitrust laws do far more harm than good and that we would be better off if we didn't have them at all, if we could get rid of them".
- ii. ***Common carriage competition:-*** This involves different firms competing to distribute goods and services via the same infrastructure for example different electricity companies competing to provide services to customers, over the same electricity network. For this to work requires government intervention to breakup vertically integrated monopolies, so that for instance in electricity, generation is separated from distribution and possibly from other parts of the industry such as sales. The key element is that access to the network is available to any firm that needs it to supply its services, with the price the infrastructure owner is permitted to charge being regulated. Such a system may be considered a form of deregulation, but in fact it requires active government creation of a new system of competition rather than simply the removal of existing legal restrictions.
- iii. ***Stock market:-*** One regulatory response is to require that private companies running natural monopolies be quoted on the stock market. This ensures they are subject to certain financial transparency requirements, and maintains the possibility of a take over if the company is mismanaged. The later in theory should help ensure that the company is efficiently run.
- iv. ***Public ownership:-*** A traditional solution to the regulation problem, especially in Europe is public ownership instead of government regulating a firms behaviour, it simply takes it over (usually by buy – out), and sets itself limits within which to act.
- v. ***Network effects:-*** Network effects are considered separately from natural monopoly statues. Natural monopoly effects are a property of the producers cost curves, whilst network effects arise from the benefit to the consumers of a good

from standardization of the good. Many goods have both prosperities, like operating system software and telephone networks.

SELF-ASSESSMENT EXERCISE

Discuss the regulation of natural monopolies

4.0. CONCLUSION

We shall conclude with the original concept of natural monopoly as attributed to John Stuart Mill. Writing before the marginalism revolution, he believed that prices would reflect the costs of production in the absence of artificial or natural monopoly. In the light of his assertion, it may be clear that regulation may be necessary to avoid or prevent exploitation.

5.0. SUMMARY

This unit examined the concept of natural monopoly, industries with natural monopoly and historical examples. It concluded by examining the regulation of natural monopolies.

6.0. TUTOR – MARKED ASSIGNMENT

Q1 What are natural monopolies?

Q2 Briefly discuss the regulation of natural monopolies?

7.0. REFERENCES / FURTHER READINGS

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MODULE 3

UNIT 1: THEORY OF CONSUMER BEHAVIOUR

CONTENTS

1.0 Introduction

2.0 Objectives

3.0 Main Content

3.1 Cardinal Utility Analysis

3.2 Ordinal Utility Theory

3.2.1 Indifference Curves Theory

3.2.2 Revealed Preference Hypothesis

4.0 Conclusion

5.0 Summary

6.0 Tutor-Marked Assignment

7.0 References / Further Readings

1.0 INTRODUCTION

Consumer behaviour is a study of how individuals make decisions to spend their available resources or consumption related aspects such as what, when and how they buy. It is concerned with the allocation of the resources owned by individuals as they pursue the goal of satisfying their needs. However, heterogeneity among people makes understanding consumer behaviour a challenging task. Consumer behaviour is influenced by culture, society, family, friends and reference groups, and this provides a wide range of diversities in trying to understand the patterns of individual decision making and hence the choices the individuals make in consumption.

These diversities in the behaviour of consumers have been curbed with the development of a series of assumptions by which an evaluation is made of these economic behaviours thereby providing an empirical means of processing the consumption patterns of consumers. These models which include the cardinal marginal utility analysis and the indifference curve analysis, theorize that the consumer is assumed to be rational and conscious about economic calculations, and therefore follows the law of marginal utility. An individual buyer seeks to spend his money on such goods which give maximum satisfaction (utility) according to his interests and at relative cost. The buying behaviour is determined by the income – its distribution and level – which affects the purchasing power. Consumer behaviour is therefore based on the assumption that consumers have stable preferences, and they attempt to do as well as possible given those preferences and the constraints placed on their resources, and that changes in behaviour are due to changes in these constraints.

2.0 OBJECTIVES

At the end of this unit, you should be able to:

Explain the diverse theories propounded to explain the behaviour of the consumer

Be critical of the theories and the validity of the basis of their assumptions.

3.0 MAIN CONTENT

3.1 CARDINAL MARGINAL UTILITY ANALYSIS

Amongst the different theories that have been advanced to explain the consumer's demand for a good, the cardinal marginal utility analysis is the oldest theory. The cardinal marginal utility analysis provides an explanation of consumer's demand for a product and derives the law of demand which establishes an inverse relationship between price and quantity demanded of the product.

It may be noted that, in economic theory, utility hypothesis forms the basis for the theory of demand. The cardinalists postulated that utility can be measured. Various suggestions have been made for the measurement of utility. Some economists have suggested that utility can be measured in monetary units, by the amount of money the consumer is willing to sacrifice for another unit of a commodity. Others suggested the measurement of utility in subjective units, called utils.

In examining this approach to the problem of comparison of utilities, the assumptions underlying it will be stated and its weaknesses pointed out.

Assumptions of the Cardinal Marginal Utility Analysis

a. **Rationality**

The consumer is rational. He aims at the maximization of his utility subject to the constraints imposed by his given income. The consumer therefore, given the prices of commodities, plans the spending of his income so as to attain the highest possible satisfaction or utility.

b. **Cardinal Utility**

Utility is regarded to be a cardinal concept. The utility derived from each commodity is measurable. In other words, utility is a measurable and quantitative entity. A person can express the utility or satisfaction he derives from a commodity in quantitative terms. Thus, a person can say that he derives utility equal to 7 utils from the consumption of a unit of good A, and 14 utils from the consumption of a unit of good B. It also assumes that a person can compare in respect of size how much one level of utility is greater than another, that is, a person can say that the utility he gets from the consumption of one unit of good B is double the utility he obtains from the consumption of one unit of a good A. Utility is thus measurable on a ratio scale.

Moreover, according to the cardinalists, utility is not only conceivable in quantitative terms but can also be actually, measured in quantitative terms. Thus, marginal utility, measurable in principle, is also measurable in terms of money. The utility is measured by the monetary units that the consumer is prepared to pay for another unit of the commodity.

c. **Cardinal Marginal Utility of Money**

This is another important assumption of the marginal utility analysis. While the marginal utility analysis assumes that marginal utilities of commodities diminish as more of them are purchased and consumed, the marginal utility of money remains constant throughout when the individual is spending money on a good and the amount of money with him varies. This assumption is necessary if the monetary unit is used as the measure of utility. The essential feature of a standard unit of measurement is that it be constant. If the marginal utility of money changes as income increases (or decreases) the measuring rod for utility

becomes like an elastic ruler, inappropriate for measurement.

d. **Diminishing Marginal Utility**

As regards this assumption, the marginal utility of a commodity diminishes as an individual consumes more units of the commodity. In other words, as a consumer takes in more and more units of a commodity, the extra utility or satisfaction that he derives from an extra unit of the commodity falls relative to that of the preceding unit. The total utility thus increases but at a decreasing rate and the intensity of the consumer's want for the commodity goes on falling until a point is reached where the individual no longer wants any more units of the commodity. That is, when saturation point is reached, marginal utility of the commodity becomes zero. Zero marginal utility of a commodity implies that the individual has all that he wants of the commodity in question.

e. **Total Utility is Additive**

Total utility is regarded to be additive. This implies that separate utilities of different goods can be added to obtain the total sum of the utilities of all goods purchased and consumed. The utility which an individual derives from the consumption of a good is the function of the quantity of that good and of that good alone. In other words, the utility an individual derives from the consumption of a good does not depend upon the quantity consumed of other goods; it depends upon the quantity consumed of that good alone. On this assumption then, the total utility which a person gets from the whole collection of goods purchased by him is simply the total sum of the separate independent utilities of the goods.

$$U = U_1(x_1) + U_2(x_2) + \dots + U_n(x_n)$$

This assumption was however relaxed in later versions of the cardinal utility theory. Total utility of a 'basket of goods' depends on the quantities of the individual commodities. Utility is therefore dependent on the entire bundle (or basket) of goods consumed and not on the independent and separate utilities of the individual goods.

$$U = f(x_1, x_2, \dots, x_n)$$

Equilibrium of the Consumer

For a single commodity x , the consumer is in equilibrium when the marginal utility of x is equated to its market price (P_x). This is given as

$$MU_x = P_x$$

This implies that if the marginal utility of x is greater than its price, the consumer can increase his welfare by purchasing more quantities of x until the marginal utility equates the price. If, however, the marginal utility of x is less than its price the consumer can increase his total utility by reducing the quantity of x he consumes.

For the range of commodities x, y, \dots, n , the condition for the equilibrium of the consumer is the equality of the ratios of the marginal utilities of the individual commodities to their prices.

$$\frac{MU_x}{P_x} = \frac{MU_y}{P_y} = \dots = \frac{MU_n}{P_n}$$

The demand curve of the consumer can be derived from the positive segment of the marginal utility curve. With consumption of successive units of the commodity, the total utility of the consumer increases but at a decreasing rate. This implies that as extra units of the commodity are consumed, the marginal utility of the consumer diminishes. If consumption continues, total utility starts to decline at the point where marginal utility reaches zero, beyond which, consuming any more units of x provides a negative utility or disutility to the consumer.

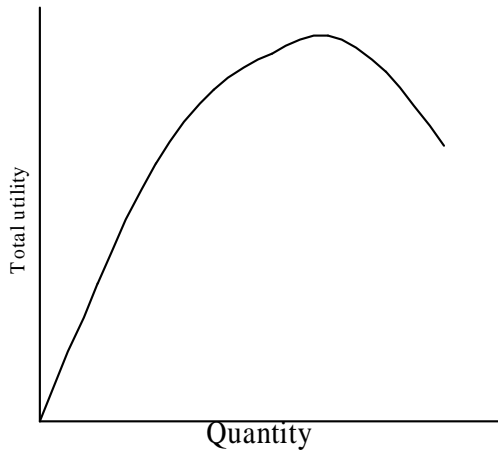


Figure 1a: Total utility

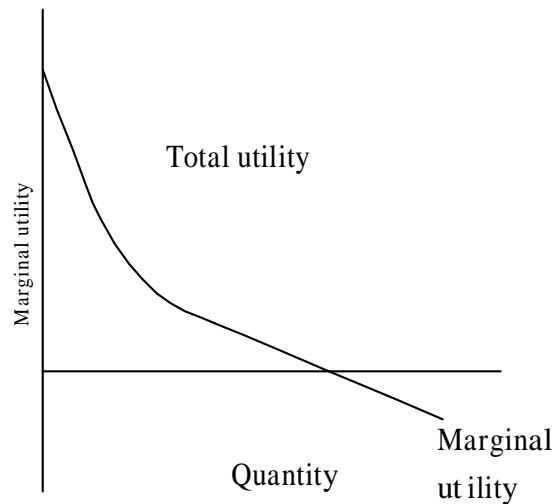


Figure 1b: Marginal utility

Figures 1a and 1b show the total utility and marginal utility respectively. The positive segment of figure 1b is identical with consumer's demand curve for commodity x .

Critique of the Cardinal Marginal Utility Analysis

The cardinalist analysis has been criticized; its shortcomings and drawbacks have also been pointed out.

The assumption of cardinal utility is extremely doubtful. The satisfaction derived from various goods cannot be measured objectively. Measurability of utility is unrealistic, thus, cannot be expressed or stated in cardinal numbers. Since utility is a psychic feeling and a subjective thing, it cannot therefore be measured in quantitative terms. In real life, individuals are only able to compare the satisfactions derived from the consumption of

various goods or combination of goods. A consumer can state only whether a good or a combination of goods gives him more, or less, or equal satisfaction as compared to another.

The assumption of constant utility of money is also unrealistic. As income increases the marginal utility of money falls as opposed to the assumption of the cardinalists which holds that the marginal utility of money remains constant at any given outlay of income or varying prices of commodities. As such, money cannot be used as a measuring rod since its own utility changes.

The axiom of diminishing marginal utility has been established from introspection. Introspection is the ability of the observer to reconstruct events which go on in the mind of another person with the help of self observation. This form of comprehension may be just guess work or intuition or the result of long lasting experience. It is a psychological law which must be taken for granted.

The assumption that total utility is additive cannot stand. The cardinalists assume that utilities derived from various goods are independent. This means that utility which an individual derives from the consumption of a good is a function of the quantity of that good and of that good alone. The utility from the consumption of a good therefore, does not depend upon the quantity consumed of other goods; it depends on the quantity consumed of that good alone. On this assumption, the total utility which a person gets from the whole collection of goods consumed by him is simply the total sum of the separate utilities of the goods. Utility functions are thus additive. But in actual life, it is not so. The utility or satisfaction derived from a good depends on the availability of some other goods which may either be substitutes for or complementary with the former.

SELF-ASSESSMENT EXERCISE 1

Why is constant marginal utility of money necessary for the cardinal utility theory?

3.2 ORDINAL UTILITY THEORY

The ordinal school of thought does not agree with the cardinal approach that utility is measurable; rather, it believes utility to be an ordinal magnitude. Utility cannot be measured in quantitative cardinal terms. It cannot be subjective (utils) or given monetary values, that is, it is not quantitative, being a psychological feeling. According to the ordinalists, cardinal utility is not attainable.

The consumer is believed to be capable of simply “comparing” the different levels of satisfaction. The consumer may thus not be able to exact amounts of utilities derived from commodities or any combination of them, but is capable of judging whether the satisfaction obtained from a good or combination of goods is equal to, lower than, or higher than another.

The way a consumer ranks or orders various alternative commodities or baskets of commodities from among the vast number of goods and services available to him, provides information about his preference, which are, his likes and dislikes. Consumer preference indicates what alternatives he prefers over others and between which he is indifferent. These preferences for various commodities or indifference between various commodities or alternative baskets of commodities is the result of the working of various factors such as

heritage, geographical environment, education, social culture, and information about products. How these preferences are formed are not explained, they are only described.

In addition to the consumer's preferences, his income and prices of goods also determine his choice of an alternative.

There are two main ordinal theories. These are the *Indifference Curves Theory* and the *Revealed Preference Hypothesis*.

3.2.1 INDIFFERENCE CURVES THEORY

This theory evolved to supersede the cardinal utility analysis. Some assumptions of the cardinal marginal utility analysis were retained. The assumptions of the indifference curve theory are however less stringent than those of the cardinal utility approach. Only ordinality is required while the assumption of constant utility of money is dropped.

Assumptions of the Indifference Curves Theory

d. **Rationality**

The consumer is assumed to be rational. He aims at maximizing his utility given his income and market prices. It is assumed that the consumer has full knowledge of, and is certain of all the relevant information which includes knowledge of all available commodities, their prices and his income.

e. **Utility is ordinal**

This means there is complete ranking in the consumer's preferences. It is taken as axiomatically true (an accepted principle) that the consumer can rank his preferences (order the various "baskets of goods") according to the satisfaction derived from each basket.

Between two bundles or combinations of goods, a consumer is able to decide whether he prefers good A to B, prefers B to A, or is indifferent between the two. If the consumer prefers A to B, it is inferred that he gains greater satisfaction from bundle A than B. If the consumer is indifferent between bundles A and B, it can be inferred that he gains the same level of satisfaction from the two bundles of goods. The consumer can therefore rank every pair of bundles or combinations of commodities. Consumer's preferences are independent of costs. A consumer may prefer A to B but might buy B because it is cheaper. The consumer does not need to know the precise amount of satisfaction gained. It is enough that he expresses his preference for the various bundles of commodities. It is therefore not necessary to assume that he can measure the intensity of his preference.

f. **Diminishing Marginal Rate of Substitution**

Indifference curves are assumed to be convex to the origin and preferences are ranked in terms of indifference curves. The slope of the indifference curve is called the marginal rate of substitution of the commodities. The indifference curve theory is based on the axiom or accepted principle of diminishing marginal rate of substitution.

The marginal rate of substitution of two commodities is the negative of the slope of the indifference curve at any point. It is defined as the number of units

of commodity A that must be given up in exchange for an extra unit of commodity B so that the consumer maintains the same level of satisfaction.

- g. The total utility of the consumer is dependent on the quantities of the commodities consumed.

$$U = f(q_1, q_2, \dots, q_n)$$

e. **Consistency and Transitivity of Choice**

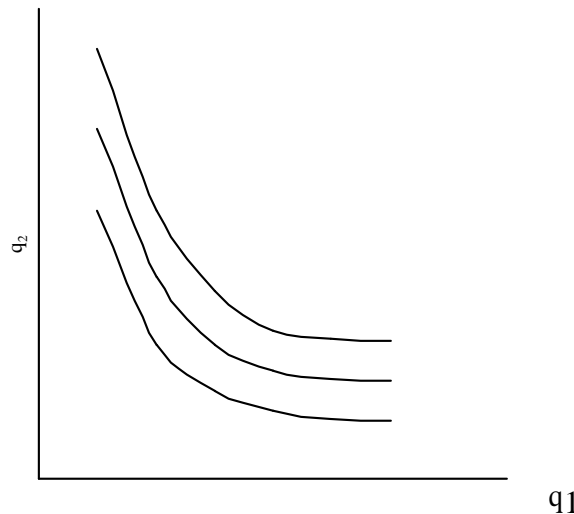
The consumer's tastes and preferences are consistent. If in one period the consumer chooses commodity A over B, he will not choose B over A in another period if both bundles are available to him. This can be symbolically written as: if $A > B$, then $B < A$.

The consumer is also assumed to be transitive in the choices he makes. If a consumer prefers good A to B and B to C, then he will also prefer A to C. Also, if he is indifferent between A and B and between B and C, then he will also be indifferent between A and C.

When a consumer prefers good A to B, it implies that he gets more satisfaction from good A as compared to good B.

Equilibrium of the consumer

The equilibrium of the consumer is determined through the indifference curve. An *indifference curve* is a locus of particular combinations or bundles of goods which yield the same level of satisfaction or utility to the consumer, so that he is indifferent as to the particular combination consumed. An *indifference map* is a collection of indifference curves corresponding to different levels of satisfaction. On an indifference map, given that indifference curves do not intersect, combinations of goods lying on a higher indifference curve yield a higher level of satisfaction and are preferred to the lower indifference curve.



Indifference curve II is preferred I. Similarly, indifference curve III is preferred to II. The slope of the indifference curve at any point is called the marginal rate of substitution of the two commodities.

$$[\text{Slope of the indifference curve}] = -\frac{dy}{dx} = MRS_{xy}$$

The marginal rate of substitution of x for y is the number of units of commodity y that must be forgone in exchange for an extra unit of commodity x so that the consumer maintains the same level of satisfaction. It is equal to the ratio of the marginal utilities of the commodities involved in the utility function:

$$MRS_{xy} = \frac{MU_x}{MU_y}$$

The consumer is also recognized to have budget or income constraint which limits his maximizing behaviour. This constraint is made up of the income of the consumer and the prices and quantities he may be able to consume of the respective commodities, and may be written as

$$Y = p_x q_x + p_y q_y$$

The consumer is in equilibrium when he maximises his utility, given his income and the market prices. The first condition for this to take place is that the marginal rate of substitution be equal to the ratio of the commodity prices

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

The second (and sufficient) condition is that the indifference curve be convex to the origin. This condition is fulfilled by the axiom of diminishing $MRS_{x,y}$, which states that the slope of the indifference curve decreases as we move along the curve downwards from the left to the right.

Critique of the Indifference Curves Approach

The indifference curves theory has its weaknesses despite the importance of the theory. First, the theory of its axiomatic assumption of the existence and the convexity of the indifference curves, does not establish the actual existence or shape of the indifference curve, it just assumes that they exist and are convex in shape.

Secondly, it is questionable whether the consumer is able to order his preferences as precisely and rationally as the theory implies. The preferences of consumers change continuously, due to the influence of various factors. This causes ordering of these preferences, where possible, to be considered valid for the very short run.

Thirdly, the indifference curve theory has retained most of the weaknesses of the cardinal utility theory with the assumption of rationality and the concept of the marginal utility implicit in the definition of the marginal rate of substitution.

Another problem with the indifference curve theory is that it does not analyse the effects of advertising, past behaviour (habits), stocks, interdependence of the preferences of the consumer, which lead to behaviour that would be considered as irrational, hence these effects are ruled out by the theory.

SELF-ASSESSMENT EXERCISE 2

Two indifference curves do not intersect. Why?

3.2.2 REVEALED PREFERENCE HYPOTHESIS

The cardinal utility theory and the indifference curve theory provide a psychological explanation of consumers' demand. They derive law about consumer's demand from how the consumer would react psychologically to certain hypothetical changes in price and income.

The revealed preference theory however seeks to explain consumer's demand from his actual behaviour in the market in various price-income situations. This theory is therefore not a psychological or introspective explanation, but a behaviouristic explanation of consumer's demand. The revealed preference theory is also based on the concept of ordinal utility and therefore regards utilities to be merely comparable and not quantifiable.

The revealed preference theory has made possible the establishment of the "law of demand" directly on the revealed preference axiom, without the use of indifference curves and all their restrictive assumptions. This theory has the advantage over the indifference curves approach by establishing the existence and the convexity of the indifference curve, it does not accept them axiomatically.

In this theory, choice reveals preference.

Assumptions of the Revealed Preference Theory

a. **Rationality**

The consumer is assumed to behave rationally, in that he prefers bundles of goods that include more quantities of the commodities. The consumer is assumed to make an optimum choice among his available choices.

b. **Consistency**

The consumer behaves consistently. If a person chooses commodity A rather than B, which he could purchase with the given budget constraint, then it cannot happen that he would choose or prefer commodity B over A in some other situation in which he could have bought A if he so wished. Symbolically, it can be written as: if $A > B$, then $B < A$.

c. **Transitivity**

If an optimizing consumer prefers commodity A to commodity B of the goods and commodity B to commodity C of the goods, then he will also prefer commodity A to commodity C of the goods. This can also be symbolically written as: if $A > B$ and $B > C$, then $A > C$.

d. **The Revealed Preference Axiom**

By choosing a collection of goods in any one budget situation, the consumer reveals his preference for that particular collection. The chosen bundle is

revealed to be preferred among all other alternative bundles available under the budget constraint. The utility of the consumer is maximized by the chosen bundle of goods. The revealed preference for a particular collection of goods implies, axiomatically, the maximization of the utility of the consumer.

When a consumer is observed to choose a commodity A out of various alternative commodities available to him, he “reveals” his preference for A over all other alternative commodities which he could have purchased. This means, he considers all other alternative commodities which he could have purchased to be inferior to A.

Critique of the Revealed Preference Hypothesis

This theory is a major advancement to the theory of demand. It provides a direct way to the derivation of the demand curve, which does not require the use of the concept of utility. The theory can prove the existence and convexity of the indifference curves under weaker assumptions than the earlier theories. It has also provided the basis for the construction of index numbers of the cost of living and their use for judging changes in consumer welfare in situations which prices change.

SELF-ASSESSMENT EXERCISE 3

In the revealed preference hypothesis the consumer reveals his choice at the point of purchase. Discuss.

4.0 CONCLUSION

This topic has discussed the processes involved in the decisions of the consumer with regard to his consumption behaviours. The student should have learnt the different theoretical frameworks of the theory of consumer behaviour from which a broad application to economic theory can be made possible.

5.0 SUMMARY

The theories of consumer behaviour discussed above have all been based on the assumption that the consumer is a rational being who is aware of his wants and seeks to maximize his welfare within the constraints placed on his decisions by his income and the prices of the desired commodities.

The cardinal marginal utility theory postulates that the utility derived by the consumer is a measurable quantity; measured in terms of the money spent or in subjective terms called utils. To measure utility in terms of the money spent requires that the marginal utility of money be constant over the entire range incomes.

The ordinal marginal utility theories on the other hand oppose cardinality in the measurement of utility and propose that the consumer can only rank the utility he derives from the consumption of the different commodities; as one being more or less than another. These require consistency and transitivity in the preferences of the consumer. But while the indifference curves theory, like the cardinal marginal utility theory, is based on introspection, the revealed preference theory is based on the choices of the consumer at the point of purchase and consumption of the bundles of commodities.

6.0 TUTOR-MARKED ASSIGNMENT

1. Distinguish cardinal utility and ordinal utility.
2.
 - a. What are indifference curves?
 - b. Explain why the consumer's indifference curves (i) have negative slope, (ii) do not intersect and (iii) are convex to the origin.
 - c. What is a budget line?
3. State and explain the assumptions of the revealed preference hypothesis.

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UNIT 2: THEORY OF PRODUCTION

CONTENTS

1.0 Introduction

2.0 Objectives

3.0 Main Content

3.1 The Production Function

3.2 Returns to a Factor

3.3 Law of Variable Proportions

3.4 Returns to Scale

3.5 Input Combination Choice

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1.0 INTRODUCTION

Having had discussions on demand, we now turn our attention to the product that is being demanded by the consumer. The theory of demand holds that human wants are unlimited but clearly points out that the resource necessary to satisfy those wants are limited. So is the case with production. The motive of a producer is to make maximum profit from his output. However the resources needed to produce whatever desired level of output are limited. The producer now has to grapple with the problem of having to manage the available resources (or inputs) in such a manner as to make as little use of the available resources as possible, while producing the most amount of output from these resources. This will guarantee that he maximizes his profit through minimizing the cost of producing the desired output.

Production involves the transformation of input into output. It is the process of transforming natural, human and man-made resources into valuable goods and services output which people want, and making them available where and when they are wanted. It is the process that brings about the creation or addition of utility.

Since production involves the meeting of wants which are unlimited while at the same time the resources required to meet those wants are themselves limited, a successful production process must reflect an efficient use of these resources in the creation of the needed output. The output produced which includes not only tangible goods like cars and shoes but also intangible services like the services of a driver or a cobbler, can be produced in a variety of

ways called production processes. The theory of production therefore seeks to use that production process which ensures efficient technical and economic use of inputs.

2.0. OBJECTIVES

At the end of this unit, you should be able to:

Explain the term production

Construct a production function

Distinguish the concepts of returns to scale and returns to a factor

Discuss the processes in the choice of input combination.

3.0 MAIN CONTENT

3.1 THE PRODUCTION FUNCTION

A production function is a technical statement, which relates factor inputs to output. It specifies the maximum possible output that can be produced for a given amount of input or in another sense, the minimum quantity of input necessary to produce a given level of output. The production function is determined by the technology of a firm of an industry, or of the economy as a whole and it includes all the technically efficient methods of production.

A production process or activity is a combination of factor inputs required for the production of one unit of output. This can be illustrated using a two-input, one-output model. To produce a product Q , two inputs X and Y , which may represent capital and labour may be employed. The product Q could be a tangible (physical) good like a shoe, car or television set, or Q could be a service such as that of a cobbler, a driver or an electrician.

The production function, which may be discrete or continuous, could thus be written as

$$Q = f(x, y)$$

Varying combinations of X and Y , called processes, can be used to produce a given output Q . For example, Q may be produced through the following processes:

	Process 1	Process 2	Process 3
Labour units	3	2	1
Capital units	2	3	4

These activities can be graphically represented as follows:

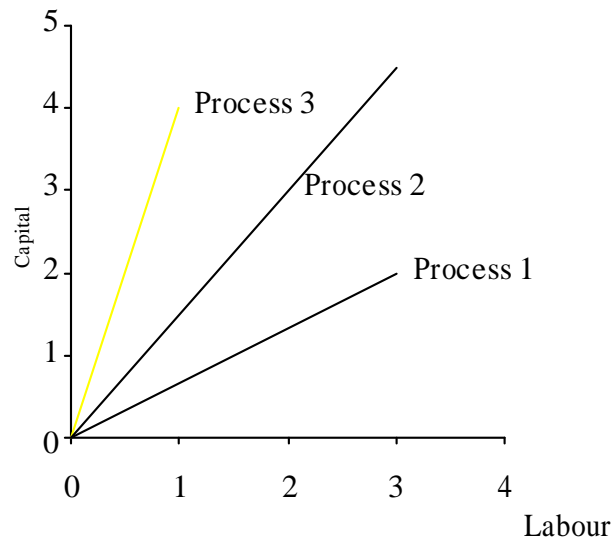


Figure 2: Map of Production Processes

The choice of the production process to employ will depend on the technical and economic efficiency of that process. This will be discussed below.

SELF ASSESSMENT EXERCISE 1

What is a production process?

3.2 RETURNS TO A FACTOR

Returns to a factor measures the relationship between the level of output and variations in only one factor input. Most commodities typically exhibit diminishing returns. This implies that with increases in the quantity of any one factor input, the output increases initially, but as the factor input continues to be increased, the output only increases at a diminishing rate. The principle of diminishing returns states that *as the quantity of a variable input increases, with the quantities of all other factors being held constant, the resulting rate of increase in output eventually diminishes*. The marginal product of a variable factor must eventually decline as increasing quantities of the variable factor are combined with other fixed factors, which if allowed to continue will lead to an eventual decline in the total product of the commodity, as will be shown below.

Total, Marginal and Average Product

Total Product

The total product is the total output produced by all the factors of production applied during a given period of time. It is the entire output from a production system. This is synonymous with Q in the function above.

$$Q = f(x, y)$$

Marginal Product

The marginal product of a factor, MP_x , is the change in output resulting from a one-unit change in the factor input, holding all other input levels constant. It is expressed as

$$MP_x = \frac{\partial Q}{\partial x}$$

where ∂Q is the change in output resulting from a one-unit change, ∂X , in the variable factor, X .

Average Product

The average product derived by dividing the total product, which is obtained, by the quantity of the variable input.

$$AP_x = \frac{Q}{X}$$

Given a table showing varying quantities of the variable factor, X , which is employed in the production of commodity, Q , we can discern the total, marginal and average product.

Input quantity (X)	Total product of the input (Q)	Marginal product of the input X ($MP_x = \Delta Q / \Delta X$)	Average product of the input X ($AP_x = Q/X$)
1	15	15	15
2	48	33	24
3	68	20	22.67
4	73	5	18.25
5	70	-3	14

SELF ASSESSMENT EXERCISE 2

Distinguish between returns to scale and returns to a factor.

3.3 LAW OF VARIABLE PROPORTIONS

The law of variable proportions examines the relationship in a production function when only one factor is varied while all other factors are left fixed. This law, also known as the law of diminishing returns, studies the effect on output of changes in the use of only one factor, holding all other factors constant. The law, according to Samuelson (1980), states that *“an increase in some inputs relative to other fixed inputs will, in a given state of technology, cause output to increase; but after a point the extra output resulting from the same additions of extra inputs will become less and less.”*

Assumptions of the Law of Variable Proportions

1. The state of technology is assumed to be given and unchanged.
2. The quantity of only one factor input is varied while all others are kept fixed.
3. The proportions in which the various factors can be combined to produce a product can be varied.

The example above shows us that as the quantity of the variable factor X is increased in successive units, the total product initially increases at an increasing rate but afterwards it increases at a diminishing rate. This relation is made clearer by the initial increase in the

marginal product, which eventually diminishes with increasing quantities of the variable factor.

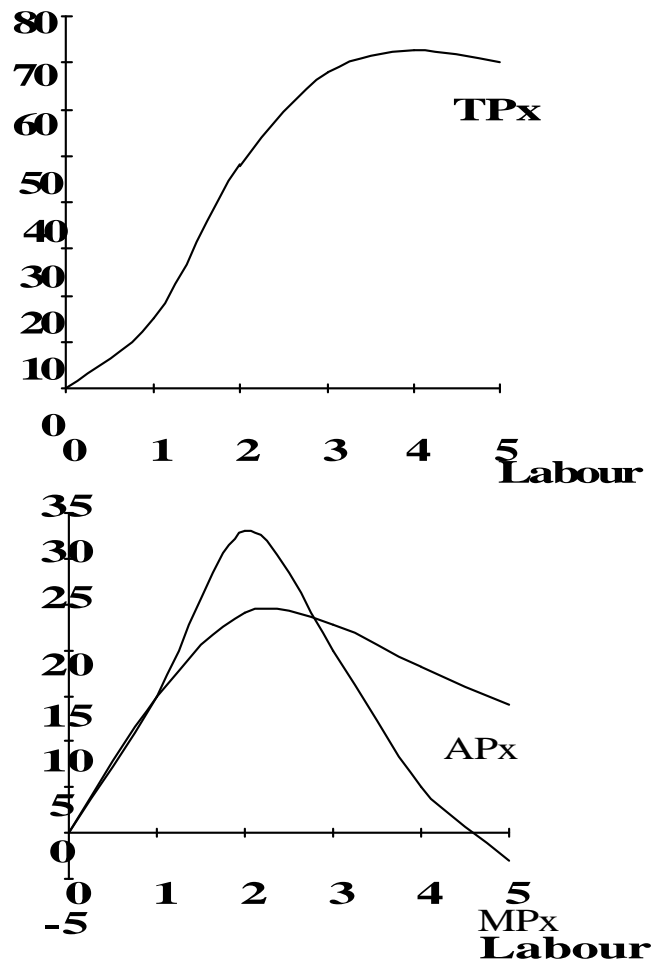


Figure 3: Illustration of the Three Stages of Production

Three Stages of the Law of Variable Proportions

The behaviour of the total product, marginal product and average product can be graphically decomposed into the three stages the firm encounters in production when only one factor is varied holding the other factors fixed.

- Stage 1:** The firm at this stage experiences an *increasing return* to scale. As the variable factor is increased, the total product increases at an increasing rate as can be seen in the increase in the marginal product and average product. The incremental unit of input produces an output that is relatively larger than that produced by the preceding unit of input.
- Stage 2:** At this stage, the firm experiences *diminishing returns* as increasing quantities of the variable factor increase output but at a diminishing rate. This is the region the intersection of the marginal product and average product, and where the marginal product touches the x-axis.
- Stage 3:** Beyond the point where the marginal product touches the x-axis, the firm experiences *negative returns*. The total product begins to diminish with increases in the variable factor.

SELF ASSESSMENT EXERCISE 3

Within which of the three production stages should the firm base its output?

3.4 RETURNS TO SCALE

The concept of returns to scale measures the changes in the level of output of a commodity as quantities of all the factor inputs vary. With returns to scale, we are concerned with how the returns will vary when all the factors are increased in the same proportion. Returns to scale may be constant, increasing or decreasing.

Constant Returns to Scale

Constant returns to scale occur if factor inputs and the output produced increase in the same proportion. If the factor inputs are doubled, for example, with constant returns to scale, the output produced in the process are expected to also double.

Increasing Returns to Scale

Where an increase in all the factor inputs by a given proportion increases output to a proportion higher than that of the factor inputs, returns to scale are said to be increasing. Hence, in a situation where the output trebles, for example, when factor inputs have only been doubled, the production is said to be experiencing increasing returns to scale.

Decreasing Returns to Scale

Contrary to a situation of increasing returns to scale, when output expands in a proportion less than the increase in factor inputs, there is a situation of decreasing returns to scale. In this case, a trebling of the amount of input may only double the output produced.

It should be noted however that different production functions do not always exhibit different types of returns to scale. Practically, a single production function may relate three phases of increasing, constant and diminishing returns to scale as the scale of production expands.

SELF ASSESSMENT EXERCISE 4

If the prices of factors were to remain constant at all production levels, which type of returns to scale would the firm find most profitable? Why?

3.5 INPUT COMBINATION CHOICE

In production, the choice regarding the levels of the respective factor inputs to be employed in producing a commodity is a crucial one. Here, for two-input, one-output production system, isoquants of varying shapes, may be used. An isoquant is a locus of all the technically efficient methods for producing a given level of output. There are different shapes of production isoquants depending on the degree of substitutability of the factor inputs. These include: the linear isoquant; input-output isoquant; kinked isoquant; and the smooth, convex isoquant

The smooth, convex isoquant assumes the continuous substitutability of the two factor inputs over a certain range, beyond which factors cannot substitute each other. Here, there are an infinite number of possible input combinations in the production of a given level of output. All points on the given isoquant are said to be technically efficient and as such, to produce a given level of output, it is impossible to increase the use of one input without reducing the use of the other input. Some important characteristics of the smooth, convex isoquant include: it is convex to the origin; it has negative downward slope from left to the right; the production space contains an infinite number of production isoquants each

depicting a different level of output; higher isoquants depict higher levels of output; and no two isoquants intersect.

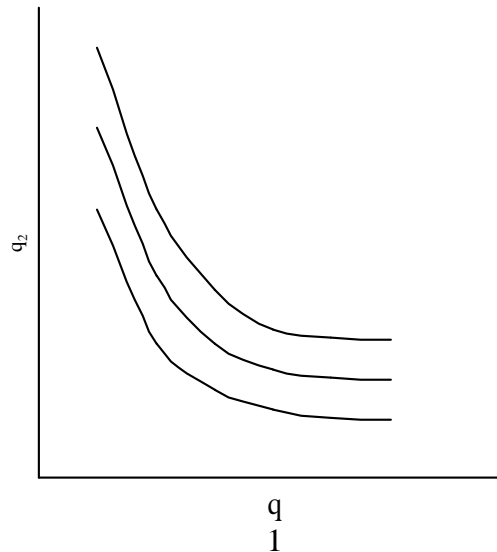


Figure 4: A map of smooth, convex isoquants

The slope of the isoquant, $-\partial K/\partial L$ defines the rate of substitution of factors of production. The slope of the isoquant decreases in absolute terms in a leftward movement down the slope of an isoquant, showing the increasing difficulty in the substitution of capital for labour. The slope of the isoquant is called the Marginal Rate of (Technical) Substitution of the factors of production.

$$-\frac{dK}{dL} = MRTS_{L,K}$$

Similarly, the marginal rate of technical substitution is equal to the ratio of the marginal products of the factors of production.

$$-\frac{dK}{dL} = MRTS_{L,K} = \frac{MP_L}{MP_K}$$

Factor Intensity

The slope of the production process line through the origin measures factor intensity in production.

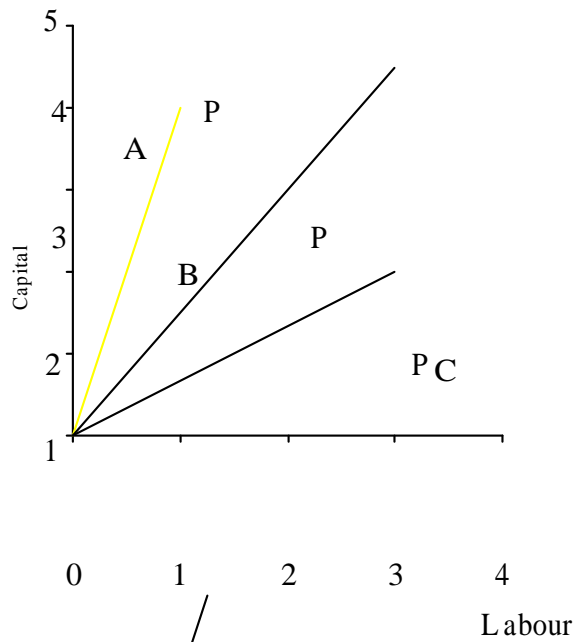


Figure 5: Map of production process

From the diagram, production process PA is more capital intensive than production process PB, implying that the process uses more capital resources than process PB which uses more labour resources relative to PA. Also, PB is equally more capital intensive than PC. On the other hand, PC is more labour intensive than both PA and PB.

Production theory concentrates on the argument that production is feasible where the marginal product (MP) of the factors is positive. This ensures that any increase to the stock of productive factors adds to the total output of the firm. The theory of production therefore operates on the range of isoquants over which their slopes are negative and convex to the origin.

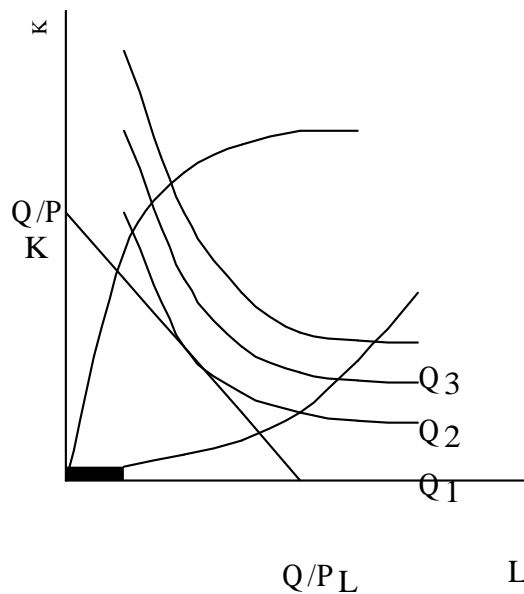


Figure 6: Economic region of production

In the diagram, the production function is shown in the form of a set of isoquants. The higher the isoquant, the higher the level of output, hence Q2 is preferred to Q1 while Q3 is preferred to both Q2 and Q1.

The locus of points on the isoquants where the marginal product (MP) of the factors of production is zero forms the ridge lines. The upper ridge line is the locus of points on the isoquant where the marginal product of capital (MPK) is zero while the lower ridge line is the locus of points on the isoquant where the marginal product of labour (MPL) is zero. Production techniques are only efficient in the region within the upper ridge line and the lower ridge line. Outside this region, production processes are inefficient owing to the fact that the marginal products of the respective factors are negative.

We stated earlier that the choice of the production process to employ depends on the technical and economic efficiency of that process, relative to other process. A process A is said to be technically efficient if it uses less of one any factor (say labour) and no more from the other factors (say capital) as compared to method B. If however process A uses less of one input (say labour) but more of the other input (say capital) relative to process B, both activities are not directly comparable, but are both considered to be technically efficient and are included in the production function. In this case, the process to use shall depend on the economic efficiency of that activity.

An economically efficient process is determined from among the technically efficient production processes. It is that process for which the total cost of factor inputs is the lowest in the production of the same level of output as compared to the alternative process.

Thus given the following production processes A , B and C for the production of unit of product Q , with X and Y representing quantities of labour and capital employed in the production respectively, we may proceed as follows.

	Process A	Process B	Process C
Labour unit L	8	6	12
Capital unit K	5	7	9

From the table above, process B utilizes 6 units of labour, the lowest, while processes A and C utilize 8 and 12 units of labour respectively. For capital, it is process A which utilizes the lowest quantity of 5 units, whereas, processes B and C utilize larger quantities of 7 and 9 units respectively. It can be shown that process B utilizes less labour relative to process A and C while it utilizes more capital relative to only process A , while process A utilizes less capital than processes B and C while it utilizes more labour relative only to process B , the two processes A and B are thus said to be technically efficient. Process C , which utilizes larger quantities of both labour and capital, is therefore said to be technically inefficient.

Taking the technically efficient processes, A and B , to determine which of the processes to employ in the production of one unit of product Q , we now seek the economically efficient of the two processes. Assuming that a unit of labour costs 15 naira while a unit capital costs 20 naira, we compute thus:

	Process A	Process B
Labour unit	$8 * \text{₦}15 = \text{₦}120$	$6 * \text{₦}15 = \text{₦}90$

X		
Capital unit Y	$5 * \text{₦}20 = \text{₦}100$	$7 * \text{₦}20 = \text{₦}140$
Total cost	₦220	₦230

Process A , whose total production cost of **₦220** is less than that of **₦230** for process B is the least-cost method of production. It said to be economically efficient and thus employed in the production of product Q .

SELF ASSESSMENT EXERCISE 5

Identify the processes in determining the most economical means of producing a quantity of output.

4.0 CONCLUSION

Production is an important aspect in the creation of value, which is used in the satisfaction of human wants and that of the society as a whole. It is therefore necessary to develop

means of maximizing the efficiency of the production process so that it becomes profitable while it minimizes avoidable wastages. With this the society maximizes the welfare it can derive from the use of its resources.

5.0 SUMMARY

The unit has discussed the theory of production. The production function was discussed, as well as, the concepts of returns to scale and returns to a factor. There were also discussions on the law of variable proportions and the choice of input combination.

6.0 TUTOR-MARKED ASSIGNMENT

1. What is production function? Distinguish between fixed inputs and variable inputs.
2. State the law of variable proportions and its assumptions.
3. Given the following processes, determine which of the processes is economically efficient if labour cost per unit is ₦15 and capital cost per unit is ₦20.

	Process <i>A</i>	Process <i>B</i>	Process <i>C</i>
Labour unit <i>L</i>	9	7	9
Capital unit <i>K</i>	8	8	6

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UNIT 3: THEORY OF COST

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3.0 Main Content

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3.3 Long-Run cost

3.4 Economies and Diseconomies of Scale

4.0 Conclusion

5.0 Summary

6.0 Tutor-Marked Assignment

7.0 References / Further Readings

1.0. INTRODUCTION

As the firm produces value, it encounters costs that are related to its production. These costs could include the cost of management, raw materials, labour and capital that are invariably a part of the firm's production.

The firm, being a profit maximizing entity, can only maximize its profits by ensuring that it produces its output at the minimum possible cost. This it does by ensuring that its operations are not only technically efficient but are economically efficient as well. The firm also optimizes the scale of production so as to minimize avoidable costs.

2.0. OBJECTIVES

You, at the end of this unit, should be able to:

Explain the cost function

Distinguish between short-run and long-run costs

Explain the effects of internal and external economies or diseconomies on the costs of the firm.

3.0 MAIN CONTENT

3.1 COST FUNCTION

Costs in economic theory are distinguished into short-run costs and long-run costs. The short-run typically is a period when the firm experiences some fixed costs, where the availability of at least one input is fixed in availability. On the other hand, long-run costs are incurred over a period long enough to permit the change of all factors of production, and hence all factors are variable. The firm is able to be flexible and vary its factor inputs resulting in variations in all its cost components.

The short-run total cost function is given as

$$C = f(Q, T, P_f, K)$$

and the long-run function is

$$C = f(Q, T, P_f)$$

where C = total cost

Q = output

T = technology

P_f = prices of factors of production

K = fixed factors of production

Output (Q) has a direct relationship with the total cost as an increase in the output leads to an increase in the total cost and vice versa. An improvement in the state of technology usually provides the producer with cost saving techniques of producing the output. Technology therefore has an indirect relationship with the total cost. Rises in the prices of the factors of production directly lead to increases in the total cost of production, hence, a direct relationship.

Graphically, the other factors of the total cost (or cost) function apart from the output (Q), act as shift factors as changes in any or all of them shift the cost curve outwards or inwards, depending on the direction of change. The relationship between total cost and output can be plotted on a two-dimensional diagram allowing for movements along the cost curve, holding all other factors constant. This implies that the cost function may be written as

$$C = f(Q)$$

Fixed and Variable Costs

Fixed or overhead costs are those costs, which do not vary with changes in the quantity of output. They remain the same over a given range of output, whether the producer produces at the lower limit of that range or at its upper limit. Rental payments and depreciation on plant and machinery do not change over a given range of output. They are fixed costs.

Variable costs, on the other hand, are subject to change with changes in the level of output. They rise as more output is produced and fall with less output. Payments for labour, raw materials, fuel and power are examples of variable costs, as they change with varying levels of output. It should be noted that variable costs do not change at a constant rate over the range of production level, but at the initial levels, the rise is at a decreasing rate, beyond which, they rise at an increasing rate.

Depending on whether the firm is in the short-run or the long-run, it may experience either fixed and variable costs, or variable costs alone.

SELF-ASSESSMENT EXERCISE 1

What are the components of the fixed cost?

3.2 SHORT-RUN COST

We have said that short-run costs are those incurred over a period where some factors of production are fixed and cannot be altered by the firm. Short-run cost curves reflect the optimal or least-cost input combination for producing output where there are some fixed production circumstances. Here, we encounter cost concepts that include total cost, average cost and marginal cost.

The total cost is a sum of all costs, that is, the total fixed cost and the total variable cost. This relationship is expressed as

$$TC = TFC + TVC$$

The average cost which shows the cost per unit of the output, is useful in comparing product prices of rival firms. It is categorized as follows:

Average fixed cost: Dividing the total fixed cost by the level of output derives the average fixed cost:

$$AFC = \frac{TFC}{Q}$$

Given that the total fixed cost is constant, the average fixed cost declines as output increases, as it is spread out over a larger output.

Average variable cost: The average variable cost is the ratio of the total variable cost to the level of output:

$$AVC = \frac{TVC}{Q}$$

Being subject to the law of diminishing returns, the average variable cost initially declines as output increases, but it eventually rises after a point.

Average total cost: The average total cost is the sum of the average fixed cost and the average variable cost. In other words, it is the ratio of the total cost to the level of output:

$$ATC = AFC + AVC$$

or

$$ATC = \frac{TC}{Q}$$

Marginal cost is the increase in total cost as a result of producing one more unit of output. The marginal cost may be calculated by either the change in the total cost or the change in the total variable cost, as fixed costs are generally constant. It is important in the decision of the firm in determining the level of its output, as it shows the cost reduction or increment resulting from the increase in output by one unit. Using calculus, marginal cost is given as

$$MC = \frac{\partial TC}{\partial Q}$$

These cost relationships can be expressed in the table below:

Output Q	Total fixed cost TFC (₱)	Total variable cost TVC (₱)	Total cost TC (₱)	Marginal cost MC (₱)	Average fixed cost AFC (₱)	Average variable cost AVC (₱)	Average total cost ATC (₱)
0	100	0	100	-	-	-	-
1	100	30	130	30	100	30	130
2	100	55	155	25	50	27.5	77.5
3	100	75	175	20	33.3	25	58.3
4	100	100	200	25	25	25	50
5	100	130	230	30	20	26	46
6	100	175	275	45	16.67	29.2	45.83

This table can be represented graphically to show the total cost (TC), total variable cost (TVC) and the total fixed cost (TFC).

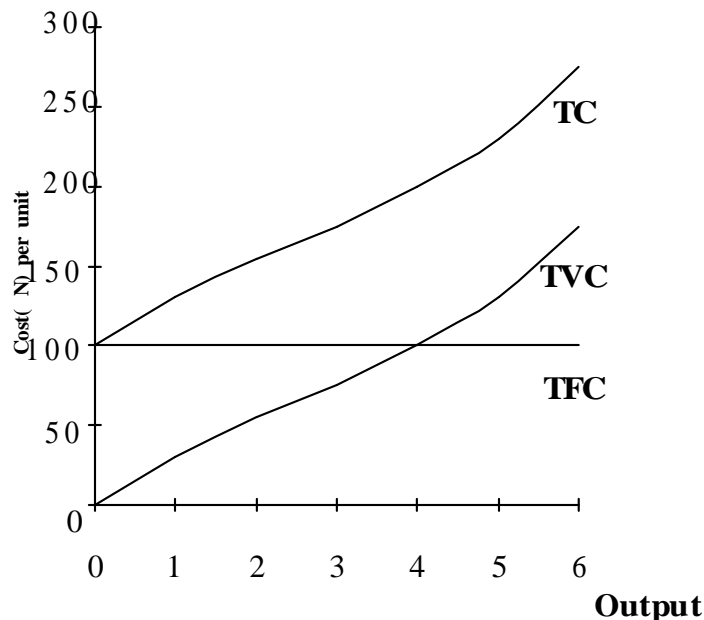


Figure 7: Total Cost (TC), Total Variable Cost (TVC) and Total Fixed Cost (TFC) Curves

SELF-ASSESSMENT EXERCISE 2

Why does the total variable cost curve have the origin as its intercept?

3.3 LONG-RUN COST

In the long-run the firm has complete flexibility in the input usage levels. Consequently all long-run costs are variable. The long-run cost curve shows the minimum cost impact of output changes for the optimal plant size in the present operating environment.

Long-Run Total Costs

The total cost curve of a firm, in the long-run, slopes out from the origin, depicting the absence of any fixed costs. Since all costs during this period are said to be variable, when there is no output being produced costs are expected to be zero, and they grow as the level

of output grows. This gives the total cost curve the following shape, assuming a state of constant returns to scale.

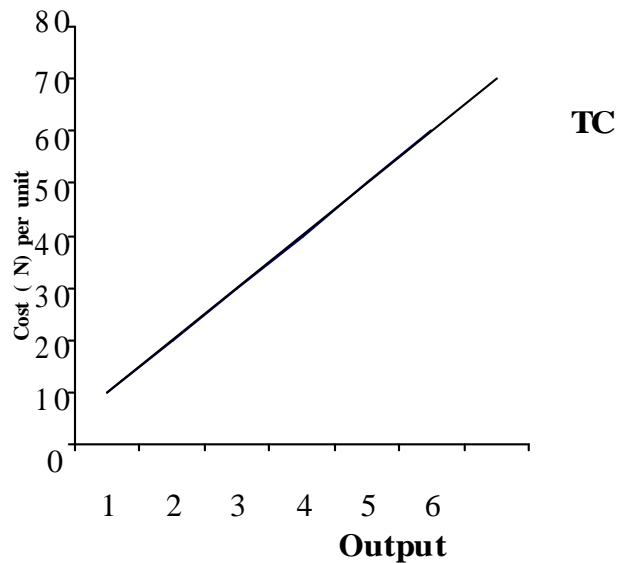


Figure 8: Long-Run Total Cost Curve

Long-Run Average Costs

The long-run average cost curve of the firm is an envelope of short-run average cost curves of the firm. The short-run cost curves relate costs and output for a specific scale of plant while the long-run cost curves identify optimal scales of plant for each level of production. The long-run average cost curve is therefore a locus of all the optimal (minimum cost) points of the short-run cost curves of the firm for each plant size.

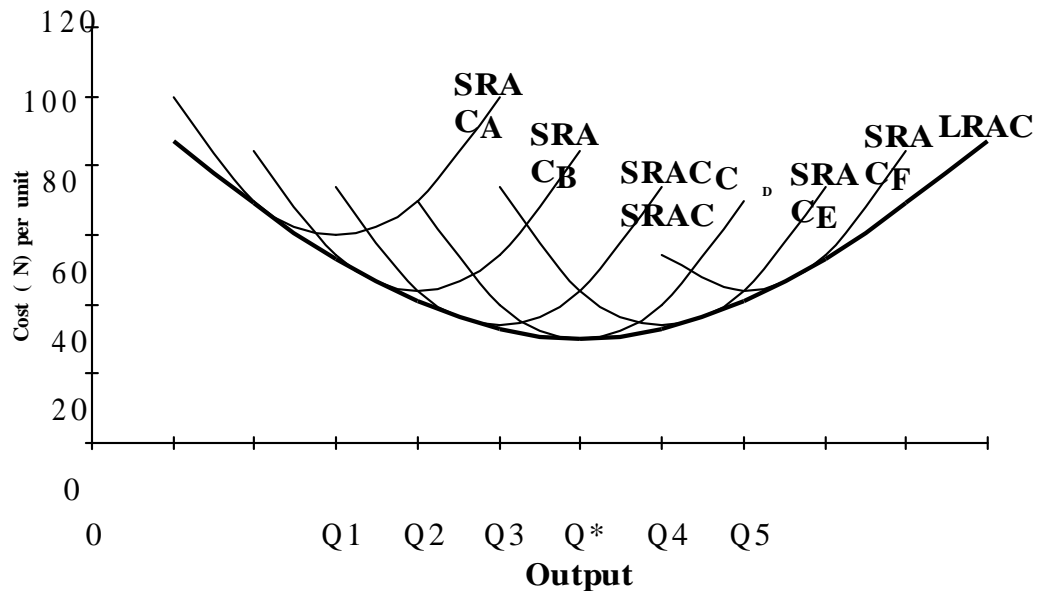


Figure 9: Deriving Long-Run Average Cost Curve from a Family of Short-Run Average Cost Curves

From the diagram, Q_1 , Q_2 , Q_3 , Q^* , Q_4 and Q_5 represent the least-cost points of the respective short-run average cost curves: $SRACA$, $SRACB$, $SRACC$, $SRACD$, $SRACE$ and $SRACF$. The U shape of these short-run average cost curves shows that for each plant, the firm first experiences increasing returns to scale, then constant returns to scale at the base, and then diminishing returns to scale. This implies that costs initially start to decline and get to a

minimum before they begin to rise again. As the firm produces on plant A with short-run average cost curve SRACA it may find it profitable to change to plant B as average costs begin to rise after point Q1. Similarly, after point Q2 on the curve SRACB, the firm may find it profitable to change plant to one with higher capacity (plant C) with optimal cost at Q3 on SRACC. This process continues until the firm produces an output of Q^* where it becomes necessary change to plant D with short-run average cost curve SRACD. At any level of output after point Q^* , the firm can only increase output at a higher average cost as any successive plant (SRACE and SRACF) produces output at a minimum average cost that is higher than that of the preceding plant.

The long-run average cost curve (LRAC) is an envelope of all the possible short-run average cost curves. The optimal scale of the firm is found at Q^* which coincides with the minimum point of the short-run average cost curve SRACD. It is at this point therefore that the firm should produce its output in order to minimize per-unit cost of production.

SELF-ASSESSMENT EXERCISE 3

Distinguish between the long-run and the short-run.

3.4 ECONOMIES AND DISECONOMIES OF SCALE

Depending on the scale of production of the firm, it will encounter some economies or diseconomies, which may be internal or external to the firm. These economies or diseconomies have been related by the downward and upward slopes respectively of the average cost curves of the firm in our discussions above.

Internal Economies or Diseconomies of Scale

By *internal*, we refer to the cost components that are internal to the firm. These include the cost of labour and management, among others.

Internal Economies of Scale

Internal economies of scale occur as the firm expands its production up to a certain point. From our discussions of the average cost curves, as the output of the firm expands, the cost of producing each unit of output continually diminishes until it gets to a certain point where it rises. As the firm increases its scale of production, it becomes possible to use more specialized and technically more efficient form of all factors, and it also becomes possible to introduce division of labour and specialization, both of which expand output but at relative lower cost. While the cost continues to diminish, the firm is said to experience internal economies of scale.

Internal Diseconomies of Scale

Beyond a certain point the long-run average cost curve rises indicating a rise in per unit cost of production. The cost of management typically rises as the size of the firm expands as more assistants and supervisors must be employed to manage the system, thus adding to production costs. When this happens, the firm experiences internal diseconomies of scale.

External Economies or Diseconomies of Scale

Since the firm operates as part of an industries producing similar products, economies or diseconomies which the industry experiences have effects on the firm. These economies or

diseconomies could arise with changing cost of factors, wages and interest rates in the economy, which may or may not be connected with the level of output of the industry as whole.

External economies or diseconomies bring about shifts in the average cost curves of the firm, both in the short-run and the long-run, as well as the marginal cost curves of the firm. External economies therefore shift the cost curves downward while external diseconomies shift the cost curves upwards.

SELF-ASSESSMENT EXERCISE 4

What cost components form internal economies or diseconomies to the firm?

4.0 CONCLUSION

The discussions above show that the firm in profit maximizing quest must seek the optimal level of output that minimizes the cost of production. It therefore needs to understand its cost components so as to determine whether it is operating in the short-run or the long-run. This will enable the firm know what areas of its operations are generating the most cost so as to find means of minimizing these operations, hence minimize costs.

5.0 SUMMARY

The unit discussed the theory of cost. It looked at the production function and dissected it into the short-run and long-run costs. It also discussed the concept of economies and diseconomies of scale.

6.0 TUTOR-MARKED ASSIGNMENT

1. Distinguish between short-run and long-run costs
2. What form of economy or diseconomy of scale would a general increase in wages in the economy bring to the firm? Why?
3. Given the following table of costs, provide the missing details in (a) to (f)

Output Q	Total fixed cost TFC (₦)	Total variable cost TVC (₦)	Total cost TC (₦)	Marginal cost MC (₦)	Average fixed cost AFC (₦)	Average variable cost AVC (₦)	Average total cost ATC (₦)
0	50	0	50	-	-	-	-
1	50	a	85	35	50	35	85
2	50	60	b	25	25	30	55
3	50	80	130	c	16.67	26.67	43.3
4	50	105	155	25	d	26.25	38.75
5	50	135	185	30	10	e	37
6	50	180	230	45	8.33	30	f

7.0 REFERENCES / FURTHER READING

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UNIT 4

LINEAR PROGRAMMING I

CONTENTS

- 1.0 Introduction
- 2.0 Objectives
- 3.0 Main Content
 - 3.1 Linear Programming (LP) — Allocation Definition
 - 3.1.1 Expressing LP problems - Limitations
 - 3.2 Graphical LP Solution
 - 3.2.1 Production and Material Limitations
 - 3.2.2 The Valuation of Scarce Resources
- 4.0 Conclusion
- 5.0 Summary
- 6.0 Tutor-Marked Assignment
- 7.0 Reference / Further Reading

1.0 INTRODUCTION

Linear programming typically deals with the problem of allocating the limited resources available to an organisation among competing activities in the best possible or optimal way, that is, in a way minimizes the returns from performing them. The problem of resource allocation arises whenever one must select the level of certain activities that compete for scarce resources to perform them.

2.0 OBJECTIVES

After studying this unit, you should be able to:

1. Explain the techniques of linear programming (LP);
2. Describe the objective functions and the constraint of LP;
3. Solve the minimizing problems graphically.

3.0 MAIN CONTENT

3.1 Linear Programming (LP) Allocation, Definition

A variety of business situation exist to which description such as the following applies; the allocation of production facilities to different products, product mix, portfolio selection for the allocation of investment funds, quality control, inspection problems, among others.

Linear programming uses a mathematical model to describe the problem of concern. The term "linear" suggests that all the mathematical functions in the model are required to be linear functions. The word "programming" is not synonymous with computer programming. Rather, it means planning. Thus, linear programming involves the planning of activities to obtain an optimal result, that is, a result that, among feasible alternatives, reaches the specified goal best according to the mathematic model. LP is a mathematical technique concerned with the allocation of scarce resources.

3.1.1 Expressing LP Problems — Limitations

Before considering the detailed methods of solving LP problems, it is necessary to be able to express a problem in a standardized manner. This not only helps the calculations required for a solution but also ensures that no important element of the problem is over-looked. The two major factors are:

The objectives, and The limitations or constraints

Objectives: The first step in LP is to decide what result is required, i.e. the objective. This may be to maximize profit or contribution, or minimize cost or time or some other appropriate measures. Having decided upon the objective, it is now necessary to state mathematically the elements involved in achieving this. This is called the *objective function*.

Example: 1

A factory can produce two products, A and B. The contributions that can be obtained from these products are:

A contributes N20 per unit, B contributes N30 per unit and it is required to maximize contribution.

The objective function for this factory can be expressed as:

$$\text{Maximise } 20x_1 + 30x_2$$

where x_1 = number of units of A produced
and x_2 = number of units of B produced

Note: This problem has 2 unknowns, x_1 and x_2 . These are sometimes known as the *decision variables*. Only a single objective at the time (in

the case, to maximize contribution) can be dealt with in a basic LP problem.

The objective function is:

Example: 2

A farmer mixes three products to feed his pigs. Feedstuff M costs 20p per kilo, feedstuff Y costs 40p per kilo and feedstuff Z costs 55p per kilo. Each feedstuff contributes some essential part of the pigs' diet and the farmer wishes to feed

$$\text{Minimise } 20x_1 + 40x_2 + 55x_3$$

where x_1 ,	=	number of kilos of
x_2	=	number of kilos of Y
x_3	=	number of kilos of Z

Alternatively, if the costs were required in N's, the objective function could be expressed as follows:

$$\text{Minimise } 0.2x_1 + 0.4x_2 + 0.55x_3$$

Note: This example has three decision variables. The number of decision variables can vary from two to many hundreds. For examination purposes, four or five is the maximum that is likely to be encountered. Linearity has been assumed in both examples above and is assumed in all those that follow.

Limitations or Constraints

Circumstances always exist which govern the achievement of the objective. These factors are known as *limitations* or *constraints*. The limitations in any given problem must be clearly identified, quantified, and expressed mathematically. In a problem concerned with the allocation of scarce resources restrictions take the form:

- Resources used < Resources available

The resources used must be expressed in linear form and the resources available form part of the given data.

Limitation Examples:

A factory can produce four products and wishes to maximise contribution. It has an objective function as follows:

$$\text{Maximise } 5.3x_1 + 2.7x_2 + 6.0x_3 + 4.1x_4$$

Where x_1 = number of units of A produced
 x_2 = number of units of B produced
 x_3 = number of units of C produced
 x_4 = number of units of D produced

and the coefficients of the objective function (i.e. 5.5, 2.7, 6.0 and 4.1) are the contributions per unit of the products.

Therefore,

	Products			
	A	B	C	D
Skilled hours	5	3	1	8
Unskilled hours	5	7	4	11

The limitations as regards to labour can be stated as follows:

$$\text{Skilled: } 5x_1 + 3x_2 + x_3 + 8x_4 \leq 8000$$

$$\text{Unskilled: } 5x_1 + 7x_2 + 4x_3 + 11x_4 \leq 6000$$

In addition a general limitation applicable to all maximising problems is that it is

Notes:

The resource limitations in this maximising problem follow a typical pattern being of the less than or equal to type (1);

The formal statement of the non-negativity constraints on the unknowns (x_1 , x_2 , etc.) has to be made for computer solutions but is normally inferred when solving by manual means;

This above restriction applies to labour hours. Machine hour restrictions would be dealt with in a similar fashion.

3.2 Graphical LP Solution

Graphical methods of solving LP problems can only be used for problems with *two* unknowns or decision variables. Problems with

three or more unknowns must be solved by techniques such as the simplex method. Graphical methods are the simplest to use and should be used wherever possible.

- (a) Limitations. Graphical methods can deal with any number of limitations but as each limitation is shown as a line on a graph, a large number of lines may make the graph difficult to read. This is rarely a problem in examination questions.
- (b) Types of problems and limitations. Both maximization and minimization problems can be dealt with graphically and the method can also deal with limitations of the 'greater than or equal to' (>) type and the 'less than or equal to' (<) type.
- (c) Graphical example. The method of solving LP problems graphically will be described step by step using the following maximising example as a basis.

Example: 3			
A manufacturer produces two products, Klunk and Klick. Klunk has contribution of £3 per unit and Klick £4 per unit. The manufacturer wishes to establish the weekly production plan which maximizes contribution.			
	Per		
	Machining (Hours)	Labour (Hours)	Material (kgs)
Klunk	4	4	1
Klick	2	6	1
Total available per	100	180	40
Because of a trade agreement, sales of Klunk are limited to a weekly maximum of 20 units and to honour an agreement with an old established customer at least 10 units of RHO(must be sold per week.			

Step 1: Formulate the LP model in the standardized manner described earlier above.

$$\text{Maximise } 3x_1 + 4x_2$$

Subject to constraint A $4x_1 + 2x_2 < 100$ (Machining hours constraint)
 constraint B $4x_1 + 6x_2 < 180$ (Labour hours constraint)
 C $x_1 + x_2 < 40$ (Materials constraint)

$$x_1 < 20 \quad (\text{Klunk sales constraint})$$

$$x_2 > 10 \quad (\text{Klick sales constraint})$$

$$x_2 \geq 0$$

$$\text{where } x_1 = \text{number of units of Klunk}$$

$$x_2 = \text{number of units of Klick}$$

Note:

As it is impossible to make negative quantities of the products, it is necessary formally to state the non-negativity constraint (i.e. $x_i \geq 0$).

The resource and sales constraints include both types of restrictions (i.e. $>$ and $<$).

This is a problem with only two unknowns (i.e. x_1 and x_2), it can be solved graphically. The number of limitations does not exclude a graphical solution.

Step 2: Draw the axes of the graph which represent the unknowns, x_1 and x_2 thus:



Figure 1

Note: The scales of the axes are best determined when the lines for the limitations are drawn. Each axis must start at zero and the scale must be constant (i.e. linear) along the axis but it is not necessary for the scales on both axes to be the same.

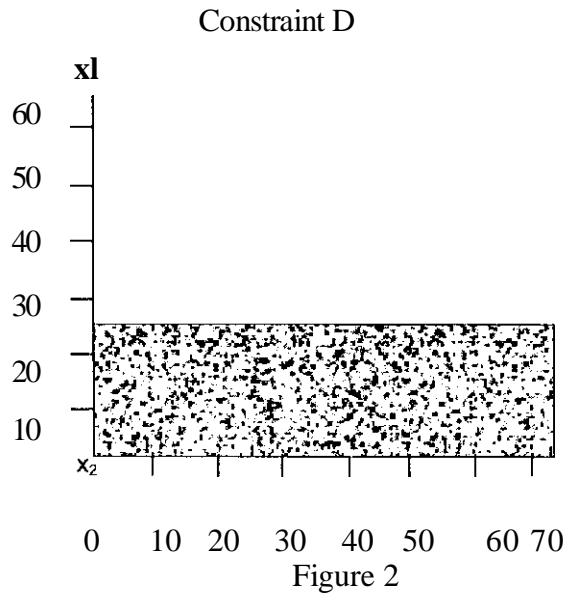
Step 3: Draw each limitation as a separate line on the graph.

Sales Limitations: These normally only affect one of the products at a time and in Example 1, the sales restrictions were:

$$x_1 < 20 \text{ and } x_2 > 10$$

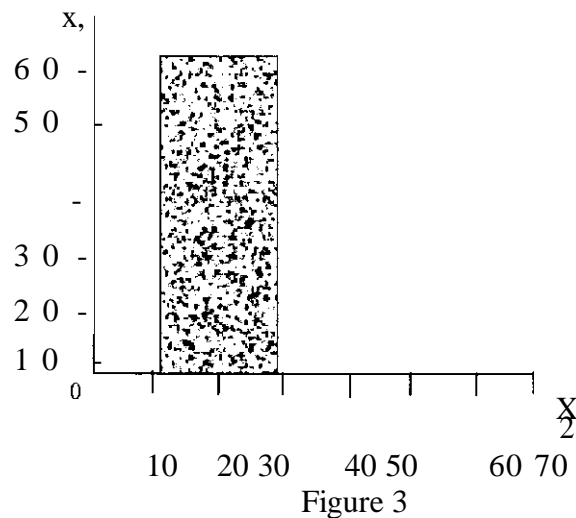
These limitations are drawn on the graph as follows:

The Klunk Sales constraint (i.e. $x_1 < 20$).

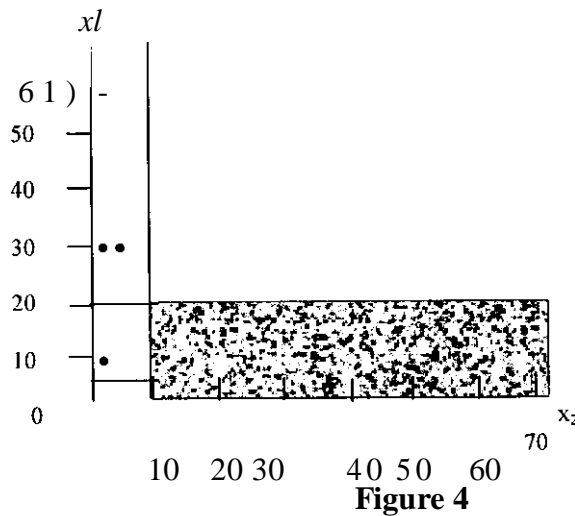


Note: The horizontal line represents $x_1 = 20$ and the batched area below the line represents the area containing all the values less than 20.

The Klick sales constraint (constraint E) (i.e. $x_2 \geq 10$) is now entered thus:



Note: The vertical line represents $x_2 = 10$ and the hatched area to the right of the line represents the area containing all values greater than 10 (i.e. $x_2 \geq 10$). These two sales limitations can be shown on the same graph thus:



Note: The hatched area represents the area of possible production (i.e. which does not violate the constraints drawn) and is called the *feasible region*. The areas on the graph marked (E1) violate one or both of the constraints.

3.2.1 Production and Material Limitations

In a similar fashion to above, the other restrictions should be drawn on the graph. Because these restrictions involve BOTH unknowns the y will be sloping lines on the graph and not horizontal or vertical lines like the sales restrictions.

The three remaining restrictions are all of the same type and area dealt with as follows:

The matching constraint, constraint A, $4x_1 + 2x_2 \leq 100$ is drawn on the graph as $4x_1 + 2x_2 = 100$.

Therefore, when $x_1 = 0$, $x_2 = 50$ (i.e. $\frac{100}{2}$)

and when $x_2 = 0$, $x_1 = 25$ (i.e. $\frac{100}{4}$)

and so a line can be drawn from 25 on the x_1 axis to 50 on the x_2 axis thus:

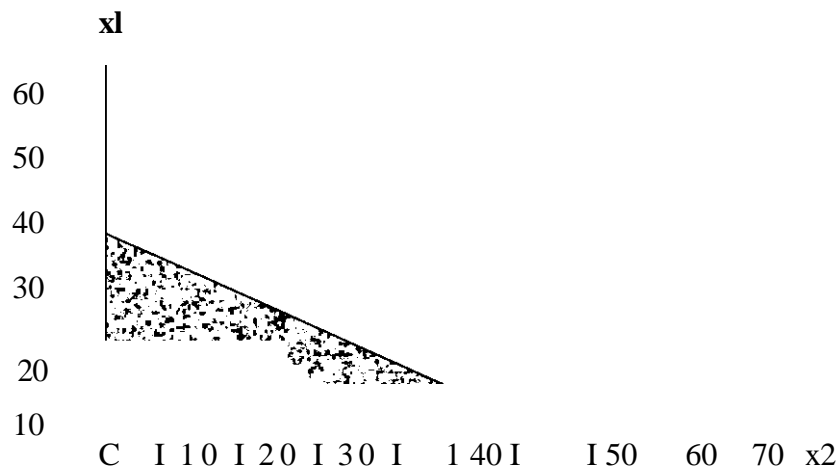


Figure 5

Note: As previously, the batched area represents the area containing the 'less than' values. The other constraints are dealt with in the same manner.

i.e. The labour constraint $B: 4x_1 + 6x_2 \leq 180$ is drawn on the graph as $4x_1 + 6x_2 = 180$.

Therefore, when $x_1 = 0$, $x_2 = 30$ (i.e. $\frac{180}{6}$)

and when $x_2 = 0$, $x_1 = 45$ (i.e. $\frac{180}{4}$)

and so a line can be drawn from 45 on the x_1 axis to 30 on the x_2 axis.

The materials constraint (C), $x_1 + x_2 \leq 40$ when $x_1 = 0$, $x_2 = 40$, $x_1 = 40$

and a line can be drawn from 40 on the x_1 axis to 40 on the x_2 axis.

All of the constraints (sales, production and material), can now be drawn on a single graph and the resulting feasible region defined.

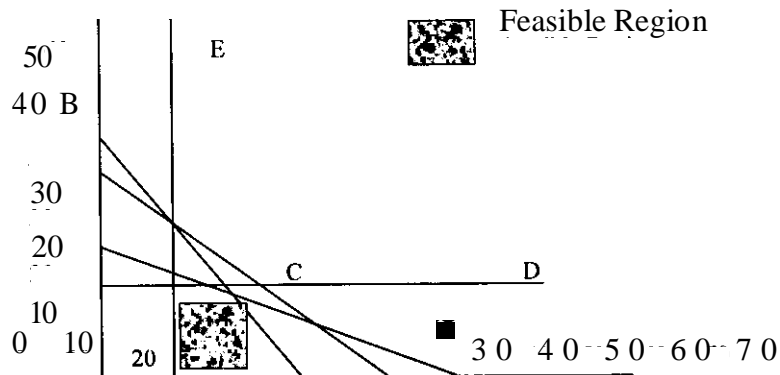


Figure 6

Note:

- (a) The *feasible region* is the area which does not contravene any of the restrictions and is therefore the area containing all possible production plans.
- (b) The non-negativity restrictions (i.e. $x_1 \geq 0$, $x_2 \geq 0$) are automatically included in the graph because the graph quadrant used in the earlier figure only shows positive values. It should be noted that as more restrictions are plotted, the feasible region usually becomes smaller.
- (c) It will be noted that the material constraint C (line 40, 40) does not touch the feasible region. This is an example of a *redundant* constraint, i.e. it is non-binding.

Step 4: Now that the feasible region has been defined, it is necessary to find the point in or on the edge of the feasible region that gives the maximum contribution which, it will be recalled, is the specific objective.

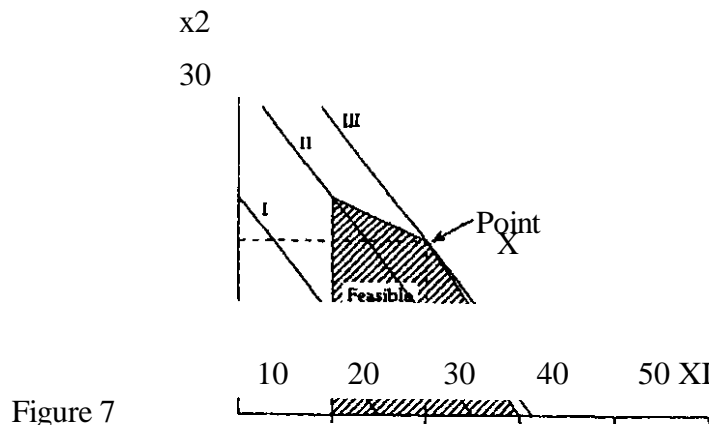
This is done by plotting lines representing the *objective function* and thereby identifying the point in the feasible region which lies on the maximum value objective function line that can be drawn. These objective function or contribution lines are straight lines representing different combinations of Klunk and Klick which yield the same contribution. For example:

- 20 units of Klunk and zero units of Klick yield £60 contribution
- 12 units of Klunk and 6 units of Klick yield £60 contribution
- 8 units of Klunk and 9 units of Klick yield £60 contribution
- zero unit of Klunk and 15 units of Klick yield £60 contribution, etc.

Very many other contribution lines could be drawn and if a number of these lines were drawn on the graph, it would be noticed that:

- (a) They are parallel to each other with the same shape, which is determined by the relative contribution of the products.
- (b) The further to the right they are drawn, the higher value of contribution they represent.

It therefore follows that the contribution line furthest to the right but still touching the feasible region shows the optimum production plan to provide the maximum possible contribution, thus:



Optimum solution at point X: i.e. 15 units of x_1 and 20 units of x_2 yielding a contribution of £125 (i.e. £3 x 15 + 4 x 20).

Notes:

- (a) The lines marked I to III are three of the many contribution lines that could be drawn and represent the following contributions

$$3x_1 + 4x_2 = 60$$

$$3x_1 + 4x_2 = 90$$

$$3x_1 + 4x_2 = 125$$

The contribution line has a slope of $4/3$ which is the ratio of the coefficients of x_1 and x_2 . The intercept on, say, the x_1 axis is found by dividing the contribution by the x_1 coefficient, and vice versa. The intercepts for line II in figure..., for example, are as follows:

$$\text{Intercept on } x_1 \text{ axis} = \frac{\text{contribution}}{x_1 \text{ coefficient}} = \frac{90}{3} = 30$$

$$\text{Intercept on } x_2 \text{ axis} = 90 = \frac{22.5}{4}$$

- (b) Only parts of lines **I**, **II** and **III** are feasible. As we require a maximise contribution, we are only interested in Point X where line **III** touches the feasible region. It will be noted that the optimum is at a vertex or corner of the feasible region. This is ALWAYS the case.
- (c) Various contribution lines have been drawn on earlier page for instructional purposes. For examinations, it is sufficient to draw only the contribution line representing the optimum position, i.e. in the example above, line **III**.
- (d) The contribution lines are sometimes termed **iso-profit** lines.
- (e) A simple way to check your answer is actually possible is to insert the values of the unknowns in the constraints and check whether the constraints are satisfied, e.g. the optimum solution of example found from figure is

$x_1 = 15$ units
 $x_2 = 20$ units

These values can be inserted into the constraints thus:

Constraint A: $(4 \times 15) - (2 \times 20) = 100$ constraint satisfied, no spare
Constraint B: $(4 \times 15) + (6 \times 20) = 180$ constraint satisfied, no spare
Constraint C: $(1 \times 15) + (1 \times 20) = 35$ constraint satisfied, 5 below maximum

Constraint D: Sales of $x_1 = 15$ Constraint satisfied, 5 below maximum

Constraint E: Sales of $x_2 = 20$ Constraint satisfied, 10 above maximum

It will be noted that the two constraints which intersect at the optimum vertex (see figure ...) are constraints A and B. These are the only constraints fully satisfied with no spare values. This is a general rule. They are known as **binding constraints**.

Minimization

Example

Provided that they only have two unknowns, minimization problems can also be dealt with by graphical means. The general approach of drawing the axes with appropriate scales and inserting lines representing the limitations is the same as for maximizing problems but the following differences between maximizing and minimizing problems will be found.

- (a) Normally in a minimizing problem the limitations are of the greater than or equal to type so that the feasible region will be above all or most of the limitations.
- (b) The normal objective is to minimize cost so that the objective function line(s) represent cost and because the objective is to *minimize* cost the optimum point will be found from the **cost line further to the left which still touches the feasible region**, i.e. the converse of the method used for maximizing problems.

Example: 4

A manufacturer is to market a new fertilizer which is to be a mixture of two ingredients A and B. The properties of the two ingredients are:

	Ingredients analysis				
	Bone meal	Nitrogen	Lime	Phosphates	Cost/kg
Ingredient A	20%	30%	40%	10%	1.2p
Ingredient B	40%	10%	45%	5%	0.8.

It has been decided that:

- (a) the fertilizer will be sold in bags containing 100 kgs
- (b) it must contain at least 15% nitrogen
- (c) it must contain at least 8% phosphate
- (d) it must contain at least 25% bone meal

Solution:

Because of the basic similarity between graphing minimizing and maximizing problems (except for the two differences mentioned above), the detailed intermediate steps given in example ... above will be repeated.

The problem in standardized format is as follows:

Objective

Function:

Minimise $12x_1 + 8x_2$ (cost expressed in tenths of a penny)
subject to:

Constraints A $x_1 + x_2 = 100$ (weight constraint)

$$\begin{array}{ll}
 & 0.3x_1 + 0.1x_2 \leq 15 \text{ (nitrogen constraint)} \\
 C & 0.1x_1 + 0.08x_2 \leq 8 \text{ (phosphates constraint)} \\
 & 0.2x_1 + 0.4x_2 \leq 25 \text{ (bone meal constraint)}
 \end{array}$$

$$x_1 \geq 0 \text{ and } x_2 \geq 0$$

Where x_1 = kgs of ingredient A

x_2 = kgs of ingredient B

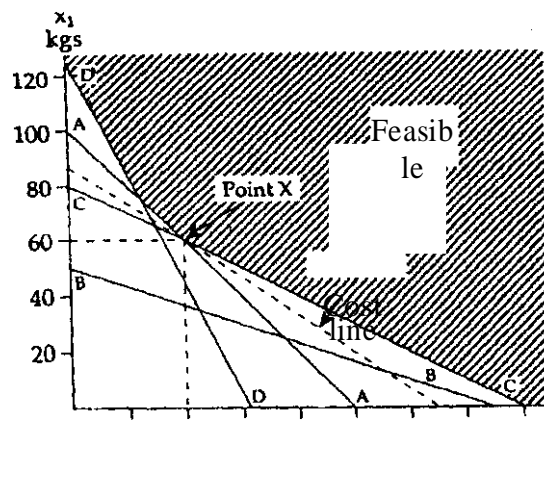


Figure 8

Notes on
7.8 above:

20 40 60 80 100 120 140 160

Figure

Optimum solution at point X i.e. 60 kgs of x_1 and 40 kgs of x_2 giving a cost of:

$$12 \times 60 + 0.8 \times 40 = \text{£}1.04 \text{ per 100 kilo bag.}$$

- Only one cost line ($12x_1 + 8x_2 = 1,040$ in tenths of a penny) has been drawn so as to show the optimum position.
- Each restriction on the graph is labeled A, B, C, D and can be cross referenced to those stated in the standardized format above.
- The optimum position in the feasible region is the furthest *point to the left* touched by the cost line. This is because it is a minimizing problem. Note again that the optimum is at a corner or vertex of the feasible region.

Using Simultaneous Equations

An alternative method of finding the solution values of the constraints at any intersection of the graph, including the optimal vertex, is to solve the simultaneous equations of the relevant binding constraints. To illustrate this, the answers to the maximizing problem and the minimizing problem in Example... will be re-calculated using simultaneous equations below;

Reworking Example

The two constraints which intersected at optimum were constraints A and B (see figures and) thus:

□	Constraint A	$4x_1 + 2x_2 = 100$
□	Constraint B	$4x_1 + 6x_2 = 100$

Solving by deducting A from B gives:

$$4x_2 = 80$$
$$. \therefore x_2 = 20$$

and by substitution, $x_1 = 15$, which confirms the answer found by reading off the intercepts of the graph.

Reworking example....

The intersecting constraints were A and C (see figure) thus:

Constraint A	$x_1 + x_2 = 100$
Constraint C	$0.1x_1 + 0.05x_2 = 8$

$$A - 10C = 0.5x_2 = 20$$
$$x_2 = 40$$

and substituting $x_1 = 60$, again confirming the results from the graph.

If it was known what constraints appeared at the optimum intersection before the graph was drawn, then the problem could be solved by simultaneous equations without having to draw a graph. However, this is unlikely to occur but it is sometimes useful to calculate the exact solution values using the equations rather than use the approximate values obtainable from a graph.

3.2.2 The Valuation of Scarce Resources

The graphing of an LP problem not only provides the optimal answer but also identifies the binding constraints, alternatively called the limiting factors. For example, in example ... machining hours and labour hours are the binding constraints, the shortage of which limits further production and profit. Not all factors in a given problem are limiting factors. For instance, in example ... constraints C, D and E are not at their maxima and therefore not scarce or limiting.

It is important management information to value the scarce resources. These valuations are known as the *dual prices* or *shadow prices* and are derived from the amount of the increase (or decrease) in contribution that would arise if one more (or one less) unit of scarce resource was available. Only a scarce resource can have a positive dual price and the calculated price assumes that there is only a marginal increase or decrease in the availability of the scarce resource and that all other factors are held constant.

Finding the Shadow or Dual Prices

There are two methods of calculating these prices — the arithmetic method and the dual formulation — and both are illustrated using the data and results from Example ..., reproduced below:

Original Problem:

Maximize $3x_1 + 4x_2$

Subject to:

Constraint A	$4x_1 + 2x_2$	100	machining hours
Constraint B	$4x_1 + 6x_2$	180	labour hours
Constraint C	$+ x_2$	40	materials
Constraint D	x_1	20	sales
Constraint E	x_2	10	sales

Where	x_1	=	units of klunk
	x_2	=	units of klick

The solution was Produce 15 x_1 and 20 x_2 giving a contribution of £125. Constraints A and B are binding

The problem now is to find the shadow prices of the two binding constraints, machine hours and labour hours, i.e. what is the valuation of one more (or less) machine hour and one more (or less) labour hour?

Arithmetic Method of Finding Shadow Prices

Dealing first with machine hours, we assume that 1 more machine hour is available (but labour hours are constant at 180) and calculate the resulting difference in contribution, thus:

The binding constraints become:

Machine hours	$4x_1 + 2x_2 = 101$	(i.e. original 100 + 1)
Labour hours	$4x_1 + 6x_2 = 180$	(unchanged)

Solving these simultaneous equations, new values for x_1 and x_2 are obtained: $x_1 = 15.375$ and $x_2 = 19.75$ and substituting into the objective function gives a new contribution.

$$3(15.375) + 4(19.75) = \text{£}125.125$$

original contribution = £125

$$\text{Difference} = \underline{\text{£}0.125}$$

Thus 1 extra machine hour has resulted in an increase in contribution of £0.125 which is the shadow price per machining

hour. A similar process for labour hours is shown

below:

New constraints with extra labour hour: (but machine hours constant at 100).

Machine hours	$4x_1 + 2x_2 = 100$
Labour hours	$4x_1 + 6x_2 = 181$

and solving gives $x_1 = 14.875$ and $x_2 = 20.25$

New contribution	$3(14.875) + 4(20.25)$	= £125.625
Original contribution		= £125

$$\text{Difference} = \underline{\text{£}0.625}$$

$$\text{shadow price per labour hour} = \underline{\text{£}0.625}$$

Notes:

- (a) Similar results would be obtained in each case if 1 less hour had been used in the calculations. Verify this yourself

- (b) The shadow prices calculated above only apply whilst the constraint is binding. If, for example more and more machining ours became available, there would eventually be so many

machining hours that they would no longer be scarce and some other constraint would become binding. This point is developed further below.

Dual Formulation Method for Shadow Prices

Every LP problem has an *inverse or dual* formulation. If the original problem known as the *primal problem*, is a maximizing one then the dual formulation is a minimizing one and vice versa. Thus, as the Example ...primal formulation is a maximizing problem, its dual is the minimizing problem. Solving the dual problem gives the shadow prices of the binding constraints, hence the alternative term, dual prices.

The stages in finding and solving the dual for the solution to Example... are shown below.

The relevant parts of the original fill formulation which appear in the solution are:

Maximize	$3x_1$	+	$4x_2$	
(objective function)				
Subject to	$4x_1 + 2x_2 \leq 100$			(machine hours)
	$4x_1 + 6x_2 \leq 180$			(labour hours)

Constraints C, D, E (non-binding so do not appear in the solution).

The minimizing dual problem is formed by inverting the above formulation, i.e. making the columns into rows and the rows into columns thus:

Dual

formulation:

Minimize	$100M + 180L$	(i.e. originally the constraint column)
Subject to	$4M + 4L \leq 3$	(originally the x_1)
	$2M + 6L \leq 4$	(originally the x_2)

What are now the constraints can be solved by simultaneous equations?

$$\begin{aligned}4M + 4L &= 3 \\2M + 6L &= 4\end{aligned}$$

Solving gives $M = 0.125$ and $L = 0.625$, which will be recognized as the valuations already calculated earlier above.

If these dual prices are inserted into the objective function of the dual, exactly the same value is obtained as in the primal problem.

$$\text{i.e. } 100 (0.125) + 180 (0.625) = \underline{\underline{\pounds 125}}$$

This result is identical to the Primal problem and this will always be

so. Notes:

- (a) The dual formulation above is a contraction of the full dual formulation. This is possible here because the problem had already been solved and it was then known that three of the constraints (C, D and E) were non-binding.
- (b) The dual formulation is developed further in subsequent

chapters. Interpretation of Shadow Prices

The shadow price of a binding constraint provides valuable guidance because it indicates to management the extra contribution they would gain from increasing by one unit the amount of the scarce resource. As an example, the shadow price of labour hours calculated above is £0.625 per hour. This means that management would be prepared to pay up to £0.625 per hour extra in order to gain more labour hours. If the current labour cost was £8 per hour then management would be prepared to pay up to £8.625 per hour for extra labour hours, perhaps from overtime working.

It is important to realise that only binding constraints have shadow or dual prices. Those that are not binding have zero shadow prices. This accord with common sense for there would be little point in paying more to increase the supply of a resource of which you already have a surplus. In example ... constraints C, D and E have zero shadow prices.

SELF ASSESSMENT EXERCISE

What is the 'objective function' of linear programming?

4.0 CONCLUSION

In this unit, you have been introduced to linear programming as a method of solving problems where an objective has to be optimized subject to constraints and how LP is a resource allocation technique.

5.0 SUMMARY

Linear programming is a solution method to problems where an objective has to be optimized subject to constraints. All factors concerned have to be numeric and there must be linear relationships.

LP is a resource allocation technique where some objective, for instance, to maximize contribution, is required to be optimized subject to resource constraints.

LP problems can be maximizing or minimizing problems.

6.0 TUTOR- MARKED ASSIGNMENT

A firm produces two products X and Y with a contribution of N8 and N10 per unit respectively. Production data are (per unit):

	Labour hours	Material A	Material B
X	3	4	6
Y	5	2	8
Total available	500	350	800

Formulate the LP model in the standardized way. Solve the model in the above question using the graphical method.

7.0 REFERENCES / FURTHER READINGS

Lucey, T. (2002). *Quantitative Techniques 6th Edition*, (LLST) Educational Low-Priced Sponsored Texts.

Owen, F. and Jones, R. (1975). *Modern Analytical Techniques*, Polytech Publishers Limited, Stockport.

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UNIT 5 LINEAR PROGRAMMING II

CONTENTS

- 1.0 Introduction
- 2.0 Objectives
- 3.0 Main Content
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 - 3.2 Mixed Limitations
 - 3.3 Comparing Simplex and Graphical Solutions
- 4.0 Conclusion
- 5.0 Summary
- 6.0 Tutor Marked Assignment
- 7.0 Reference / Further Reading

1.0 INTRODUCTION

When considering linear programming methods, one has so far confined one's attention to production problems — maximizing profit product — mix or minimum cost combination for inputs and blending problems. The time is now to widen the horizons of linear programming techniques and introduce various techniques which will simplify the method under certain conditions.

2.0 OBJECTIVES

After studying this unit, you should be able to:

- ☐ use the simplex method for solving maximizing LP problems;
- ☐ interpret the simplex tableau.

3.0 MAIN CONTENT

3.1 Simplex Method

A step by step arithmetic method of solving LP problems whereby one moves progressively from a position of, say, zero production, until no further contribution can be made. Each step produces a feasible solution and each step produces an answer better than the one before, i.e. either greater contribution in maximizing problems, or less cost in minimising problems. The mathematics behind the Simplex method are complex and this unit does not try to explain why the method works but it does describe how to use the technique.

Formulating the Simplex Model

To use the Simplex method, it is first necessary to state the problem in the standardised manner. It will be recalled that this results in an objective function and a number of constraints which are inequalities either of the \geq or $<$ type. Having stated the problem in the standardised format, the inequalities must be converted to equations. For example, if a manufacturer made two products A and B, which took 3 and 5 hours respectively to machine on a drilling machine which was available for up to 320 hours per period the constraint would be written in the standardised format as follows:

$$3x_1 + 5x_2 < 320$$

where x_1	units of A
x_2	units of B

This is converted into an equation by adding an extra variable called a *slack variable*
thus

$$3x_1 + 5x_2 + x_3 = 320$$

The slack variable, x_3 in this case, represents any unused capacity in the constraint and can thus take any value from 320 hours (i.e. the position of zero production and therefore maximum unused capacity), to 0 hours (i.e. the position of the machine being fully utilised and therefore, zero unused capacity).

Notes:

- (a) Each constraint will have its own slack variable;
- (b) Once the slack variable has been incorporated into the constraint the Simplex method automatically assigns it an appropriate value at each iteration.

A Simplex Maximizing Example

The following maximizing example will be used to provide a step by step approach to the Simplex method.

Example: 1

A company can produce three products, A, B and C. The products yield a contribution of £8, £5 and £10 respectively. The products use a machine which has 400 hours capacity in the next period.

Each unit of the products uses 2, 3 and 1 hour respectively of the machine's capacity. There are only 150 units available in the period of a special component which is used singly in products A and C.

200 kgs only of a special alloy is available in the period. Product A uses 2 kgs per unit and Product C uses 4 kgs per units. There is an agreement with a trade association to produce no more than 50 units of Product B in the period.

Step 1: Express the problem in the standardised format

thus: Objective function:

$$\begin{array}{llllll}
 \text{maximise} & 8x_1 & + & 5x_2 & + & 10x_3 \\
 \text{subject to} & 2x_1 & + & 3x_2 & + & x_3 < 400 \\
 & x_1 & & & & + x_3 < 150 \\
 & 2x_1 & & & + & 4x_3 < 200 \\
 & & & x_2 & & < 50 \\
 & & & & & x_j \geq 0, x_2 \geq 0, x_3 \geq 0
 \end{array}$$

$$\begin{array}{lll}
 = & \text{where } x_1 & = \text{no. of units of Product A} \\
 & x_2 & = \text{no. of units of Product B} \\
 & x_3 & = \text{no. of units of Product C}
 \end{array}$$

Step 2: Make the inequalities in the constraints into equalities by adding a 'slack variable' in each constraint, thus:

$$\begin{array}{llllllll}
 \text{maximize} & 8x_1 & + & 5x_2 & + & 10x_3 & & \\
 \text{subject to} & 2x_1 & + & 3x_2 & + & x_3 & + & x_4 = 400 \\
 & x_1 & & & & + & x_3 & + x_5 = 150 \\
 & 2x_1 & & & + & 4x_3 & + & x_6 = 200 \\
 & & & x_2 & & & & + x_7 = 50
 \end{array}$$

Note: x_4, x_5, x_6, x_7 are the slack variables and represent the spare capacity in the limitations.

Step 3: Set up the initial Simplex Tableau by arranging the objective function and equalized constraints from Step 2 in the following form.

leau Table 8.1

Solution variable	Products			Slack variables				Solution quantity
	x ₁	x ₂	x ₃	x ₄	x ₅	x ₆	x ₇	
x ₁	2	3	1	1	0	0	0	400
x ₂	1	0	1	0	1	0	0	150
x ₃	2	0	4	0	0	1	0	200
x ₄	0	1	0	0	0	0	1	50
Z	8	5	10	0	0	0	0	0

Notes:

- It will be seen that the values in the body of the table are the values from the objective function and constraints in Step 2.
- The variable 'Z' has been used for the objective function and represents total contribution.
- The tableau shows that $x_1 = 400$, $x_2 = 150$, $x_3 = 200$, $x_4 = 50$ and $Z = 0$.
- The tableau shows a feasible solution, that of nil production, nil contribution, and maximum unused capacity as represented by the values of the slack variables x_4 , x_5 , x_6 and x_7 .

Although feasible, this plan can obviously be improved and this is done as follows:

Step 4: Improve the previous feasible solution by making as many as possible of the product with the most contribution, i.e. the highest figure in the Z row. The number that can be made will be limited by one or more of the constraints becoming operative thus:

Select highest contribution in Z row — i.e. 10 under x_3 .

Divide the positive numbers in the x_3 column into the solution quantity column.

$$\begin{aligned}
 \text{i.e. } & 400 \div 1 = 400 \\
 & 150 \div 1 = 150 \\
 & 200 \div 4 = 50 \\
 & 50 \div 0 \quad (\text{ignore})
 \end{aligned}$$

Select the row that gives the lowest answer (in this case the row identified x6). Ring the element which appears in both the identified column (x3) and the identified row (x6), this element is known as the *pivot element* thus:

Initial Simplex tableau reproduced, Table 2

Solution Variable	Products		Slack variables			Solution quantity
	x ₁	x ₂	x ₄	x ₅	x ₆	
x ₄	2	31		0	0	400
x ₅	1		0			150
I	1	0	0	1	0	200
x ₇	1	40				50
	2	0	0	0	1	
	0	1	0			
	0		0	0	0	
			1			
Z	8		50	0	0	0
	10		0			

Step 5: Divide all the elements in the identified row (x6) by the value of the pivot element (4) and change the solution variable to the heading of the identified column (x3) thus:

Old row

X6 2 0 4 0 0 1 0 200

Divide by 4 and re-titling the new row becomes

New row

X3 I_A 0 1 0 0 I/4 0 50

Enter this row in a new tableau

Second Simplex tableau Table 3

Row Nos	Soluti on	Products			Slack variables				Soluti on
		x ₁	x ₂	x ₃	x ₄	x ₅	x ₆	x ₇	
	x	2	3	1	1	0	0	0	40
Z	4	1	0	1	0	1	0	0	0
I	x	1/2	0	1	0	0	I _A	0	150
5	Z	8	5	10	0	0	0	0	0

Notes:

- (a) The row numbers have been included to aid the explanatory material which follows and form no part of the Simplex Tableau.
- (b) It will be seen that this second tableau is identical to the first except for row 3 which was calculated above.
- (c) Row 3 means that 50 units of x_3 are to be produced.

Step 6: As a consequence of producing 50 units of x_3 , it is necessary to adjust the other row so as to take up the appropriate number of hours, components etc. used and to show the contribution produced for the 50 units of x_3 . This is done by repetitive row by row operations using Row 3 which makes all the other elements in the pivot elements column into zeros. To maintain each row as equality, it is, of course, necessary to alter each element along the row on both sides of the equality sign. Using Row 1 in the Second Tableau as an example, the process is as follows:

Row 1	x_4	2	3	1	1	0	0	0
		400						
Minus Row 3 x_3		<u>1/2</u>	<u>0</u>	<u>1</u>	<u>0</u>	<u>0</u>	<u>1/4</u>	<u>0</u>
Produces a								
new row	x_i	11/4	01	0	0	—1/4	0	350

Notes:

- (a) This new row will be inserted into a third tableau along with all the other altered rows and Row 3 from the second tableau.
- (b) The aim of this row operation was to produce the zero (marked *). In this case, a simple subtraction was all that was necessary but to make a zero in other cases may require further operations using Row 3 as a basis.

The other rows in the second tableau are operated on a similar fashion.

Row 2 x_5	1	0	1	0	10	0	150
Minus Row 3 x_3		<u>1/2</u>	<u>0</u>	<u>1</u>	<u>0</u>	<u>0</u>	<u>50</u>
Produces a							
new row	x_5 V2	0	0*	0	1	0	100

Row 4 needs no operation because the element in column x_3 is already zero.

Row 5	Z	8	5	10	0	0	0	0	=0
Minus $R_{\text{cnn}}/3 \times 1$		<u>5</u>	<u>0</u>	<u>10</u>	<u>0</u>	<u>0</u>	<u>2\frac{1}{2}</u>	<u>0</u>	= 500
Produces a new row	Z	11/2	0	1	0	0	-2\frac{1}{2}	0	=-500

Notes:

- To produce the required zero (0 *), it was necessary to multiply the Row 3 by 10 and then subtract from Row 5.
- The '-500' at the end of the new Z row is the contribution earned by 50 units of x_3 at £10 i.e. £500. The negative sign is merely a result of the Simplex method and the fact that the contribution is shown as a negative figure can be disregarded.

Step 7: When all the row operations have been done, a third tableau can be produced thus:

Third Simplex tableau, Table 4

Row	Solution variable	Product			Slack variables				
		x_1	x_2	x_3	x_4	x_5	x_6	x_7	
6 (Row 1 — Row 3)	x_4	11/2	3	0	1	0	-1/4	0	350
7 (Row 2 — Row 3)	x_5	1/2	0	0	0	1	-1/4	0	100
8 (i.e. Row 3)	x_3	1/2	0	1	0	0	1/4	0	50
9 (i.e. Row 4)	x_7	0	1	0	0	0	0	1	50
10 (Row 5 — 10x)	Z	3	5	0	0	0	-2\frac{1}{2}	0	-500

Notes:

- All the new rows produced by the row operations in Step 6 have been inserted into the third tableau.
- The rows have been consecutively numbered again and a summary of the operations carried out in Step 6 to produce the new lines has been given against the new row numbers. e.g. Row 10 was produced by multiplying Row 3 by 10 and subtracting it from Row 5.

Step 8: To produce subsequent tableaux and eventually an optimum solution, steps 4 to 7 are repeated until no positive numbers can be found in the Z row. From Row 10 it will be seen that the maximum contribution is 5. x_2 column is chosen

The positive numbers in the x_2 column are divided into the solution quantities and the lowest result selected.

ie.	Row 6	$350 \div 3$	=	116%
	Row 7	$100 \div 0$	=	ignore
	Row 8	$50 \div 0$	=	ignore
	Row 9	$50 \div 1$	=	50

Row 9 is selected and the pivot element identified and the solution variable altered to x_2 thus

$$\text{Row 9 } x_2 \quad 0 \quad 1 \quad 0 \quad 0 \quad 0 \quad 1 \quad = \quad 50$$

As the pivot element is already 1 no further action is necessary on it but the other elements in the pivot element column (x_2) must be made into zeros by using row operations based on Row 9 thus

$$\begin{array}{l} \text{Row 6 } x_4 \quad 1\% \quad 3 \quad 0 \quad 1 \quad 0 \quad \text{---} \quad 0 \quad = \quad 350 \\ \text{Minus } 3 \times \\ \text{Row 9 } x_2 \quad \underline{0} \quad \underline{3} \quad \underline{0} \quad \underline{0} \quad \underline{0} \quad \underline{0} \quad \underline{3} \quad = \quad \underline{150} \\ \text{Produces a} \\ \text{new row } x_4 \quad 1\frac{1}{4} \quad 0^* \quad 0 \quad 1 \quad 0 \quad \text{---IA} \quad \text{---3} \quad = \quad 200 \end{array}$$

Note:

It was necessary to multiply Row 9 by 3 to produce the zero in column x_2 (0*) Rows 7 and 8 need no operation because the elements in column x_2 are already zero.

$$\begin{array}{l} \text{Row 6 } Z \quad 3 \quad 5 \quad 0 \quad 0 \quad 0 \quad \text{---} \quad 21/2 \quad 0 \quad = \quad \text{---}500 \\ \text{Minus } 5 \times \\ \text{Row 9 } x_2 \quad \underline{0} \quad \underline{5} \quad \underline{0} \quad \underline{0} \quad \underline{0} \quad \underline{a} \quad \underline{5} \quad = \quad \underline{250} \\ \text{Produces a} \\ \text{new row } x_4 \quad 3 \quad 0^* \quad 0 \quad 1 \quad 0 \quad \text{---} \quad 21/2 \quad \underline{5} \quad = \quad \underline{750} \end{array}$$

The new row produced can now be entered into a fourth tableau as follows:

Fourth Simplex tableau, Table 8. 5

Row	Solution	Products			Slack variables				Solution
Nos.	variable	x1	x2	x3	x4	x5	x6	quantity	
11 (Row 6 — 3x Row 9)	x4	11/2	3	0	1	0	—1/4	—3	200
12 (as Row 7)	x5	1/2	0	0	0	1	—1/4	0	100
13 (i.e. Row 8)	x3	1/2	0	1	0	0	1/4	0	50
14 (Pivot Row as Row 9)	x2	0	1	0	0	0	0	1	50
15 (Row 10 — 5x Row 9)	Z	3	0	0	0	0	—21/2	—5	—750

Notes:

- (a) The above tableau shows that 50 units of Products B and C could be made (x_2 and $x_3 = 50$).
- (b) As a result of this amount of production £750 contribution would be gained ($Z = 750$).

Step 9: Because there is still a positive number in the Z row (3 under column x_1) the iterative process is repeated in precisely the same manner. Column x_1 is chosen and the positive numbers in the x_1 column are divided into the solution quantities and the lowest number selected.

$$\begin{array}{llll} \text{ie.} & \text{Row 11} & 200 \div 11/4 & = 133 1/4 \\ & \text{Row 12} & 100 \div 1/4 & = 200 \\ & \text{Row 8} & 50 \div 1/2 & = 100 \\ & \text{Row 9} & 50 \div 0 & = \text{ignore} \end{array}$$

Row 13 is selected and the pivot element identified and the solution variable altered to x_1 thus

$$\begin{array}{ccccccc} \text{Row 13 } x_1 & 0 & 0 & 0 & 0 & 0 & = 50 \\ & & 1/2 & & & & \end{array}$$

The pivot element must be made into a 1 so the whole row is multiplied by 2 thus

$$\begin{array}{ccccccc} \text{Row 13 } x_1 & 0 & 2 & 1 & 0 & 1/2 & = 100 \end{array}$$

The rest of the elements in column x_1 must now be made into zeros by the usual row operations.

$$\begin{array}{llllllll} \text{Row 11 } x_4 & 11/2 & 0 & 0 & 1 & 0 & 0 & = 200 \\ \text{Minus } 1/2 \text{ 'A' } x & & & & & & & \\ \hline & 11/2 & 0 & 3 & 0 & 0 & 3 & = 150 \\ \text{Row 13 } x_1 & & & & & & \% & \\ \hline \text{Produces} & & 0 & & 1 & 0 & & \\ \text{anew row } x_4 & 0 * & & -3 & & -1 & -3 & = 50 \\ & & 0 & & 0 & 1 & & \\ \text{Row 12 } x_5 & 1/2 & & 0 & & & & 100 \end{array}$$

Minus 54 x

$$\text{Row 13 xi} \quad \begin{array}{cccccc} \% & 0 & 1 & 0 & 0 & 0 \end{array} \quad = \quad 50$$

Produces a
new row x6 0*

$$\begin{array}{cccccc} 0 & -1 & 0 & 1 & 0 & 0 \end{array} \quad = \quad 50$$

Row 14 needs no operation because the element in column x1 is already zero.

$$\text{Row 15 Z} \quad \begin{array}{cccccc} 3 & 0 & 0 & 0 & 0 & -21/4 \end{array} \quad \begin{array}{cc} -5 & = \end{array} \quad -750$$

Minus 54 x

$$\text{Row 13 xi} \quad \begin{array}{cccccc} 3 & 0 & 6 & 0 & 0 & -11/2 \end{array} \quad \begin{array}{cc} 0 & = \end{array} \quad 300$$

Produces a
new row x5 0*

$$\begin{array}{cccccc} 0 & 0 & -6 & 0 & 0 & -4 \end{array} \quad \begin{array}{cc} -5 & = \end{array} \quad -1050$$

The new rows produced can now be entered into a fifth tableau thus

table Table 6

Row Nos.	Solution variabl e	Products				Slack variables				Solution quantity
		X,	x2	x _s	x4	x _s	x6	x,		

16 (Row 11 — $11/2 \times$ Row 18)	x_4	0	0	—3	1	0	—1	—3	50
17 (Row 12 — $1/2 \times$ Row 18)	x_5	0	0	—1	0	1	—1/2	0	50
18 (Pivot Row 2 \times Row 13)	x_3	1	0	2	0	0	1/2	0	100
19 (as Row 14)	x_2	0	1	0	0	0	0	1	50
20 (Row 15 — $3 \times$ Row 13)	Z	0	0	—6	0	0	—4	—5	—
		1050							

As there are no positive values in the Z row the optimum solution has been reached.

Step 10: All that remains is to obtain the maximum information from the fifth tableau.

Dealing first with the solution variables: x_1 , x_2 , x_4 and x_5 , Optimum product mix

XI 100 i.e. produce 100 units of Product A

X2 50 i.e. produce 50 units of Product B

Value of Slack Variables

50 i.e. there are 50 machine hours unused at Optimum

X5 50 i.e. there are 50 components unused at Optimum

Note:

It will be seen that the other two slack variables, x_6 and x_7 , do not have values in the Solution Quantity column. Their values are both zero, which means x_6 and x_7 , representing the alloy and sales constraints respectively, have no unused capacity at optimum and the constraints they represent are fully utilised.

Contribution and Resource Valuations

It will be seen from Row 20 in Table 6 that Z has the Solution Quantity of —1,050. This means, at optimum, the maximum contribution is £1,050 (this can be confirmed by calculating the contributions of the optimum product mix, i.e. $(100A \text{ and } 50B = (100 \times 8) + (50 \times 5) = 1,050$).

The value of —6 under Product x_3 , the product that was not in the optimum plan, means that if any unit of x_3 was produced then overall contribution would fall by £6.

The values of Row 20 for the slack variables are of great importance. These are the valuations of resources and are known as shadow prices. These have the following meanings:

x_4	=	0	i.e. there are no value to be gained from increasing machine hours
x_5	=	0	i.e. there are no value to be gained from increasing components
x_6	=	—4	i.e. for every extra kilo of alloy available £4 extra overall contribution would be gained
x_7	=	—5	i.e. for every extra unit of B that was allowed to be produced contribution would increase by £5

It will be seen that only the constraints x_6 and x_7 that are binding, i.e. are fully utilised, have non-zero shadow prices. This is a general rule, for there would be no value in increasing the availability of a resource already in surplus. Thus, in this example, machine hours and the supply of components have shadow prices of zero.

The shadow prices of the binding constraints can be used to confirm again the overall contribution thus:

$$\begin{array}{rcl}
 \text{Alloy availability } 200\text{kg} \times \text{£}4 & = & \text{£}800 \\
 \text{Sales constraint } 50 \text{ units} \times \text{£}5 & = & \underline{\underline{\text{£}250}} \\
 & & \underline{\underline{\text{£}1050}}
 \end{array}$$

When solving LP problems by graphical means, the shadow prices have to be calculated separately. When using the Simplex process they are an automatic by product.

Note:

- (a) Each variable in the final solution variable column has a specific meaning which is detailed above.
- (b) Using step 10 as a guide interpret the meanings of the solution variables and the valuations in the Z row of the intermediate tableaux.
- (c) Alternative names for shadow prices are: shadow costs, dual prices or simplex multipliers.
- (d) Take heart. To work through a normal Simplex problem with 3 unknowns is a very quick process once the foregoing steps are mastered.

3.2 Mixed Limitations

The maximizing example given above had constraints all of which were of the 'less than or equal to' type (\leq). This is a common situation but on occasions the constraints contain a mixture of $<$ and varieties. The usual cause of one or more 'greater than or equal to' (\geq) constraints is the requirement to produce at least a given number of certain products.

In such circumstances, the simplest approach is to reduce the capacity of the other limitations by the amounts required to make the required number of the product(s) specified. Then maximize in the normal way and add back the quantities which were required to be produced, to the optimum solution found by the normal Simplex method. The method is shown in the following example.

Example Contained Mixed Constraints

Assume that an LP problem had been set up in the usual standardised format as follows:

Example: 2

Objective function

$$\begin{array}{llllll}
 \text{Maximize} & 5x_1 & + & 3x_2 & + & 4x_3 \\
 \text{Subject to} & \text{a. } 3x_1 & + & 12x_2 & + & 6x_3 < 660 \text{ (machine hours)} \\
 & \text{b. } 6x_1 & + & 6x_2 & + & 3x_3 < 1,230 \text{ (labour hours constraints)} \\
 & \text{c. } 6x_1 & + & 9x_2 & + & 9x_3 < 990 \text{ (component constraints)} \\
 & \text{d.} & & & & x_3 > 10 \text{ (sales constraints)}
 \end{array}$$

where x_1 , x_2 and x_3 represent units of Products A, B and C

Only one of the constraints d. is of the variety so we decide to make the minimum quantity possible to satisfy constraint d. i.e. 10 units of x_3 . The resource requirements for 10 units of x_3 must be subtracted from the total available in constraints a, b and c thus:

$$\begin{array}{llll}
 \text{Constraints} & \text{a.} & 3x_1 + 12x_2 + 6x_3 & < \\
 & & 660 - (6 \times 10) & \\
 & \text{b.} & 6x_1 + 6x_2 + 3x_3 & < 1,230 - (3 \times 10) \\
 & \text{c.} & 6x_1 + 9x_2 + 9x_3 & < 990 - (9 \times 10)
 \end{array}$$

Notes:

- (a) In each case the expression in the bracket represents the coefficient of x_3 in each constraint multiplied by the 10 units being made.
- (b) An alternative way of dealing with the constraint is to multiply both sides by -1 and change the inequality sign.

$$\begin{array}{c}
 (x_3 \ 10) \times \\
 -1 \text{ i.e. } -x_3 -10
 \end{array}$$

This constraint can then be used in the normal manner.

Having eliminated constraint D and made the appropriate reductions in the other constraints, the initial Simplex Tableau can be set up.

Initial Simplex tableau Table 8.7

Modified Constraint,	Solution variable	Products			Slack variables			Solution quantity
		x1	x2	x3	x4	x5	x6	
A	x4	3	12	6	1	0	0	600
B	x5	6	6	3	0	1	0	1,200
C	x6	6	9	9	0	0	1	900
	Z	5	3	4	0	0	0	0

Note:

This is now a normal maximizing Simplex model with a slack variable for each constraint and is solved by exactly the same process covered in the earlier part of the chapter.

After carrying out the usual *Simplex procedure*, the final tableau becomes:

Final Simplex tableau Table 8

Solution variable	x,	Products		Slack variables		Solution quantity
		x3	x4	Xs	X6	

xt	0	7%	1%	1	0	—%	
	150	x5	0	—3	—6	0	1
1	300						
X6	1	11/4	N	0	0	1/6	150
Z	0	0	—6	0	0	—5/6	—750

Solution from final tableau —150 units of x_1 producing £750 contribution plus production to satisfy constraint d. 20 units of x_3 producing £40 contribution.

Therefore total solution is 150 units of x_1 and 10 units of x_3 giving £790 contribution.

As previously described in Step 10, the tableau can be interpreted as follows:

Spare capacity $x_4 = 150$ means that there are 150 spare machining hours

$x_5 = 300$ means that there are 300 spare labour hours

Products Not Being Made

From the final Tableau table it will be seen that x_2 and x_3 do not appear in the Simplex solution and they have valuations in the Z row of $—4\frac{1}{2}$ and $—3\frac{1}{2}$ respectively. We already know that 10 units of x_3 will be made and the tableau informs us that the 10 units of x_3 which we have had to make have cost £35 in reduced contribution. Any units of x_2 that were made would similarly reduce contribution by £4.50 per unit.

Shadow Prices

Only one constraint (constraint C, components) is fully utilised and thus has a non-zero shadow price. The tableau shows that for every extra component that could be obtained, contribution would be increased by £216.

As previously, the shadow price of the binding constraint can be used to confirm the overall contribution as follows:

$$\text{Modified component constraint} = 900 \times £216 = £750.$$

An alternative method of dealing with mixed limitations uses what are termed *artificial variables* as well as slack variables. This method is outside the scope of this course material.

3.3 Comparing Simplex and Graphical Solutions

The Simplex method can be used for problems with any number of unknowns — even those with only two unknowns that can also be solved graphically. To illustrate both solution methods, example is shown below using the Simplex method (graphically).

Example reproduced from Unit 2

Maximise $3x_1 + 4x_2$

$$4x_1 + 2x_2 \leq 100 \quad A$$

$$4x_1 + 6x_2 \leq 180 \quad B$$

$$x_1 + x_2 \leq 40 \quad C$$

$$x_1 \leq 20 \quad D$$

$$x_2 \leq 10 \quad E$$

This problem is inserted into the initial tableau with a slack variable for each of the five constraints and with constraint E multiplied by —1 to reverse the inequality sign.

Initial Simplex tableau Table 9

Solution variable	Products	Slack variables						Solution quantity
	x_1	x_2	x_3	x_4	x_5	x_6		
x_1	1	0	0	0	0	0	100	
x_2	0	1	0	0	0	0	40	
x_3	0	0	1	0	0	0	180	
x_4	0	0	0	1	0	0	20	
x_5	0	0	0	0	1	-1	10	
Z	3	4	0	0	0	0	0	

This problem is then solved by the usual Simplex iterations. Each improves on the one before and the process continues until optimum is reached. The following tables show the position after each one is cross referenced to figure ... which is a reproduction of the graphical solution.

First iteration equivalent to point 1 on Table 10

Solution n	Products		Slack variables					Solution
	x1	X2 X7	X3	X4	X5	X6		
variabl e								quantity
X4	0.667	1	0	0	0	0	—1	10
x4	2.667	0	1	0	0	0	0	2
80 x5	—0.333	0	0	0	1	0	1	0
0	1	0	6	0	0	0	0	120 x5
0	0	1	0	0	1	0	0	30 x7
0	0	0	1	0	0	20	0	0
Z	3	0	0	0	0	0	0	4
—40								

This shows 10x2 being produced and £40 contribution. The first four constraints have surpluses of 80, 120, 30 and 20 respectively. Not optimum, as there are still positive values in Z row.

Second iteration equivalent to point 2 on Table 11

Solution n	Products		Slack variables					Solution
	x1	X2 X7	X3	X4	X5	X6		
variabl e								quantity
x4	0.667	1	0	0.167	0	0	0	30
X4	2.667	0	1	—0.333	0	0	0	40
x5	—0.333	0	0	—0.167	0	0	0	10
X6	1	0	0	0	1	1	0	20
x7	0.333	0	0	0.167	0	0	1	20
Z	0.333	0	0	—0.667	0	0	0	—120

This shows 30x2 being produced and £120 contribution. All constraints have surpluses except labour hours. Not optimum as there is a positive value in Z row.

Third iteration equivalent to point 3 on Table 12

Solution n	Products		Slack variables -					Solution
	x1	X2	X3	X4	xs	x6	x7	
variabl e								quantity

X4			0.375	0.125	0	0	0	15
X4	0		-0.25	0.25	0	0	0	20
	0	X	5		1	0	0	5
	0							
X6			-0.375	0.125	0	1	0	5
X7			-0.25	0.25	0	0	1	10
Z	0	0	-0.125	-0.625	0	0	0	-125

This is the optimum and shows all the information obtained previously.

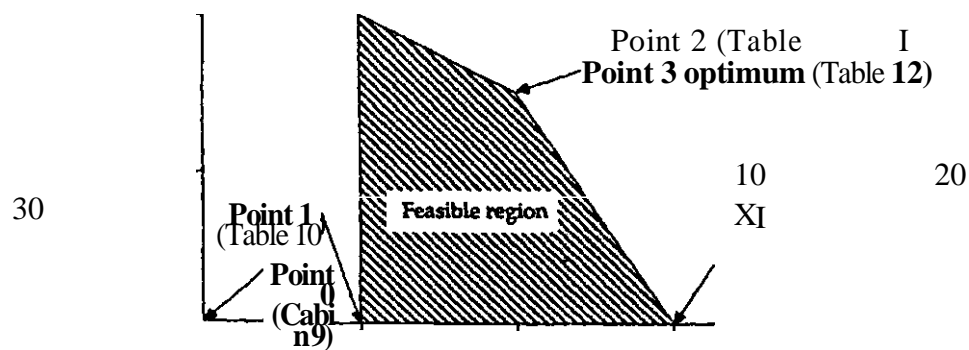


Figure 1 Graphical/Simplex comparison

Solution:

Optimum production:

□ $x_1 = 15$ i.e. produce 13 units of Klunk

□ $x_2 = 20$ i.e. produce 20 units of Klick giving an overall contribution of £ 125

Shadow prices of binding constraints:

$x_3 =$ £0.125 i.e. each additional machine hour would produce £0.125 extra contribution labour.

x_4 £0.625 i.e. each additional labour hour would produce £0.625 extra contribution labour.

The non-binding constraints represented by x_5 , x_6 and x_2 have 5, 5 and 10 spare respectively.

Note:

By seeing how the Simplex interactions move from one vertex to an improved vertex on the feasible region, it is possible to gain a better understanding of the process.

Summary of Simplex method

Flow chart 1 (on page) provides a concise summary of the Simplex method and is cross referenced to key points in the Unit.

SELF ASSESSMENT EXERCISE 2

- (i) What is the dual of a minimizing LP problem?
- (ii) How is the final Simplex Tableau interpreted?

4.0 CONCLUSION

This unit introduces special techniques for linear programming e.g. transformation in a simple approach.

5.0 SUMMARY

The simplex flow chart method shows the steps of maximizing. The simple transformation given may be applied to all minimization problems with all constraints of the greater than or equal type. The simplex method can be applied to all combinations but only a restricted range of problem is covered.

6.0 TUTOR- MARKED ASSIGNMENT

Form the dual of the following problem:

Minimise: $30A + 608 + 20C$

Subject to: $5A + 10B + 15C > 2,000$
 $2A + 38 + IC > 300$
 $8A + 6B + 4C > 650$

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MODULE 4 MONEY AND FINANCIAL INSTITUTION

UNIT 1 MONEY, TYPES AND FUNCTIONS

Contents

- 1.0 Introduction
- 2.0 Objectives
- 3.0 Main Content
 - 3.1 What is Money?
 - 3.2 Trade by Barter
 - 3.3 Types of Money
 - 3.4 Qualities of Money
 - 3.5 Functions of Money
- 4.0 Conclusion
- 5.0 Summary
- 6.0 Tutor-marked Assignments
- 7.0 References/Further Reading

1.0 INTRODUCTION

In this unit, you will learn that the wealth of a community exists in the goods and services it produces and that money is merely a convenient way of measuring wealth. We must now investigate money more closely and determine what it does, and what problems it creates. Market economy or Money economy should be compared with the subsistence economy. Subsistence economy means that people consume what they have themselves produced and exchange nothing. In a market economy, exchange may take two forms: direct exchange (barter) or indirect exchange using money as a “means of payment” or “medium of exchange”. It should be noted that barter involves such inconveniences at a comparatively early stage. In the development of an economy, we should expect a medium of exchange; money comes into use.

In every economic system, whether dominated by private interest as in capitalism or government interest as in communism and socialism, or mixed economy having a blend of capitalism and communism, money has very crucial roles to play. Its roles in the economy is pervasive, touching every aspect of the economy.

A special attention is given to money because the use of monetary policy as a stabilisation tool by the government is based on the role of money in the economy. We cannot have a proper grasp of monetary theories and policies without first of all understanding money.

2.0 OBJECTIVES

It is hoped that by the end of this unit, you will be able to:

- (i) understand the meaning of money and how it evolved.
- (ii) show the various types of money and the functions that money performs in every economy.

3.0 MAIN CONTENT

3.1 What is Money?

Everybody who has reached the age of Kindergarten knows what money is. You possibly have touched money today. However, the term 'money' means different things to the ordinary man in the street. It is often used to describe wealth and financial resources, credit and income. When we say "the man has money or the man is in money", we are referring to money as wealth or financial resources. It differs from the way an economist uses the term 'money'.

Economists see money as anything that serves as a medium of exchange in a given society. Chandler and Goldfield (1997) defined money as "anything that is generally acceptable as a medium of exchange". Amacher and Ulbrich (1986:239) defined it as "an item that people accept as payment for goods or services." Cox (1983) defined it as "anything which passes freely from hand to hand and is generally acceptable in settlement of debt and other financial obligation is money." From these definitions, we have two things to note. The first is that whatever serves as money has to be generally acceptable in settling financial obligations. The second thing is that anything whatsoever can serve as money provided it is acceptable as money within a given community. The legal tender approach to defining money brings to fore the point that the law can help a commodity to achieve general acceptability.

3.2 Trade by Barter

It is the direct system and practice of exchanging goods and services for goods or services. The best way to understand the importance of money in any economy is to look at an economy that does not use money.

When there is no generally accepted medium of exchange, individuals engage in barter. The problem or difficulties of Trade by Barter includes:

- ☐ ☐ The difficulty of double co-incidence of wants;
- ☐ ☐ It wastes time and energy;
- ☐ ☐ Difficulty in assessing the value of the commodities;
- ☐ ☐ The exchange always becomes uninteresting;
- ☐ ☐ It does not encourage deferred payments;
- ☐ ☐ It does not encourage the system of division of labour and specialisation;
- ☐ ☐ There is no lending and borrowing;
- ☐ ☐ It discourages large-scale production.

STUDENTS ASSESSMENT EXERCISE

How did Trade by Barter encourage the introduction of money?

3.3 Types of Money

- (i) **Coins:** They are metal money with definite amount.
- (ii) **Paper Money:** It is in form of paper notes which originated from the receipts that the Goldsmiths issued to people.
- (iii) **Bank Money:** It is deposit in both Savings Account, Current Account and Fixed Deposit Account.
- (iv) **Foreign Money:** It is the money of other countries and it serves as money in the foreign exchange market.
- (v) **Legal Tender:** It is money backed by the force of law in a country which is generally acceptable as a medium of exchange.
- (vi) **Gold Backed Money:** It is money that can easily be converted or changed into gold by the central authority that issues money.
- (vii) **Commodity Money:** It is commodity used as money in the old days, e.g. cowries, shark teeth, manila etc.

(viii) **Token Money:** This is money whose intrinsic worth is less than its normal or face value.

(ix) **Representative Money:** It is a document or lieu of legal tender but not fully and freely acceptable e.g. cheques, postal and money order bills, etc.

(x) **Fiduciary Note Issue:** This is the type of money that are not backed by either gold or any foreign currency.

3.4 Qualities of Money

This is also known as the characteristics of money.

(a) **Homogeneity:** Each unit of money must be homogenous, that is, each unit held by different individuals must be identical;

(b) **General Acceptability:** Each unit of money must be generally acceptable in exchange for goods and services purchased;

(c) **Portability:** Each money unit must be easily carried about. In other words, it must be easily transmissible;

(d) **Divisibility:** Money must be capable of being divided into small units;

(e) **Recognisability:** Money must be easily recognisable by all and sundry in order to detect any counterfeit;

(f) **Relative Scarcity:** Money must be relatively scarce in order to maintain its value;

(g) **Stability in Value:** There should be absence of inflation and deflation to make money stable in value as well as enable it serve some useful functions such as the store of value and means of deferred payment;

(h) **Durability:** Money must be capable of staying long without spoiling or going bad.

3.5 Functions of Money

(a) Money serves as a medium of exchange. With the introduction of money, goods and services are exchanged with money and thus exchange is facilitated. With money as a mean of exchange, the problems of barter are by-passed.

(b) Money serves as a store of value. In-so-far as there is no inflation and deflation in the economy, money serves as a store of value since money would not lose its value any period it is kept.

(c) Money serves as a unit of account. All business transactions are accounted in money units. Whether it is payments, debts or costs, it is made in money units. This facilitates exchange or transactions.

(d) Money serves as a measure of value. With money, one can measure the quality or value of goods, services or different occupations. Thus money is used to measure and compare the value of goods and services.

(e) Money serves as a standard for deferred payments – With the use of money, one can postpone or defer the payment for goods and services purchased. This function is important these days when business transactions are carried out mostly on credit basis.

4.0 CONCLUSION

Money has a very crucial role to play in every economy. One good way to understand the importance of money to any society is to imagine a situation where there is no money in an economy. All the problems associated with the barter system will become very prominent in such economy.

In every economy, money performs four major functions. The first two can be classified as primary or basic function while the last two are secondary functions. They are said to be secondary because they are derived from the first two. Any commodity that can perform the primary function can automatically perform the secondary functions, but not all commodities that perform the secondary functions can perform the primary functions.

The primary functions of money are:

- (a) Money as a medium of exchange.
- (b) Money as a unit of value.

The secondary functions are:

- (a) Money as a standard for deferred payment.
- (b) Money as a store of value.

5.0 SUMMARY

In this unit, it is clear that money plays a vital role in the economic system of any country. Modern economic activity is based on specialisation and exchange. Money is a device for promoting specialisation and exchange. Specialisation and exchange would revert to the barter system of money that have ceased to exist.

We are living in an economy based on money. Government development programmes as well as individual enterprise activities are calculated in terms of money as a unit of account. The existence of a unit of account permits the growth of a price system and this in turn promotes growth of markets. By serving as a medium of exchange, money facilitates the exchange of goods and services among specialists.

6.0 TUTOR-MARKED ASSIGNMENTS

- (1) In your own words, give a functional definition of money.
- (b) Discuss the various types of money. Which of them is currently in use in Nigeria.
- (2) What are the functions of money? Describe clearly how money performs these functions.
- (3) What are its main characteristics and major roles in the economy of a nation.
- (4) The inadequacies of Trade by Barter as an Exchange Mechanism gave birth to money. Name and explain these inadequacies.

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UNIT 2: DEMAND FOR MONEY

CONTENTS

- 1.0 Introduction
- 2.0 Objectives
- 3.0 Main Content
 - 3.1 Demand for Money
 - 3.2 The Liquidity Preference Theory
 - 3.3 Motives for Holding Money (DD for Money)
 - 3.4 Determinants of Money Demand
 - 3.5 Quantity Theory of Money
 - 3.6 Criticisms of Quantity Theory of Money
- 4.0 Conclusion
- 5.0 Summary
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1.0 INTRODUCTION

Money just like every other commodity has its own demand and supply. However, money has certain qualities, or characteristics, or attributes, which distinguishes it from other commodities. Money does not need to be converted to any other thing before it is used to pay for other goods and services. It is the most liquid of all commodities. Money confers to the holder a general purchasing power. Once you hold money, you can get other commodities. The most distinguishing feature of money is that it is a medium of exchange. It is generally accepted in settlement of financial obligations. Now, we know that money serves as a medium of exchange and a store of value. People, therefore, demand to hold money in order to utilise these services. Broadly speaking, there are three motives or reasons why people prefer to hold money instead of other assets. They are the Transactionary Motive, the Precautionary Motive and the Speculative Motive. This unit, therefore, presents a detailed discussion of the demand for money.

2.0 OBJECTIVES

At the end of this unit, you should be able to:

- (i) understand the meaning of liquidity preference and the various reasons why people demand for money to hold as idle cash balances.
- (ii) comprehend what is Quantity Theory of Money and the criticisms associated with it.
- (iii) define the “Demand for Money”.

3.0 MAIN CONTENT

3.1 Demand for Money

Each individual or person tries to hold his wealth in any of two broad forms. It is either held as idle cash balances which yield no income or held as non-cash assets such as securities, houses, bags of rice, vehicles and other commodities. These other commodities yield some income, appreciate or depreciate in value over time. Wealth held as idle cash balances

guarantees no income, instead it reduces in value during inflation. The decision to hold money as cash balances instead of spending it immediately in buying other assets is called the demand for money. Demand for money, therefore, refers to the total amount of money balances that people want to hold for certain purposes.

STUDENTS ASSESSMENT EXERCISE

(i) Explain the term “Demand for Money”

Solution

Demand for money means the demand to hold money, that is, to keep one's resources in liquid form instead of in some form of investment. OR it means the desire to hold money in liquid cash as against spending the money.

3.2 The Liquidity Preference Theory

If an individual decides to hold all his wealth in the form of other wealth-creating or financial assets, he faces the danger of illiquidity (that is, having no cash to settle his immediate illiquidity obligations). To avoid the danger of illiquidity, he may prefer to hold money instead of other assets. This is what Lord J. M. Keynes called Liquidity Preference. Liquidity Preference is the extent to which a person prefers to hold cash balances instead of parting with it or keeping his wealth as other assets. Keynes propounded the Liquidity Preference theory, which states that “the stock of money held by the public will vary inversely with the rate of interest (price of money).” The higher the return on income-yielding assets, the less likely it is that cash will be held (Leiter, 1968:55). There is a level to which interest rate will reach and people will no longer be willing to invest at all. This level is called the Liquidity trap level. Apart from the level of income and rate of interest generated by other assets, there are other determinants of how much a person will be willing to hold as cash. These other factors include interval between pay days, general price level, level of expenditure, and availability of credit. These factors are, however, influenced by the level of income. Other factors such as a person's attitude towards risks and expectations are equally influenced by the rate of return (or Interest Rate). When interest rates are high, more people will be willing to take risk.

STUDENTS ASSESSMENT EXERCISE

i “The Demand for Money is a function of the rate of interest real income and the price level.” Discuss.

3.3 Motives for Holding Money (DD for money)

Whoever is holding money is holding it to enable him get something else. Each person has his own reasons for holding money, and not because he wants to chew the paper called money. The demand for money is, therefore, said to be a derived demand.

Lord John Maynard Keynes who propounded the Keynesian theory identified three reasons that prompt people to hold money. These reasons are transactions, precautionary and speculative.

i Transactions Motive

The first reason people hold money balances is to enable them pay for their normal day-to-day transactions. People hold money as a medium of exchange. It is generally accepted by individuals and firms in payment for goods and services. Keynes observed that the level of transaction undertaken by individuals and society as a whole has a stable relationship with the level of income. Keynes, therefore, confirmed that “the demand for money for transactionary purposes was proportional to the level of income”. This means that the higher the income level, the larger the amount held for transaction purpose. The Monetarists led by Milton Friedman also agreed that “the demand for money will be proportional to the level of income for each individual and hence for the aggregate economy. Therefore, money is held for the

purchase of goods and services because of the no synchronisation of the periods of income receipts and their disbursements. This is determined directly by the level of income.

ii Precautionary Motive

The term “Precautionary Motives” refers to the desire to hold cash balances in order to meet expenditures which may arise due to unforeseen circumstances such as sickness and accidents. Uncertainties are a reality of life. We can never be quite certain what payments we have to make in the future. Lacking certainty we, therefore, arm ourselves with money against emergencies. Like the transaction motive, it is relatively interest-inelastic unless the rate of interest is really very high. As the case of transactions motive, the amount of money an individual holds for precautionary purposes is also dependent on the level of Income. The higher the level of income, the more the amount held for precautionary purposes. Both Keynesians and monetarists agree on this point.

iii Speculative Motive

The third reason why people hold money is to enable them speculate on the possible outcome of business events. If people expect prices to fall in the near future, for instance, they can suspend further purchase now, and hold more money waiting to buy when prices will fall. In the same way, if people think that prices are relatively low now and expect prices to rise in the near future they will use their money to buy financial assets which they will sell later when prices will rise. The amount of money for speculative purpose is not based on the level of income. It is determined by what people expect to gain or to lose by holding other assets. This expected gain or loss depends on the interest rate. Lord Keynes used movement in bond prices to illustrate the speculative motive for holding money and how this is influenced by interest rates.

STUDENTS ASSESSMENT EXERCISE

(iii) Discuss the motive for holding money?

Solution

Reasons or motive for demand for money includes

(i) Transaction Motive: The desire to keep or hold money for the day-to-day transactions;

(ii) The Precautionary Motive: Necessary in order to meet up with unforeseen circumstances or unexpected expenditure;

(iii) Speculative Motive: People also keep money with the hope of using such money kept in making quick money.

3.4 Determinants of Money Demand

Apart from the factors identified by Keynes, other factors were later identified by Professor Milton Friedman in his modern quantity Theory of Money. These include the price level, the rate of change of prices or inflation real permanent income or wealth and return on bonds and equities. Therefore, the determinants of money could be seen as

(a) Income

Demand for money varies directly with the level of income, that is, the higher the level of income, the higher the level of income, the higher the level of money demand.

(b) Interest Rate

Demand for money varies inversely with the interest rate.

(c) Price level

There is direct positive relationship between money demand and the price level.

(d) The Rate of Price Changes

Inflation rate varies inversely with money demand. This is a weak determinant of money.

(e) Real Permanent Income

Real permanent income or wealth varies directly with money demand.

(f) Return on Bonds and Equities

The higher the return on bonds and equities the lower the demand for money.

3.5 Quantity Theory of Money

The classical quantity theory of money was developed by Irwin Fisher in 1911 and was generally accepted view until the 1930's about the relationship between the amount of money in economy or circulation and the level of prices. It is a theory about how much money supply is needed to enable the economy to function.

The quantity theory took the view that money was used only as a medium of exchange to settle transactions involving the demand and supply for goods and services. The theory is based on the simple identity between total money spend and the price level in the economy. This is illustrated with an equation.

Where M – is the money supply

$$MV = PT$$

V – is the velocity of circulation i.e. the rate at which money changed hands in the society.

P – is the Price level

T – rate of Transaction

Given the assumption that 'V' and 'T' are constant, the price level 'P' varies directly with the amount of

change in money supply i.e. $P = MVT$

3.6 Criticisms of Quantity Theory of Money

Today, no one accepts that the influence which money has on the economy can be explained in terms of a simple quantity theory. To a lesser or greater extent, they would question the three key assumptions necessary to convert the equation of exchange into a theory of the determination of prices. As we have seen, these three key assumptions were:

- ☐ the velocity of circulation of money is constant.
- ☐ the stock of money is an instrument which can be controlled.
- ☐ Say's Law (supply creates its own demand) will operate.

The validity of these three assumptions is critically on the grounds that

- (a) prices cannot respond quickly to changes in money supply;
- (b) an increase in the distribution of wealth might result from an increase in the money supply and price levels;
- (c) if people expect price to rise, they might decide to hold more of their wealth in physical asset and less in money and so the velocity of circulation will fall;
- (d) people must be fooled by inflation.

STUDENTS ASSESSMENT EXERCISE

(iv) Examine the quantity theory of money.

Does it offer an adequate explanation of inflation?

4.0 CONCLUSION

Money is such an important asset in the asset market and this is why people choose to hold it. A person's decision about how much money to hold (his or her money demand) is part of a broader decision about how to allocate wealth among the various assets that are available. This analysis demonstrate that the price level in an economy is closely related to the amount of money in the economy.

5.0 SUMMARY

In this unit, we have succeeded in stating that The Demand for Money is the total amount of money that people choose to hold in their portfolios. The principal macro-economic variables that affect money demand are the price level, real income and interest rates. The Quantity

Theory of Money is an early theory of money demand that assumes that velocity is constant, so that money demand is proportional to income.

The motive for holding money can be divided into three motives namely: Transactional motives, Precautionary motives and the Speculative Motives.

6.0 TUTOR-MARKED ASSIGNMENTS

1. Explain in details, the reason why an individual may decide to hold part of his money wealth as money balances pointing out the factors that can influence the amount he decides to hold.

(a) Explain the Liquidity Preference theory

(b) Define velocity. Discuss the role of velocity in the quantity theory of money.

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UNIT 3: SUPPLY OF MONEY

CONTENTS

- 1.0 Introduction
- 2.0 Objectives
- 3.0 Main Content
 - 3.1 Supply of Money – Meaning
 - 3.2 Determinants of Money Supply
 - 3.3 Money Stock Composition – (Measuring Money)
 - 3.4 Factors that affect Money Supply
 - 3.5 Problems in defining Money Supply
- 4.0 Conclusion
- 5.0 Summary
- 6.0 Tutor-marked Assignments
- 7.0 References / Further Reading

1.0 INTRODUCTION

A type of financial asset that has long been believed to have special macro-economic significance is money.

Money is the economist's term for assets that can be used in making payments such as cash and cheque accounts. One reason that money is important is that most prices are expressed in units of money used in the three markets in our model of the macro-economy. The three markets are the labour market, the goods market and the asset market. By asset market we mean the entire set of markets in which people buy and sell real and financial assets, money just like every other commodity or financial asset has its own demand and supply. In this unit, we shall consider the Supply of Money, in the asset market.

2.0 OBJECTIVES

At the end of the unit, you should be able to:

- (i) define the Supply of Money.
- (ii) understand the determinants of Money Supply.
- (iii) estimate the money stock.
- (iv) highlights the problems in defining the supply of money.

3.0 MAIN CONTENT

3.1 Supply of Money

The supply of money in any economy at any particular period is the total sum of all money held by all members of the society. Generally, money supply is taken as the total amount of money in circulation at any given time e.g. notes and coins and demand deposits in commercial banks. Afolabi (1991) explained "Supply of Money" as the amount of money which is available in an economy in sufficiently liquid and spendable form. "What constitutes the components of this supply of money depends on what has been officially accepted as the constitutes of Money Supply for that country". Thus, each country's money supply definition may be unique. Ajayi and Ojo (1981) defined money supply in Nigeria as the total sum of

currency outside the banks, demand deposit at Commercial Banks, domestic deposits with the Central Bank less Federal and State Government's demand deposits with the Central Banks. They proved that the preponderance of the money supply in Nigeria consisted of currency outside banks and this probably still applies.

Bowden (1986:114) an American author simply defined it as the actual number of "spendable dollars" in existence. At first instance, his definition appears to refer only to the physical dollar in circulation. But notice that he put the "spendable dollars" in quotes. He used this term to include money created by the banking system such as demand deposits, which can be used to pay for debts by the issuance of cheques. Money supply is, therefore, the quantity of money available for spending at each point in time.

3.2 Determinants of Money Supply

It is normally assumed that the nominal money supply is exogenously determined i.e. it is supplied by the monetary authority or Central Bank. But the real money supply is endogenously determined since the price level variation cannot be fixed.

Ajayi and Ojo (1981) have also established that the following three economic factors determine the supply of money or the quantity of money in the economy.

- (a) The behaviour of banks concerning the amount of reserves that they want to hold. This decision on reserves is a function of the profit maximising behaviour of banks and the expectation of the managers with respect to economic environment
- (b) The behaviour of the non-bank public with respect to the way they divide their wealth or money holdings between cash and demand deposits (i.e. the proportion of total wealth that people want to hold in cash).
- (c) The behaviour of the Monetary authorities with regards to the decisions about the size of the monetary base, Legal reserve ratio, and the discount rate. (The monetary base is the currency in circulation plus all the assets that banks are allowed to count while computing their legal reserve ratio). In determining the level of money through the exogenous factors, the government increases or reduces the supply in accordance with the desired economic target they want to achieve.

Ojo, M. O. (1993) puts it this way "a Monetary Control framework begins by establishing a link between the monetary control instruments and the ultimate target for output, growth, inflation and the balance of payments".

STUDENTS ASSESSMENT EXERCISE

What are the determinants of money supply?

3.3 Money Stock Composition (Measuring Money)

Another important disagreement among economist is what to include or exclude in measuring the money stock. This disagreement, as Checkley P. (1980) explained arises because assets fulfill some of the functions of money but not all.

Focusing only on those assets that serve directly as a medium of exchange and are generally acceptable in settling financial obligations, we get the M definition of money stock. The M definition comprises currency in circulation and demand deposits.

The monetarists led by Professor Milton Friedman of University of Chicago argue that savings and demand deposits should be included in money supply because they constitute "temporary abode of purchasing power". This definition of money stock as M plus savings and Time deposits is called M₁. This also agree with Keynesian interest sensitive demand for money.

These two definitions M_1 and M_2 were the only ones existing until 1970s. With new developments in the banking system, two economists Gurley and Shaw quoted in Checkley (1980) argued that quasi-money should be included because they serve as good substitute for money. This led to M_3 definition of money stock as M_2 plus deposits held in non-bank financial institutions. Money stock was later expanded to include investments in government securities because they are easily cashable. This led to M_4 definition of money as M_3 plus investment in government securities. In definition of money stock in Nigeria, the Central Bank of Nigeria focuses on M_1 and M_2 .

STUDENTS ASSESSMENT EXERCISE

Examine the Composition of Money Stock.

3.4 Factors that affect Money Supply

The general belief is that the Central Bank of Nigeria issues notes and coins on behalf of the Federal Government, it must be the Central Bank that determines the stock of money supply, this may not be entirely true. Afolabi (1991) has given five factors that could affect money as follows:

- (i) **Monetary base or High Powered Money:** The money supply will naturally increase if the Central Bank expands the monetary base. The monetary base or high powered money is the total of bank reserves plus currency in the hand of the public.
- (ii) **Credit Creation:** When banks create credit, the credit will in turn lead to demand deposit and so on. The extent to which commercial banks are allowed to create credit will therefore affect the extent of money supply.
- (iii) **Portfolio behaviour of the Public:** If most people keep their money in the bank, the banking system will have Liquid reserves to lend out and create derivative deposit which is the deposit created through lending. If the marginal propensity to hold currency increase, the Liquidity of commercial bank will go down and money supply will similarly fall.
- (iv) **Reaction policies of the Central Bank:** Monetary policies of the CBN applied in reaction to the dictates of the economy will have effects on money supply.
- (v) **Foreign Exchange Transactions:** Domestication of Foreign Exchange will have the tendency to increase domestic money supply.

Specifically, money supply is also influenced by the other following factors:

- (a) **Total reserves supplied by the Central Bank:** If the total reserves supplied by the Central Bank is high, money supply will be high.
- (b) **Reserve Requirements:** If the reserve requirement – percentage of commercial banks deposits legally required to be kept with the Central Bank is high money supply will be low.
- (c) If the non-bank public increases its demand for time deposits, money supply will increase.
- (d) **Demand for Currency:** If the non-bank public increases its demand for currency, money supply will increase.
- (e) **Demand for excused reserves:** If commercial banks demand for excess reserves increases, money supply increases.
- (f) **Interest Rates:** There is a positive relationship between money and interest rate. That is, the higher the interest rate the higher the money supply.
- (g) **The Bank Rate:** If the rate at which commercial banks borrow from the Central Bank or discount bill rises, money supply falls.

STUDENTS ASSESSMENT EXERCISE

Analyse the factors that affect money supply in the Nigerian Economy.

3.5 Problems in Defining Money Supply

There were difficulties with the monetarist thesis, neither of which was satisfactorily resolved. First, in an advanced and more important an evolving-financial system, it was not possible to define the stock of Money in an unambiguous way, or at least there were a

number of different but equally valid definitions of the money supply and there was no strong reason for choosing one in preference to any other.

As we have seen, money can be defined either narrowly or broadly. However, there are or have been within the Nigerian institutional context a number of different definitions of the money supply. The definitions change frequently as does the popularity of one measure over another which partly illustrates the difficulty in trying to pin down the concept.

STUDENTS ASSESSMENT EXERCISE

Examine the problems in defining money supply.

4.0 CONCLUSION

Money supply represents the total amount of money in the circulation of a given country. It comprises all those things which possess the characteristics of money. In Nigeria, money supply are broadly classified into two: (i) Narrow Money Supply (M1) and (ii) Broad Money supply (M2).

In Modern economics, the money supply is determined by the Central Bank such as Bank of England, CBN. The terms 'money supply' and 'money stock' are used inter-changeably. The problem of defining money supply is still associated with a considerable degree of controversy.

5.0 SUMMARY

In this unit, we have tried to examine fully, the concept of money supply. In concluding our discussion of money supply, let us make few observations about the supply of money. First, is that, it affects the price level and hence other economic variables. The next observation is that, it expands as economics activities grow. Furthermore, as money stock increases, total spending increases. The money supply in an economy is influenced by internal and external factors.

6.0 TUTOR-MARKED ASSIGNMENTS

- 1 What comprises the supply of money in Nigeria?
- 2 Pinpoint the problems in defining the money supply.
- 3 Discuss the factors that help to determine the supply of money in Nigeria.

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UNIT 4: TYPES OF FINANCIAL INSTITUTIONS

CONTENTS

- 1.0 Introduction
- 2.0 Objectives
- 3.0 Main Content
 - 3.1 Financial Institutions
 - 3.2 Types of Financial Institutions
 - 3.3 Bank Financial Institutions
 - 3.4 Non-Bank Financial Institutions
- 4.0 Conclusion
- 5.0 Summary
- 6.0 Tutor-Marked Assignments
- 7.0 References/Further Reading

1.0 INTRODUCTION

In the last unit, we discussed exhaustively the supply of money and now we want to focus on the Financial Institutions that are responsible for the supply of money. The Financial Institutions operate and function in an economic system. In its ordinary usage, the word “System” can be used to refer to “a group of related parts working together”. This is the sense in which it is used here – the financial institutions working together to provide the financial services required in an economy. The Nigerian Financial System comprises the banking system (all the banks) the non-bank financial institutions, the regulatory bodies, and other financial market participants, that play the role of financial intermediation in the Nigerian economy. The Central Bank of Nigeria Briefs (1996) defined a financial system as “a conglomerate of various institutions, markets, instruments, and operators that interact within an economy to provide financial services. Such services may include resource mobilisation and allocation of financial intermediation and facilitation of foreign exchange transactions to enhance international trade.

2.0 Objectives

At the end of this unit, you should be able to:

- (i) define Financial Institutions fully.
- (ii) recognise the various types of Financial Institutions.
- (iii) arrange Financial Institutions into bank and non-bank financial institutions.

3.0 MAIN CONTENT

3.1 Financial Institutions

Financial institutions are institutions which serve the purpose of channelling funds from lenders to borrowers. They hold money balance of, or borrow from individuals and other institutions, in order to make loan or other investments. Finance has to do with money. It is an organised system of managing money i.e. a system of lending and borrowing money. A Financial Institution acts as an intermediary between those individuals or firms who wish to lend and those who wish to borrow. The existence of financial intermediaries reduces the risks by allowing specialist institutions to evaluate the credit worthiness of borrowers. The risk reduction may encourage lending and thus reduces the interest rate of most individuals and risk averters.

Institutionally, it is common to distinguish between banks and non-bank financial institutions. The importance of the former is that their liabilities enter the common definitions of the money supply. The liabilities of non-bank financial institution may enter some money supply definitions or they may be classed as “near money” depending on their liquidity. Examples of non-bank intermediaries/ institutions listed in terms of decreasing liquidity are: Building societies, Savings banks, Hire purchase, Insurance companies, Pension funds and Investment trusts

3.2 Types of Financial Institutions

Financial Institutions can be broadly classified into two: banks or bank financial institutions in the banking sector and non-bank financial institutions.

Commercial, Central, Merchant and Development banks are in the banking sector while Building Societies, Hire Purchase Companies, Insurance Companies, Pension Funds and Investment Trust are non-bank financial institutions. While liabilities of banks form part of the money supply, the liabilities of non-bank financial institutions do not for they are referred to as “near money”.

In Nigeria, the following types of financial institutions can be identified.

- Traditional Financial Institutions
- Commercial Banks
- Central Banks
- Development Banks
- Insurance Companies
- The Federal Savings Banks
- The People’s Bank
- Community Banks
- Savings and Loan Associations
- Investment and Unit Trusts
- Credit and Cooperative Societies
- Pension Scheme (NPF), (NSITF)
- Financial Companies
- Micro Finance Bank

STUDENTS ASSESSMENT EXERCISE

- List exhaustively the types of Financial Institutions in Nigeria.

3.3 Bank Financial Institutions

Structurally, the bank-financial institution is made up of:

(a) The Supervisory and Regulatory Authorities: They comprise the Central Bank of Nigeria which is the Principal regulatory body, Federal Ministry of Finance. The Securities and Exchange Commission, Nigerian Deposit Insurance Corporation, Nigerian Insurance Supervisory Board (Now renamed National Insurance Commission) and to a lower extent the Federal Mortgage Bank and National Board for Community Banks. These Supervisory bodies are also referred to as monetary authorities.

(b) The Banking System (Banks): The banking system comprises all the banks that operate within the economy. This includes commercial banks, merchants banks, development banks and other specialised banks, such as the Community Banks and People’s Bank of Nigeria. Apart from few development banks, all these banks collect deposits, and give out loans. They are key actors in performing the role of financial intermediation.

3.4 Non-Bank Financial Institutions

Apart from banks, there are other institutions that perform the role of financial intermediation. These other institutions are called non-bank financial institutions. At times,

they are simply referred to as other financial institutions. These institutions include finance house, savings and loan institutions, insurance companies, the discount houses, Bureau de Change, Pension and other trust funds. There are also informal savings and loan associations like cooperative societies, ESUSU or Isusu groups known as “Ajo” and Alashie in Hausa language. An Isusu group is an association of like-minded individuals who contribute a pre-determined amount of money which is given to each member of the group one after the other after each collection. The amount may be contributed on weekly or monthly basis.

4.0 CONCLUSION

Financial Institutions are establishments that issue financial obligations such as demand deposits in order to acquire funds from the public. The institutions then pool these funds and provide them in larger amounts to businesses, governments or individuals. Examples are commercial banks, insurance companies, savings and loan associations. In some countries, financial institutions are also known as “Financial Intermediaries”.

Financial Institutions can be classified into bank and non-bank Financial institutions. Bank Financial Institutions include the central banks, the commercial banks and the development banks. Non-bank financial institutions include discount houses, issuing houses, insurance companies, building societies and the stock exchange. These institutions operate in markets with instruments to acquire funds from the public for investment.

5.0 SUMMARY

What you have learned in this unit concerns the definitions/meanings of financial institutions and the various types of Financial Institutions grouped into bank and non-bank financial institutions. It has served to introduce the functions and control of financial institutions. The two units that follow shall build upon this introduction.

6.0 TUTOR-MARKED ASSIGNMENTS

Q1 - What is a financial system? Discuss the various categories of institutions that make up the structure of The Nigerian Financial System.

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UNIT 5: FUNCTIONS OF FINANCIAL INSTITUTIONS

CONTENTS

- 1.0 Introduction
- 2.0 Objectives
- 3.0 Definitions
 - 3.1 Banks Financial Institutions
 - 3.1.1 Central Bank of Nigeria
 - 3.1.2. Commercial Banks
 - 3.1.3 Merchant Banks
 - 3.1.4 Development Banks
 - 3.2 Other (Non-Bank) Financial Institutions
 - 3.2.1 Insurance Companies
 - 3.2.2 Finance Companies
 - 3.2.3 Primary Mortgage Institutions
 - 3.2.4 National Economic Reconstructions Fund
 - 3.2.5 Traditional Financial Institutions
 - 3.2.6 Discount Houses
 - 3.2.7 Nigerian Social Insurance Trust Fund
 - 3.2.8 Thrift and Credit and Co-Operative Societies
 - 3.2.9 Investment and Unit Trusts
 - 3.2.10 Savings and Loans Associations
 - 3.3 Specialised Banks (Non-Conventional Banks)
 - 3.3.1 People's Bank of Nigeria (PBN)
 - 3.3.2 Community Banks
 - 3.3.3 Federal Savings
- 4.0 Conclusion
- 5.0 Summary
- 6.0 Tutor-Marked Assignments (TMA)
- 7.0 References/Further Reading

1.0 INTRODUCTION

In the last unit, we have been able to compose and specify what financial institutions are. This will help to assemble the functions of the various financial institutions in this unit. Having defined what financial institutions are legally, the laws also establishes different types of financial institutions. The types of financial institution depends on the law establishing it and its functions. Depending on the stage of economic political and technological developments in a nation, each nation has the authority to grant licences to various types of financial institutions.

2.0 OBJECTIVES

It is hoped that by the end of this unit, you will be able to:

- (i) recognise the functions of banks financial institutions like CBN, Commercial Banks, Merchant Banks, and Development Banks,
- (ii) recall the functions of non-bank financial institutions like the insurance companies. Finance Companies, Primary Mortgage Institutions, NERFUND,

Discount Houses, NSITF, etc., and
(iii) define the functions of specialised banks – Non-Conventional Banks.

3.0 MAIN CONTENT

3.1 Banks Financial Institutions

3.1.1 Central Bank of Nigeria

The Central Bank of Nigeria stands as the apex of the banking system. It licenses, supervises and regulates the banks within the banking system. It is owned by the Federal Government.

The CBN was established in 1959. It goes ahead to perform the following functions:

Currency issue and circulation Promotion of monetary stability through the formation and implementation of government monetary policies. Acting as banker and financial adviser to the government. Encouragement of the growth and development of financial institutions. Supervision and regulation of banks and other financial institutions. Development of the money and capital markets through the creation of local government outlets.

Helping in the clearing and collection of cheques by banks by providing the clearing house.

Penalising of non-complying financial institutions to ensure compliance and help achieve government objectives. Undertake research and publications of a country

Maintains close contact with other international financial institutions. The CBN safeguards the International value of the currency of the nation. The CBN mobilises capital resources for economic development.

STUDENTS ASSESSMENT EXERCISE

List the functions of Central Bank of Nigeria.

3.1.2 Commercial Banks

The Banks and other financial institutions Decree No 25 of 1991 defined a commercial bank as “any bank in Nigeria whose business includes the acceptance of deposits withdrawable by cheques. This definition presents the major distinguishing functions of commercial banks from other banks. According to Osumbor (1984) in his book *Business Finance and Banking in Nigeria*, commercial banks are unique in their performance of services and are distinguished from other forms of financial institutions or intermediaries because of the following functions:

Accept deposits from customers i.e. savings, current or demand deposit, fixed deposit or time deposit. Lend money to approved customers i.e. overdraft, loan.

Allow the use of cheque Safe-keep valuable assets for customer. Provision of standing order facilities.

Give business advice to their customers. Agents of government for monetary policy.

Assists customers for acquisition and sales of shares. Issue of discount bills of exchange i.e. payment on behalf of customer. Commercial bank creates money, this is done through deposits.

Money created = Original Deposits.

Cash ratio or reserve requirements.

They involve in agricultural financing.

They offer employment opportunities.

They act as guarantors to their customers.

They solve problem of foreign exchange.

They issue traveller’s cheques.

Their activities accelerate the economic development of a nation since they act as intermediaries between large number of depositors and borrowers.

These banks could assume the responsibility of carrying out the duties of attorney, executor and trustee.

STUDENTS ASSESSMENT EXERCISE

Restate the Statutory functions of Commercial Banks.

3.1.3 Merchant Banks

According to the Nigerian Banking Amendment Decree (No. 88) of 1979, Merchant Bank means any person in Nigeria who is engaged in wholesale banking, medium and long-term financing equipment leasing, debt factoring, investment management issue and acceptance of bills and the management of unit trust. They are also called Acceptance Houses or Discount Houses. Functions or services of merchant banks are often divided into two classes – banking and corporate finance services.

Banking Services / Functions:

- Acceptances of Merchant Banks (MB) accept bills of exchange from importers and exporters which are easily rediscountable.
- Loans and Advances – MB provides loans and advances of short, medium and long term nature
- Deposits – MD accepts the following deposits- current account deposits for corporate clients, fixed term deposits accounts for both corporate and non-corporate clients and Negotiable Certificates of Deposits.
- Equipment leasing – MDs lease equipment, machine, tools, motor vehicles to farmers and industrialists.
- Foreign Exchange Services: MBs as authorised dealers performing foreign exchange services: Corporate Finance Services.
- Project Financing: MBs finance the construction of new projects or ventures.
- Issuing House Services or Public Issue – MBs provide services to clients who want to raise money from the public through the offer for subscription of shares/ securities.
- Investment and financial advisory services.
- Portfolio management.
- Money Market Services.
- Help to finance international trade
- Debt factoring – Taking over the debts of a firm and thereafter provides her with the amount to finance the businesses.

STUDENTS ASSESSMENT EXERCISE

Compare functions of Merchant Banks with that of Commercial Banks.

3.1.4 Development Banks

Development banks are financial institutions which are set up to provide banking services that will help in the development of a particular sector or aspect of the economy. They are normally government owned institutions set up for the sole purpose of enhancing economic development rather than for profit motives. The major reason for the introduction of development banks is to bridge the gap in the provision of long-term finance for individuals. The existing Commercial and Merchant banks specialise in the provision of short term and medium-term finance because of their deposit structure. They could provide the much needed long-term finance. Another reason is the exigency of providing credit facilities to the priority sector of the economy.

Other banks are reluctant to give such credit facilities because of the high-risk involved. Instances of such sectors are Agriculture, Commerce, Cooperatives, and small scale industries. This is what Professor G. O. Nwankwo (1980) called the “gap thesis” and

“exigency thesis”. Currently, there are six development banks operating in Nigeria. Each is set up to perform specific developmental role as discussed below.

(1) The Nigerian Industrial Development Bank Limited (NIDB)

The bank which was established in 1964 has the main function of encouraging the establishment and growth of medium and large-scale industries in Nigeria. This is done through the provision of medium and long-term finance for the private and public sectors, promoting and development of projects and provision of financial, technical and managerial assistance to indigenous enterprises among other functions.

It provides finance mainly for large scale industries but recently some small scale industries have benefited from NIDB loans.

(2) The Nigerian Bank for Commerce and Industry (NBCI)

The need to encourage the establishment and ownership of small scale industries and other business ventures by indigenous Nigerian Investors after the promulgation of the Nigerian Enterprises Promulgation Decree of 1972 (also known as indigenisation Decree) led to the establishment of this bank in 1973. Its main functions were to assist indigenous business through share underwriting, identification of viable projects, preparation of feasibility studies, offering of managerial and technical advice. It was therefore set up to provide the much needed capital for the implementation of the objectives of the Nigerian enterprises promotion. Thus, Nigerians were given ready sums of capital for the purchase of foreign business as provided for by the act.

(3) Nigerian Agricultural and Cooperative Bank (NACB)

As a step towards encouraging agricultural production, the NACB was established in 1973 mainly to provide the needed finance for agricultural development projects and allied industries including poultry, farming, pig-breeding, fisheries, forestry and timber production, animal husbandry and any other type of Farming, as well as storage, and marketing of such production in Nigeria. Its principal function is to promote agricultural assistance to interested individuals, Cooperative societies, companies and government agencies throughout Nigeria. It also offers technical assistance including advice and preparation of feasibility studies.

(4) Federal Mortgage Bank (FMB)

The Nigerian Building Society (NBS) was established in 1957 with the main aim of providing loanable funds to Nigerians who were keen on investing in real estate. The NBS later in 1977, under Decree No. 7 of the Federal Military Government of Nigeria, metamorphosed into what is today known as the Federal Mortgage Bank of Nigeria (FMBN). The Decree establishing FMBN assigned to it the responsibility of performing the following functions:

- (i) The provision of long-term credit facilities to mortgage institutions in Nigerian at such rates and upon such terms as they may be determined by the Federal Government being rates and terms designed to enable the mortgage institutions to grant comparable credit facilities to Nigerian individuals desiring to acquire houses of their own.
- (ii) The encouragement and promotion of mortgage institutional development at State and National levels.
- (iii) The supervision and control of the activities of mortgage institutions in Nigeria in accordance with the policy directed by the Federal Government.
- (iv) The provision of long-term credit facilities directly to Nigerian individuals at such rates and upon such terms as may be determined by the Board in accordance with the policy directed by the Federal Government.
- (v) The provision of credit facilities with the approval of the Government, at competitive commercial rates of interest to commercial property developers, estate developers and developers of officers and other specialised types of buildings.
- (vi) The Decree also allowed the banks to accept term deposits and savings from mortgage institutions trust funds, the post-office and private individuals as the board may determine

and to promote the mobilisation of savings from the public.

(5) Urban Development Bank (UDB)

The Urban Development Bank was established by Decree 51 on 1992 mainly to take care of the problems of inadequate housing, transportation, electricity and water supply that have posed serious concern in most Nigerian Urban areas. The bank's main function is to provide financial resources to both the public and private sectors of the economy for the development of urban dwellings, mass transportation and public utilities.

(6) Nigerian Export-Import Bank

The sharp decline in the prices of petroleum products in the international market during the late 1970s brought to fore the need to encourage non-oil export so as to ensure that Nigeria does not remain a mono-cultural economy. This and the need for financial import and exports generally led to the establishment of NEXIM in 1991. The bank is charged with the responsibility of helping the nation to attain increased export growth as well as a structured balance and diversification on the product composition and destination of Nigerian products. Its functions include the provision of export credit guarantee and export credit insurance functions, provisions of credit in support of support establishment and management of export funds and other related services.

STUDENTS ASSESSMENT EXERCISE

Examine the main functions of the various types of Development Banks.

3.2 Other Non-Banks Financial Institutions

3.2.1 Insurance Companies

Primarily, insurance companies provide against the various risks that often arise within the economy. They do these by spreading the losses to the unfortunate few over many people. In performing these functions, they collect premiums from several insured. This role is similar to the mobilisation of savings by banks in the sense that a large amount of money is pooled together as premium. The amount so collected by the government securities, public sector enterprises, and shares of private companies. By doing this, they have performed the role of financial intermediation, Insurance companies in turn insure the Nigerian reinsurance corporation which was established in 1977, and supervised by the Nigerian Insurance Supervisory Board (Okonkwo, 1998).

Functions/Roles of Insurance Companies

- * Insurance companies provide the most effective method of handling many of the pure risks encountered by individuals and firms.
- * Insurance companies facilitates risk transfer.
- * They accumulate substantial funds which are used for long-term investment.
- * Through their life and pension businesses they help to develop the financial markets
- * They help to mobilise national resource by encouraging individuals to save.
- * They operate pension scheme on behalf of companies.
- * They grant loans to mortgages.
- * They act as underwriters in the capital market.
- * Insurance policies are used as collateral securities for bank loans.
- * They help to improve the balance of payments position of the country by insuring imports and exports and through reinsurance, Marine Insurance facilities international trade.
- * It promotes bilateral and multilateral trade.
- * Insurance gives the entrepreneur the confidence and provides him the security needed to venture into uncertain areas. It reduces the burden of losses of the entrepreneur.
- * Information released by insurers on incidence of certain risks enable people to take more

measures to avoid such loss.

- * It provides employment opportunities to people.

3.2.2 Finance Companies

Finance Houses mobilise funds from the public mainly through the issuance of money market instruments like certificates of deposits, and other commercial papers. They provide these funds to investors in the form of short-term and medium-term finance such as local purchase order (LPO) financing, leasing, hire purchase, debt factorising and investment in securities. These assets being financed by them often act as a security for their lending. These are sometimes referred to as Hire Purchase Companies.

3.2.3 Primary Mortgage Institutions

These are institutions involved in mortgage financing apart from the Federal Mortgage Bank. They are referred to as primary because they deal directly with individuals and firms, while the Federal Mortgage Bank serves as a supervisory body. These institutions are also involved in the financial intermediation process. They mobilise savings from savers and borrow from other institutions to finance the development of the housing sector. A mortgage bank is a financial institution established for the acceptance of fixed deposits from members of the public with the aim of encouraging them to build their own house by offering them long-term loans. They are also known as building societies.

Functions of Mortgage Banks

- * They accept fixed deposits from members of the public.
- * They encourage members of the public to save money.
- * They construct and provide houses to low group.

3.2.4 National Economic Reconstruction Fund (NERFUND)

As part of the economic reconstruction under the Structural Adjustment Programme, the NERFUND was established by Decree No. 25 of 1988. The primary aim of this fund is to provide soft Medium and Long-term finance to small and medium scale enterprises that are 100 per cent owned by Nigerians. As a financial intermediary, NERFUND sources its funds through the Federal Government, the Central Bank of Nigeria and Foreign Government, The Central Bank of Nigeria and Foreign Government and International Development Finance Institutions like the African Development Bank. The fund so mobilised both from local and foreign sources are made available to small and medium scale industries provided they are 100% Nigerian owned.

3.2.5 Traditional Financial Institutions

Traditional financial institutions are traditional credit groups such as “Esusu” which were originally the institutional agencies for credit supply to members and Esusu or Nsusu or Asuu. It is a kind of cooperative which consists of people who agree to contribute a certain sum of money and hand it over to a member of the group. They take the form of associations of people in the same place of work who mutually agree to come together in order to encourage one another to save, lend and manage money.

Functions of Traditional Financial Institutions

- * They encourage their members to form the habit of saving money.
- * They encourage their members to invest the money they have saved.
- * They lend money to their members.
- * They save their members the pains of going to banks to borrow.
- * They inculcate the principles of democracy in their members.
- * They discourage their members from being extravagant.

3.2.6 Discount Houses

Discount houses are institutions that specialise in the provision of discounting and discounting facilities, buying and selling of securities, especially government securities. They act as financial intermediaries. They also issue their own securities to banks as a mean of raising funds.

There are four Discount houses in Nigeria operating presently. Banks in need of funds approach them instead of going to discount their bills with the CBN.

3.2.7 Nigerian Social Insurance Trust Fund

The Nigeria Social Insurance Trust Fund (NSITF) was established in 1993 by Decree No 7. It replaced the National Provident Fund which was established in 1961. Its main function is to provide a more comprehensive social security scheme for Nigerian private sector employees. It raises funds through a compulsory contribution to the fund by private and public sector employees and employers. The funds so mobilised are used to provide pension benefits to contributors. But, before it is time to pay the contributions, these funds are invested by the fund managers or given out as loans. These investments, apart from serving as a source of credit to investors earn some dividends or interests which help to ensure that the contributor are paid more than their contributions.

Pensions are often the only form of savings for retirement which a person will make. They are a part of the remuneration of the employee, deferred until he has finished active work, to which he has right. Thus pension fund constitute another reliable source of funds for investment in commerce and industry and for financing the economy.

3.2.8 Thrift and Credit and Co-operative Societies

The main functions of Thrift, Credit and loans Cooperative societies is to raise investment finance. Members pays an agreed sum of money every month into a common fund. The members borrow at a certain interest rate. This type of Co-operative society is a savings club and is popular amongst traders, artisans and peasant farmers.

Functions

- It is a valuable means of mobilising some capital for investment.
- Members obtain loans easily from their society and there is no requirement for a collateral. The only condition required is an approved project plant for which the loan is required.
- Members form the habit of saving a little of their income, especially in the rural areas, where banking facilities are scarce.
- Exposure of monthly meetings and regular co-operative education means greater enlightenment for members.

3.2.9 Investment and Unit Trusts

Many investment companies were established in Nigeria to complement the rapid industrial development efforts of both the Federal Government and the State/Regional Government. Most investment companies have common objectives bordering on developmental functions. These companies mainly finance and complement Government efforts in developing industrial and commercial ventures in those states.

The function of investment and unit trusts is to raise collective capital from the public and to direct such funds into profitable investment channels. The two different types of organisation enable the small investors with limited capital to spread his risks over a wide range of securities under full time specialist management.

A unit trust on the other hand, is a method of investment whereby money subscribed by many people is pooled in a fund, the investment and management of which is subject to the legal provisions of a trust deed.

3.2.10 Savings and Loans Associations

These are said to be the best known non-bank intermediaries. These associations were originally organised to make mortgage loans to their own members, but they have increasingly emphasised theirs as savings institutions, catering to small investors and local governments and even state government.

The principal asset of these associations is conventional mortgage loans for family dwellers while their liabilities consist of depositors funds, principally from the government and share accounts savers. The associations normally in good time pay interest which is usually higher than that paid by commercial banks on their savings deposits. They are also allowed to issue large denomination of certificates of deposits.

STUDENTS ASSESSMENT EXERCISE

Assemble all the functions of Non-bank Finance Institutions.

3.3 Specialised Bank (Non-Conventional Banks)

3.3.1 People's Bank of Nigeria (PBN)

The People's Bank of Nigeria (PBN) was established in October, 1989 but was given Legal Status by

Decree No. 22 of 1990. The Decree specified its functions as

(i) the provision of basic credit requirements of under-privileged who are involved in legitimate economic activities in both urban and rural areas and who cannot normally benefit from the service of the orthodox banking system due to their inability to provide collateral security.

(ii) the acceptance of savings from the same group of customers and making repayments of such saving together with any interest thereon after placing the money in bulk sums on short-term deposits with commercial and merchant banks.

People's Bank of Nigeria (PBN) is a non-conventional bank established to provide specialised services and grant credit facilities to the urban and rural poor masses who cannot satisfy the stringent collateral requirements normally demanded by conventional banks.

Those served by the bank include the poor roadside hawkers, mechanics, vulcanizers, plumbers, electrician, food seller, truck pusher, hair dressers, dress makers, etc.

Therefore, from the foregoing, People's Bank of Nigeria has the following aims:

- (a) Increasing investment and savings;
- (b) Raising per capital income and PNG;
- (c) Halting rural urban migration;
- (d) Bridging the gap between the rich and the poor;
- (e) Increase productivity, and
- (f) Providing credit facilities to the disadvantaged classes who could not have ordinarily benefited from credit facilities in conventional banks.

3.3.2 Community Bank

The Bank and other Financial Institutions Decree 1991 defined a community bank as "a bank whose business is restricted to a specified geographical area in Nigeria. Operationally, it is also defined as a self sustaining bank owned and managed by a community or a group of communities to provide financial services to that community or communities. A community bank may be owned by Community Development Associations (CDAS), Cooperative Societies, farmers groups, clubs, trade groups and their similar groups or by indigenous businessmen or individuals within a community. Community Banks operate basically like commercial banks, except that they are prohibited from engaging in "sophisticated banking services" like foreign exchange transactions and export financing. Again, their operations are restricted to a specified geographical area like

a unit bank. Thirdly, they are not members of the clearing house. As such, their cheques are cleared through commercial banks.

Functions of Community Banks

- * Accept various types of deposits including savings, time and target deposits from individuals, groups and other organisations.
- * Issue redeemable debentures to interested parties to raise funds from members of the public.
- * Receive money or collect proceeds of banking instruments on behalf of its customers.
- * Provide ancillary banking services to its customers such as remittance of funds.
- * Maintain and operate various types of accounts with or for other banks in Nigeria.
- * Invest surplus funds of the bank in suitable instruments including placing such funds with other banks.
- * Pay and receive interests as may be agreed between Community Banks and their clients in accordance with public policy.
- * Provide credit to its customers, especially small and medium scale enterprises based in its area of operation.
- * Operate equipment leasing facilities.

3.3.3. Federal Savings Bank

The Post Office Savings Bank established in 1889 was later rebaptised in 1974 to be known as the Federal Savings Bank (FSB). The FSB even though carries out certain commercial banking functions still has as its objectives, as was stipulated in its parent bank act – the Post-Office Savings Act, 1958, has the following:

- (i) to provide a ready means for the deposit of savings, especially in the rural areas, and
 - (ii) to encourage thrift and the mobilisation of savings, also, especially in the rural areas.
- These special savings scheme were at that time designed to mobilise funds for national development, especially at rural levels.

STUDENTS ASSESSMENT EXERCISE

Analyse the functions of Community Banks

4.0 CONCLUSION

The banks Financial Institutions is the most important component of the Nigerian Financial System. The same applies to other countries of the World. It is the heart of the Financial System. This is because apart from being the key operators in the Financial markets, monetary policies of the government are implemented through the banking system.

Moreover, the banks Financial Institutions creates money, and by doing this, influences the economy of a country in no small measure. These are in addition to the traditional roles of savings mobilisation, and financial intermediation, and provision of settlement mechanism. Banks constitute the major source of credit to the economy.

The Bank Financial Institutions comprises all Banks that operate within the boundaries of Nigeria by whatever name they are called and their branches. These include the Central Bank of Nigeria, which stands at the apex of the system, commercial banks, merchants banks, development banks, community banks and the People's Bank of Nigeria.

The non-bank financial institutions also known as other financial institutions are those institutions, apart from banks, that help to perform the role of financial intermediation. They collect funds from the surplus unit under various titles, and go ahead to make the funds available to the investors who have need for such funds.

Development banks are specialised in lending to different sectors of the economy depending on government priorities.

Insurance and Pension Schemes aim to return the money borrowed to the policy holder.
Investment and Unit trusts buy shares and keep them for the benefit of the members.
For credit and co-operatives societies, they on-lend the money they get from their members to various other members for various purposes.
Finance companies use the money they get to lend to people wanting to buy capital goods over a period.

5.0 SUMMARY

In this unit, we have been able to compose all the functions of financial institutions of various types. Therefore, the institutions in the world has made possible, and of course, efficiently and effectively, a situation where the surplus money of savers could be mobilised to finance the worthy needs of reliable borrowers through these Financial Institutions discussed thus far.

6.0 Tutor-Marked Assignments

(TMA)

Q1 -Discuss the various roles that Commercial Banks play in the Nigerian Economy. Q2 -In which ways does a Merchant Bank differ from a commercial bank?

Q3 -What reasons justify the establishment of Development Banks in Nigeria?

Q4 -How many development banks do we have in Nigeria? Mention them and briefly discuss the major reasons for the establishment of each.

Q5 -Discuss the difference between the People's Bank of Nigeria and Community Banks in terms of ownership, geographical spread and customers served.

Q6 -Explain how the following institutions perform the role of the financial Intermediation.

- (a) Insurance Companies
- (b) Finance Companies
- (c) Discount Houses
- (d) NERFUND

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UNIT 6: THE CONTROL OF FINANCIAL INSTITUTIONS

CONTENTS

- 1.0. Introduction
- 2.0. Objectives
- 3.0. Definitions
 - 3.1 Central Bank of Nigeria .
 - 3.2 The Nigerian Deposit Insurance Corporation (NDIC)
 - 3.3 The Federal Ministry of Finance
 - 3.4 The Securities and Exchange Commission
 - 3.5 The National Insurance Commission
 - 3.6 The Federal Mortgage Bank of Nigeria
 - 3.7 The National Board for Community Bank
- 4.0 Conclusion
- 5.0 Summary
- 6.0 Tutor-Marked Assignments
- 7.0 References/Further Reading

1.0 INTRODUCTION

In the last unit, we have examined fully the functions of financial institutions. Now we have to look at the control of financial institutions in this unit. To ensure that good standards are maintained by the various operators within the financial system to check any excesses of these operators, and ensure a well-functioning and safety of the system, certain institutions are created by the Federal Government to regulate and oversee their activities. These institutions are the regulatory and supervisory authorities. The specific roles of these authorities will be discussed in this unit.

2.0 OBJECTIVES

At the end of this unit, we shall be able to:

- (i) identify the regulatory and supervisory authorities of the various Financial Institutions.
- (ii) examine how Central Bank of Nigeria controls the various Financial Institutions.
- (iii) specify the role of the Nigerian Deposit Insurance Corporation.
- (iv) assess the importance of the Federal Ministry of Finance incorporated.
- (v) explain the activities of the Securities and Exchange Commission (SEC).
- (vi) appreciate the role of the National Insurance Commission.
- (vii) illustrate the impact of the Federal Mortgage Bank of Nigeria.
- (viii) categorise the very essence of the National Board for Community Banks.

3.0 MAIN CONTENT

3.1 Central Bank of Nigeria

The Central Bank of Nigeria is the principal regulator and supervisor of the entire Nigerian Financial Institutions. The Central Bank of Nigeria stands at the apex of the banking system. It licenses, supervises and regulates the banks within the system in order to pursue an effective monetary policy and to control credit in the economy, the Central Bank uses the following weapons:

- * Open Market Operations
- * The Bank Rate
- * Moral Suasion
- * Special Directives

The CBN is charged with the responsibility for promoting a sound financial structure in Nigeria. To this end, the Bank acts as a banker to and supervisor of banks and other financial institutions by providing the following:

- * Bankers' Clearance
- * Banks' Examination
- * Foreign Exchange Monitoring
- * Prudential Guidelines
- * Acts as lender of the last Resort
- * Reserve Requirements
- * Cash Reserve Requirement
- * The Stabilisation Securities
- * Interest Rate Policy
- * Capital Funds Adequacy

STUDENTS ASSESSMENT EXERCISE

How does the CBN Control the Financial Institutions?

3.2 The Nigerian Deposit Insurance Corporation (NDIC)

The NDIC was established by Decree No. 27 of 19 June 1988. Although it is a special type of insurance company, it complements the efforts of the Central Bank in the regulation and supervision of banks. Specifically, NDIC performs the following functions:

1. Provision of deposit insurance of related services for banks.
2. Examination of the books and affair of insured banks and other deposit taking institutions to ensure a healthy operation.
3. Identification and restructuring of acting banks to avoid bank failures.
4. Settlement of the depositors of failed banks up to a maximum indemnity of N50,000.
Deposits in excess of this amount are to be settled along with other creditors as part of the bank liquidation process in the event of bank failure.
5. Resolution of the problem of distress in the Nigerian Financial system. In performing the above functions, the NDIC works hand-in-hand with the CBN. This regulatory body is meant to insure all deposit liabilities of licensed banks and other financial institutions.

STUDENTS ASSESSMENT EXERCISE

“It has been said that the existence of Nigeria Deposit Insurance Co-operation serves in itself to reduce the frequency of loss by depositors” Develop arguments to support this position and then examine the basic reasons behind the adoption of an insurance plan in Nigeria.

3.3 The Federal Ministry of Finance

This ministry acts as an agent of the government in the financial system. Its functions

- (1) Advising the government on its monetary and fiscal operations after consultations with the Central Bank of Nigeria.
- (2) Preparation of the Federal Government Budget and its break-down.
- (3) Licensing of bureau de change. It was also involved in the licensing of banks until 1991 when it became the sole responsibility of the Central Bank of Nigeria.
- (4) Carrying out related financial institutions as directed by the Presidency. Before the CBN was given more autonomy, the CBN was reporting to the Ministry of Finance.

3.4 The Securities and Exchange Commission (SEC)

This body is responsible for the regulation of capital market operations in Nigeria. It was established in 1979 by the SEC Act of 27 September 1979 to replace the capital issues

Commission that existed before then. The SEC Decree of 1988 further strengthened its activities. Its functions among others are as follows:

- * Promotion of an orderly and active Capital Market.
- * Determination of the amount and timing of securities to be offered privately with intent to transfer them later.
- * Registering and supervising stock exchange and branches stock brokers issuing houses investment advisers and other bodies involved in securities trading.
- * Approval of companies to be listed in the capital market.
- * Creating the necessary atmosphere for orderly growth and development of the capital market.
- * Approval and regulation of mergers and acquisitions vide the companies and Allied matters Decree 1990.
- * Issuance of guidelines on foreign investments, in the Nigerian Capital Market.
- * Maintenance of Surveillance over the Capital Market.

Students Assessment Exercise

In Nigeria, apart from the CBN, the financial system consists of bank financial institutions and non-bank financial institutions. Name the institutions in these groups and discuss the differences between them as well as their importance to the society.

3.5 The National Insurance Commission

The National Insurance Commission (NIC) was established in 1997. This body which was established by the president in his 1997 annual budget speech took over the Supervision and control of the business of insurance in Nigeria from the National Insurance Supervisory Board which was established by the Insurance Special Supervision Fund (Amendment) Decree No. 62 of 1992. This commission is the apex institution in the insurance industry. However, it collaborates with the Central Bank of Nigeria in performing its (NIC) functions. Prior to 1992, the insurance department of the Federal Ministry of Finance carried out the supervision of insurance companies and their operations.

The functions of the Nigerian Insurance Commission include among other things:

- (a) The supervision and control of insurance business in Nigeria.
- (b) Settings of standards for the conduct of insurance business.
- (c) Establishment of a bureau to receive and resolve public complaints against insurance companies and intermediaries.
- (d) Consideration and approval of insurance premium rates applicable to various classes of insurance. Now that the distress syndrome is affecting the insurance industry, this commission is expected to be involved in the resolution of distress in the industry.

3.6 The Federal Mortgage Bank of Nigeria

To help tackle the problem of housing which has been an issue of serious concern in most Nigeria cities, the Federal Mortgage Bank was established by Decree No. 7 of 1997. This new body took over the assets and liabilities of the Nigerian Building Society which was established in 1956. From inception, the bank has been functioning as one of the development banks. It provided both finance and advisory services in the area of housing. The regulatory and supervisory role of this institution became prominent from 1991. To help implementing the National Housing policy which was adopted in 1990 by the government, Decree No. 3 of 1991 gave more powers to the Federal Mortgage Bank of Nigeria to act as the apex Mortgage institution in Nigeria. Furthermore, in 1993, the finance functions of this institution were transferred to a new institution known as Federal Mortgage Finance Limited which was carved out of the bank. This is to enable the bank concentrate on its regulatory role. In this new position, the functions of the bank include:

- The Licensing supervision and regulation of primary Mortgage Institutions.
- Management of the National Housing Fund.
- Acting as a banker and adviser to other mortgage finance institutions who retail functions to individuals, organisations and estate developers.
- Carrying out researches aimed at improving housing patterns and standards in both urban and rural areas.
- Encouragement and promotion of the development of mortgage institution at states and national levels and provision of long-term finance for them (Ugwuanyi 1997).

3.7 The National Board for Community Banks

Following the introduction of a new set of self-sustaining banks called Community Banks in 1990, the National Board for Community Banks was established to serve as an apex institution for Community Banks. Like other supervisory bodies, its roles are performed in collaboration with the Central Bank of Nigeria. Specifically, the functions of the Board are:

- To receive and process application for the establishment for Community Banks and issuance of provisional license to Community Banks before their formal licensing by the Central Bank of Nigeria.
- To supervise and control the activities of Community Banks, provide them with long-term finance and set standards to ensure the safety of Community Banks

STUDENTS ASSESSMENT EXERCISE

- What is a Community Bank?
- What are the aims and objectives of Community Bank in Nigeria?
- Propose some operational strategies for Community Bank in Nigeria.

4.0 CONCLUSION

A Central Bank is the government's representatives in the financial system. It has a very close association with both the government and the financial sector of any Nigerian economy, advising the government on monetary policies and implementing the policies on behalf of the government. A Central Bank helps to control the Commercial Banks, Merchant Banks, Development Banks, Community Banks, Peoples' Bank, Finance Companies, Insurance Companies, etc. The effective implementation of regulatory measures will likely give earlier warning about the potential problems of Financial Institutions and hence provide financial regulations with more time to prevent failures.

5.0 SUMMARY

In this unit, we have succeeded in focusing exhaustively on the controls of Financial Institutions. This is very necessary for greater efficiency and effectiveness of the Financial Institutions.

6.0 TUTOR-MARKED ASSIGNMENTS

- Q.1 Certain institutions are created by the Government to ensure that good standards are maintained by the various operators within the Nigerian Financial System. Mention these institutions and briefly discuss how they maintain such standards.
- Q.2 As a supervisor in the Nigerian Financial System, what are the roles of the Nigerian Deposit Insurance Corporation (NDIC) and the Federal Ministry of Finance?
- Q.3 (a) What led to the establishment of National Board for Community Board?
(b) Discuss the role of the National Insurance Commission.

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