COURSE GUIDE

BUS 825
RESEARCH METHODOLOGY

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CONTENTS **PAGE**

INTRODUCTION

The importance research design and methodology has been recognised by the global business environment. It is becoming obvious that without research, planning and forecasts will be difficult to get by. This course will be an eye opener to business planners and researchers alike. There is a strong belief that research has not been put in its proper place, because the knowledge of research is scanty among students and business researcher especially in the developing world of today.

The course will also present some issues of critical importance in the writing of research proposals. The ethics in the research process has also been a serious issue in the research profession. To this end, the course highlights how ethical research can be put in place and how it can benefit all stake holders. The course highlights the problems of research in developing countries and suggests ways in which the problems can be approached.

COURSE AIM

This course is aimed at acquainting students with the practical aspects of research in humanities and social sciences. Its major focus is on the globally acceptable research process, including choice of research topic, choice of research design, data collection, data analysis, and statistical inferences. To ensure that this aim is achieved, such issues as research proposals, types of research designs, data presentation techniques, and related areas will be presented in detail.

COURSE OBJECTIVES

By the end of this course, you will be able to:

- define research process,
- select a researchable project topic,
- write a good research proposal,
- discuss the different types of research designs,
- define the meaning and types of sampling designs,
- examine the sample size for a given survey activity,
- write research questions and construct the corresponding questionnaires,
- explain the characteristics of a good questionnaire, and administer such questionnaire,
- select data, analyse them, and prepare the research report.

COURSE MATERIAL

The course material package comprises:

- the course guide
- the study units
- self-assessment exercises
- tutor-marked assignments
- references/further reading

STUDY UNITS

The study units are as listed below.

Module 1

Unit 1 Introduction to the Research Process

Unit 2 Essential Parts of a Research Project
Unit 3 The Research Proposal
Unit 4 Structuring and Evaluating a Research Proposal
Unit 5 Research Design

Module 2

Unit 1 Components of a Research Design
Unit 2 Overview of Data Collection, Variables, and Sample Selection
Unit 3 Sampling Design and Determination of the Sample Size
Unit 4 Research Questions and Questionnaire Design
Unit 5 Hypotheses and Hypothesis Testing I

Module 3

Unit 1 Hypotheses and Hypothesis Testing II
Unit 2 Data Presentation and Analysis
Unit 3 Presentation of the Research Report for Student Thesis
Unit 4 Ethics in Business Research
Unit 5 Problems of Research in Developing Countries

ASSIGNMENT FILE

Each unit of the course has a self-Assessment Exercise. You will be expected to attempt them as this will enable you understand the content of the unit.

TUTOR-MARKED ASSIGNMENT

The Tutor-Marked Assignments at the end of each unit are designed to test your understanding and application of the concepts learned. It is important that these assignments are submitted to your facilitators for assessments. They make up 30 percent of the total grading score for the course.

FINAL EXAMINATION AND GRADING

At the end of the course, you will be expected to participate in the final examinations as scheduled. The final examination constitutes 70 percent of the total grading score for the course.

SUMMARY

This course, BUS 825: Research Design and Methodology for Business Decisions, is ideal for today's business manager faced with the current global business environment. It will enable you research into business and policy problems, as well as set achievable goals. The course also enables the business manager make appropriate business plans. Having successfully completed the course, you will be equipped with the latest global approach to research proposals and research administration. I bet you will enjoy the course.

Good luck.

MAIN COURSE

CONTENTS **PAGE**

MODULE 1

UNIT 1 INTRODUCTION TO THE RESEARCH PROCESS

CONTENTS

1.0 INTRODUCTION

Unit 1 introduces you to the basic concepts of research. It presents important definitions which are required for the basic understanding of a scientific research process.

2.0 OBJECTIVES

By the end of this unit, you will be able:

- define research
- state what a research process is all about
- explain some basic research concepts such as variables and hypotheses.

3.0 MAIN CONTENT

3.1 Definitions of Research

Research can simply be defined as the process of arriving at dependable solutions to problems through planned and systematic collection, analysis and interpretation of data. Research is an important tool for advancing knowledge for promoting progress, and for enabling scholars to relate more effectively to the environment, to accomplish their objectives, and to resolve conflicts.

Research is often based on two types of definitions: conceptual definition and operational definition.

i. Conceptual definitions are definitions that describe concepts by using other concepts. As an example, a conceptual definition for "political violence" might be an "aggressive behaviour toward political institutions and persons occupying political roles." One conceptual definition of "intelligence" might be "the ability to think in an abstract manner." Another might be "the ability to solve problems."

ii. Operational definitions attempt to bridge the gap between the theoretical-conceptual level and the empirical-observational level. An operational definition involves a series of instructions describing the operations that must be carried out by a researcher in order to demonstrate the existence, or the degree of existence, of an empirical occurrence represented by a concept.

Many concepts in the social sciences and humanities are given operational definitions solely on the strength of reactions to specific situations, since manipulation of the property to be defined is often difficult. A research will often argue that a certain individual is "conservative" if he or she answers a series of questions in a specific manner. The assumption is that certain answers to specific questions represent particular personality patterns, one of which is "conservatism."

Research attempts to discover relationships existing among important variables. It is aimed at finding the condition under which a certain phenomenon of interest occurs and the conditions under which it does not occur in what might appear to be similar circumstances.

3.2 The Basic Research Concepts

We look at the two often used research concepts:

i. the variables; and,
ii. the hypotheses.

3.2.1 The Variables

A variable is an empirically applicable concept that takes on two or more values. Examples of empirically applicable concepts that are treated as variables include: "social class"; "expectations"; "tolerance;" "political participation;" and, "membership in organisations." For instance, social status may be symbolised by the letter "Y" and differentiated by at least five values such as: lower, lower middle, middle, upper middle, upper. Income may be symbolised by the letter "I" and graded with three values: low, medium, high. Income can also be graded by a series of numerical, for example, N100, 000, N250, 000, and N500, 000.

Observe that some variables have only two values. For example, if the empirically applicable concept is "sex", then its values can only take female and male. Other examples of two-valued variables are: Middle Class-Working Class, Student - Non student. These types of variables are often referred to as being dichotomous variables. Most variables investigated in the social sciences are however, not dichotomous. They are instead, characterised by a large number of values.

There are three common types of variables in scientific research, whether dichotomous or multi-valued. These are:

i. independent variables or predictor variables
ii. dependent variables or criterion variables
iii. control variables or test variables.

The variable that the researcher is interested in explaining is the dependent variable. The explanatory variables are the independent variables. An independent variable is the hypothesised cause of a dependent variable, and the dependent variable is the expected outcome of the independent variable.

The distinction between the above types of variables is analytic and relates to a particular purpose of research. An independent variable in one study may be a dependent variable in another. The decision to treat

a variable in terms of the above types of variables will depend on the objective of a given research. Nevertheless, after making a decision, the researcher has to be consistent in his or her classification throughout the research process.

You can illustrate the relationship between an independent variable and a dependent variable using a two-dimensional graph. Following the mathematical custom, X can be referred to as the independent variable and you can represent it by the horizontal axis, while Y, the dependent variable, can be represented by the vertical axis. The X-values are plotted on the X-axis, and Y-values on the Y-axis. For example, suppose that in a study of revenues obtained by a profitable business venture, you have two sets of measures: X which measures the number of units sold per sales period, and Y which measures the corresponding revenues from sales. Table 3.1 below presents some hypothetical data on the two measures, X and Y.

Table 1.1: Number of Units Sold of a Product and Revenue Obtained from Sales

Number of Units Sold (N'000s) (X)	**Revenue Obtained (Y)**
1	5
2	8
3	12
4	14
5	14
6	18
7	22
8	20
9	25
10	28

You can refer to table 3.1 as the revenue schedule. You can attempt plotting this schedule on the two-dimensional graph.

3.2.2 The Hypotheses

Hypotheses are regarded as tentative answers to research problems. They are usually expressed in the form of a relationship between independent and dependent variables. Hypotheses are said to be tentative because their validity are evaluated only after they have been empirically tested. When you, as a researcher, propose a hypothesis, you will lack assurance that it will be verified. Researchers construct a

hypothesis, and if it is rejected, they consider another hypothesis.
You can come up with a hypothesis either by deduction from theories, or directly from observations, or by intuition, or from a combination of these. The source of a hypothesis is of little significance compared with the way in which it can be rejected or accepted.

If hypotheses are rejected, there is a need to modify the theory from which they were deduced. The failure to reject hypotheses does increase the credibility of the theory. Where formal theories are not available for hypothesis deduction, hypothesis can be generated from conceptual frameworks. In such cases, the failure to reject a hypothesis may lead to the construction of a more systematic and rigorous theory.

3.2.3 Characteristics of a Researchable Hypothesis

For a hypothesis to be researchable, no matter its source, it must possess the following requirements:

i. The hypothesis must be clear: Clarity can be obtained by means of definitions. You require valid operational definitions for all the concepts in the research hypothesis. In the defining process, you should use professional literature and experts' opinions.

ii. Given that research in the social sciences is to some extent a social activity whose problems and methods tend to be affected by the milieu in which it takes place, you as the researcher must be aware of your values and make them as explicit as possible.

iii. The hypothesis must be specific: You must explicate the expected relations between the variables and the conditions under which these relations will hold. For instance, a hypothesis stating that "X is related to Y" is over generalised and will not allow concrete predictions. This is so because the relationship between X and Y can be positive or negative.

iv. For hypotheses to be researchable, you must make sure that there are methods available for testing them.

The scientific approach to research relies on the observations and methods employed in generating observations. This approach assumes that the world can be known only as experience is processed through human intelligence.

3.3 Basic Operation in Scientific Research Process

Scientific explanations in the research process, whether deductive or probabilistic, explicate the factors in a situation that are responsible for

the occurrence of a particular phenomenon. In practice, this involves four distinct operations.

i. **Demonstrating Co-variation:** Co-variation simply means that two or more phenomena (or variables) vary together. For example, if a change in the level of education is accompanied by a change in productivity (or income), one can say that education co-varies with productivity (income). In scientific research, the notions of co-variation are expressed through measures of relationships, commonly referred to as Correlations or Association. Thus, a correlation between variables is necessary evidence for a casual interpretation.

ii. **Eliminating Spurious Relations:** This operation requires the scientist to demonstrate that the observed correlation is non-spurious. A non-spurious relation is defined as a correlation between two phenomena (variables) that cannot be explained by a third factor. In other words, if the effect of all relevant factors is eliminated and the relation between the investigated phenomena is maintained, then the relation is non-spurious.

iii. **Establishing the Time Order of Occurrences:** This requires the researcher to demonstrate that one phenomenon occurs first or changes prior to another phenomenon. For example, studies have shown that the correlation between urbanisation and democratic development is non spurious. To establish that urbanisation is casually related to democratic development, it must also be demonstrated that the former precedes the latter.

iv. **Theorising:** Theory is viewed here as an interpretation of, or conceptual justification for, an observed co- variation. This interpretation specifies the casual nature of a co- variation by explicating the mechanism that connects the phenomenon under investigation.

3.4.1 The Research Process

The research process is the overall scheme of scientific activities in which research scientists engage. Seven principal types of activities are

enumerated below, each of which can be regarded as a process in the research process.

a. **Problem Identification:** A problem is an intellectual stimulus calling for a response in the form of scientific solution. The first stage in any research process is to identify the research problem(s).

b. **Statement of hypotheses about the identified problem(s):** Stimuli (or problems) that are too general or too abstract present difficulties in the investigation and therefore requires concretisation. This is attained by hypotheses. Hypotheses are regarded as tentative answers to researchable problems. The researcher breaks down a general problem into a set of concrete hypotheses and investigates each separately. Consider the problem, "What brings youth to universities?" This involves considerations such as the motivation to study, the individual's financial state, the social background of one's family, encouragement by peers, and one's academic achievements in secondary school. These five considerations generate five hypotheses:

i. The inclination to enrol at university increases with the motivation to study.
ii. An individual's financial state co-varies with his or her propensity to study at the university.
iii. Youth from relatively well - to-do families tend to enrol at universities.
iv. The greater the encouragement to study at university given by peers, the stronger the tendency to do so.
v. Academic achievement in secondary school co-varies with the tendency to study at university.

Each of these hypotheses can be tested by observation on the basis of which it will either be rejected or accepted. The rejection option is the characteristic feature of hypotheses and the reason for viewing them as tentative answers.

c. **Research Design:** A research design is the structure, program, and strategy upon which hypotheses are evaluated.

d. **Measurement:** Measurement can be defined as any procedure whereby observations are systematically assigned symbols. These symbols are amenable to logical, mathematical and statistical manipulations that reveal information that otherwise could not

have been revealed. Symbols can be added, subtracted, , expressed in percentage or introduced as subjects or objects in sentences, or employed as elements in graphs and diagrams.

e. Data Collection: This is the stage whereby observations are made and recorded. Data can be collected in several ways including field observations and survey (for primary data), and journals and publications (for secondary data). Any data collection method can also be used to gather information concerning different hypotheses.

f. **Data Analysis:** At this stage, all available data is analysed according to research objectives, research questions, and hypotheses. The analytical method to be used will depend basically on the type of research as well as the research design.

g. Empirical Generalisations: An empirical generalisation

is a statement asserting a universal connection between variables of interest. The logic whereby observations are transformed into empirical generalisation is referred to as induction. We may distinguish two types of inductive principles: one is the principle of enumeration in which inductive hypothesis is treated as being well established if it has not been refuted by experience. The other inductive principle is that of elimination, according to which an inductive hypothesis is taking to be well established if, while it has not been refuted by experience, alternative hypothesis have been so refuted.

SELF-ASSESSMENT EXERCISE

In a research process, discuss how the term ‘constant’ differs from a “variable”.

4.0 CONCLUSION

You have been informed on the theoretical definition of scientific research. You must have also learned about what variables are and what research hypotheses stand for.

5.0 SUMMARY

Research is based on two types of definitions: conceptual definition and operational definition. Conceptual definitions are definitions that describe concepts by using other concepts. Operational definitions

attempt to bridge the gap between the theoretical-conceptual level and the empirical-observational level. An operational definition involves a series of instructions describing the operations that must be carried out by a researcher in order to demonstrate the existence, or the degree of existence, of an empirical occurrence represented by a concept.

A variable is an empirically applicable concept that takes on two or more values. There are three common types of variables in scientific research, whether dichotomous or multi-valued. These are:

i. independent variables or predictor variables;
ii. dependent variables or criterion variables; and,
iii. control variables or test variables.

Hypotheses are regarded as tentative answers to research problems. They are usually expressed in the form of a relationship between independent and dependent variables. Hypotheses are said to be tentative because their validity are evaluated only after they have been empirically tested.

The research process is the overall scheme of scientific activities in which research scientists engage. Seven principal types of activities in the research process include:

i. Problem identification
ii. Statement of hypothesis about the identified problem
iii. Research design
iv. Measurement
v. Data collection
vi. Data analysis
vii. Empirical generalisation.

6.0 TUTOR-MARKED ASSIGNMENT

Enumerate the activities necessary in a scientific research process, and explain why they are important.

7.0 REFERENCE/FURTHER READING

Nachimias, D. & Nachimias, C. (1976). *Research Methods in the Social Sciences*. New York: Martin's Press.

UNIT 2 ESSENTIAL PARTS OF A RESEARCH PROJECT

CONTENTS

1.0 INTRODUCTION

In this unit, you will be introduced to the necessary parts of a research projects. The unit will be mostly beneficial for beginners and those involved in undergraduate and postgraduate thesis.

2.0 OBJECTIVES

By the end of this unit, you will be able to:

- describe the preliminaries of research
- state the guidelines for selecting a research topic
- discuss what research proposals are all about
- state the purpose and significance of a research.

3.0 MAIN CONTENT

3.1 Choice of Research Topic

To most students, the most difficult aspect of a research project or dissertation is the choice of a research topic. Some students abandon a chosen topic after many hours of exploration, while others continue even though the research problem is unsuitable and end up having nothing worthwhile but the satisfaction of having met another requirement for the award of a degree.

3.1.1 Sources of Research Topics

You should be guided by the following sources of research topics while choosing your individual dissertation topic:

i. **Observations and experience:** A research topic can evolve from personal experiences and observation of a set of problems. Such incidents as fire outbreak, theft, loss of sales, business distress and the like, are prospects for research topics.

ii. **Review of literature:** Literature is one of the major sources of research topics. A review of literature on subjects of interest can reveal several important issues and problems that call for research. Topical discussions in classroom subjects can also present excellent opportunities in the choice of a research topic.

iii. **Previous research projects:** As part of their recommendations, many past research projects often make recommendations for future research. These recommendations are also excellent sources of research topics.

iv. **Theories:** These are propositions explaining certain phenomena, such as the theory of demand and supply. The propositions here are good sources of research topics.

3.1.2 Guidelines for Selecting a Research Topic

Although there are no standard rules that will ensure the suitability of a research problem, a number of suggestions can be made as guides in the choice of a research topic.

1. The topic must be of personal interest to the researcher.
2. The topic should be sufficiently original that it does not involve objectionable duplication.
3. The topic must be researchable.
4. The topic must be significant. The topic must be capable of contributing to existing knowledge.
5. The research into the problem must be feasible. The research should ensure that data are available.
6. The topic must be consistent with the researcher's competence, interest and circumstance.

3.1.3 Suggested Useful Questions in the Choice of a Research Topic

The followings are useful questions that will aid in the choice of a research topic.

1. In your field of interest, what practical problems do you think have to be met by those individuals doing the actual work?
2. What problems are under active attack in the recent research?
3. What facts, principles, generalisations and other findings have resulted from research in your field?
4. What practical implication for school, work can you draw from the results?
5. To what extent have the findings of research actually been applied to your field?
6. What problems remain to be subjected to research and what problems are now emerging?
7. What are the difficulties to be met in prosecuting the research yet to be conducted in your field?
8. What are the relationships between research in your field and research in adjacent field?
9. What research techniques or procedures have been developed in your field?
10. What concepts are being operative, either explicitly or implicitly in the research in your field?
11. What assumptions have been implicit in the research in you field?

3.2 Research Proposal

A research proposal is analogous to the plans and specifications, which precedes the construction of a building. The whole must be envisaged and each detail must be conceived. A research proposal should contain the following parts:

a. **Title:** The title of the research (or research topic) comes first in the proposal. The choice of terms in the title should help to indicate the scope of the research.

b. **Introduction:** This serves as the backbone of the research. Here, the researcher explains how he or she became interested in the problem and how he or she felt the study is important, establishes the need for the study and identifies its purpose.

c. **Statement of the problem:** The statement of the research problem should elaborate upon the information implied in the title of the research. The problem statement should be brief and in specific terms.

Research problem can take one of the following forms.

i. An unsatisfactory state of affairs – state that arises due to deviations from expectations.
ii. An unanswered question – those questions demanding some answers constitute research problems.
iii. A missing link – a gap in the implementation process.
iv. An unsatisfied need – existence of need yet to be satisfied constitutes a research problem.
v. Organisational imbalance – imbalance in the development and provision of facilities in an organisation can constitute a problem.

The points to be borne in mind in stating a research problem are that the researcher should:

i. Know what a problem is
ii. Tell the reader what the research problem is all about;
iii. Learn and adopt certain characteristics of problem statements.

d. Purpose of research: The purpose of the research should be a quick overview of the research itself. The purpose should be written in clear and concise manner, indicating the important aspects of the research.

e. Hypotheses: This may or may not be included in the proposal, depending on the type and nature of the research. Hypotheses are usually incorporated if statistical testing is to be used. If needed, the hypothesis should be stated as null hypothesis – a statement that no significant relationship between the variables exists.

Notice that a hypothesis is an informed, intelligent guess about the solution to a problem. It is a proposition whose validity needs to be established.

Importance of hypotheses

The formulation and the use of hypotheses in research:
i. provides a guide and direction to the research.
ii. draws the attention of the researcher to the important aspects of the problem under investigation.
iii. provides a framework for drawing conclusions.

Types of hypotheses

There are basically two types of hypotheses in social science research.

i. **Research hypotheses:** These are often referred to as non-parametric hypotheses. They are postulation about the relationships between two or more variables that are of critical interest in the solutions of the research problem. Research hypothesis does not express the variables in measurable terms.

ii. **Statistical hypotheses**: These hypotheses, often referred to as parametric hypotheses, are propositions about statistical population which is to be verified on the basis of data collection from a sample of the given population. These hypotheses express the relationship between two or more variables in statistical and measurable terms.

Sources of hypotheses
Sources of hypotheses include:

i. experience
ii. literature
iii. theory
iv. previous findings.

Characteristics of good hypotheses

A good hypothesis should be:

- testable
- a statement of an expected relationship between two or more variables
- plausible
- consistent with current knowledge
- unambiguous.

f. **Significance of the research:** This should contain the importance and usefulness of the research.

g. **Scope and limitations of the research:** The scope of the research sets forth the exact bound of the topic being researched. Scopes are restrictions imposed on the research by the researcher himself. Limitations are restrictions imposed on the research by the nature of the research itself. These limitations serve as constraints to the research and can affect the result of the study.

h. Definition of terms: Terms that have unique use in the study should be defined in the research proposal.

i. Review of related literature: The review of literature serves two purposes in the research report:

- to set the theoretical base for the research
- to set the current research into perspective to show "the state of the art".

The review of related literature should be in an organised form, with appropriate sub – heads to indicate the areas or topics covered. Authors must be appropriately cited with the correct referencing format. (For acceptable reference formats, see Onwe, O.J. (1998): 77 – 78).

j. Research design: This is a plan or blueprint specifying how data relating to the research will be collected and analysed. It provides the procedural outline for the research. The design:

- provides the researcher with the necessary framework for tackling a particular research problem
- helps in the proper delineation of the scope and limitations of the research.
- acquaints the researcher with the potential problems in the execution of the research.

k. Presentation and analyses of data: This is where the research data is presented and analysed for possible inferences. This is a chapter on its own and has three important sections:

- presentation and analysis of data according to the responses to the research questions
- presentation and analysis of data on test of hypotheses
- presentation and analysis of other relevant data.

Data must be presented objectively, awaiting editorial comments or conclusions about what the data shows. The Analytical Tables should be presented with appropriate numbering, titles and sources.

l. Summary of findings, recommendations and suggestion for future research: The summary serves as a synopsis which many readers will read first in order to determine if the research is worth further readings. The procedures should be summarised in general terms with only enough detail given for the reader to obtain a general picture of what was done.

Recommendations are made based on the research findings. Most research studies seem to raise more questions than they answer and these questions lead to recommendations for future research.

m. **Abstracts:** The abstract is a brief summary of the research, usually about 100 words in length or one page. It should give information on the research problem that was studied, the research methodology, the results and the major conclusions.

A good abstract should have approximately four paragraphs made up of:

1. Two or three statements or sentences about the problems and objectives of the research.
2. Two or three statements or sentences about the research method that was used.
3. Two or three statements about the research findings.
4. Two or three statements or sentences about the recommendations and conclusions based on the research findings.

SELF-ASSESSMENT EXERCISE

Discuss briefly the guidelines for selecting a research topic.

4.0 CONCLUSION

This unit has exposed you to the basic activities in carrying out a dissertation work. You also learned how to choose a research topic, including the guidelines for choosing a research topic. You need however, to be always guided by your supervisor. Avoid being forced to choose a research topic you are not interested in.

5.0 SUMMARY

The choice and approval of a research topic can be difficult tasks. To ease off the task, you can look at the sources of research topics including:

i. observation and experience
ii. review of literature
iii. previous research work
iv. theories.

Though there has been no standard rule for choosing a research topic, experience has given the following guideline, among others:

i. the topic must be of personal interest to the researcher.
ii. the topic should be sufficiently original that it does not involve objectionable duplication.
iii. the topic must be researchable.

A research proposal is analogous to the plans and specifications, which precedes the construction of a building. The whole must be envisaged and each detail must be conceived.
A good hypothesis should be:

(a) testable
(b) a statement of an expected relationship between two or more variables
(c) plausible
(d) consistent with current knowledge
(e) unambiguous.

6.0 TUTOR-MARKED ASSIGNMENT

Choose three different research topics and discussed briefly your considerations or reasons for choosing them.

7.0 REFERENCE/FURTHER READING

Onwe, O. J. (1998). *Elements of Project and Dissertation Writing: A Guide to Effective Dissertation Report*. Lagos: The Impressed Publishers.

UNIT 3 THE RESEARCH PROPOSAL

CONTENTS

1.0 INTRODUCTION

This unit seeks to inform you about the purpose of a research proposal and how it can be used by you as a researcher and management decision maker. You will also learn about the different types of research proposals.

2.0 OBJECTIVES

By the end of this unit, you will be able to:

- state the purpose of a research proposal
- describe the content and types of research proposals
- describe how you can evaluate the quality of a research proposal.

3.0 MAIN CONTENT

3.1.1 Purpose of Research Proposal

A proposal is generally looked at as an individual's or group of individuals' offer to render a service to a potential sponsor. The objectives of a business research proposal are to:

1. Present the management or research question to be answered through research and explain its importance.
2. Discuss the research efforts of others who have worked on related management questions.

3. Suggest the data necessary for solving the management question and suggest ways in which the data can be obtained, treated, and interpreted.

In presenting your research proposal, you should make your research plan clear and simple. You should also present your services and credentials in the best possible way to encourage the acceptance of your proposal among competing proposals. A proposal is often referred to as a work plan, prospectus, outline, statement of intent, or draft plan. The proposal tells you what, why, how, where, and to whom the research will be done. The benefits of the research must also be made clear to the sponsor.

Note that the more inexperienced a researcher is, the more important it is to have a well-planned and adequately documented proposal. The research proposal is essentially a road map, showing clearly the location from which a journey begins, the destination to be reached, and the method of getting there. A well-prepared research proposal would include potential problems that may be encountered along the way and methods for avoiding or working around them.

3.2 Benefits of the Research Proposal to the Sponsor

A research proposal allows the sponsor to assess the sincerity of the researcher's purpose, the clarity of his or her research design, the extent of his or her relevant background material, and fitness for undertaking the project. Depending on the type of research and the sponsor, various aspects of a standard proposal design are usually emphasised. The proposal displays the researcher's discipline, organisation, and logic. It therefore allows the sponsor of the research to assess both the researcher and the proposed research design, to compare them against competing proposals on current organisational, scholastic, or scientific needs, and to make the best selection for the project.

Comparison of the results of the research project is one of the first steps in the process of evaluating the overall research. By comparing the final product with the stated objectives, it will be easy for the sponsor to decide whether the research goal, that is, a better decision on the management question, has been achieved.

It has been observed that many managers, requesting research from an in-house, departmental research project, appear not to be adequately knowledgeable on the problem they are addressing. The research

proposal acts as a catalyst for discussion between the person conducting the research and the manager. It is the role of the researcher to translate the management question, as described by the manager, into research question and to outline the objectives of the study. Upon review of the researcher's translation of the management question, the manager may discover that the interpretation of the problem does not reflect all the original symptoms. The proposal thus serves as the basis for additional discussion between the manager and the researcher till all aspects of the management question are clear and understood. It may be discovered that parts of the management question are not researchable, or not subject to empirical analysis. This then calls for an alternative design, such as qualitative or policy analysis study. The discussions will enable the sponsor and the researcher to agree on a carefully worded research question. In figure 3.1 below, you observe the proposal development process. The figure reveals that proposal development can work in an iterative way until the sponsor authorises the research to take off.

For most outside research contracts, the process appears to be different. In this case, you will submit the proposal in response to the request for bid or request for proposal (RFP). In this case, you will need to convince the sponsor that your approach to the research question differs from that indicated by the management question specified in the initial RFP. By so doing, you will show superior understanding of the management dilemma compared to other researchers with competing proposals.

3.3 Benefits of the Research Proposal to the Researcher

A proposal can be more beneficial to the researcher than to the sponsor. The act of writing a proposal encourages the researcher to plan and review the logical steps in the research project. The related management and research literature reviewed by the researcher in developing the research proposal prompts the researcher to assess previous approaches to similar management questions and revise the research plan accordingly. In addition, developing the proposal offers the researcher the opportunity to discover flaws in the logic, errors in assumptions, or even management questions that may not be adequately addressed by the objectives and design of the research project.

A thorough proposal process reveals all possible cost-related activities, thus allowing accuracy in cost estimates. Many of these cost-related activities are related to time, so that, a proposal benefits the researcher by forcing a time estimate for the project. The time and cost estimates encourage the researcher to plan the project so that work can progress steadily toward the deadline. Since human beings are often inclined to

procrastinate, having a time schedule helps them work methodologically toward the completion of the research project. You need to be guided by the fact that a poorly planned, poorly written, or poorly organised proposal can damage a researcher's reputation more than the decision not to submit a proposal.

3.4 Types of Research Proposals

Research proposals are often classified into those that are generated for internal audience and those generated for external audiences. An internal proposal is done by staff research specialists or by the research department of a given business organisation.

External proposals sponsored by university grant committees, government agencies; government contractors, not-for-profit organisations, or corporations can be further classified as either solicited or unsolicited. The larger the project, the more complex will be the proposal. In a public sector project, the complexity is generally greater than in a comparable private-sector project. Three general levels of complexity have been noted as follows:

i. exploratory studies, ii. small-scale studies, iii. large-scale studies.

An exploratory study generates the simplest research proposal. The more complex and common in business is the small-scale study. The large-scale professional study is the most complex proposal.

3.4.1 Internal Proposals

Internal proposals are regarded as being more succinct than external proposals. A three-page memo from the researcher to management, outlining the problem statement, study objectives, research design, and schedule is good enough to start an internal exploratory research. Privately and publicly operated businesses are usually concerned with how to solve a particular problem, make a decision, or improve an aspect of the business. Regardless of the intended audience, in the small- scale proposal, the literature reviews are not stressed and can be stated briefly in the research design. An executive summary is not mandatory for a small-scale internal research proposal. For funds to be committed however, it is necessary to provide time schedules and budgets for internal small-scale proposals.

3.4.2 External Proposals

An external proposal is either solicited or unsolicited. A solicited proposal is usually in response to a research need. Such proposal is likely competing against several other proposals for a grant. An unsolicited proposal represents a suggestion by a contract researcher for a research that might be done. An example is that of a consulting firm that proposes an omnibus study to a given trade association to address a problem arising from a change in the cultural or political-legal environment.

An unsolicited proposal has the advantage of not having competitors, but the disadvantage of having to speculate on the ramifications of a management dilemma facing an organisation's management. The writer of an unsolicited proposal must decide to whom the proposal should be sent, which can be a problem. Unsolicited proposals are time-sensitive, so that the window of opportunity is likely to close before a redirected proposal finds its appropriate recipient.

The most important parts of an external proposal are the objective, the design, qualifications, time schedule, and the budget. Note that in contract research, the results and objectives sections are the standards against which the completed project is measured. As the complexity of the project increases, more information will be required about the project management and the facilities and special resources.

Before leaving this unit, take a little time to look at table 3.1 below. Compare the proposal modules that have been suggested for each type of study. This will most likely improve your understanding of research proposals.

Table 1.2: Proposal Modules: A Comparison of Management-Oriented Proposals and Student Proposals.

Proposal Type/ Proposal Modules	Management						Govt	Student		
	Internal			External						
	Exploratory Study (ES)	Small Scale Study (SS)	Large Scale Study (LS)	ES	SS	LS	LS Contract	Term Paper	MS Thesis	PhD Thesis
Executive Summary		√	√	√	√	√	√			
Problem Statement	√	√	√	√	√	√	√	√	√	√
Research Objectives	√	√	√	√	√	√	√	√	√	√
Literature Review			√			√			√	√
Benefits of Study			√	√	√	√	√			√
Research Design	√	√	√	√	√	√	√		√	√
Data Analysis						√	√			√
Nature and form of Results		√	√		√	√	√		√	√
Qualification of Researchers				√	√	√	√			
Budget		√	√		√	√	√			
Schedule	√	√	√	√	√	√	√			√
Facilities a n d Special Resources			√	√	√	√	√		√	√
Project Management			√			√	√			
Bibliography			√			√	√	√	√	√
Appendices			√			√	√		√	√
Measurement			√			√	√			√

SELF-ASSESSMENT EXERCISE

Discuss briefly the qualities of an acceptable research proposal.

4.0 CONCLUSION

This unit has exposed you to the basic requirements of good research proposals. You learned about different types of proposals and their degrees of importance both to the research sponsor and the researcher. You also learned about the process of a proposal development and a check list on proposal modules. The check list serves as a guide to the requirements of acceptable research proposals.

5.0 SUMMARY

A proposal has been defined as an individual's or group of individuals' offer to render a service to a potential sponsor. The objectives of a business research proposal are enumerated as follows:

i. To present the management or research question to be answered through research and explain its importance.
ii. To discuss the research efforts of others who have worked on related management questions.
iii. To suggest the data necessary for solving the management question and suggest ways in which the data can be obtained, treated, and interpreted.

A research proposal allows the sponsor to assess the sincerity of the researcher's purpose, the clarity of his or her research design, the extent of his or her relevant background material, and fitness for undertaking the project. The research proposal displays the researcher's discipline, organisation, and logic.

Research proposals are often classified into those that are generated for internal audience and those generated for external audiences. An internal proposal is done by staff research specialists or by the research department of a given business organisation. External proposals sponsored by university grant committees, government agencies; government contractors, not-for-profit organisations, or corporations can be further classified as either solicited or unsolicited. The larger the project, the more complex the proposal.

6.0 TUTOR-MARKED ASSIGNMENT

How does internal research proposal differ from an external research proposal?

7.0 REFERENCE/FURTHER READING

Cooper, D. R. & Schindler, P. S. (2001). *Business Research Methods*. New York: McGraw-Hill.

UNIT 4 STRUCTURING AND EVALUATING A RESEARCH PROPOSAL

CONTENTS

1.0 INTRODUCTION

Unit 4 presented you with the basic principles of research proposals. In unit 5, we introduce you to the best practice in structuring and evaluating a research proposal. The idea is to help you develop, write, and present an acceptable research proposal.

2.0 OBJECTIVES

By the end of this unit, you will be able to:

- describe how an acceptable research proposal can be structured
- discuss the necessary parts of a research proposal
- state how to impress a research sponsor and win a research grant.

3.0 MAIN CONTENT

3.1 Structuring the Research Proposal

Using table 3.1 of unit 4 as a reference point, you can design a set of modules that tailors your research proposals to the intended audience. Each of the following modules is flexible so that, the content and length may be adapted by you to specific needs. These modules include:

i. executive summary
ii. problem statement
iii. research objectives
iv. literature review
v. relevance/importance of the research
vi. the Research design and methodology
vii. data analysis
viii. the nature and form of the results
ix. qualifications of the research crew
x. the budget

3.1.1 The Executive Summary

The aim of executive summary is to allow a busy manager or sponsor to quickly understand the thrust of the research proposal. The summary represents essentially an informative abstract, giving executives the opportunity to grasp the essentials of the proposal without reading the details. Another aim of the executive summary is to secure a positive evaluation by the executive who passes the proposal on to his or her staff for a full evaluation. The executive summary should therefore include the following:

i. brief statement of the management dilemma and management question,
ii. the research objectives;
iii. the research questions; and,
iv. the benefits of your research and your approach.

If the proposal is unsolicited, a brief description of your qualifications will also be appropriate.

The research question appears to be at the heart of your case for research sponsor. The question that shapes what you present here would be: What is your core intellectual agenda? What is the research question that your proposal aims at answering and what is the significance of the

research question? Is the research valuable to anyone? Who are the beneficiaries or 'end users' of the research?

3.1.2 Problem Statement

A well thought problem statement will convince the sponsor to continue reading the proposal. You need to capture the reader's interest by stating the dilemma at hand, its background, its consequences, and the resulting management question. You need to emphasise the importance of answering the management question. You should also mention any restrictions or areas of the management question that will not be addressed.

You must be sure the problem statement is clear without the use of idioms. The problem statement should enable the sponsor understand the management dilemma and the question, its significance, and why something should be done to change the status quo.

3.1.3 Research Objectives

The research objectives should address the purpose of the investigation. They are aimed at laying out exactly what is being planned by the proposed research. In a descriptive type of research, the objectives can be stated as the research question. If the proposal is for a causal type of study, the objectives can be restated as hypothesis. The objectives module should flow naturally from the problem statement so as to give the research sponsor specific, concrete, and achievable goals. The objectives should be listed either in order of importance or in general terms first, followed by specific terms (or research question followed by underlying investigative questions.

The research objective is usually the basis for judging the rest of the proposal and, ultimately, the final report. You should verify the consistency of the proposal by checking to ensure that each objective is discussed in the research design, data analysis, and results modules or sections.

3.1.4 Literature Review

The literature review module examines the recent research studies, company data, or industry reports that act as basis for the proposed study. You need to begin your presentation of the related literature and relevant secondary data from a comprehensive perspective, moving to more specific studies that are associated with your problem statement. If

the problem being addressed has a historical background, begin with the earliest References/Further Reading.

Try to avoid the extraneous details of the literature. A brief review of the information is enough. You must always refer to the original source of the literature information. If you discover something of interest in a quotation, find the original publication and ensure that you understand it. This will enable you avoid errors of interpretation or transcription. Try to emphasise the importance of results and conclusions of other studies, the relevant data and trends from previous research, and particular methods or designs that could be duplicated or should be avoided. You have to present how the literature applies to study you are proposing; you can show the weaknesses or faults in the design, presenting how you would avoid similar problems. If your proposal deals specifically with secondary data, discuss the relevance of the data and the bias or lack of bias associated with it.

You should end the literature module by scrutinising the important aspects of the literature and interpreting them in terms of the identified problem. Refine the problem as is needed in light of your findings from the literature review.

3.1.5 Relevance/Importance of the Research

This module describes the explicit benefits accruing from your research. The importance of doing the study now needs to be emphasised. The module requires your understanding of what is most troubling to your sponsor. If it is a potential union unrest, for example, you cannot promise that an employee survey will prevent a union unrest. All you can do is to show the importance of the survey information, as well as its implications. This importance will more than likely allow the management respond to employee concerns and initiate a linkage between those concerns and union unrest.

3.1.6 The Research Design and Methodology

At this point, you must have let the sponsor understand what the problem is, what your study goals are, and why it is important for you to carry out the study. You must have been also satisfied that you have made robust argument outlining the need for your particular research question to be answered, and you have articulated what is intellectually the best approach to seeking the answer. It is now time to present the design and methodology module. This describes what you are going to do in technical terms. This module should be made up of as many

subsections as is needed to show the phases of the project. You should provide information on your proposed design for such tasks as sample selection and sample size, data collection method, instrumentation,

procedures, and ethical requirements. You need to clearly explain what you propose to do and why you propose to do it.

You must set out clearly what you consider will be the best methodological approach to seeking the answers to your research question. Will your proposed methodology be primarily quantitative or qualitative? Will your research involve working in the field? When more than one methodology exists to approach the design, discuss the methods you have rejected and why the approach you selected is superior.

3.1.7 Data Analysis

This module involves a brief on the method used for analysing the data, especially for a large-scale contract research projects or doctoral thesis. If the project is a small project, you would include the proposed data analysis within the discussion of the research design. You need to describe the way you will handle the data and the theoretical basis for using your selected techniques. This presentation will assure the sponsor that you are following correct assumptions as well as using theoretically sound procedure for data analysis.

The data analysis module is so important to evaluating contract research proposals that the researcher should contact an expert to review the latest techniques available for use in the particular research project and compare this to your proposed techniques.

3.1.8 The Nature and Form of the Results

This module will enable the sponsor to go back to the statement of the management question and research objectives and perhaps discover that each of the research goals has been covered. In this module, you are required to specify the types of data to be obtained and the interpretations that will be made in the analysis. If the data are to be released to the sponsor for proprietary reasons, you should make sure this is reflected.

The module also contains the contractual statement telling the sponsor the types of information to be received. Statistical conclusions, applied findings, recommendations, action plans, models, strategic plans, and the like are examples of what we refer to as forms of results.

3.1.9 Qualifications of the Research Crew

This module should begin with the principal investigator followed by similar information on all individuals involved with the project. The two critical elements here are:

i. professional research competence including relevant research experience, the highest academic degree held, and membership in business and technical societies; and,
ii. relevant management experience.

Giving so many competing individual researchers, research specialty firms, and general consultancies providing research services, the sponsor will like to be assured that the researcher(s) is or are professionally competent. Past research experience has been noted as the best barometer of competence, followed by the highest academic degree earned. In documenting relevant research experience, you as a researcher should present a concise description of similar projects that you undertook. Highest degree usually follows your name for example, Onyemaechi Onwe, PhD in Economics). Society or association memberships provide some evidence that the researcher is knowledgeable on the latest methodologies and techniques. Membership in the West African Research and Innovation Management Association (WARIMA) is a good one.

Highly established and well-known research institutes and companies do sometimes subcontract specific research activities to firms or individuals that specialise or offer specific resources or facilities. This is especially the case for studies involving quantitative research techniques such as econometric techniques of data analysis, or those involving qualitative techniques such as in-depth personal interviews and focus groups. You can provide brief profiles of these institutes or companies in this module only if you believe their inclusion will enhance your research credibility.

3.1.10 The Budget

You need to present the budget in the form requested by the sponsor. The first and foremost thing to know is your sponsor or funder. Read the sponsor's guidelines on what may or may not be included in costing of a project. Some sponsors will allow equipment, other will not. Some will allow a certain percentage of the budget to be claimed as indirect costs and others will not. Some sponsors require secretarial assistance to be individually budgeted for. Others insist it should be included in the research director's fees or the operation's overhead.

An effective budget should typically not be more than two pages. Table 3.1 below is an example of a format that can be used for a small contract research project. It is advisable to put additional information, backup details, and hourly time and payment calculations into an appendix if required or kept in your file for future reference.

The budget statement in an internal research proposal will be based on employee and overhead costs. Budget presented by an external research organisation is not just the wages and salaries of its employees but sometimes the person-hour price that the contracting firm charges. External research firms avoid giving detailed budget for fear of the possibility of disclosing their costing practices publicly. They fear this would reduce their flexibility in negotiating contracts.

It is extremely important that you try to retain all information you used in generating the research budget. If you used quotes from external contractors, get the quotation in writing. If you estimated time for interviews, keep explicit notes on how the estimate was made.

Table 1.3: Sample Research Proposal Budget

Budget Items	**Rate**	**Total Days**	**Charge**
A. Salaries: 1. Research Director, Joseph Onwe 2. Associate 3. Research Assistants (2) 4. Secretarial (1)	 N2000/day N1000/day N200/day 100/day	 20 days 10 days 60 days 20 days	 N40,000 N20,000 N12,000 N2,000
		Sub-Total	**N74,000**
B. Other Costs: 5. Employee Services & Benefits 6. Travel 7. Office Supplies 8. Telephone 9. Rent 10. Other Equipment 11. Publications and storage Costs			 - N10,000 N2,500 N4,000 - - N1,500
		Sub-Total	**N18,000**
C. Total of Direct Costs			**N92,000**
D. Overhead Support			**N20,000**
		TOTAL FUNDING REQUESTED	**N112,000**

3.1.11 Schedule

A research schedule needs to include the major research phases, their time table, and their milestones signifying completion of a phase. Major phases, for example, may be as follows:

Phase 1	exploratory interview	Phase 2	final research proposal
Phase 3	questionnaire revision	Phase 4	field interviews
Phase 5	editing and coding		
Phase 6	data analysis		
Phase 7	report generalisation		

You should have an estimated time schedule for each of these phases. You need to have also the people assigned to complete each phase.

If the research project is large and somehow complex, it will be helpful for you and your sponsor to chart your chart your schedule using the critical part method (CPM). As you can observe from Figure 3.1 below, in a CPM chart, the nodes represent major milestones and the arrows suggest the activity needed to get to the milestone. More than one arrow pointing to a node will indicate all those tasks that must be completed before the milestone can be reached. A number is usually placed along the arrow showing the number of days, weeks or months required for that task to be completed. The pathway from start to the end take takes the longest time to complete is referred to as the critical path, because any delay in an activity along that path will delay the completion or end of the entire project.

Note that there are currently software programmes that are designed for project management are available for installation in personal computers and laptops. Your ICT department can help.

The Milestones:

3	Proposal approval
7	Interview completed
9	Final report

Critical Path
Start – 1 – 3 – 4 – 7 – 8 – 9 – **End**
Completion Time: 6 + 10 + 3 + 8 + 8 + 4 + 1 = **40 working days**

3.4 Facilities and Special Resources

Research projects often require special resources and facilities. You need to describe these in detail. For instance, a contract exploratory study may require specialised facilities for focus group sessions. Computer assisted telephone or other interviewing facilities may be needed. Your proposed data analysis may require sophisticated computer algorithms, and therefore, requiring your access to an adequate computer system. These requirements vary depending on the nature and complexity of the study. The proposal should therefore, contain the list of relevant facilities and resources that you will use for effectiveness. The costs for such facilities should be detailed in your budget.

3.5 Project Management

The aim of this module is to prove to the sponsor that the research team is organised in a way to carry out the project effectively and efficiently. For complex research projects, you would require a master plan, showing how all the phases will be brought together. Suggested inclusions of the master plan are:

i. the research team's organisation,
ii. management procedures and controls for executing the research plan,
iii. examples of management and technical reports,
iv. the research team's relationship with the sponsor,
v. financial and legal responsibility,
vi. management competence.

It is most helpful for you to use tables and charts in presenting the master plan. If several researchers are part of the team, you need to indicate the relationships between the researchers and their assistants. Sponsors are interested in knowing that the research director is an individual capable of leading the team and acting as a useful liaison to the sponsor.

Note in addition that procedures for information processing, record control, and expense control are critical to large operations. You need to show these as part of the management procedures. You need to record the type and frequency of progress reports. The sponsor would like to be kept up-to-date. You need also to delineate the sponsor's limits to control during the research process.

In this module, you should also discuss any details such as printing facilities, clerical help, or information-processing capabilities to be provided by the sponsor, rather than you as the researcher. Payment frequency and timing should be covered by you in the master plan. You need to provide proof of financial responsibility and overall management competence in the master plan.

3.6 Bibliography and Appendices

A bibliography is necessary for all research projects requiring a literature review. You must use the bibliography format required by the sponsor. If the sponsor did not specify any, you should consult a standard style manual which will give you the necessary details for preparing the bibliography. You need to provide an appendix, in the form of glossary of terms, when you have many words that are unique to your particular research topic and are not easily understood by the general management community.

This glossary should consist of terms and definitions. Any acronym used by you should be defined. The appendix should also contain samples of your proposed measurement instruments. This will enable the sponsor to be able to discuss particular changes in one or more of the instruments. You can also include any detail that reinforces the body of the proposal. This may include your curriculum vitae, profiles of firms or individuals to which the project may be subcontracted, budget details, and extended descriptions of special facilities or resources.

3.7 Evaluating the Research Proposal

Research proposals are usually subject to formal or informal reviews. Formal reviews are regularly done for solicited proposals. The formal review process typically includes:

i. Development of review criteria, using the request for proposal (RFP) guidelines.
ii. Assignment of points on each criterion, using a universal scale.
iii. Assignment of a weight for each criterion, based on the importance of each criterion.
iv. Generation of a score for each proposal, representing the sum of all weighted criterion scores.

It is the sponsor who assigns the criteria, the weights, and the scale to be used for scoring each criterion before receiving the proposals. The proposal is evaluated with this checklist of criteria. Points reflecting the

sponsor's assessment of how well the proposal meets the company's needs are recorded for each criterion. Points such as 1 through 10, with 10 being the highest number of points assigned to the best proposal for a particular criterion. After the review, the weighted criterion scores are then added to get a cumulative total. It is the proposal with the highest number of points that will win the research contract.

It is worth noting that, in practice, many factors do contribute to the acceptance and funding of a research proposal. Beyond the required modules as discussed above, other factors can quickly eliminate a research proposal from consideration or improve the sponsor's reception of the proposal. Among these factors are:

i. Neatness.
ii. Organisation, in terms of being both logical and easily understood.
iii. Completeness in fulfilling the request for proposal's (RFP's) specifications, including budget and time schedule.
iv. Appropriateness of writing style.
v. Submission within the RFP's timeline.

It is important to stress the importance of the technical writing style. The writing style must be in such a way that the sponsor understands clearly the problem statement, the research design, and the methodology. The sponsor must understand why the proposed research should be funded and the exact goals and concrete results that is expected from the research.

You should also endeavour to make sure the research proposal meets the specified RFP guidelines, including budgetary restrictions, and schedule deadlines. If your schedule does not meet the expected deadline, your proposal will be disqualified. If your budget is too high relative to competing those of competing proposals, it will be rejected. However, a low budget compared to those of competing proposals may suggest that something is missing or there is something wrong with you as a researcher or your research team.

Finally, a late proposal will not be reviewed under normal circumstances. Lateness communicates a level of disrespect for the sponsor. A late proposal can also communicate a weakness in project management, which can raise an issue of professional competence.

SELF-ASSESSMENT EXERCISE

Enumerate and discuss briefly the major phases of a research.

4.0 CONCLUSION

You have leart the different necessary modules of a research proposal, ranging from the executive summary to the bibliography and appendices. Emphasis was placed on scheduling as this is the most critical part of a proposal's preparation. For an easy and practical scheduling, you were introduced to the critical path method (CPM). You were also informed that research proposals are subject to both formal and informal reviews. Formal reviews are regularly done for solicited proposals.

5.0 SUMMARY

In this unit, you have leart that in structuring a research proposal, you can design a set of modules that tailors your research proposal to the
intended audience. The following modules have been suggested:

i. Executive summary
ii. Problem statement;
iii. Research objectives
iv. Literature review
v. Relevance/importance of the research
vi. The research design and methodology
vii. Data analysis
viii. The nature and form of the results
ix. Qualifications of the research crew
x. The budget

Research proposals are usually subject to formal or informal reviews. Formal reviews are regularly done for solicited proposals. The formal review process typically includes:

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i. Neatness.
ii. Organisation, in terms of being both logical and easily understood.
iii. Completeness in fulfilling the request for proposal's (RFP's) specifications, including budget and time schedule.
iv. Appropriateness of writing style.
v. Submission within the RFP's timeline.

6.0 TUTOR-MARKED ASSIGNMENT

Discuss the importance of an executive summary needed for a research proposal.

7.0 REFERENCE/FURTHER READING

Cooper, D. R. & Schindler, P. S. (2001). *Business Research Methods*. New York: McGraw-Hill.

UNIT 5 RESEARCH DESIGN

CONTENTS

1.0 INTRODUCTION

Research design can be thought of as the structure of research -- it is the "glue" that holds all of the elements in a research project together. We often describe a design using a concise notation that enables us to summarise a complex design structure efficiently. What are the "elements" that a design includes? In this unit, you will be able to answer this question and become comfortable with issues bordering on research designs.

2.0 OBJECTIVES

By the end of this unit, you will be able to:

- describe research designs
- discuss why a research design is necessary in research activities
- recognise when a research design is valid and acceptable
- select the appropriate design for your research activities.

3.0 MAIN CONTENT

3.1 Elements of a Research Design

The elements of a research design can be outlined as follows:

1. Observations or measures: These are symbolised by an 'O' in design notation. An O can refer to a single measure (e.g., a measure of body weight), a single instrument with multiple items (e.g., a 10-item self-esteem scale), a complex multi-part instrument (e.g., a survey), or a whole battery of tests or measures given out on one occasion. If you need to distinguish among specific measures, you can use subscripts with the O, as in O1, O2, and so on.

2. Treatments or programs: These are symbolised with an 'X' in design notations. The X can refer to a simple intervention (e.g., a one-time surgical technique) or to a complex hodgepodge program (e.g., an employment training program). Usually, a no-treatment control or comparison group has no symbol for the treatment (some researchers use X+ and X- to indicate the treatment and control respectively). As with observations, you can use subscripts to distinguish different programs or program variations.

3. Groups: Each group in a design is given its own line in the design structure. If the design notation has three lines, there are three groups in the design.

4. Assignment to group: Assignment to group is designated by a letter at the beginning of each line (i.e., group) that describes how the group was assigned. The major types of assignments are:

   i. R = random assignment
   ii. N = non-equivalent groups iii. C = assignment by cut-off

5. Time: Time moves from left to right. Elements that are listed on the left occur before elements that are listed on the right. Study figure 3.1 below.

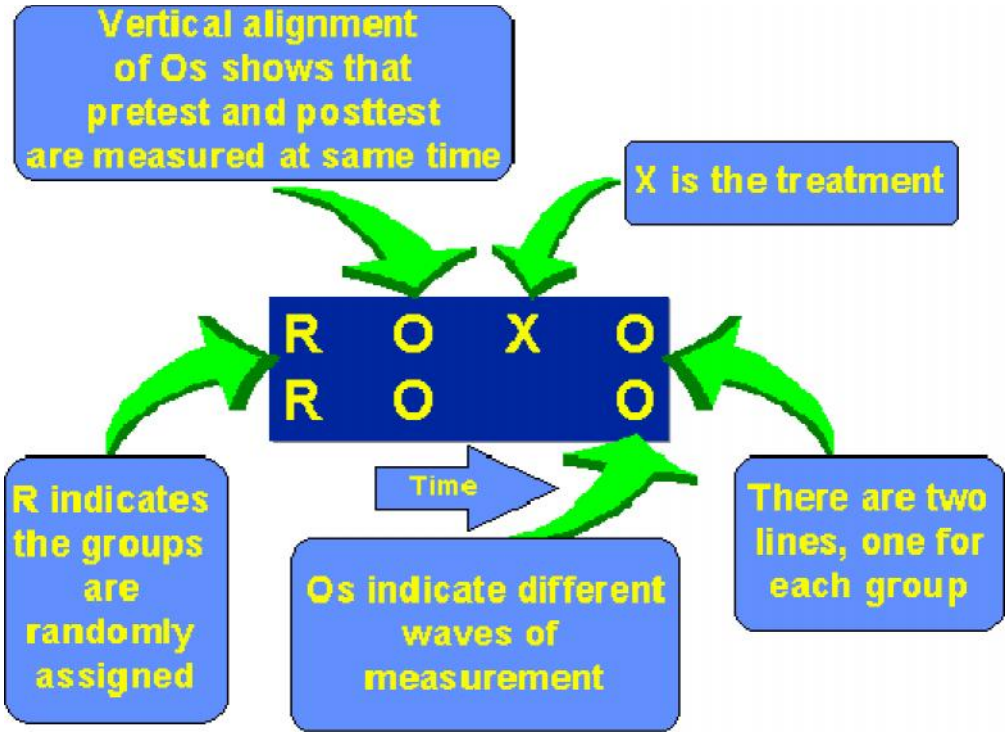

Figure 1.1: Examples of Design Notations

3.1.2 Design Notation Examples

It's always easier to explain design notation through examples than it is to describe it in words. Figure 3.1 above shows the design notation for a pre-test/post-test (or before-after) treatment versus comparison group randomised experimental design. Let us go through each of the parts of the design. There are two lines in the notation, so you should realise that the study has two groups. There are four Os in the notation, two on each

line and two for each group. When the Os are stacked vertically on top of each other it means they are collected at the same time. In the notation you can see that we have two Os that are taken before (i.e., to the left of) any treatment is given -- the pre-test -- and two Os taken after the treatment is given -- the post-test. The R at the beginning of each line signifies that the two groups are randomly assigned (making it an experimental design). The design is a treatment versus comparison group one because the top line (treatment group) has an X while the bottom line (control group) does not. You should be able to see why many of my students have called this type of notation the "tic-tac-toe" method of design notation -- there are lots of Xs and Os! Sometimes we have to be more specific in describing the Os or Xs than just using a single letter. In the second figure, we have the identical

research design with some subscripting of the Os. What does this mean? Because all of the Os have a subscript of 1, there is some measure or set of measures that is collected for both groups on both occasions. But the design also has two Os with a subscript of 2, both taken at the post-test. This means that there was some measure or set of measures that were collected only at the post-test.

With this simple set of rules for describing a research design in notational form, you can concisely explain even complex design structures. And, using a notation helps to show common design sub-structures across different designs that we might not recognise as easily without the notation.

3.2 Types of Research Design

A research design can be classified according to any of the following types:

1. **Historical research design:** This involves a systematic and objective enquiry into events, developments and experiences in the past. This is an ideal design for historians.

2. **Survey research design:** This is a research design in which a group of people or items is studied by collecting and analysing sample data or data from the entire population. If the survey involves study of a sample from the population, it is referred to as a Sample Survey. If it involves the study of the entire population, it is referred to as a Census Survey.

   The idea of sampling is fundamental to survey research. A sound knowledge of sampling theory and techniques is necessary for the execution of a good survey research. Survey research is classified into:

   i. **Procedure – based survey**:
      - questionnaire survey,
      - interview survey,
      - observational survey,
      - panel survey (where data are collected from a given sample at
      - different time periods, and suitable for studying trends and fluctuations).

ii. **Purpose – based survey:** These are surveys classified by purposes they intend to accomplish and include:

iii. **Developmental survey:** This seeks to ascertain how some dimensions, variables and characteristics of a given population change with time,

iv. **Descriptive survey:** Studies which aim at collecting data on, and describing in a systematic manner, the characteristics, features or facts about a given population. Descriptive Surveys do not require hypotheses, since they are merely concerned with a description of events as they occur.

v. **Correlation Survey**: This seeks to establish what relationship exists between two or more variables.

v. **Public Opinion Survey:** It is designed to find out the opinion of people in a given area towards an issue of interest.

3. **Case study research design:** This involves intensive study geared towards a thorough understanding of a given social unit. It is worth noting that case studies are of limited generalisability. Only very few units are involved in case studies and as such, the findings cannot be generalised to the population.

4. **Causal – comparative or ex – post – facto research design**: This type of design seeks to establish cause – effect relationships. Here, the researcher attempts to link some already existing effect or observation to some variables as causative agents.

5. **Experimental research design:** This also establishes cause and effect relationships, except that it uses control groups.

3.3 Validity of a Research Design

Conclusions drawn from analysing survey data are only acceptable to the degree to which they are determined valid. Validity is used to determine whether a research measures what it intended to measure and to approximate the truthfulness of the results. Researchers often use their own definition when it comes to what is considered valid. In quantitative research testing for validity and reliability is a given. However, some qualitative researchers have gone so far as to suggest that validity does not apply to their research even as they acknowledge the need for some qualifying checks or measures in their work. This is wrong. To disregard validity is to put the trustworthiness of your work

in question and to call into question others confidence in its results. Even when qualitative measures are used in research they need to be looked at using measures of reliability and validity in order to sustain the trustworthiness of the results. Validity and reliability make the difference between "good" and "bad" research reports. Quality research depends on a commitment to testing and increasing the validity as well as the reliability of your research results.

Any research worth its weight is concerned with whether what is being measured is what is intended to be measured and considers the ways in which observations are influenced by the circumstances in which they are made. The basis of how our conclusions are made play an important role in addressing the broader substantive issues of any given study. For this reason, we are going to look at various validity types that have been formulated as a part of legitimate research methodology.

3.3.1 Face Validity

This is the least scientific method of validity as it is not quantified using statistical methods. This is not validity in a technical sense of the term. It is concerned with whether it seems like we measure what we claim. Here we look at how valid a measure appears on the surface and make subjective judgments based off of that. For example, if you give a survey that appears to be valid to the respondent and the questions are selected because they look valid to the person administering the questionnaire, he can also administer the questionnaire on a group of random people and untrained observers, and see whether the questions appear valid to them. In research it's never sufficient to rely on face judgments alone and more quantifiable methods of validity are necessary in order to draw acceptable conclusions. There are many instruments of measurement to consider so, face validity is useful in cases where you need to distinguish one approach over another. Face validity should never be trusted on its own merits.

3.3.2 Content Validity

This is also a subjective measure but unlike face validity we ask whether the content of a measure covers the full domain of the content. If a researcher wanted to measure introversion they would have to first decide what constitutes a relevant domain of content for that trait. This is considered a subjective form of measurement because it still relies on people's perception for measuring constructs that would otherwise be difficult to measure. Where it distinguishes itself is through its use of experts in the field or individuals belonging to a target population. This study can be made more objective through the use of rigorous statistical

tests. For example, you could have a content validity study that informs researchers how items used in a survey represent their content domain, how clear they are, and the extent to which they maintain the theoretical factor structure assessed by the factor analysis.

3.3.3 Construct Validity

A construct represents a collection of behaviours that are associated in a meaningful way to create an image or an idea invented for a research purpose. Depression is a construct that represents a personality trait which manifests itself in behaviours such as over sleeping, loss of appetite, difficulty concentrating, etc. The existence of a construct is manifest by observing the collection of related indicators. Any one sign may be associated with several constructs.

Construct validity is the degree to which inferences can be made from the results of a given research design. To establish construct validity, you must first provide evidence that your data supports the theoretical structure. You must also show that your theory has some correspondence with reality. There are other related issues that are important in looking at construct validity.

1. Convergent validity: The degree to which an operation is similar to other operations it should theoretically be similar to.
2. Discriminative Validity - if a scale adequately differentiates itself or does not differentiate between groups that should differ or not differ based on theoretical reasons or previous research.
3. Nomological network: Representation of the constructs of interest in a study, their observable manifestations, and the interrelationships among and between these. According to Cronbach and Meehl, a nomological network has to be developed for a measure in order for it to have construct validity.
4. Multi-trait-multi-method matrix: Six major considerations when examining construct validity according to Campbell and Fiske. These include evaluations of the convergent validity and discriminative validity. The others are trait method unit, multi-method/trait, truly different methodology, and trait characteristics.

3.3.4 Internal Validity

This refers to the extent to which the independent variable can accurately be stated to produce the observed effect. If the effect of the dependent variable is only due to the independent variable(s) then

internal validity is achieved. This is the degree to which a result can be manipulated.

3.3.5 Statistical Conclusion Validity

A determination of whether a relationship or co-variation exists between cause and effect variables. This requires ensuring adequate sampling procedures, appropriate statistical tests, and reliable measurement procedures. This is the degree to which a conclusion is credible or believable.

3.3.6 External Validity

This refers to the extent to which the results of a study can be generalised beyond the sample, which is to say that you can apply your findings to other people and settings. Think of this as the degree to which a result can be generalised.

3.3.8 Criterion-Related Validity

This can alternately be referred to as Instrumental Validity. The accuracy of a measure is demonstrated by comparing it with a measure that has been demonstrated to be valid. This implies the correlations with other measures that have known validity. For this to work you must know that the criterion has been measured well. And be aware that appropriate criteria do not always exist. What you are doing is checking the performance of your research design against a criterion. The criterion you use as a standard of judgment accounts for the different approaches you would use.

i. Predictive validity: Design's ability to predict what it is theoretically able to predict. The extent to which a measure predicts expected outcomes.

ii. Concurrent validity: Design's ability to distinguish between groups it theoretically should be able to. This is where a test correlates well with a measure that has been previously validated.

When we look at validity in survey data we are asking whether the data represents what we think it should represent. We depend on the respondent's mind set and attitude in order to give us valid data. In other words, we depend on them to answer all questions honestly and conscientiously. We also depend on whether they are able to answer the questions that we ask. When questions are asked that the respondent

cannot comprehend or understand then the data does not tell us what we think it does.

SELF-ASSESSMENT EXERCISE

Explain why validity is important in the choice of a research design.

4.0 CONCLUSION

You have observed that the choice of a research design has important elements to be considered. In choosing a research design, you need to look at its validity in terms of construct, content, and such other types of validity discussed in this unit.

5.0 SUMMARY

Research design can be thought of as the structure of research -- it is the "glue" that holds all of the elements in a research project together. A research design can be classified according to any of the following types:

i. historical research, ii. case study research,
iii. causal comparative research, iv. experimental research.

Conclusions drawn from analysing survey data are only acceptable to the degree to which they are determined valid. Validity is used to determine whether the research measures what it intended to measure and to approximate the truthfulness of the results. Researchers often use their own definition when it comes to what is considered valid. To be guided, you can consider the following types of validity.

i. Face validity
ii. Content validity
iii. Construct validity
iv. Internal and external validity
v. Statistical validity
vi. Criterion-related validity.

6.0 TUTOR-MARKED ASSIGNMENT

Explain in detail why generalisations from case studies may be limited.

7.0 REFERENCES/FURTHER READING

Cooper, D. R. & Schindler, P. S. (2001). *Business Research Methods*.

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MODULE 2

UNIT 1 COMPONENTS OF A RESEARCH DESIGN

CONTENTS

1.0 INTRODUCTION

In this unit, you will examine the different components of a research design. It suffices to say that the classic research design has four components: comparison, manipulation, control, and generalisation. It is on the basis of these components that you, as a researcher, can draw inferences concerning the criterion of causality and the criterion of generalisability.

2.0 OBJECTIVES

By the end of this unit, you will be able to:

- describe the basic components of a research design
- explain relevant research designs
- describe research principles more than before looking at this unit.

3.0 MAIN CONTENT

3.1 Comparison

The process of comparison focuses on the concept of co-variation and association between two or more variables. Assume for example, that a positive relationship exists between, say, the teaching method, X, and the achievement of students, Y; you will then think of finding a joint occurrence of both the teaching method (X) and a certain degree of achievement (Y). This implies that students are likely to achieve more after being exposed to the teaching method than before. Put differently, students who are studying under teaching method X will have higher achievement than those students who are studying under other teaching methods.

It follows that in order to assess the joint occurrence of the teaching method and achievement; you need to make a comparison of the group of students exposed to the teaching method X with the group of students that were not exposed to the method. You can also make a comparison of the group's achievement before and after exposing them to the teaching method, X. To measure co-variation therefore, the subject's scores on the dependent variable are evaluated before and after the introduction of the independent variable, or a group that is exposed to the independent variable is compared with the group that is not exposed. In the first case, a group is compared with itself; in the latter case, an experimental group is compared with a control group.

3.2 Manipulation

In quantitative methods, the term causality is meant to say that, if the variable Y is caused by the variable X, then an induced change in X will be followed by a change in Y. The assumption is that this relationship is asymmetrical, that is, one variable is the determining force, and the other is a determined response. If a teaching method, X, is to influence achievement, then you have to demonstrate that improvement in achievement will take place only after exposure to the teaching method. You can do this by some form of control over the introduction of the

teaching method, so that you can measure achievement before and after the introduction of the teaching method. In an experimental setting, you can introduce the experimental stimulus yourself; in a natural setting, on the other hand, this may not be possible. In both natural and experimental (laboratory) settings, the major evidence required to determine the time sequence is that a change occurred only after the activation of the independent variable, in this case, the teaching method, X.

3.3 Control

Another criterion of causality requires that other factors be ruled out as rival explanations of the observed association between the variables under investigation. Such factors can likely invalidate the inference that the variables are causally related. This has been theoretically formulated as the problem of internal validity, which addresses itself to the question of whether the independent variable did in fact cause the observe response.

The factors jeopardising internal validity are often classified into those which are extrinsic to the research activity and those which are intrinsic and can impinge upon the results during the research period. More light can be thrown on these two classified factors as follows:

3.3.1 Extrinsic Factors

These factors refer to possible biases resulting from differential recruitment of subjects to the experimental and control groups in experimental research. These have been theoretically designated as selection factors that produce differences in the two comparison groups prior to the research activity.

3.3.2 Intrinsic Factors

These kinds of factors refer to changes in the research subjects or in their backgrounds which occur during the period of research, or changes in the measuring instrument, or the reactive effect of the observation itself. The major intrinsic factors include:

i. **History:** History refers to all events occurring during the time of the research that are likely to affect the research subjects and provide a rival explanation for the change in the dependent variable. For example, in a study attempting to assess the effect of an election campaign on voters' behaviour, the hypothesis can be that propaganda to which voters are exposed

during the campaign is likely to influence their voting behaviour. You will then compare the voting intentions of the subjects before and after exposure to the propaganda. The differences that you may discover in the voting intentions of the group that have been exposed to propaganda and those that have not could result from differential exposure to the material, or from events that occurred during this period.

ii. **Maturation:** This is a second group of factors that may become plausible rival hypotheses. Maturation includes biological and psychological processes that produce changes in the subjects as time passes. These changes could influence the dependent variable and confound the research results. Suppose you want to evaluate the effect of a specific teaching method on student achievement and record the students' achievement before and after the teaching method has been introduced. Between the pre-test and the post-test, students may have become older and may be wiser. This change which is unrelated to the teaching method, could possibly explain the difference between the two tests. It has been noted that maturation, like history, constitutes a serious threat to the validity of causal inferences.

iii. **Experimental mortality**: This refers to drop out problems that prevent the researcher from obtaining complete information on all cases or subjects. When subjects drop out selectively from the experimental or control group, the final sample on which complete information is available can be biased.

iv. **Instrumentation:** Instrumentation designates changes in the measuring instruments between the pre-test and the post-test. To associate the difference between post-test and pre-test scores with the independent variable, you need to assume that repeated measurements with the same measurement instrument under constant conditions will yield the same result. If you cannot make such an assumption, observed differences can be attributed to the change in the measurement instrument and not necessarily to the independent variable. You can refer to the stability of measurement as reliability. The absence of stability can be a threat to the validity of experiments.

v. **Testing:** The process of testing may change the phenomenon being measured. The effect of being pretested might sensitise the subjects and improve their scoring on the post-test. A difference between post-test and pre-test scores could thus be

attributed not necessarily to the experimental stimulus but rather to the experience gained by the subject while taking the pre-test.

The extrinsic and intrinsic factors that can threaten the internal validity of a design may be controlled by several operations. Control of intrinsic factors can be facilitated by the employment of a control group from which the experimental stimulus is withheld. There are two methods of control that can be employed to counteract the effect of extrinsic factors. These methods include:

i. matching; and, ii. randomisation.

i. Matching: matching involves equating the experimental and control groups on extrinsic variables that are presumed to be related to the research hypothesis. There are two suggested ways of matching groups:

- by precision or pair wise matching
- by frequency distribution.

With precision matching, for each subject in the experimental group, another one with the same characteristics is selected for the control group. For example, to control the effect of age, for every individual in a specific age category in one group, there should be one in the same category in the second group. Having matched on the extrinsic variables, the investigator is assured that any difference found between the experimental and control groups cannot be due to the matched variables.

The main disadvantage of matching is however, the difficulty in matching a large number of variables. When there are many relevant characteristics that need to be controlled, it can be difficult to find matching pairs.

When matching by frequency distribution, you equate the experimental and control groups for each of the relevant variables separately rather than in combination. Instead of one-to-one matching, the two groups are matched on central characteristics. When matching for age, for example, the average age of one group should be equivalent to that of the second.

ii. Randomisation: Randomisation is a process through which subjects are randomly assigned to the experimental and control groups. You can do randomisation either by flipping a coin to decide which subjects will be included in the experimental group; by using a table of random numbers; or by any other method which assures that any of the subjects

has an equal probability of being assigned to either the experimental group or the control group.

3.4 Generalisation

Apart from internal validity, another significant research question concerns the generalisation of the research findings. External validity of research designs refers to the ability to generalise the research results. Two sources of external validity which can limit the generalisation of research findings have been discussed in the literature, including:

- representativeness of the finding of the sample
- reactive arrangements in the research procedure

.

i. Representativeness of the Sample: The random assignment of subjects to experimental and control groups assures equality between the groups and thus contributes to the internal validity of a research. It does not necessarily assure representativeness of the population of study, however. Most results that prove to be internally valid might be specific to the sample selected for a given study. To enable generalisation beyond the limited scope of the specific study, you must be careful in selecting the sample using a sampling method that assures representation. Probability methods such as random sampling can make generalisations to larger and clearly defined populations possible.

ii. Reactive Arrangements: Results of a study should be generalised not only to a larger population but also to a real-life setting. When a study is carried out in a highly artificial situation, these generalisations cannot always be accomplished. In addition to the possible artificiality of an experimental setting, various features in the setting might be reactive and likely affect the external validity of the research results. For instance, a pre-test may influence the responsiveness of the subjects to the experimental stimulus; its observed effect would thus be specific to a population that has been pretested. The reactive effect of testing on the subjects can be avoided by carrying out a protest only, and the generalisation of the results can be improved by avoiding highly artificial situations.

3.5 Notes on Causal Relationships

Causal analysis is basically concerned with the way one variable affects, or is responsible for, changes in another variable. An explicit and stricter interpretation of causation as it relates to experimental research, is that some external factor "produces" a change in the dependent variable. In business research, you find that the cause-effect relationship tends to be less explicit. You should be more interested in understanding, explaining, predicting, and controlling relationships between variables than you should be in discussing and discerning causes.

There are three possible relationships that you will observe between two variables. The relationship may be:

i. symmetrical
ii. reciprocal
iii. asymmetrical.

3.5.1 Symmetrical Relationship

A symmetrical relationship is one in which two variables fluctuate together, but you assume the changes in neither variable are due to changes in the other. You will most often find symmetrical conditions when two variables are alternate indicators of another cause or independent variable. For instance, a correlation between low work attendance and active participation in a sports club can be the result of (dependence on) another factor, such as lifestyle preference.

3.5.2 Reciprocal Relationship

A reciprocal relationship exists when two variables mutually influence or reinforce one another. A reading of an advertisement, for example, may lead to the use of a given brand of a product. This usage, in turn, may sensitise the person to notice and read more of the advertising of that particular brand.

3.5.3 Asymmetrical Relationship

Most research analysis seeks for asymmetric relationships. In asymmetric relationship, you postulate that changes in one variable (the independent variable, referred to IV in short) are responsible for changes in another variable (the dependent variable or DV). Identification of the independence variable and the dependent variable is often obvious, but

at times, the choice is not clear. When the choice is not clear, you can evaluate independence and dependence on the basis of:

i. the degree to which each variable may be altered. The relatively unalterable variable is the independent variable such as age, social status.

ii. the time order between the variables. The independent variable precedes the dependent variable.

In table 2.1 below you observe the description of four types of asymmetrical relationships, including:

i. stimulus-response;
ii. property disposition;
iii. disposition-behaviour; and,
iv. property-behaviour.

Experiments mostly involve stimulus-response relationships. Property-disposition relationships are often studied in business and social science research. Many ex post facto researches involve relationships between properties, dispositions, and behaviours.

Table 2.1: Types of Asymmetrical Causal Relationships

Type of Relationship	**Nature of Relationship**	**Examples**
Stimulus-Response	An event or change results in a response from some object	• A change in work rules leading to a higher level of employee output • A change in economic policy restricting corporate financial decisions • A price increase resulting in fewer sales
Property-Disposition	An existing property causes a disposition	• Age and savings attitudes • Gender and attitudes toward social issues • Social class and opinions about taxation
Disposition-Behaviour	A disposition causes a specific behaviour	• Opinions about a brand and its purchase • Job satisfaction and work output • Moral values and tax cheating

Property-Behaviour	An existing property causes a specific behaviour	• Stage of family life cycle and purchase of furniture • Social class and family savings patterns • Age and sports participation.

SELF-ASSESSMENT EXERCISE

With plausible examples, present and discuss any three types of asymmetric relationships in research.

4.0 CONCLUSION

This unit has exposed you to the basic components of a typical research design. You also learned about the classification of factors that are likely to jeopardise the internal validity of research results including, extrinsic and intrinsic factors. We ended the discussions with the classifications and meaning of causal relationships.

5.0 SUMMARY

A research design has four major components including:

i. Comparison
ii. manipulation
iii. control
iv. generalisation.

The process of comparison focuses on the concept of co-variation and association between two or more variables. Manipulation is a research situation in which a change occurs only after the activation of an independent variable. Control variables are often required in many experiments research processes. Generalisation of the research results or findings is often necessary for predictive purposes. Generalisation of research results can be improved by avoiding highly artificial situations.

There are three possible causal relationships that you will observe between two variables. The relationship may be:

i. symmetrical
ii. reciprocal
iii. asymmetrical.

6.0 TUTOR-MARKED ASSIGNMENT

You are required to discuss practical examples of any three components of a research design.

7.0 REFERENCES/FURTHER READING

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UNIT 2 OVERVIEW OF DATA COLLECTION, VARIABLES, AND SAMPLE SELECTION

CONTENTS

1.0 INTRODUCTION

When you must have submitted and had your research proposal approved, selected, or accepted, you will have collected and collated a lot of secondary data as a result of your literature review. Literature review is usually an ongoing activity which you can continue even before your proposal is accepted. You should be in a position to now begin to collect original or primary data for your research. In this unit, you will be examining the classical methods by which you can collect original data.

2.0 OBJECTIVES

By the end of this unit, you will be able to:

- choose a data collection method
- identify and classify the variables you want to collect data for
- select a suitable sample.

3.0 MAIN CONTENT

3.1 Overview of Data Collection Process

Data collection methods are used in that section or research activity which is dedicated to collecting data. Many research projects are

allowed to use more than one method. The different possible methods of data collection can be listed as follows:

i. The critical incident method
ii. Diaries
iii. Focus group method
iv. Interview method
v. Observation method
vi. Protocol analysis
vii. Questionnaires method
viii. Inspection
ix. Abstract from existing records.

These methods will be discussed in much more detail in subsequent units. Note at this point that qualitative (or phenomenological) methods of data collection have been theoretically described as 'an array of interpretative techniques which seek to describe, decode, translate and otherwise come to terms with the meaning, not the frequency, of certain naturally occurring phenomena in the social world.' When you use a method to collect data on the frequency of occurrence of a phenomenon or variable, you will obtain quantitative data. But if you are collecting data on the meaning of a phenomenon, you will obtain a qualitative data. Quantitative data is referred to as numerical data while qualitative data is nominal (named) data.

In figure 2.1 below, we summarise the overview of the data collection process. It is however important you realise that the research process is less rigid than the figure suggests, especially in a phenomenological study.

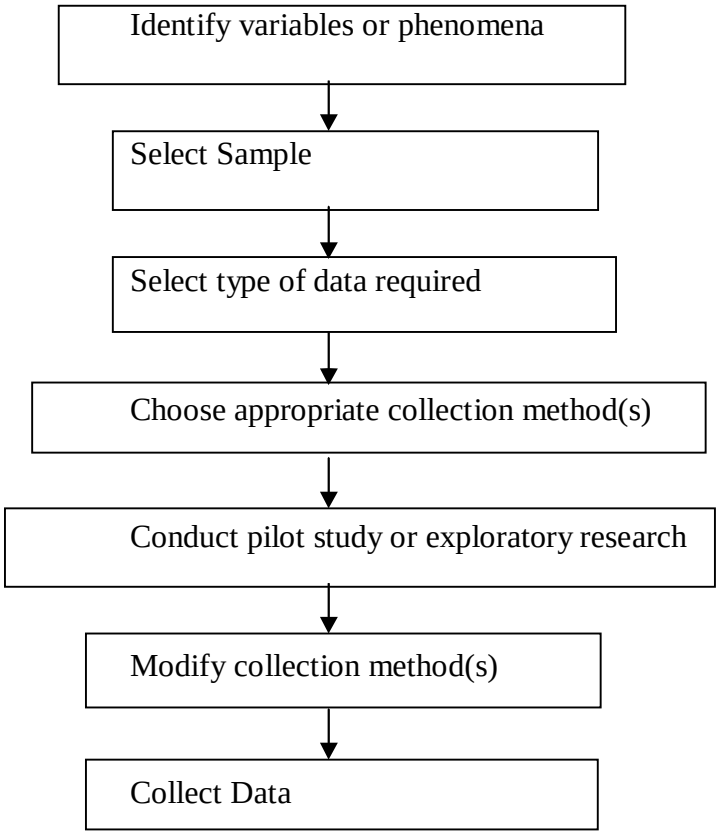

Fig. 2.1: Overview of the Data Collection Process

3.2 Sources of Data

Sources of data include:

1. Publications: These include published data from such government agencies as the Federal Office of Statistics (FOS), Nigeria Deposit Insurance Corporation (NDIC), Central Bank of Nigeria (CBN), and the World Bank. These are the major sources of secondary data.
2. Experimentation: Data can be obtained through experiments.
3. Survey: With appropriate questionnaire instrument, reliable data can be obtained through survey. Survey is the major source of primary data.

3.3 Variables

In your research proposal, you should have included a purpose statement which indicated the unit of analysis you may have chosen for your study. By unit analysis, we mean the kind of case to which the variables

or phenomena under study and the research problem refer, and about which data will be gathered and analysed. The unit of analysis ranges from an individual, an event or an object, to a body of individuals, a relationship or an aggregate.

Researchers are interested in collecting data about variables. If you are working under a phenomenological paradigm, you may prefer to use the term phenomena rather than variables. As you may have observed in the previous units, a variable refers to an attribute of the entity which you may have chosen as your unit of analysis. The most important characteristic of a variable has been identified as its ability to change; a variable can take more than one value, either across entities (for cross-section data) or within the same entity over time (for time-series data). These different values can be observed and measured in the research process. In the subsections that follow, you will review the different classifications of variables.

3.3.1 Qualitative and Quantitative Variables

A variable can either be qualitative or quantitative. A qualitative variable can be referred to as a non-numerical attribute of an individual or object. Qualitative variables such as gender or colour attempt to divide people or objects into groups. Other qualitative variables like job position or social class, which both divide and order objects or people are known as ordered qualitative variables.

A quantitative variable can be referred to as a numerical attribute of an individual or object. Nevertheless, to obtain a quantitative variable, you need to find a suitable measuring tool. For such variables as income, age, and height, this will not be a problem, since they have accepted measures that are already in use. There are some difficulties with other variables, such as loyalty, honesty, and intelligence. Here, you may have to devise your own measuring tool, or look for what other researchers may have used as measures. For instance, psychologists measure intelligence as an intelligence quotient (or IQ), which is a score coming from a specially designed test. This measure is often referred to as a hypothetical construct.

Quantitative variables are classified into discrete and continuous variables. A discrete quantitative variable takes only one of range of distinct values between the start and end of a scale. As an example, the number of sales assistants in a shopping mall on different days of the week might range from one to five. Between the start and end of this scale, the variable can only take the values 0, 1, 2, 3, 4, and 5.

A continuous quantitative variable can take any value between the start and end of a scale. As an example, a suitable range for an adult's age might be from 22 to 40 years. Between the start and end of this scale, any value of the variable (that is, age) can be possible. One adult can be 30 years of age; another might be 30.5 years, or another 30.56 years, and so on, with increasingly more accurate measurement.

Table 2.2 contains examples of qualitative and quantitative variable, and in figure 2.2, we give examples of how discrete quantitative data and continuous quantitative data can be generated.

Table 2.2: Examples of Qualitative and Quantitative Variables

Qualitative Variables	**Discrete Quantitative Variables**
Name Job Title Employment Status Place of Birth Colour of Eyes/Hair	Number of dependants Number of subordinates Number of cars owned Date of birth Clothes/shoe size
Ordered Qualitative Variables	**Continuous Quantitative Variables**
Social class Qualifications Job grade	Income Height Weight

Data Type	**Question Type**	**Responses**
Qualitative →	**Do you own company shares**	**Yes --- No ---**
Quantitative: Discrete → Number ------	How many Cigars do you smoke a day?	
Continuous → Number ------	How tall are you?	

Fig. 2.2: Generation of Qualitative and Quantitative Data

Note again that discrete quantitative data are numerical responses which arise from a counting process, while continuous quantitative data are numerical responses which arise from a measuring process.

3.3.2 Independent and Dependent Variables

The independent variable is the variable that can be manipulated in order to be able to predict the values of the dependent variable. The dependent variable is the variable whose values are being predicted by the independent variable. For example, you may wish to vary the intensity of lighting in your factory (the independent variable) in order to observe the effect on the productivity levels of employees (the dependent variable). Or you may place individuals in a stressful situation, may be by creating loud, random noises (the independent variable), in order to observe their ability to complete complex tasks (the dependent variable).

3.3.3 Extraneous and Confounding Variables

An extraneous, often referred to as exogenous variable, is any variable other than the independent variable which might have an effect on the dependent variable. If your research involves an investigation of the relationship between productivity and motivation, for example, you may find it difficult to exclude the effect on productivity of other factors such as heat wave, a work to rule or domestic problems. A confounding variable is one which obscures the effects of another variable such as, the novelty for employees of being the centre of attraction by the researcher, or working in an unfamiliar place, especially when the research is laboratory based.

3.4 Selection of a Sample

The selection of a sample is a fundamental activity in survey and experimental research. A phenomenological study will require a sample of one subject. A sample is a subset of a population. A population may refer to a body of people or collection of items under consideration for a given research purpose. A sampling frame refers to a list of other records of the population from which all the sampling units are drawn. This is sometimes called the sample space. In a large business organisation, for example, you may have a list of all the employees and this forms the sample frame or space from which you can obtain a sample of employees in the organisation. Statisticians use sample behaviours to draw inferences about the population behaviour. Figure 2.3 illustrate the difference between a sample and a population

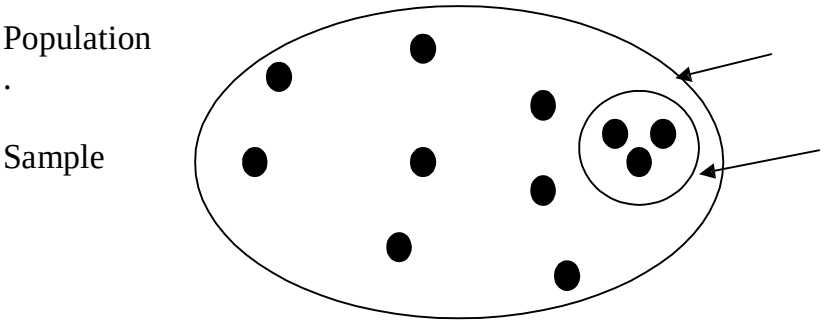

Fig. 2.3: Pictorial Representation of the Difference between Population and Sample

At times, you may want to use the entire population instead of a sample. This decision will depend on the size of your study as well as the size of your population of interest. If your research topic is concerned with the performance of small- and medium-scale beverage companies at Enugu State, for example, you may decide, for purpose of the research that you will solely focus on a company with a turnover of less than N200 million per year. You will need to identify companies that fit this criterion. If your investigations indicate that there are 20 such companies in the state, your research findings will relate only to beverage companies in Enugu State.

A good and representative sample for the entire population is one in which the results obtained from the sample can be taken to be true for the entire population. It is the one in which you can generalise from the results. In scientific research, it has been said that a good sample must be:

i. chosen at random that is, every member of the population must have a chance of being selected,
ii. large enough to satisfy the needs of the investigation being undertaken,
iii. unbiased.

You must make sure that your sample is not biased and is representative of the population from which it is drawn. A situation where you can have a biased sample is where you ask for volunteers to participate in the study or where you select your friends. This sample is likely to be biased as the volunteers or friends may possess certain characteristics that those who do not volunteer do not have. A good sample selection involves the following activities, shown in figure 3.4 below.

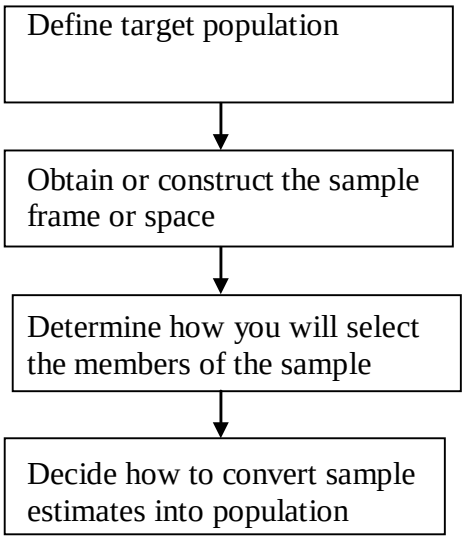

Fig. 2.4: Selecting a Sample

SELF-ASSESSMENT EXERCISE

Explain what you understand by the following:

i. a variable ii. a sample iii. a population

4.0 CONCLUSION

You have been informed in this unit that data collection is a very critical and expensive activity in a research project. Associated with data collection is sampling for which if wrongly done can make generalisation of findings invalid and unacceptable. Also in this unit, you are able to identify the various types of variables, with the basic classifications being dependent and independent variable. Variables can also be classified as either qualitative or quantitative variable.

5.0 SUMMARY

The different possible methods of data collection have been listed as:

i. The critical incident method, widely used during in-depth interviews to generate qualitative data.

ii. Diaries, a daily record of events or thoughts used in capturing what people do, think and feel.
iii. Focus group method, normally associated with a phenomenological methodology and used to gather data relating to the feelings and opinions of a group of people involved in a common situation.
iv. Interview method.
v. Observation method.
vi. Protocol analysis, used in ascertaining the way people behave and think in a given situation.
vii. Questionnaires method.

When you use a method to collect data on the frequency of occurrence of a phenomenon or variable, you will obtain quantitative data. But if you are collecting data on the meaning of a phenomenon, you will obtain a qualitative data. Quantitative data is referred to as numerical data while qualitative data is referred to as nominal data. Researchers are interested in collecting data about variables. The most important characteristic of a variable has been identified as its ability to change; a variable can take more than one value, either across entities (for cross-section data) or within the same entity over time (for time- series data). These different values can be observed and measured in the research process.
A variable can either be qualitative or quantitative. A qualitative variable can be referred to as a non-numerical attribute of an individual or object. A quantitative variable can be referred to as a numerical attribute of an individual or object. An independent variable is the variable that can be manipulated in order to be able to predict the values of the dependent variable. A dependent variable is the variable whose values are being predicted by the independent variable. A good and representative sample for the entire population is one in which the results obtained from the sample can be taken to be true for the entire population. A good sample must be:

i. chosen at random that is, every member of the population must have a chance of being selected
ii. large enough to satisfy the needs of the investigation being undertaken
iii. unbiased.

6.0 TUTOR-MARKED ASSIGNMENT

Explain why it is important for your sample to be unbiased.

7.0 REFERENCE/FURTHER READING

Hussey, J. & Hussey, R. (1997). *Business Research: A Practical Guide for Undergraduate and Postgraduate Students*. New York: Palgrave.

UNIT 3 SAMPLING DESIGN AND DETERMINATION OF THE SAMPLE SIZE

CONTENTS

1.0 INTRODUCTION

This unit is specifically designed for your understanding of the techniques useful in obtaining the samples relevant to your study. By now, you must have been able to define what sampling is all about and what makes a good and unbiased sample. Also of important in this unit is how you can determine the sample size for your study. You cannot just come up with a number or figure and claim that is your sample size. You will be required to provide a statistical proof of how your sample size was determined for your specific research activity.

2.0 OBJECTIVES

By the end of this unit, you will be able to:

- list the different types of sampling designs
- discover how you can determine your sample size
- explain how to select your survey samples statistically.

3.0 MAIN CONTENT

3.1 Sampling Designs

By a sample design we mean the procedure(s) in which subjects for a given sample can be selected from the population. A sample design can take either of two types including:

i. probabilistic design
ii. non–probabilistic design

3.1.1 Probabilistic Design

In probabilistic sampling, the subjects of a given sample are chosen based on known probabilities. Four most commonly used probabilistic sampling designs include:

i. Simple random sampling: This is the design in which every subject in a given population has the same chance of being selected as any other subject. One useful technique in the use of simple random sampling is to list all subjects in the population from which the needed sample will be drawn.

Having done this, the researcher has two methods available for the selection of the needed sample:

- Sampling with replacement
- Sampling without replacement

ii. Systematic Sampling: This is a non-random sampling design, though it requires random selection of a starting point. In the process, a researcher selects his or her respondents in the sample systematically using a sampling interval. By sampling interval, we mean the gap between selections.

For any given serially listed population subjects, the sampling interval is determined by dividing the number of subjects listed in the population (N) by the desired sample size (n). Suppose the size of the population, N = 1000, and the desired sample size, n = 200 subjects, then the sampling interval will be N/n = 1000/200 = 5. From the randomly selected starting point, the researcher can then select every 5th subject as part of the sample.

Example

Let the serially listed subjects in the population be N = 20, and the required sample size be, n = 5. Then, the sampling interval will be N/n =
20/5 = 4.

The listings are as follows:

1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20. Assuming that we randomly select the 7th listing, then starting from the
7th listing, every 4th subject will be selected as part of the sample as follows:

7, 11, 15, 19, and 3.

Thus, subjects with serial numbers 7, 11, 15, 19, and 3 will be selected.

iii. Stratified sampling: This is said to be a fair representation of various strata within a given population of interest. The following example will illustrate the process of stratification.

Assume an industry comprising of the following executives:

20 Managing Directors (MDs)
50 Executive Directors (EDs)
1000 General Managers (GMs)
1330 Managers

Total number of executives = 2,400

The executives can be representatively stratified as follows:

Executives	Number	Percent
MDs	20	0.8
EDs	50	2.1
GMs	1000	41.7
Managers	1330	55.4
Total	**2,400**	**100**

With a 5 percent error term and the appropriate formula for determination of the sample size, the needed sample size was computed

as 343 subjects. We can now obtain a stratified sample of the 343 executives from the population as follows:

Managing Directors = 0.8% of 343 = 3
Executive Directors = 2.1% of 343 = 7
General Managers = 41.7% of 343 = 143
Managers = 55.4% of 343 = 190
Total 343

It follows that a researcher interested in having a representative sample of the executives in the given industry will choose a sample of 3
Managing Directors, 7 Executive Directors, 143 General Managers, and
190 Managers, totalling 343 executives.

iv. Cluster sampling: This is applicable in research situations where the subjects in the population of interest are distributed in clusters of geographical or ethnic settlements. The process involves the selection of an ethnic settlement at random. Then every single subject within this settlement is used as one of the subjects in the sample.

3.1.2 Non–Probabilistic Design

In non – probabilistic design, there is no probabilistic way of estimating the representative ness of the selected samples. It allows the researcher too much discretion in the selection of subjects and as such, it is not advisable to use this design in research practices. Additionally, inferences drawn from this research design, as well as the statistical results, can be misleading and biased.

Non – probabilistic designs include:

i. Convenience sampling: Often referred to as accidental sampling.
ii. Judgment sampling: Applicable in situations in which the researcher is guided by the belief that reference subjects will provide the required information for the given research process.
iii. Quota sampling: Mostly used in cases whereby the characteristics of the population of interest can be easily identified. It can ensure representative ness in the choice of sample subject and hence it is similar to stratified sampling.

3.2 Randomness and Randomisation

This section is an attempt to simplify for you the term 'random.' It is very difficult to define "random." The dictionary notion of "haphazard," "accidental," "without aim or direction," may not help very much. Randomness implies that there is no known law, capable of being expressed in language, which correctly describes or explains events and their outcomes. When events are random events, they cannot be predicted individually. Randomisation is the assignment of objects (subjects or groups) of a universe to subsets of the universe in such a way that, for any given assignment to a subset, every member of the universe has an equal probability of being chosen for that assignment.

The principle of randomness has been stated as follows: Since in a random procedure, every member of a given population has an equal chance of being selected, members with certain distinguishing characteristics; male or female, high or low intelligent, dogmatic or not dogmatic, and so on, will probably, if selected, be counterbalanced in the long run by the selection of other members of the population with the "opposite" quantity and quality of the characteristic. Suppose, for example, you wish to test the hypothesis that "math phobic" people are generally non-scientific. You want to set up two groups of "math phobic" individuals, one that is scientific, one that is not.

Naturally, you would wish to have the two groups in other variables that may have a possible effect on being scientific. One way you may do this would be for you to assign the subjects to both groups at random by, say, tossing a coin for each subject in turn, and assigning the subject to one group of the toss in heads, and to the other group of the toss in tails. You can also use the table of random numbers and assign the subjects as follows: if an odd number turns up, assign a subject to one group, and if an even number turns up, assign the subject to the other group. You can now assume that the groups are approximately equal in all possible independent variables. The larger the groups, the safer you will be in this assumption. In this way, we can say that you have used randomisation to equalise your subjects' chances of being selected.

3.3 Determination of Sample Size

We present, in this discussion, the traditional methods of sample size determination. These methods are represented by formulas, and the formula to use will depend on the type, objectives, and the hypotheses of a given research. The formulas are outlined as follows:

3.3.1 Sample Size for Mean Values

The sample size for studies and tests of hypotheses involving population average or mean values is obtained by:

$$n = \frac{Z^2\sigma^2}{e^2}$$

where n = the sample size
Z = the Z – value corresponding to the desired confidence Level
σ = a pre – determined value of the population standard Deviation e = the maximum acceptable margin of error (or sampling error)

Example

Suppose a researcher wants to be 99 percent confident that the true value of a particular population mean will be within 10 percent of the sample mean. This implies that the estimate of the true population mean by the sample would be in error by 10 percent. From the normal distribution table on Z values, we obtain the value of Z corresponding to 99 percent confident level or 1 percent level of significance as Z = 2.58. If a survey of similar population indicates that 0.8 is a realistic estimate of the population standard deviation, then, the sample size becomes:

$$n = \frac{Z^2\sigma^2}{e^2} = \frac{(2.58)^2(0.8)^2}{(0.1)^2} = 426$$

The required sample size is 426 subjects.

3.3.2 Sample Size for Proportions

The sample size for statistical estimations and test of hypotheses involving proportions is formulated as:

$$n = \frac{Z^2pq}{e^2}$$

Where Z and e are as defined above
p = the approximate value of the true proportion of success
q = 1 – p = the approximate value of the true proportions of failure

Example

Suppose a researcher wanted to know the size needed to estimate the proportion of consumers of a particular product who are females. The researcher wishes to be 99 percent confident, with a sampling error of 2.5 percent in the estimation of the true proportion. There is no prior information about the true proportion, p, so that, for a conservative estimate, p = 0.50.

Again, as in the previous example, the value of Z at 99 percent level is 2.58.

$$\text{Thus, } n = \frac{Z^2pq}{e^2} = \frac{Z^2p(1-p)}{e^2} = \frac{(2.58)^2(0.5)(0.5)}{(0.025)^2} = \frac{1.6641}{0.000625}$$

= 2662.56 or 2663.
The required sample size would be approximately 2663 subjects.

3.3.3 Sample Size for Finite Population

When the size of population of interest is finite or known, the sample size can be determined using a famous formula, the Taro Yamane's formula:

where N = the finite (known) size of the population n = sample size
e = sampling error

Example

Consider a population of size N = 500. With a sampling error of 5 percent, the required sample size will be:

$$n = \frac{N}{1+ Ne^2} = \frac{500}{1+ 500\ (0.05)^2}$$

$$= \frac{500}{1+1.25} = \frac{500}{2.25} = 222.22$$

Thus, the required sample size is approximately 222 subjects.

SELF ASSESSMENT EXERCISE

Outline the two major classifications of sampling designs, and mention three differences between them.

4.0 CONCLUSION

You have been exposed to the scientific sampling designs. By now, you should be able to choose an appropriate design for your research proposals. The term, 'randomness', has also been explained. You have also been informed on the methods and techniques of sample size determination.

5.0 SUMMARY

There are two different classifications of sampling designs:

i. probabilistic design
ii. non – probabilistic design

The four most commonly used probabilistic sampling designs are:

i. simple random sampling;
ii. systematic sampling;
iii. stratified sampling; and,
iv. cluster sampling.

The recommended sampling designs for a survey research are those of probabilistic designs.

Non-probabilistic designs include:

i. convenience sampling;
ii. judgment sampling; and,
iii. quota sampling.

Randomisation is the assignment of objects (subjects or groups) of a universe to subsets of the universe in such a way that, for any given assignment to a subset, every member of the universe has an equal probability of being chosen for that assignment. The methods for determining sample size for surveys are represented by formulas. The formula to use will depend on the type, objectives, and the hypotheses of a given research.

6.0 TUTOR-MARKED ASSIGNMENT

Carry out a research on any of the statistics textbooks that deals with the use of table of random variables, and attempt to explain how you can use this table in selecting a sample for your study.

7.0 REFERENCES/FURTHER READING

Nachimias, D. & Nachimias, C. (1976). *Research Methods in the Social Sciences.* New York: Saint Martin's.

Osuala, E. C. (1987). *Introduction to Research Methodology*. Benin City: Ilupeju Press.

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UNIT 4 RESEARCH QUESTIONS AND QUESTIONNAIRE DESIGN

CONTENTS

1.0 INTRODUCTION

In preparation for a survey type of research, you need to know the derivation of questionnaire from your stated research questions. In this unit, you will be exposed to the processes involved in deriving research questions and survey questionnaire. It is from the responses to the questionnaire that you will be able to answer your research questions and test your research hypotheses. You will therefore be able to explain the hypothesis testing in unit 10 that will follow.

2.0 OBJECTIVES

By the end of this unit, you will be able to:

- explain more about derivation of research questions
- describe how you can construct and write questionnaires
- state the different types of questionnaires
- outline the general rules for designing questionnaire questions
- design questionnaire for your specific study.

3.0 MAIN CONTENT

3.1 Statement of the Research Question

The aim of any research activity is to look for solution to an identified problem. As you may have had the experience, whenever you are confronted with a problem, few possible solutions may have appeared immediately. For example, if you find yourself unable to sleep in the night, you will immediately suspect a few possible solutions. It could be that you were stressed up thinking about the following day, or you had a tough day, or your job had lined up too much for your abilities. You will then begin to explore some solutions to these immediately to enable you sleep for the night.

The situation is same in a research process. A researcher faced with this problem would first take an informed guess of likely solutions to the problem and then sets out to produce evidence that will confirm or refute these possible solutions. These possible solutions are usually expressed as either research questions or hypotheses. A research question posed by a researcher is expected to yield an answer that leads to solutions to the stated research problem. For example, if the specific research problem is: 'Distress in the Nigerian Banking Industry,' the research questions may be:

i. What is the origin of bank distress in Nigeria?
ii. What is the role of deregulation on the incidence of bank distress in Nigeria?
iii. Are there enough qualified bank managers for implementing policies against bank distress in Nigeria?
iv. Are there possible economic effects of distress in the banking industry?

3.1.1 Characteristics of a Good Research Question

The following provide some guides on the statement of effective research questions.

1. Research questions provide focus and direct attention to the major issues in the research project. Research questions determine therefore, what data to be sought for and how and where to look for them. Research questions must always be related to the problem being addressed in the research project. They should represent the critical issues in the study.

2. there appears to be no precise rule on the number of research questions to be formulated, the number should be neither too small as to exclude very important aspect s of the research problem, nor too large as to give rise to an unmanageable list of research questions. You should formulate as many research questions as will cover all the major issues in the research project.

3. You must make clear the language of the research question. The research question needs to be unambiguous. Research questions should be formulated in such a way that you can provide answers to them. Every research question you posed in the research project must be answered. As much as possible, do not formulate research questions that lend themselves to only "yes" or "no" type of answers.

3.2 Questionnaire Design

Questionnaires are associated with both positivistic and phenomenological methodologies. A questionnaire is composed of a list of carefully structured questions, selected after considerable testing, with a view of eliciting reliable responses from your chosen sample. Questionnaires are derived from specific research questions because it is the questionnaire responses that provide answers to the research questions. The aim of questionnaires is to find out what selected group of participants do, think or feel about a given research issue.

Questionnaires are the most frequently used instruments for the collection of primary data or information, especially in survey research. Every question in questionnaire must produce responses that will help answer the stated research questions. A questionnaire design is concerned with the type of questions, their wording, the reliability and validity of the responses. Since questionnaire design is a crucial element of many of the data collection processes, it is important you take it very serious.

Before constructing a questionnaire, you should identify clearly the objective of the questionnaire. The researcher must know what information should be obtained from the respondents, using the questionnaire to be constructed.

The important factors that can guide the construction of questionnaire include:

1. The characteristics of the sample involved: knowledge of such characteristics as the level of education, socio – economic class, age, sex, and the like will help the researcher to design questions appropriately.

2. The type of questionnaire format to adopt: the researcher should know whether the questions should be of fixed – response type or open – ended:

    i. Structured or fixed response questionnaire: This is the type of questionnaire in which respondents are given response alternatives by the researcher.

    ii. Unstructured or open – ended questionnaire: In this type of questionnaire, the researcher does not provide the response alternatives. Respondents are free to give their individual responses

A positivistic approach suggests that structured or fixed response questions should be used, while a phenomenological approach suggests the use of open-ended questions. Open-ended questions can only be coded after they have been completed by the respondents, after which the responses can be computer processed. The issue on coding will be discussed in detail in subsequent units. In structured interviews, you need to be sure that each respondent will understand the questions in exactly the same way, and that every respondent is asked the questions in the same way as the others.

3.2.1 Length of the Questionnaire

You have to bear in mind that the longer the questionnaire, the lower will be the response rate and vice versa. The length of questionnaire should therefore be minimised if the researcher is interested in a high response rate.

The researcher may also be guided by the following:

i. avoid questions which do not relate to the research objectives, research questions and research hypotheses.
ii. avoid such leading questions as those questions, beginning with such terms as “In view of the fact that”
iii. avoid unnecessary presumptions about the respondents.

The format to be adopted will depend on the depth of the information required.

3.2.2 Validation of the Constructed Questionnaire

A commonly used validation process is to send the constructed questionnaire to a panel of experts in the area of the research interest or problem for validation. The questionnaire to be sent to the experts should be accompanied by clear guidelines on what is expected of them. These guidelines should include the purpose of the study, the research questions, and the research hypotheses. After validating the content of the questionnaire, the next step is to do a pilot test of the questions on a sample of the intended respondents. This will enable you ascertain how the respondents will likely react with the questionnaire in terms of clarity, ambiguity and coverage.

3.3 Characteristics of a Good Questionnaire

For a research questionnaire to provide information needed to meet the objectives of the research, it must have the following characteristics:

i. relevance
ii. consistency
iii. usability
iv. clarity
v. quantifiable
vi. legibility.

Questionnaires are a popular method of collecting data. If well designed, a questionnaire survey appears cheaper and less time-consuming than conducting verbal interviews and you can take very large interviews.

In figure 2.5 below, we summarise the major decisions or considerations when using questionnaires as data collection instrument.

- Sample size
- Type of questions
- Wording of the questions and how to ensure that they are intelligible and unambiguous
- Design of the questionnaire, including any instructions
- Method of distribution and return of completed questionnaires
- Tests for validity and reliability and when they should be applied
- Methods for collating and analysing the data collected
- Any action to be taken if questionnaires are not returned

Fig. 2.5: Major Decisions/Considerations in the Use of Questionnaire

Figure 2.6 gives the general rules for designing questionnaire.

- Explain the purpose of the interview or questionnaire to all participants
- Keep your questions as simple as possible
- Avoid the use of jargon or specialist language
- Phrase each question so that only one meaning is possible
- Avoid vague, descriptive words such as 'large' and 'small'
- Avoid asking negative questions as these can easily be misinterpreted
- Only ask one question at a time
- Include relevant questions only (unless needed and necessary, avoid questions on sex or gender and age)
- Include questions which serve as cross-checks on answers to the other questions
- Avoid questions which require the respondents to perform calculations
- Avoid leading or value-laden questions which imply what the required answer might be
- Avoid offensive questions or insensitive questions which could cause embarrassment
- Avoid questions that look like memory test
- Keep your interview schedule or questionnaire as short as possible, but include all the questions required to cover your research purpose and/or answer your research questions and test your stated research hypotheses.
- Minimise the number of open-ended questions to ensure good return and response rate.

Fig. 2.6: General Rule for Designing Questionnaire Questions

3.4 Administration of the Questionnaire

Three traditional modes of administrating the questionnaire include:

i. personal interview - involves a face – to – face interview whereby the researcher presents the questions to the respondents with the aim of helping in the clarification of the questions. This has the highest response rate.

ii. telephone interview - involves phone calls to the respondents. This mode is not very feasible, especially in developing countries with clumsy telephone services.

iii. mail - this is the least costly mode. It however has the least rate of response.

SELF-ASSESSMENT EXERCISE

Enumerate and briefly discuss the two major types of questionnaire.

4.0 CONCLUSION

This unit has informed you about the construction and design of both research questions and the questionnaire questions associated with them. You learned that a research question is expected to yield an answer that leads to solutions to the stated research problem. A questionnaire is composed of a list of carefully structured questions, selected after considerable testing, with a view of eliciting reliable responses from your chosen sample. Questionnaires are derived from specific research questions because it is the questionnaire responses that provide answers to the research questions. Two major types of questionnaires were discussed as including the open-ended type and the fixed-response or closed-ended type.

5.0 SUMMARY

The aim of any research activity is to look for solution to an identified problem. A research question posed by a researcher is expected to yield an answer that leads to solutions to the stated research problem. A questionnaire is composed of a list of carefully structured questions, selected after considerable testing, with a view of eliciting reliable responses from your chosen sample. Questionnaires are derived from specific research questions because it is the questionnaire responses that provide answers to the research questions. Their aim is to find out what selected group of participants do, think or feel about a given research issue.

The important factors that can guide the construction of questionnaire include:

i. The characteristics of the sample involved: knowledge of such characteristics as the level of education, socio – economic class, age, sex, and the like will help the researcher to design questions appropriately.
ii. The type of questionnaire format to adopt: the researcher should know whether the questions should be of fixed – response type or open – ended:

    A structured or fixed-response questionnaire is the questionnaire in which respondents are given response alternatives by the researcher.

Unstructured or open – ended questionnaire is the one in which the researcher does not provide the response alternatives. Respondents are free to give their individual responses.

For a research questionnaire to provide information needed to meet the objectives of the research, it must have the following six characteristics:

i. relevance
ii. consistency
iii. usability
iv. clarity
v. quantifiable
vi. legibility.

The traditional modes of administering a research questionnaire are personal interview, telephone, and mail. Researchers observe that the most effective mode is that of the personal interview.

6.0 TUTOR-MARKED ASSIGNMENT

Distinguish between the term 'research question' and the term 'questionnaire.' Design a research question of your choice and construct five questionnaire questions from the research question.

7.0 REFERENCES/FURTHER READING

Hussey, J. & Hussey, R. (1997). Business Research: *A Practical Guide for Undergraduate and Postgraduate Students.* New York: Palgrave.

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UNIT 5 HYPOTHESES AND HYPOTHESES TESTING I

CONTENTS

1.0 INTRODUCTION

The statement of hypotheses has been an important part of a research proposal, especially in social sciences and humanities. It will be useful for you to be familiar with the meaning of hypothesis and the different methods of testing it. This unit will therefore expose you to the basic principles of hypotheses testing and how practical inferences are drawn from such tests.

In testing hypotheses, assumptions about the population parameter, such as the population average or mean, are made in advance, and the relevant population sample provides the information needed for the test of the assumptions. This unit looks at hypotheses testing by focusing on such concepts as the sampling distribution, null and alternate (or research) hypotheses, the level of significance, rejection values, and decision rules.

2.0 OBJECTIVES

By the end of this unit, you will be able to:

- state what hypotheses are all about
- discuss the statement of research hypotheses

- list the different classifications of hypotheses
- explain the classical methods or strategies for testing hypotheses
- state and test hypotheses relevant to your research activities.

3.0 MAIN CONTENT

3.1 Definition and Sources of Hypothesis

3.1.1 Definition of Hypotheses

You can define hypothesis as a conjectural proposition, an informed, intelligent guess about solution to a problem. You can refer to it as an assumption or proposition whose veracity and validity must be established. A hypothesis provides you with the necessary guide in your search for the solution to the problem being addressed in the research proposal. Hypothesis helps you ensure that you do not waste time and energy in searching for the solutions to the problem anywhere and anyhow.

Formulation and use of appropriate hypotheses is crucial and fundamental to the success of your research activities. This is essentially the case in studies for which you are seeking for cause and effect relationships. You need to know the situations which do not require your formulation of hypotheses. The situations are in cases of preliminary or exploratory investigations that are aimed at gaining more information about some happenings, or where you have no knowledge about possible solutions to the problem under investigation.

In using hypotheses, you should endeavour to make your hypotheses comprehensive enough to cover all aspects of your problem focus. It has been noted that the use of hypotheses may lead to researchers neglecting or ignoring important aspects of findings from the research data, not covered by the hypotheses. This only happens when the hypotheses are not appropriate and comprehensive enough.

3.1.2 Sources of Hypotheses

As discussed briefly in Unit 2, research hypotheses can be obtained from the following sources:

1. Experience: What you know about the problem under investigation.

2. The literature: From the review of related literature, you can obtain useful ideas relating to possible solutions to the problem under investigation.
3. Theory: From theories you can derive hypotheses through the process of deductive reasoning, for example, "if A is true then B will be true."
4. Previous findings: Findings of previous studies can also serve as sources of hypotheses. Such findings may give rise to some new issues which needs to be resolved. Such issues then form the basis for formulating pertinent hypotheses. Also, deductions made from the findings of previous studies can be useful in formulating hypotheses.

3.1.3 Qualities of Good Hypotheses

A good hypothesis should be:

i. Testable: It should be in such a way that empirical evidence relating to its validity can be obtained.
ii. A statement of an expected relationship between two or more variables. the aim of using hypothesis is usually to find out how two or more variables are related. A good hypothesis should therefore, specify the expected relationship between the variables of interest in measurable terms.
iii. Plausible: A hypothesis should be based on what is consistent with reasoning. It should not only relate to the problem of interest but also its likelihood as a solution to the problem should not be in doubt.
iv. Consistent with current knowledge: A hypothesis should not contradict established knowledge. If it does, it will appear unreasonable.
v. Unambiguous: A hypothesis needs to be stated in clear unambiguous and simple terms. Any term you use in formulating the hypothesis should be operationally defined by you.

3.2 Types of Hypotheses

There are several ways of classifying hypotheses but we will be interested in classifying them as either research hypotheses or statistical hypotheses.

3.2.1 Research (or Non-Parametric) Hypotheses

Research hypotheses are postulations about the relationships between two or more variables that are highly important in solutions to the problem of interest in your research. Research hypotheses may take any of the following forms:

i. The use of minimum deposit requirements will facilitate real banking in Nigeria.
ii. Nigerian workers' poor attitude to work is due to the fact that supervisors do not have powers to discipline them.

Observe that research hypotheses do not express the variables in quantitative or measurable terms and therefore, they cannot be directly tested by statistical methods.

3.2.2 Statistical (or Parametric) Hypotheses

A statistical hypothesis is a proposition about population parameters, such as the population mean or the population standard deviation, which is to be verified on the basis of the data or information obtained from a sample of the population. Statistical hypotheses express the relationship between two or more variables in statistical, quantitative, or measurable terms. The statistical parameter on which the test will be based is specified and the variables are reduced to numerical quantities. This is the form in which these hypotheses are tested, unlike the research hypotheses.

Like in any hypothesis, research hypothesis can be formulated in two forms:

1. Null hypothesis: a null hypothesis is the hypothesis which states that 'no difference' or 'no relationship' exists between two or more variables. It is often referred to as hypothesis of 'no effect' or 'no difference.' Examples of null hypotheses can be:

2. Alternate hypothesis: an alternate hypothesis is a hypothesis that specifies any of the possible conditions not anticipated in the null hypothesis. It specifies conditions which will hold if the null hypothesis does not hold.

3.3 Hypotheses Testing

The first step in testing hypothesis is to formulate the hypothesis in statistical terms. For example, if the purpose of your investigation is to establish that educated individuals have higher income than do uneducated individuals, the statistical hypothesis might be that there is a positive correlation between education and income, or that the average income of highly educated group will be larger than the average income of a group with lower level of education. In both of these cases, the statistical hypothesis is formulated in terms of descriptive statistics (such as correlation or average), as well as a set of specifying conditions about these statistics (such as positive correlation or difference between the means).

The tools used in testing statistical hypothesis are often referred to as parametric tools. Those used in testing non-statistical hypothesis are called the non-parametric tools. In the following few examples we discuss how these tools can be used in testing hypothesis.

3.3.1 The Parametric Tools

The two basic parametric tools for testing statistical or parametric hypothesis to be discussed here are the student t-statistic and the Z-statistic.

The Student t-Statistic: The student t-statistic is used in testing hypotheses concerning the population mean or average, especially in cases involving a relatively small sample size; ($n<30$). Its application is better illustrated by an example. Before any illustration, it will be appropriate to review the process of hypotheses testing as it concerns the student t-statistic.

The Decision Values of t: The aim of any hypothesis testing is to either accept or reject a given null hypothesis. The decision to either accept or reject any hypothesis is based on two values of the test statistic, in this case the t-statistic. These two values are referred to as the decision values, including:

1. The critical or rejection value of t:

The critical value of t is obtained from the t distribution table, with known level of significance, α, and the number of degrees freedom, n-1, where n represents the number of observations.

Assume n=15 observations. With 5% level of significance and n-1 = 15-1 = 14 degrees of freedom obtained from the t-distribution table as t=1.761, for one-sided rejection region or t=2.145, for two-sided rejection regions (see figure 3.1)

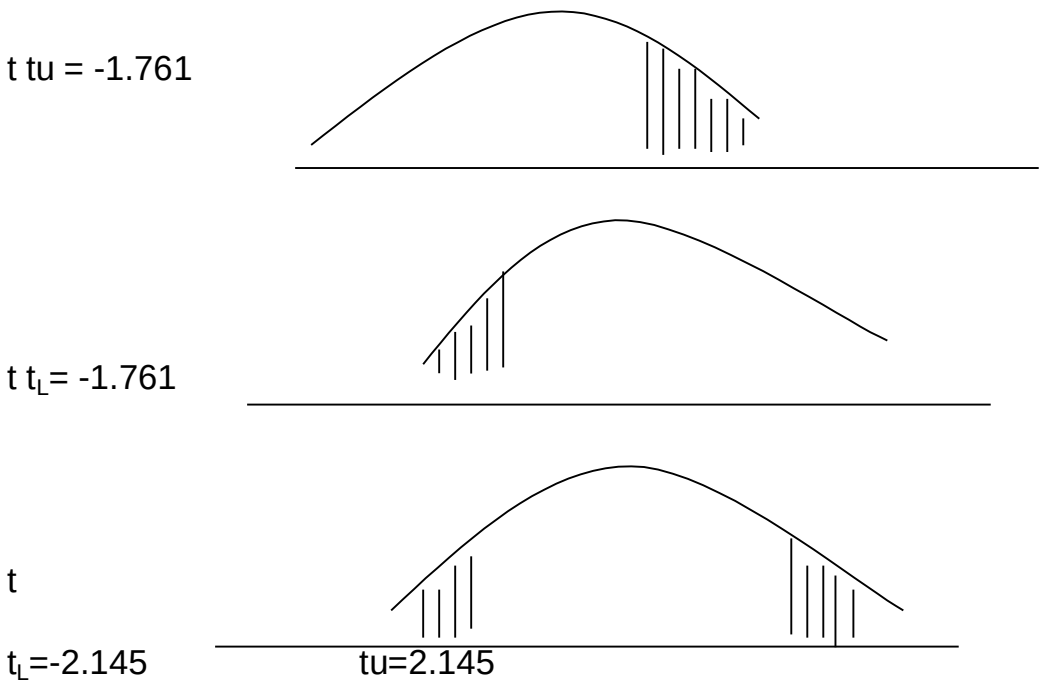


Figure 3.1: Rejection Values of t

2. The Calculated Value of t (t_c)

This is the value obtained using the statistical information needed for testing the stated hypotheses. To calculate this value, we simply apply the formula:

$$tc = \frac{\bar{X}-\mu_0}{S_{\bar{X}}}$$

Where X = sample mean
μ_0 = the hypothesized population mean
S_X = the standard error of the sample mean.

$$S_X = \frac{S}{\sqrt{n-1}}$$

Recall that S = Sample Standard deviation.

Having obtained the two values of the test-statistic, we compare them to know whether or not the null hypothesis should be rejected.

If tc > tu, reject Ho (the null hypothesis) If tc < tu, accept Ho (the null hypothesis)
And
If tc < tL, reject Ho (the null hypothesis) If tc > tL, accept Ho (the null hypothesis)
Where tc, tu, and tL refer to calculated, Upper, and Lower critical values of t respectively.

Example

Upon examining the monthly billing records of a mail-order book company, the auditor takes a sample of 10 of its unpaid accounts. The accounts receivables were:

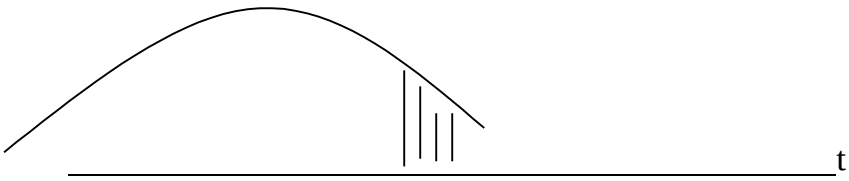
~~₦~~4, N5, N7, N7, N9, N10, N11, N12, N18, N33.

Based on the observed accounts, the auditor hypothesizes that on the average, the accounts receivable is greater than N15. Following this hypothetical belief, we want to test at 1 percent level of significance, the hypotheses:

Ho: μ = N15 (null hypothesis)
HA: μ > N15 (Alternate hypothesis)

Solution

First the inequality sign (>) indicates the use of one-sided, upper rejection region in the decision of either to reject or accept the hypothesis. It follows that, using the table on t-distribution, the critical or rejection value of t is as indicated below, with $\alpha = 0.01$ and n-1 = 10-1 = 9 degrees of freedom



The calculated value of t is obtained as follows:

$$tc = \frac{X - \mu o}{S_X}$$

where $\bar{X} = \frac{\Sigma X}{} = \frac{166}{} = 11.6$

n 10
$\mu_o = 15$
$S_X = \underline{S}$ —
$\sqrt{n}$
$S = \sqrt{\underline{\Sigma X^2 - (\Sigma X)^2/n}}$ n - 1

X	**X^2**
4	16
5	25
7	49
7	49
9	81
10	100
11	121
12	144
18	324
33	1089
$\sum X = 116$	$\sum X^2 = 1998$

$\underline{(\sum X)^2} = \underline{(116)^2} = \underline{13456} = 1345.6$ n 10 10
$\sum X^2 = 1998$
$S = \sqrt{\underline{1998-1345.6}} = \sqrt{72.49}$
9
= 8.51
Thus, $S_X = \underline{S} = \underline{8.51} = 0.851$
$\sqrt{n}$ $\sqrt{10}$

It follows that,
$tc = \underline{X-\mu o}$ S_X
= 11.6-15 = -3.995 —
0.851

Decision

Since tc(-3.995) < tu(2.82), we accept the null hypotheses (Ho = ₦15), and conclude that on the average, the account receivable is not significantly greater than ₦15.

SELF-ASSESSMENT EXERCISE

Discuss briefly the importance of statement of hypothesis for a given scientific research.

4.0 CONCLUSION

This unit introduces you to the concept of hypothesis and how it can be presented and tested. The emphasis was on statistical or parametric hypotheses. An important aspect of hypothesis testing is the decision on whether or not to reject a stated hypothesis. The decision rules were therefore discussed for your convenience.

5.0 SUMMARY

Hypothesis can be defined as a conjectural proposition, an informed, intelligent guess about solution to a problem. It is an assumption or proposition whose veracity and validity must be established. A hypothesis provides you with the necessary guide in your search for the solution to the problem being addressed in the research proposal and helps you ensure that you do not waste time and energy in searching for the solutions to the problem anywhere and anyhow.

There are several ways of classifying hypotheses but we will be interested in classifying them as either research hypotheses or statistical hypotheses. Research hypotheses may take any of the following forms:

(i) The use of minimum deposit requirements will facilitate real banking in Nigeria.
(ii) Nigerian workers' poor attitude to work is due to the fact that supervisors do not have powers to discipline them.

A statistical hypothesis is a proposition about population parameters, such as the population mean or the population standard deviation, which is to be verified on the basis of the data or information obtained from a sample of the population. The tools used in testing statistical hypothesis are often referred to as parametric tools. Those used in testing non-statistical hypothesis are called the non-parametric tools. In the following few examples we discuss how these tools can be used in testing hypothesis.

6.0 TUTOR-MARKED ASSIGNMENT

Data on the age of individual customers were observed as: 15 years, 16 years, 18 years, 17 years, and 22 years.

1. What is the average age of customers according to the data?
2. Using a 1 percent significance level, test the hypothesis:

Ho: U = 17.5 years
Ha: U < 17.5 years

7.0 REFERENCE/FURTHER READING

Onwe, O. J. (2007). *Statistical Methods for Business and Economic Decisions: A Practical Approach*. Lagos: Samalice Press.

MODULE 3

UNIT 1 HYPOTHESES AND HYPOTHESIS TESTING II

CONTENTS

1.0 INTRODUCTION

This unit is a continuation of the discussions of hypotheses testing. In unit 10, the student t-statistic used in testing parametric of statistical hypotheses was discussed. In this unit, the other statistic used in testing parametric hypotheses for a large sample size, the Z-statistic will be presented and discussed. The unit will end with non-parametric tools being used in testing non-parametric hypotheses.

2.0 OBJECTIVES

By the end of this unit, you will be able to:

- distinguish tools in testing a hypothesis
- differentiate between parametric and non-parametric hypotheses
- discuss hypotheses testing.

3.0 MAIN CONTENT

3.1 The Z-Statistic

Like the t-statistic, Z-statistic is a parametric tool used in testing parametric hypotheses. In this discussion, we are interested in the use of Z-statistic in testing hypotheses that involve percentages or proportion of subjects having particular responses to particular research question or issues.

3.1.1 Tests of Hypotheses for Sample Proportions: One Sample

For large samples, the applicable test-statistic for sample proportions is the Z-statistic. The rejection value of Z for a given level of significant is obtained from the Z-distribution table. And the calculated value of Z for tests of proportions can be obtained by:

$$Z_C = \frac{P_S - P}{\sigma_{pS}}$$

Where p_S = the sample proportion or percentage
= Number of successes in a sample
Sample size

P = Population proportion as indicated by the null hypothesis, Ho.

σ_{ps} = standard error of the sample proportion

$$= \sqrt{\frac{P(1-P)}{n}}$$

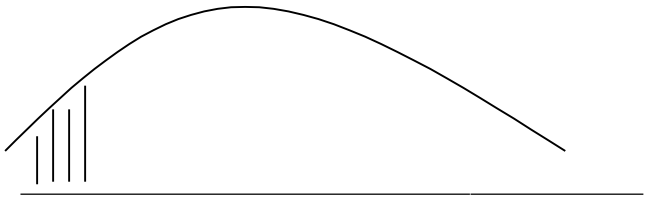
Example

Consider a supermarket that sells packaged men's shirts. The management learns from past experience that 15 percent of all shirts sold are returned to the supermarket by customers who complain that the shirts do not fit properly. In an attempt to correct this situation, the manufacturer of the shirts redesigned them and finds that, of the next 500 sales, 60 shirts were returned.

Problem is to test, at 5 percent level of significance, to see if there has been a significant decrease in the population proportion of returns.

Solution
We are required to test, Ho: P = 0.15
HA: P < 0.15 α = 0.05

Observe that the alternative hypothesis, HA, calls for a one-sided test, using the lower rejection region. The rejection value of Z at α = 0.05 is –1.64 (from the Z-distribution table) as indicated by figure 3.1 below.



Z_L = -1.64
Fig. 3.1: Rejection Value for Z (α = 0.05)

The calculated value of Z can be obtained as: $Zc = \frac{P_S - P}{\sigma_{pS}}$

where ps = 60 = 0.12 = proportion of returns
500
P = 0.15 (from the null hypothesis, Ho)

$\sigma_{ps} = \sqrt{\frac{P(1-P)}{n}} = \sqrt{\frac{0.15(1-0.15)}{500}}$

$= \sqrt{\frac{0.15(0.85)}{500}} = 0.016$
It follows that,

$Z = \frac{0.12 - 0.15}{0.016} = -1.875$

Decision

Since Z(-1.875) < Z_L(-1.64), we reject Ho and conclude that there has been a significant decrease in the population proportion of returns as a result of the changes made in the design of the shirts.

3.2 The Non-Parametric Tools

There exist certain phenomena or variables in business statistics which can hardly be described quantitatively. The mode of gathering information on these variables requires the use of nominal and ordinal scales which do not meet standard requirements of parametric statistics. The valid inferential statistical tests for these types of variables is non-parametric tests.

Non-parametric test procedures involve any of the followings:

1. Those procedures whose test-statistic does not depend upon the form of the underlying population distribution from which the sample data were drawn or,
2. Those procedures which are not concerned with the population parameters or,
3. Those procedures for which the data are of little strength to warrant meaningful arithmetic operations.

Conditions under which non-parametric statistics can be used are outlined as follows:

1. When the hypothesis to be tested does not involve a population parameter,
2. When there are no assumptions of normality about the distribution of the variables,
3. when data are gathered from such weak measuring Scales as ranking, frequency counts, and some
4. subjective measuring scales,
5. When results are needed fast and no statistical,
6. Sophistication is required.

There are two most commonly used non-parametric statistical methods in business statistics, including:

1. Chi-square ($\chi 2$) statistic
2. Spearman rank correction (rs)

At this level of discussion, however, we shall examine the Chi-square method.

3.2.1 The Chi-Square Method

The Chi-square test can only indicate whether or not a set of observed frequencies differ significantly from the corresponding set of expected

frequencies and not the direction in which they differ. In practice, there are two types of Chi-square ($\chi 2$) tests:

1. test of goodness-of-fit
2. test of independence and /or homogeneity.

The Test of Goodness-of-Fit is employed in situations whereby the researcher's objective is to find out whether or not a set of observed frequencies fits closely the theoretical or expected frequencies. The applicable formula for the test of goodness-of-fit is:

$$\chi 2c = r \sum i=1 \frac{(foi - fei)2}{fei}$$

Where fo = observed frequencies fe = expected frequencies $\chi 2c$ = calculated value of $\chi 2$

The number of degrees of freedom for r number of row entries is r-1 for the test of goodness-of-fit. Given the number of degrees of freedom and the level of significance, the rejection value of $\chi 2$ can be obtained from the $\chi 2$-distribution table.

Consider the following practical example:

In a study to determine customer References/Further Readings among two banking services: Current account and Savings account, 120 customers were asked to respond to the question, "please indicate which service you prefer most":

Current Account _? Savings Account ?
The responses indicate that 65 of the respondents preferred current account while 55 preferred savings account. This data can be summarised thus:

Table 3.1: Number Preferring Banking Services

Bank Banking Service	**Num Number preferring**
Cc Current Account	65 65
Ss Savings Account	55
Total	120 120

We want to test the following non-parametric hypotheses:

HO: The customers do not show any preference for either Current

Account or Savings Account.

HA: The customers show some preference for either Current Account or
Savings Account.

We test the hypotheses at 1 percent level of significance (that is, $\alpha = 0.01$). so that the rejection value, with r-1 = 2-1 = 1 degree of freedom, where r is the number of row categories, that is, Current Account and Savings Account, is 6.635 from the $\chi 2$ -distribution table. This rejection value is illustrated in figure 3.2 below.

$\alpha = 0.01$

χ^2
$\chi 2_u = 6.635$

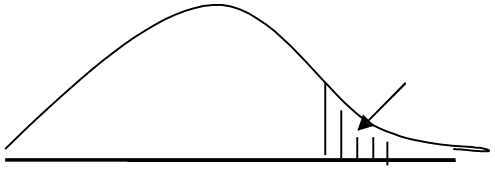


Fig. 3.2: Rejection value for $\chi 2$ (d.f = 1, $\alpha = 0.01$)

The calculated value of χ^2

Bank	Banking Service	Num No. preferring (f_{oi})		Exp Expected Preference (f_{ei})	
Curr	Current Account	65	65	60	60
Savi	Savings Account	55	55	60	60
Total		120	120	120	120

Note: Expected frequency (fei) = Number of Respondents
Number of rows

It follows that:

$\chi^2 c = \Sigma \quad \frac{(f_{oi}-f_{ei})^2}{f_{ei}}$

$= \frac{(65-60)^2}{60} + \frac{(55-60)^2}{60}$
$= 0.42 + 0.42$
$= 0.84$
$= \frac{120}{2} = 60$

Decision

Since $\chi 2c$ (0.84) < $\chi 2u$(6.635), we do not reject Ho, implying that the customers do not show any preference for either Current or Savings Account. The observed pattern of 65 preferring Current Account and 55 preferring Savings Account is not statistically significant.

Test of Independence and Homogeneity aims at ascertaining whether two or more variables are dependent upon each other. The tests of homogeneity aim at ascertaining whether the characteristics of two or more population variables are same.

Two variables are said to be independent (or not associated with each other) if the distribution of one is not related to the distribution of the other. Chi-square ($\chi 2$) test of independence can therefore be used to test if the distributions of two variables in a population are independent of each other.

Two important assumptions of the Chi-square test of independence are worth mentioning:

1. The relevant data are randomly drawn from a population of interest.
2. Two criteria are used in the cross-classification of the observations, and each observation must belong to only one criterion. This cross-classification gives rise to what is referred to as an n-contingency table.

A Contingency table is the table in which the observed and expected frequencies associated with the various levels of two variables are presented. The table is named by the number of rows(r) and number of columns (c) it has, as an (r x c) contingency table. If the table has 2 rows and 3 columns, it will be referred to as a (2 X 3) contingency table. Note that in practice, the expected frequency is recorded in the same cell as the observed frequency. The expected frequency is, however, differentiated from the observed frequency by enclosing it in a bracket inside the cell.

As an example, assume that the director of Enugu State Chamber of Commerce is interested (for planning purposes) in learning more about the international participants in its annual International Trade Fares. From the Local Hotel Association, a list of past participants is obtained. The director plans to send questionnaires to the participants on the list to find out why they participated in the Trade Fares, how much they spent, how long they stayed, and what their future plans are. The director

speculates that an offer to send each respondent a free gift will increase the rate of return of questionnaire responses. To test this proposition, questionnaires were mailed to a random sample of 30 persons with the offer of the free gift. Questionnaires were also mailed to another random sample of 30 persons with no gift offer. The results are shown in the following (2 X 2) contingency table

Table 3.2: A contingency Table of Numbers responding to Questionnaire

	Questionnaire		
Gift	Returned	Not Returned	Total
Offered	22	8	30
Not Offered	14	16	30
Total	**36**	**24**	**60**

The director's proposition can formally be hypothesised as follows:

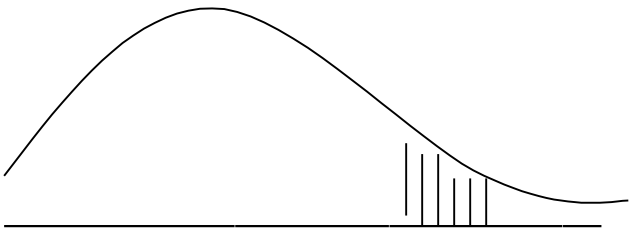
Ho: The population proposition of questionnaire returns is independent of the promise of a gift.
HA: The population proportion of questionnaire returns is dependent upon the promise of a gift.

We want to test these hypotheses at 5 percent level of significant ($\alpha = 0.05$) to see if there is a significant difference in the proportion of returns when the gift is offered.

Solution

From $\chi 2$-distribution Table, we observe the rejection value of $\chi 2$, with (r-
1)(c-1) = (2-1)(2-1) = 1 degree of freedom, at $\alpha = 0.05$ to be $\chi 2u = 3.84$

This can be illustrated as in figure 3.3 below



$\chi 2u(3.84)$

Fig. 3.3: Rejection value for $\chi 2$ (df= 1; $\alpha = 0.05$)

For tests of Independence and Homogeneity, the calculated value of Chi-square (χ^2)
is obtained by:

$$\chi^2 c = {}^{r}\Sigma\ {}^{c}\Sigma\frac{(f_{ij}-f_{ij})^2}{f_{ij}}$$

Where the expected frequencies, f_{ij} can be obtained by the definition:

$$f_{ij} = \frac{R_{it}C_{jt}}{N}$$

Where, R_{it} = row total
C_{jt} = column total
N = the grand total

From the above table 3.5, the totals are

$R_{1t} = 30$; $R_{2t} = 30$; $C_{1t} = 36$
$C_{2t} = 24$; $N = 60$

It follows that the expected frequencies, $f_{ij,}$ will be:

$$f_{11} = \frac{R_{1t}C_{1t}}{N} = \frac{(30)(36)}{60} = 18$$
$$f_{12} = \frac{R_{1t}C_{2t}}{N} = \frac{(30)(24)}{60} = 12$$
$$f_{21} = \frac{R_{2t}C_{1t}}{N} = \frac{(30)(36)}{60} = 18$$
$$f_{22} = \frac{R_{2t}C_{2t}}{N} = \frac{(30)(24)}{60} = 12$$

Note in our formulations that, f_{ij} = expected frequency of observation in the ith row and jth column, so that:

f_{11} = Expected frequency in the 1st row and 1st column f_{12} = Expected frequency in the 1st row and 2nd column f_{21} = Expected frequency in the 2nd row and 1st column f_{22} = Expected frequency in the 2nd row and 2nd column

As mentioned earlier, the expected frequencies in our example can be presented along with the corresponding observed frequencies in the (2X2) contingency table as follows:

	Questionnaire		
Gift	Returned	Not Returned	Total
Offered	22 (18)	8 (18)	30
Not offered	14 (18)	16 (12)	30
Total	**36**	**24**	**60**

The figures in brackets are the corresponding expected frequencies. The calculated $\chi 2$ can now be presented as follows:

$$\chi^2 = \frac{(f_{ij} - f_{ij})^2}{f_{ij}}$$

$$= \frac{(22-18)^2}{18} + \frac{(8-12)^2}{12} + \frac{(14-18)^2}{18} + \frac{(16-12)^2}{12}$$

$$= 0.89 + 1.33 + 0.89 + 1.33 = 4.44$$

Decision

Since $\chi 2_c(4.44) > \chi 2_u(3.84)$, we reject the null hypothesis, Ho, and infer that the population proportion of questionnaire returns in our example is dependent upon the promise of a gift.

SELF-ASSESSMENT EXERCISE

Explain the major difference between a test of homogeneity and a test of independence.

4.0 CONCLUSION

This unit has further exposed you to the way hypotheses are tested using the relevant tools. Of major significance is the use of non-parametric test tools involving tests of homogeneity and independence. This was discussed at length using a simple practical example.

5.0 SUMMARY

The Z-statistic is basically used for testing parametric hypothesis involving large samples. To reflect this statement, the discussions focused on tests involving sample proportions.

Non-parametric test procedures involve:

1. Those procedures whose test-statistic does not depend upon the form of the underlying population distribution from which the sample data were drawn or
2. Those procedures which are not concerned with the population parameters or
3. Those procedures for which the data are of little strength to warrant meaningful arithmetic operations.

There are two most commonly used non-parametric statistical methods in business statistics, including:

1. Chi-square ($\chi 2$) statistic
2. Spearman rank correction (rs)

At this level of discussion, however, we shall examine the Chi-square method.

In practice, there are two types of Chi-square ($\chi 2$) tests:

1. test of goodness-of-fit
2. test of independence and /or homogeneity.

6.0 TUTOR-MARKED ASSIGNMENT

A sample survey of users of public libraries was conducted to investigate the reading habits of men and women. The results are as follows:

Type of Literature Preferred			
Gender	Fiction	Non-fiction	Total
Men	132	102	234
Women	168	98	266
TOTAL	**300**	**200**	**500**

Test at five percent level to see if there is any evidence that women show greater preference for fiction than men.

7.0 REFERENCE/FURTHER READING

Onwe, O. J. (2007). *Statistical Methods for Business and Economic Decisions: A Practical Approach*. Lagos: Samalice Press.

UNIT 2 DATA PRESENTATION AND ANALYSIS

CONTENTS

1.0 INTRODUCTION

In this unit, you will discover the basic principles and tools of data presentation in business statistics. There are some basic things to be considered before presenting and analysing a research data. It is the aim of this unit to look at such things.

2.0 OBJECTIVES

By the end of this unit, you will be able to:

- list the first things to do before presenting and analysing a research data
- describe the acceptable tools for presentation and analysis of data
- present and analyse your data for a given research.

3.0 MAIN CONTENT

3.1 Editing

Before a given data can be presented for analysis and interpretation, it must be edited and coded. By editing, we mean the examination of the given data in order to detect errors that may cause inconsistency if they are used for analysis in their original form. Through editing, these errors can be corrected accordingly. There are two types of editing; field editing and central editing.

3.1.1 Field Editing

Field editing is a process whereby the researcher makes his or her records complete and correct without adding subjective information to his or her sources. It involves the presentation of collected information in a readable form such that all information gathered is properly reported.

3.1.2 Central Editing

Central editing ensures maximum consistency in information by correcting any inconsistency in the collected data, which might create problems in the analysis and interpretation of the results. There are four possible errors that should be watched out for in central editing.

1. Arithmetic or numeric errors: These are errors that involve the wrong recording of the units in responses. Information may be wrongly reported in months when they are requested to be in years.

2. Errors of transposition: This error occurs when a response is entered in the wrong place. For example, a question that asks for the respondent's State of Origin may generate an answer about the ethnic group to which the respondent belongs.

3. Errors of inappropriate response: These errors occur when a respondent gives a relevant response but not in the exact form that is required.

4. Errors of omission: These errors are difficult to edit and, in most cases, are interpreted to mean "no response"

3.2 Coding

Coding enables the researcher group responses into limited number of classes or categories for ease of analysis. A set of rules are observed when grouping the responses into classes or categories. The rules include:

1. Exclusiveness: This requires that a data item or response must be placed in one cell of a given category set. This is essentially relevant in a situation where a respondent or response fits into several categories.

2. Exhaustiveness: This is a requirement that all data categories or cells must be able to provide the necessary data for answering the research questions and testing the research hypotheses.

3.3 Data Analysis

Research is generally meant to generate data for analysis, and this can result in a large amount of statistical information mostly in its raw stage. For the generated data to be useful in attaining the objectives of a research, they have to be reduced to manageable dimensions through analysis. Two types of data analysis are in place; descriptive analysis and causal analysis

3.3.1 Descriptive Analysis

This deals with the study of such research variables as profiles of the respondents, organisations, groups or any other subjects. Descriptive analysis may be either qualitative, involving frequency distributions, measures of central tendency and dispersion or quantitative, which demands the use of such statistical tools as simple percentages, frequency distribution, measures of central tendency and measures of dispersion. Quantitative analysis is used in summarising quantitative information generated by the research process.

3.3.2 Causal Analysis

This involves the use of more sophisticated statistical tools to draw inferences based on the research information. Such statistics as Chi-Squares, student t statistic, and least-squares estimators are some of the important statistical tools that can be used

Causal analysis focuses on causal relationships between relevant researches variables. The analytical results would help in isolating the causes of a given problem situation. Causal analysis also uses such statistical tools as correlation coefficient, test of goodness – of – fit, test of independence, and the like. It requires proficiency in statistical analysis. (See Onwe, 1998 and standard statistics texts for the application of the statistical tools mentioned here).

3.4 Tools for the Presentation and Analysis of Research Data

This section examines the relevant data presentation and analytical tools in business statistics. The tools will include:

1. frequency distribution tools
2. parametric tools
3. non-parametric tools

3.4.1 Frequency Distribution Tools

These tools basically involve the use of histograms and frequency polygons. In this section, you will be taken through the use of these tools.

Histogram and frequency polygon

A histogram is a pictorial representation of a frequency distribution of a given grouped data. The histogram is a set of bars or blocks constructed from the grouped data. The height of each bar is represented by the frequency of the corresponding observation, and the horizontal axis of each bar is represented by the class width.

The frequency polygon

This is a diagram obtained by connecting the midpoints of the bars or blocks to form the histogram of the given set of grouped data as an example, consider the frequency distribution of the monthly salary of 100 workers in a given company:

Table 3.2: A contingency Table of Numbers responding to Questionnaire

Monthly Salary (N'00s)	**No. of Workers (f)**
640 – 659	7
660 – 679	20
680 – 699	33
700 – 719	25
720 – 739	11
740 – 759	4
∑f = 100	

The frequency distribution is represented by a two-dimensional graph, with the vertical axis labeled "frequencies (f)" and the horizontal axis labeled "Actual Class Limits". *The Actual Class Limits* are obtained by subtracting a constant value, 0.5; from each lower class limit of the frequency distribution and adding same (0.5) to the corresponding upper Class Limits. This process is presented below.

Table 3.3: The Actual Frequency Distribution of Monthly Salaries of 100 workers 2

Stated salary limits	**Actual salary limits**	**No. of Workers**
640-659	639.5-659.5	7
660-679	659.5-679.5	20
680-699	679.5-699.5	33
700-719	699.5-719.5	25
720-739	719.5-739.5	11
740-759	739.5-759.5	4

Table 3.3 is plotted in figure 3.6 to produce the histogram and polygon

Frequency
(F)

40

30

20
10

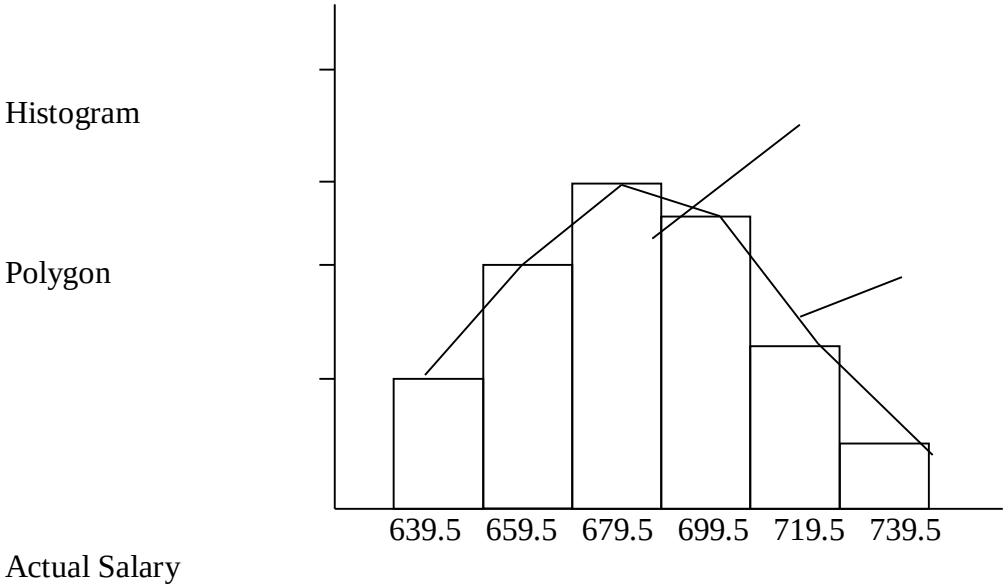


Fig. 3.6: The Graph of Histogram and Polygon

The Pie Chart

A pie chart shows the totality of the data being represented using a single circle (a "pie"). The circle is split into sectors, the size of each being drawn in proportion to the class frequency. For easy analysis, each sector is shaded differently.

As an example, consider Table 3.3 below, showing the non-managerial workforce employed at a given factory.

Table 3.3: Non-Managerial Workforce

Job Description	**Number Employed**
Labourers	21
Mechanics	38
Fitters	9
Clerks	12
Draughtsmen	4
Total	**84**

The pie chart for these data is as shown in Figure 3.7 below

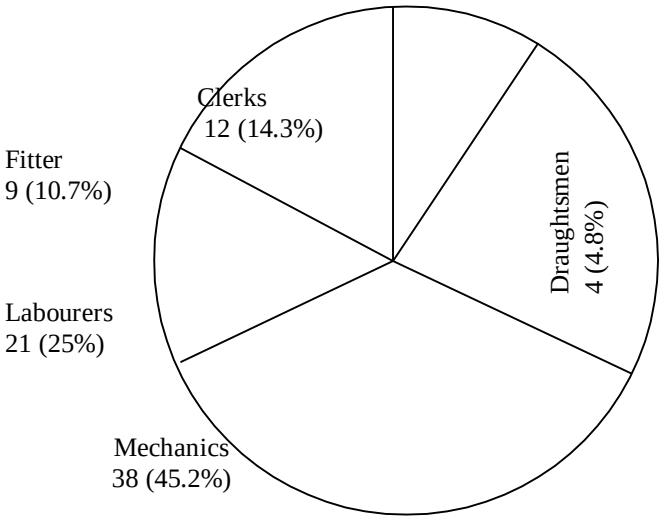


Fig. 3.7: Workforce Employed at a Factory

3.4.2 Parametric Tools

Our major interest here is on the tools used in testing parametric hypotheses. That is, hypotheses concerning population parameters, such as the population mean, μ, the population variance, δ^2 , and the population standard deviation, δ. For practical purposes, the major parametric tools are the student t-statistic and the Z-statistic. These were discussed in detail in unit 10 and 11. You may want to refer to these units.

3.4.3 Non-Parametric Tools

As presented in unit 10, the major parametric tool used in testing hypotheses is the chi-square (χ2)-statistic. Another is the Spearman Rank correlation coefficient (r_s). The use of chi-square was discussed in detail in unit 11. You may also refer to it.

SELF-ASSESSMENT EXERCISE

Discuss the importance of field editing in the data analysis process.

4.0 CONCLUSION

This unit has worked on the necessary preliminaries in the processing, presentation, and analysis of research data. You were informed on the two basic types of data analysis: descriptive analysis and causal analysis. You also learned the basic tools of data analysis, including: frequency distribution tools, parametric tools; and, non-parametric tools.

5.0 SUMMARY

Before you present your research data for analysis and interpretation, it must be edited and coded. Two types of editing were discussed including: field editing; and, central editing. The editing process will enable you discover and correct possible errors in the data you collected. The errors can be either of the followings: numeric errors, errors of transposition, errors of inappropriate response, and errors of omission.

Two types of data analysis were discussed at length: descriptive analysis and causal analysis. Descriptive analysis may be either qualitative, involving frequency distributions, measures of central tendency and dispersion or quantitative, which demands the use of such statistical tools as simple percentages, frequency distribution, measures of central tendency, measures of dispersion. The relevant data presentation and analytical tools in business statistics were discussed as frequency distribution tools, parametric tools, and non- parametric tools. Each of these tools is used according to the nature of information obtained, as well as the type of analysis required by the research.

6.0 TUTOR-MARKED ASSIGNMENT

Obtain some real data on the distribution of sales revenue in a set of business organisations of your choice. Using the data, construct a frequency polygon.

7.0 REFERENCES/FURTHER READING

Onwe, O. J. (2007). *Statistical Methods for Business and Economic Decisions: A Practical Approach*. Lagos: Samalice Press.

Nachimas, D. & Nachimas, C. (1976). *Research Methods in the Social Sciences.* New York: St Martin's Press.

UNIT 3 PRESENTATION OF THE RESEARCH REPORT FOR STUDENT THESIS

CONTENTS

1.0 INTRODUCTION

The aim of this unit is to keep you informed on the final write-up stage of your research. By the time you get to this stage, you must have collected or generated a significant amount of data and research materials. During the course of conducting your research, you are expected to have been writing draft sections of the final report. This is particularly so in writing a thesis or dissertation report. Thus, you should now be in a position to begin to write the first complete draft of your final report. If you happen not to be in this position, this unit advices you on how you might start the final report.

2.0 OBJECTIVES

By the end of this unit, you will be able to:

- plan the research report
- design a time table
- prepare content of individual sections of the report.

3.0 MAIN CONTENT

3.1 Planning the Research Report

The planning stage will include the report design, the structure and the format. We will start the discussions by looking at the strategies that can be adopted in writing the research report. Writing up the final research report can be challenging to researchers especially research students. But it can be made easier if you have been writing notes and rough drafts throughout the period of your research. There are some recommended strategies you can adopt when writing up your final research report. The strategies include, among others:

1. Brainstorming or writing down a checklist of ideas you think might be included in the final report but which does not specify the order in which they might be presented.
2. Taking verbatim notes from the relevant literature.
3. Constructing a plan that details not only the content of the finished report, but also the order in which it will be presented.
4. Writing out full drafts in continuous prose but not necessarily in polished English.
5. Revising full drafts.

The general literature advices that it is important to get your thoughts committed to paper in one way or another during the research process. Points may be generated in a random order. In many cases, a point from the literature or methodology can generate points concerned with the research results and analysis.

3.1.1 The Report Design

When planning your research report, it is recommended that you bear in mind the concept of synergy: your dissertation or thesis should be greater than the sum of its parts. In order to achieve this, you must remember that the chapters which make up your report cannot exist in isolation from one another; they are interrelated and needs to be integrated to form a cohesive whole. A logical and structural approach to a report design is summarised in exhibit 3.1 below.

Structure and Content:

- The information should be presented in a logical sequence. Each section should have a logical progression and support a central message. Each item should lead to the next.
- A standard hierarchy of headings and sub-headings should be adopted in structuring the report.

- The chapters, main sections and sub-sections should be numbered sequentially. It is usual to divide the report into chapters containing a number of main sections and, in turn, these main sections can be divided into sub-sections. Paragraphs should not be numbered.
- Titles and headings used for tables, graphs and other illustrations should also be standardised and numbered sequentially. The first digit should refer to the chapter number and the second digit to the table/chart number. For example, table 3.5 refers to the fifth table in chapter 3.
- The pages should be numbered sequentially.

Style and Layout:

- Throughout the document, there should be consistency of style in terms of page size, layout, headings, fonts, colour, justification, and so on.
- A reasonable size point, such as 12 pitch, should be used to ensure legibility
- The design and layout should be attractive. It is recommended that colour and/or white space should be used to complement the layout.
- Different colours may be used for highlighting key variables through a report.
- Avoid the combination of red and green for adjacent data, which can be a problem for colour-blind and colour-deficient people.
- Use dark colours for text and figures, since light colours may not be legible.

Presentational Forms:

- Tables, graphs and other illustrations should relate to the text so that the information is supported by the different representations.
- To maintain the reader's interest, a variety of presentations should be used, as dictated by the type of data and the purpose. Is it a continuous data for comparison?

Exhibit 3.1 Guide to Report Design

3.1.2 The Structure

The overall structure of your final research report, dissertation or thesis must be logical and clear. This principle should be applied to each chapter, section, paragraph and sentence of the report. You need to note that the structure presented in exhibit 3.1 is only a guide; you may need to modify it to reflect your own research project after discussing with your supervisor. In practice, the size of each chapter will vary according to the nature of the research problem, the methodology adopted and the use of tables, charts and diagrams. For example, in an

undergraduate dissertation project, there is often less scope for primary research and therefore the literature review will form a more substantial part of the report than other chapters. In a Ph. D. dissertation report, particularly where phenomenological approach without an a priori theoretical framework has been adopted, the methodology chapter will be a crucial and significant part of the thesis.

Your structure should not depart too far from a traditional structure, unless you have good and logical reasons. The more logical you can make your structure, the easier it would be for you to write the report and for the examiner to read it.

3.1.3 The Format

You must put your draft report in the format required by your institution. This will save you considerable time during the process of refining and improving the content of the document. You will need to ascertain the requirements regarding the style, length, and structure of the research report from your university or institution. The report will be required to be word processed with double line spacing, printed only on one side of the page. Watch out also for requirements to be met regarding page numbering, font size, and margin widths.

In most cases, the requirements would be: a left-hand margin of at least 1.25 inches leaves room for the document to be bound; a right-hand margin of 1 inch allows examiners to write comments in the margin. You must ensure that your final report document complies with your university institution's regulations.

3.2 Setting a Timetable

In the determination of the structure of your thesis, it is useful to draw up a timetable showing the critical dates of completion of the different sections. You will need to have a deadline for submission of your thesis or dissertation, and you can easily think of this as coinciding with when you have finished writing up the report. However, the fact that you have finished the write up does not mean you have reached the final stage; you will need time for editing, proof-reading and binding of the finished report.

It is usually difficult to estimate the exact amount of time the writing up and final tasks will take, as there are a lot of variables involved. Table 3.4 gives a breakdown of the main tasks for a full-time Ph. D student.

Table 3.4: Typical Time taken for writing a Ph.D. Thesis

Chapter or Task	**Number of Weeks**
Introduction	2
Literature Review	4
Methodology	2
Results or Collection of Data	4
Analysis and Discussion	4
Conclusions and Recommendations	2
Tables, Figures, References/Further Readings, Appendices, etc.	1
Consultation with Supervisors and/or others and revisions	2
Editing, Proof reading, and Binding	3
TOTAL	**24**

The time schedule shown in table 3.1 assumes that some preliminary work has been done, for example, most of the References/Further Readings are known and listed, some of the diagrams are drawn up and are ready to be incorporated, and analysis of the data has been completed. It is therefore recommended that you build in a contingency factor to allow for illness, supervisor's availability, domestic interruptions, computer breakdowns, power outages, and lost documents.

3.3 Content of Individual Sections of the Research Report

The research report is presented in a particular format. The format varies from place to place and from discipline to discipline. It is advisable to find out what format is required in a given institution, place or discipline before making presentations. Essentially, research report comprises three major sections as follows:

1. the preliminaries
2. the main body (chapters 1 to 5)
3. the appendix

The Preliminary Pages include:

The main body of the report comprises of five chapters arranged in the following format:

Chapter 1: Introduction

1.1 Background of the Study: In this subsection, the researcher traces the conditions and factors that made the study necessary. The essence is to provide the necessary background information that will show the reader the conditions, circumstances and factors that give rise to the problem under investigation.

1.2 Statement of Problem: Having traced the development of the problem in section 1 above, the problem is now formulated and defined in concise and precise terms.

1.3 Objectives of the Study: This refers to what the research will accomplish. It represents the statement of the purpose of the study. The statements of objectives are broken down to itemised specific statements.

1.4 Relevant Research Questions: As mentioned earlier, research questions represent the major questions for which the researcher seeks to answers in the course of his or her investigation.

1.5 Statement of Hypotheses: Hypotheses refer to intelligent guesses which the researcher formulates to guide his or her search for the solution to the problem.

1.6 Scope of the Study: This deals with the extent of the research problem the researcher will be concerned with in the present study, given his or her competence, time available, interest and resources.

1.7 Significance of the Study: This refers to the rationale or importance of the study. It includes the major contributions of the study both to theory and general knowledge.

1.8 Definition of Terms: Here terms or concepts peculiar to the study are defined by the researcher.

Chapter 2: Review of Related Literature.

This chapter presents the review of all literature relevant to the research topic usually organised under relevant sub-headings such as:

2.1 Historical Background: Where the history of the problem under investigation is presented.

2.2 Theories Relevant to the Research Questions and Hypotheses: Theories that gave rise to the research questions and hypotheses are discussed in this section.

2.3 Current Literature: Based On Each of the Relevant Variables Postulated by the Theories.

Chapter 3: Research Methodology

This chapter is made up of the following sections:

3.1 Restatement of the Relevant Research Questions and Hypotheses: Where the research questions, as well as the hypotheses are restated in terms of the method the question will be answered and the method the hypotheses will be tested.

3.2 Research Design and Sources of Data: This relates to the general approach in carrying out the study. Here the researcher specifies the type of research design for the study and presents the sources of data, both primary and secondary.

3.3 Characteristics of the Population of Study: The characteristics of the study population are represented here in relation to status, location and size.

3.4 Sampling Design, Procedures and Determination of the Sample Size: The type of sampling technique to be used, and the way in which the sample size for the study is determined will be presented in this section.

3.5 Questionnaire Design, Distribution and Collection of Responses: This section specifies the type of questionnaire design to be used, and the way or method in which the questionnaire will be distributed and responses collected.

3.6 Procedures for Data Processing: This section presents the techniques for data processing and analysis.

3.7 Limitations of the Research Method: The limitation of the applicable research method will be presented and specified in this section.

Chapter 4: Data Presentation and Analysis

This chapter is made up of three relevant sections:

4.1 Presentation and Analysis of Data According to Responses to the Research Questions

In this section, the researcher isolates the responses of the questions in the questionnaire which answers the stated research questions and analyses them accordingly.

4.2 Presentation and Analysis of Data Based on Test of Hypotheses: In this section the researcher presents the data to be used in testing the stated hypotheses, followed by the tests.

4.3 Analysis of Other Relevant Data: Data not directly related to either the research questions or hypotheses, but relevant in the study will be presented and analysed in this section.

Chapter 5: Summary of Findings, Recommendations and Conclusions

The relevant sections in this chapter include:

5.1 Summary of Findings
5.2 Recommendations Based On Research Findings
5.3 Conclusion.

SELF-ASSESSMENT EXERCISE

Why do you think a timetable is important for a thesis project?

4.0 CONCLUSION

This unit has focused the presentation of thesis reports and how it can be successfully done. Students are advised to make good References/Further Readings to the unit, as bad reporting can make a thesis unacceptable, redundant, and useless. The most important aspect of this unit is the area touching on presentation design, formatting, and structuring. Such areas can determine the success or failure of an approved thesis project.

5.0 SUMMARY

Writing up the final research report can be challenging to researchers especially research students. But it can be made easier if you have been writing notes and rough drafts throughout the period of your research. There are some recommended strategies you can adopt when writing up your final research report. The strategies include, among others:

1. Brainstorming or writing down a checklist of ideas you think might be included in the final report but which does not specify the order in which they might be presented.
2. Taking verbatim notes from the relevant literature
3. Constructing a plan that details not only the content of the finished report, but also the order in which it will be presented.
4. Writing out full drafts in continuous prose but not necessarily in polished English
5. Revising full drafts.

The overall structure of your final research report, dissertation or thesis must be logical and clear. You need to apply this principle to each chapter, section, paragraph and sentence of the report. Your structure should not depart too far from a traditional structure, unless you have good and logical reasons. The more logical you can make your structure, the easier it would be for you to write the report and for the examiner to read it.

In determining the structure of your thesis, it is useful for you to draw up a timetable showing the critical dates of completion of the different sections. You will need to have a deadline for submission of your thesis or dissertation, and you can easily think of this as coinciding with when you have finished writing up the report.

The format for presenting a research report varies from place to place and from discipline to discipline. It is advisable for you to find out what format is required in a given institution, place or discipline before making presentations. Essentially, research report comprises three major sections as follows:

1. the preliminaries
2. the main body (chapters 1 to 5)
3. the appendix

6.0 TUTOR-MARKED ASSIGNMENT

Have you carried out a thesis project before? If 'yes,' what were the problems you encountered, and what percentage of the problems do you think were due to wrong time scheduling?

7.0 REFERENCES/FURTHER READING

Hussey, J. & Hussey, R. (1997). *Business Research: A Practical Guide for Undergraduate and Postgraduate Student*. Great Britain: Palgrave.

Onwe, O. J. (1998). *Elements of Project and Dissertation Writing: A Guide to Effective Dissertation Report*. Lagos: Impressed Press.

UNIT 4 ETHICS IN BUSINESS RESEARCH

CONTENTS

1.0 INTRODUCTION

The term, 'ethics' appears to be a universal concept in business, law, medicine, administration, and all other life activities involving the public. It has to do with code of conduct. Ethics represent norms or standards of behaviour that guides moral choices about human behaviour and relationships with others. Like other aspects of life activities, research demands ethical behaviours from its participants

Given the fact that integrity in research is vital, this unit discusses its components. The aim is to stimulate an ongoing exchange about values and practical research constraints. The unit is organised around the theme of ethical treatment of respondents, clients, research sponsors, and other competing researchers.

2.0 OBJECTIVES

By the end of this unit, you will be able to:

- describe what ethics in research is all about,
- demonstrate how to treat respondents and subjects in an ethical manner,
- specify your ethical responsibility to your team members in your research activities,
- state professional ethical standards.

3.0 MAIN CONTENT

3.1 Ethical Treatment of Respondents and Subjects

Ethics is usually an issue in research design. You need to think about protecting the rights of the respondents and subjects. Whether you obtain your data from an experiment, interview, observation, or survey, the respondents have many rights to be safeguarded. In general, your research must be designed so as not to suffer the respondents physically or mentally. To safeguard against these, the following guidelines have been recommended.

1. Explain the benefits of the research
2. Explain the respondent rights and protections
3. Obtain informed consent

3.1.1 Explaining the Research Benefits

Whenever a direct contact is made with a respondent, it is advisable for you to discuss the benefits derivable from the given research, provided you are careful not to overstate or understate the benefits. You should begin an interview with your name, the name of the research organisation you belong to or your research sponsor, and a brief discussion of the purpose and benefit of the research. This will put the respondents at ease, let to know the person they are speaking with, and motivate them to give accurate answers to the questionnaire questions.

It is sometimes necessary however, to conceal the actual purpose and benefits of your study or experiments to avoid introducing bias. The need for concealing the research objectives will lead directly to the problem of deception.

3.1.2 Deception

Deception occurs when the respondents or subjects are told only part of the truth or when the truth is fully compromised. While some writers believe this should never occur, others suggest two reasons it should occur.

1. To prevent biasing the minds of the respondents before the survey or experiment.
2. To protect the confidentiality of a third party, such as the sponsor of the research.

It is advisable not to use deception in an attempt to improve response rates. The benefits to be gained by deception should be balanced against the risks to the respondents. When possible, you need to redesign an interview or experiment to reduce your reliance on deception. Additionally, you must adequately protect the respondents' rights and well-being. In cases where deception in an experiment could produce anxiety, you need to check a subject's medical condition to ensure that no adverse physical harm follows.

3.1.3 Informed Consent

Securing informed consent from your respondents is a matter of fully disclosing the procedures of the proposed survey or other research design before requesting permission to proceed with the survey or experiment. There are exceptions that argue for a signed consent form. If you suspect a probability of the data producing harm to the respondent, or if you offer only limited protection of confidentiality, a signed form detailing the types of limits should be obtained from the respondents or subjects. For most business research, oral consent can be sufficient. Exhibit 3.1 below shows how informed consent procedures can be implemented by you. It demonstrates how you can adhere to the highest ethical standards for survey procedures.

Informed Consent Components in Survey Introductions

1. Introduce yourselves – your name and your company or sponsor's name.
2. Briefly describe the survey topic, for instance, achieving full capacity in power supply by the year, 2010.
3. Describe the geographic area you are interviewing or target Sample.
4. Describe the purpose(s) of the research.
5. Give a "good-faith" estimate of the time required to complete the interview. Promise anonymity and confidentiality when appropriate.
6. Tell the participant the participation is voluntary.
7. Tell the respondent that item-non response is acceptable.
8. Ask permission to begin the interview.

Sample Introduction

Hello or good day, then your name, from the Business Research Institute. We are surveying Lagos metropolitan area to ask their opinion about electric power outages. This study is sponsored by the Federal Ministry of Mines and Power and its result will be used in decisions concerning constant availability of electric power by the year 2010.

The survey takes about 20 minutes. Your participation is anonymous and voluntary, and all your responses will be kept completely confidential. If there are any questions you do not feel you can answer, please let me know and we will move to the next question. So, with your permission I will continue.

Sample Conclusion of the Interview
Here, you will give the respondent some information on how to contact the principal investigator. For example: Professor Onyemaechi Joseph is the principal investigator for this study. Would you mind having his address or telephone number in case you want to contact him about the study at your convenient time.

Exhibit 3.1: Informed Consent Procedures for Surveys
Source: Adapted from Surveys conducted by Indiana University Centre for Survey Research

3.2 Ethics and the Research Sponsor

Whether you are undertaking product, market, personnel, financial, economic, or other research, the sponsor has the right to receive ethically conducted research. The sponsor has the right to confidentiality and the right to quality research.

3.2.1 Sponsor's Right to Confidentiality

Some sponsors would like to undertake a research without revealing themselves. They have the right to such confidentialities as: sponsor nondisclosure, purpose nondisclosure, and findings nondisclosure.

Sponsor nondisclosure involves situations where a company has the right to dissociate itself from the sponsorship of a research project for reasons best known to it. A good example of this situation is where a company is testing a new product idea. They would want to avoid potential consumers from being influenced by the company's current image or industry standing.

Purpose nondisclosure involves the protection of the purpose of the study or its details. This will be the case when a research sponsor is testing a new idea that is not yet patented and may not like competitors to know of the plans. The sponsor may be investigating employee complaints and would not want to spark union activity.

Even if a sponsor feels there is no need to hide its identity or the purpose of the study, the sponsor would want the research data and findings to be confidential, at least until the management decision is made. The sponsor therefore would demand and receive findings nondisclosure between themselves or their researchers and any interested but unapproved parties.

3.2.2 Sponsor's Right to Quality Research

An important ethical consideration for the researcher and sponsor has been noted as the sponsor's right to quality research. This right entails:

1. provision of a research design appropriate for the research question.
2. maximisation of the sponsor's value for the resources expended.
3. provision of data handling and reporting techniques appropriate for the data collected.

It is advisable that, from your research proposal through the design to data analysis and final reporting, it is your responsibility to guide the sponsor on the proper analytical techniques and interpretations. At times, sponsors may have heard about a sophisticated data handling technique and will want you to use it even when it is obvious it is inappropriate for the problem at hand.

The ethical researcher always follows the analytical rules and conditions for results to be valid. The researcher reports findings in ways that minimise the drawing of false and misleading conclusions. The ethical researcher also uses charts, graphs, and tables to show the data objectively, regardless of the sponsor's preferred outcomes. It has been observed that some sponsors ask research specialists to participate in an unethical behaviour. Compliance by you constitutes the breach of ethical standards. You should watch out for the following:

1. Violation of the respondent's confidentiality.
2. Changing data or creating false data to meet a desired objective.
3. Changing data presentations or interpretations.
4. Interpreting data from a biased perspective.
5. Omitting sections of data analysis and conclusions.
6. Making recommendations beyond the scope of the data collected.

3.3 Researchers and Team Members Ethics

The most important ethical responsibility of researchers has been noted as their team's safety as well as their own. The responsibility for ethical behaviour rests with the researcher who, along with assistants, is charged with protecting the anonymity of both the sponsor and the respondents. There are factors to consider in ensuring a researcher's right to safety. Some urban areas and underdeveloped rural areas may be unsafe for research assistants. For example, if the researcher must personally interview people in a high-crime area, you must provide a second team member to protect the researcher. This could be an undisclosed Police.

Ethical compliance from team members is required. Assistants are expected to carry out the prepared sampling plan, to interview or observe respondents without bias, and to accurately record all necessary data. Unethical behaviours, such as filling in an interview sheet without having asked the respondent the questions, should be seriously avoided.

3.4 Ethics and Professional Standards

Various standards of ethics can be found for the professional researcher. Many corporations, professional associations, such as Institute of Chartered Accountants of Nigeria (ICAN), Nigerian Institute of Management (NIM), Nigerian Medical Association (NMA), the Nigerian Bar Association (NBA), as well as universities and governments have a code of ethics. At present, the federal government of Nigeria has instituted a unit, the SERVICOM that ensures work ethics among Nigerian service providers.

SELF-ASSESSMENT EXERCISE

Why is it advisable for a research to embrace research ethics?

4.0 CONCLUSION

The unit has educated you on research ethics. It advices you to take research ethics a very important consideration for an effective and implementable research results. You were informed that ethics in general are norms or standards of behaviour that guide moral choices about our behaviour and our relationship with others. The aim of ethics in research is to ensure that no one is harmed or suffers adverse consequences from research activities.

5.0 SUMMARY

This unit's discussions touch on important and global ethical issues in research, that revolve around treatment of respondents and subjects, the research sponsors, the research team members, and professional standards. Your research must be designed so as not to suffer the respondents physically or mentally. To safeguard against these, the following guidelines have been recommended:

i. Explain the benefits of the research.
ii. Explain the respondent rights and protections.
iii. Obtain informed consent.

Whether you are undertaking product, market, personnel, financial, economic, or other research, the sponsor has the right to receive ethically conducted research. The sponsor has the right to confidentiality and the right to quality research. The most important ethical responsibility of researchers has been noted as their team's safety as well as their own. The responsibility for ethical behaviour rests with the researcher who, along with assistants, is charged with protecting the anonymity of both the sponsor and the respondents.

Many corporations and professional associations have adopted a code of ethics worldwide. Several professional research associations have detailed provisions for ethics in research.

6.0 TUTOR-MARKED ASSIGNMENT

Research into, enumerate and discuss the code of ethics for two professional associations of your choice.

7.0 REFERENCE/FURTHER READING

Cooper, D. R. & Schindler, P. S. (2001). *Business Research Methods*. Boston: McGraw-Hill.

UNIT 5 PROBLEMS OF RESEARCH IN DEVELOPING COUNTRIES

CONTENTS

1.0 INTRODUCTION

We feel it will be important to be aware that the research environment in developing countries can be a problem of itself. To be more informed on this problem, you are advised to carry out a rigorous research. Such research project will be significant in changing the research culture as is found in developing countries. As a starting point, you will find this unit worthwhile. This unit provides some preliminaries on the problems of research in developing countries.

2.0 OBJECTIVES

By the end of this unit, you will be able to:

- identify the problems facing researchers in developing countries in general and, specifically, in Nigeria
- draw up an acceptable research proposal on the research environment of developing countries
- write propositions on the way forward on carrying out research in developing countries in general and specifically, in Nigeria.

3.0 MAIN CONTENT

3.1 Scarcity of Data

Many social scientists in developing countries will attest to the fact that research data is difficult to get by in developing countries. No accurate population figures, no accurate and reliable income, expenditure, and balance of payments statistics. You will regularly find out that annual or time series data on important economic and/or business variables are often truncated. or abridged. At times, you find that time-series data on a country's Gross National Product (GNP) or Gross Domestic Product (GDP) differ from source to source: those from the World Bank will differ from those from the Central Bank; those from the Federal Bureau of Statistics would differ from those of the World Tables, and so on. One thus wonders how a useful research can be carried out in such environment of paucity of research data.

3.2 The Lack of Research and Development (R & D) Culture

Researchers will agree that in many developing countries, especially in the African countries, research and development do not exist in the dictionary of business activities of many organised businesses. What you often observe is the continuous dependence on "the old way of doing thing"; the notion that if it works for the predecessors, it must work for us. You will also observe the famous culture of doing by imitation among manufacturing, and even education sub-sectors. At times, these sub-sectors find themselves stagnant and unable to find new, scientific, efficient, and effective ways of effecting positive changes. The ultimate impact of this lack of research and development culture is ignorance of the importance of keeping accurate data. This is a serious research problem as accurate information is a necessary condition for effective research.

3.3 Inadequate Funding of Research Projects

It has been on record that research projects in developing countries are hardly properly funded. The problem is often attributed to either these countries' economic conditions or lack of government commitment to research. In these countries, political instability appears to be the order of the day. In most of the time, people who accidentally find themselves in government authorities may be those who do not understand enough to appreciate the contributions of research to national development. In these countries' universities, it appears the situation has assumed crisis dimension. Research has been coming to a halt due to lack of funds. The days of research grants are almost over. Academic staff stay as

much as ten years without having one single research grant, either from within the country or from outside. A good number of these staff use their meagre salaries to fund their individual research activities. They must either publish or perish.

3.4 Lack of Necessary Equipment, Facility and Research Material

In most developing countries, you will observe that the equipment, facilities and materials needed for meaningful research are either lacking or inadequate. This is especially the case in situations involving scientific experiments, where many researchers cannot find a single microscope in good working condition, or the chemical needed to undertake routine experiments for students. Where you find some of these equipment and facilities you will observe that they have either become obsolete or in a very bad state of repairs. This problem also exists in social sciences and education. You find it even difficult to obtain current journals, periodicals, and relevant textbooks.

3.5 Poor Communication Network

The communication network for many developing countries is currently far from being well developed. This situation is a serious problem as it hampers educational, scientific and social research. The mail and telephone facilities in these countries cannot effectively be used in collecting data. In many occasions, no social research worker uses this means for data collection. This problem is compounded by lack of effective and efficient transportation system. Some research areas are so remote that they cannot easily be accessed by modern transport means. You observe that conducting a valid research under these conditions appears to make the whole affair unexciting and frustrating. This may sometimes lead to guess work by dishonest research consultants, where data are made up by unscientific assumptions. Census counts in Nigeria are good cases in point.

3.6 Unattractive Working Conditions for Research Workers

Another serious problem militating against research in developing countries is the poor conditions under which research workers operate. These workers are mostly under paid. They lack incentives. The few of them residing in official quarters live in miserable conditions, and the majority of them residing inside towns suffer hardships ranging from transportation problems, power outages, to shortage of water supply, cooking gas and fuel. These can serve as sources of distraction even to the best brains. One therefore, cannot expect research workers in

developing countries to perform as well as their counterparts in the developed countries of Europe and the United States of America where research is taken serious and conditions are very congenial to research activity.

3.7 The 'Publish or Perish' Syndrome

The crave for publications in the University systems of developing countries appears to be doing more harm than good in the field of research. This crave often arises from the belief that promotion or upward mobility on the job must be determined by the amount of publications one has been able to make, regardless of the quality and nature of the publications. You may not see anything wrong with this situation on the surface. But the problem would lie in the observed fact that in the quest for publications, academics appear not to have time for well- thought-out and properly articulated research, that is, the type of research that can generate some impact either in the short- or long-run.

In many instances you observe that university lecturers in developing countries appear to be busy scratching the surface of their disciplines in the bid to write and publish as many papers as possible so as to obtain a professorial chair. One would admit that whereas nothing is wrong with using only publications as a major criterion for promotions, the fact remains that research for the mere sake of publications in order to be promoted, is likely not to make much impact on national development and economic progress. In some of the cases, such research activities end up investigating trivial problems or even replicating previous studies without positive contributions.

3.8 Lack of Record-Keeping Culture

The culture of keeping records is yet to be developed in most developing countries. It would appear these countries have no appreciation for the importance of record keeping in national planning. They do not care about keeping accurate and up-to-date records. Where you find these records, you see them so haphazard and incomplete. At times, these records are not allowed to be accessible by interested researchers. Some claim that release of records is against the so-called 'oath of secrecy.'

The state of record keeping in government establishments is so poor that some institutions and establishments cannot even claim, with any degree of certainty, the number of staff in their pay-roll. You find it even extremely difficult to obtain accurate information on the number of students who graduated the previous year from some educational institutions. The administrative implication of this is that once people

leave a particular institution, it will be almost impossible to get in touch with them again. This situation can make follow-up studies on these people impossible.

3.9 Governmental and Societal Attitudes

Government and society in general appear to have poor attitude to research in developing countries. These governments tend to be very unconcerned about the promotion of research. They often castigate research workers, who are already operating under hash and hard conditions, for not producing immediate result. They forget that research is a painstaking activity that requires a long time before its results could have practical impacts.

The society appears to be complacent on research activities. Most citizens of developing countries do not see why money and time should be "wasted" on something that does not have immediate contribution to their material wellbeing. This attitude has been observed even among literate members of the society. You can infer that certainly, the role of research as much as overall development is not fully appreciated in developing countries. This may explain the reason researchers making use of human subjects find it difficult to obtain the cooperation of such subjects, especially in survey studies. The society appears to have the general feeling that research is a mere "play", or at best, "an academic exercise." In event therefore, it does not matter whether they provide the correct responses or not.

3.10 The Business Sector Factor

The business sector factor has been observed as another impediment to the progress of research in developing countries. As you may have recalled, business organisations appear to feel completely alienated from research. This explains their look warm attitude to research and development activities. They are usually not interested in the support of research, either for the purpose of improving operational effectiveness or that of the entire national economy. Rather than invest in research and commercialisation of the research findings, they often prefer to invest in areas that can yield immediate profits. You will find it disappointing to observe that the balance sheets of many companies in the developing countries reflect net profits of billions of naira yearly, yet not even a kobo from such huge profits is invested in research that will enhance the development of the economy from which such profits are made. The implication has been that funding of research activities is

limited to governments, international agencies, and non-profit organisations. Major scientific and technological break-through are not easily and promptly commercialised in most developing countries.

There exists a case where major scientific and technological break-through by some individuals in Nigeria, for example, died almost immediately for lack of interest by business organisations. Businesses appear not to be willing to fund commercialisation of such break-through, or even to support further research on them. Though these developing countries think of catching up with developed countries, they have not shown signs of interest in research activities leading to economic progress.

SELF-ASSESSMENT EXERCISE

Discuss briefly two major problems of research in Nigeria. Can you give examples?

4.0 CONCLUSION

This unit has exposed you to the problems of research in developing countries. The idea has been to keep you informed about the research environment in such countries. You may want to think of the research implications of such problems as you present your research proposals, especially in the areas of availability of data and feasibility of the research activity.

5.0 SUMMARY

This unit has enumerated the various problems of research in developing countries. In a nutshell, the problems include, among those not listed:

i. scarcity of data
ii. lack of research and development culture
iii. inadequate funding of research projects
iv. Lack of research equipment and materials
v. poor communication network
vi. unattractive working conditions
vii. the publish or perish syndrome
viii. lack of record-keeping culture
ix. governmental and societal attitude toward research
x. the business sector factor.

Unless we can find ways of alleviating these problems, developing countries will continue to find it difficult to catch up with the rest of the world. A good starting point is to pick interest on making research data available, as well as appreciating the research capabilities of academics and other researchers.

6.0 TUTOR-MARKED ASSIGNMENT

What are the major implications of the observed lack of research and development culture among Nigerian business organisations? Discuss with simple examples.

7.0 REFERENCES/FURTHER READING

Nwogu, B. G. (n.d.). *Educational Research: Basic Issues and Methodology*. Ibadan: Wisdom Publishers Ltd.

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