COURSE GUIDE

FMS 825
RESEARCH METHODOLOGY

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INTRODUCTION

The importance of research design and methodology has been recognized 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 researchers 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.

THE 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.

THE COURSE OBJECTIVES

On completion of the requirements of this course students and managers alike will be able to:
Define and understand the research process Choose a researchable project topic Understand the basic operations in scientific research process

WRITE A GOOD RESEARCH PROPOSAL

Understand the different types of research designs Understand the meaning and types of sampling designs Determine the sample size for a given survey activity Write research questions and construct the corresponding

QUESTIONNAIRE

Know the characteristics of a good questionnaire, and administer such

questionnaire Effectively present data, analyze them, and prepare the research report.

COMPOSITION OF THE COURSE MATERIAL

The course material package is composed of:
- The Course Guide
- The Study Units
- Self- Assessment Exercises
- References

THE MODULES AND STUDY UNITS

The modules and study units are as listed below:

Module 1 Introduction to Research Approaches And Process

Unit 1 Concept of Research
Unit 2 Basic Operations in Scientific Research Process
Unit 3 Review of Related Literature
Unit 4 Hypothesis (Part One)

Module 2 Methodology

Unit 1 Research Design
Unit 2 Components of a Research Design
Unit 3 Overview of Data Collection and Sample Selection
Unit 4 Types of Sampling (Part 1)
Unit 5 Measurement Scales

Module 3 Data Acquisition and Procedure

Unit 1 Data Acquisition/Collection and Procedure
Unit 2 Validity and Reliability
Unit 3 Research Proposal
Unit 4: Structure and Evaluation of A Research Proposal

Module 4 Data Presentation and Analysis

Unit 1 Presentation and Analysis of Data
Unit 2 Presentation of Student's Academic Research Report

Module 5 Contemporary Issues in Research

Unit 1 Ethics in Business Research

Unit 2 Problems of Research In Developing Countries
Unit 3 SPSS Operations In Research
Unit 4 Introduction to Pls-Sem Analysis Using Smart Pls
Unit 5 Evaluating Pls-Sem Results In Smartpls

ASSIGNMENTS

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.

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, FMS 825: Research Methodology 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 successfullycompleted the course, you will be equipped with the latest global approach to research proposals and research administration.

MAIN COURSE

CONTENTS

MODULE 1 INTRODUCTION TO RESEARCH APPROACHES AND PROCESS

UNIT 1 CONCEPT OF RESEARCH

Unit Structure

1.1 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.

1.2 Learning Outcomes (LOs)

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

- define research
- explain what a research approach is all about
- explain some basic research concepts and processes

1.3 Definitions of Research, the Basic Research Concepts, Basic Operations in Scientific Research, and the Research Process

1.3.1. Definitions of Research

There are various definitions of research presented by various scholars and authors. In general, research is a way of thinking and finding answers to the questions that come into your mind. 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.

In our day-to-day life, we formulate several questions in our mind. We want to get answers for these questions. Some of these questions can be answered easily without any need of scientific scrutiny. While there are also some questions that need to be answered in a logical manner, the process that needs to be followed in finding answers to such questions should have to be empirical and subjective. The techniques and procedures that need to be used should also be valid and logical. In this way, we are able to get answers that are authentic and verifiable. The research process also requires scientific scrutiny and the procedures involved in this scrutiny should have to be valid and reliable.

From the above statement, we can conclude that the process that is called research should have the following features:

i) It should be undertaken in a scientific manner, biases and subjectivity should be avoided;
ii) The process should follow valid and verifiable tools, techniques and procedures;

iii) The process follows the logical and sequential procedures that are established by the academic discipline in which you are conducting research.

The process to be followed in the conduct of the research might be different from one discipline to other. The amount of rigor and control that needs to be applied also varies. In physical and natural sciences the researcher has to apply as much control as possible in conducting the research. In social sciences, the researcher cannot have similar control in the research process. In social sciences the researcher observes behavior, subjectivity cannot be controlled completely. Subjectivity should not be confused with bias, there is no place for bias in the research process.

There are several definitions of research, proposed by famous authors and scholars. You will find out that the basic meaning and the context of these definitions are the same. The difference between these definitions lies only in the way the author has undertaken research in his discipline.

Research comprises "creative work undertaken on a systematic basis in order to increase the stock of knowledge, including knowledge of man, culture and society, and the use of this stock of knowledge to devise new applications."[OECD, 2002]

Scientific research is a systematic way of gathering data, a harnessing of curiosity. This research provides scientific information and theories for the explanation of the nature and the properties of the world. It makes practical applications possible. Scientific research is funded by public authorities, by charitable organizations and by private groups, including many companies. Scientific research can be subdivided into different classifications according to their academic and application disciplines. Scientific research is a widely used criterion for judging the standing of an academic institution, such as business schools, but some argue that such is an inaccurate assessment of the institution, because the quality of research does not tell about the quality of teaching (these do not necessarily correlate totally).[Scott and Tad, 1994].

Shuttleworth (2008) in defining research maintains that research includes any gathering of data, information and facts for the advancement of knowledge.
Another definition of research is given by Creswell (2008) who states that – "Research is a process of steps used to collect and analyze information to increase our understanding of a topic or issue". It consists of three steps: Pose a question, collect data to answer the question, and present an answer to the question.

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 systematic when it adheres to the planned methodical collection of data, analysis of data and interpretation of result.
Research methodology simply refers to the practical "how" of any given piece of research. More specifically, it's about how a researcher systematically designs a study to ensure valid and reliable results that address the research aims and objectives. For example, how did the researcher go about deciding:

* What data to collect (and what data to ignore)
* Who to collect it from (in research, this is called "sampling design")
* How to collect it (this is called "data collection methods")
* How to analyse it (this is called "data analysis methods")

In a dissertation, thesis, academic journal article (or any formal piece of research), you'll find a research methodology chapter (or section) which covers the aspects mentioned above. Importantly, a good methodology chapter in a project, dissertation or thesis explains not just what methodological choices were made, but also explains why they were made.

In other words, the methodology chapter should justify the design choices, by showing that the chosen methods and techniques are the best fit for the research aims and objectives, and will provide valid and reliable results. A good research methodology provides scientifically sound findings, whereas a poor methodology doesn't.

So when investigation stops at the fact finding stage, it is not research but mere fact finding. It can be dignified with the term research only when those facts/data, after analysis can be interpreted to find out or discover the real facts, situation, meaning or essence of a phenomenon.

Research is an enquiry aimed at understanding a thing or phenomenon or solving a problem. 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. 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."

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 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.

1.4 TYPES OF RESEARCH

Most research is best understood as being either quantitative or qualitative in nature.

1.4.1 Quantitative research

In general, quantitative research specifies numerical assignment to the phenomena under study, whereas qualitative research produces narrative or textual descriptions of the phenomena under study. Quantitative scientific research methods are employed to establish general laws or principles through rigorously controlled experimentation. Employee selection techniques used by human resource personnel involve standardized tests such as aptitude tests; production and sales managers are vitally interested in trend analysis and business forecasting; economists engage in the calculation of index numbers to chart changes in the costs of goods and the effects of price rises on demand, while the organizational psychologist is interested in objective measurements of stress levels and absenteeism in the work force as a response to real and objective changing technologies.
The advantage of quantitative research is that the findings from the sample under study will more accurately reflect the overall population from which the sample was drawn.

The disadvantage of the quantitative approach is that, because the study

contains so many participants, the answers research participants are able to give do not have much depth. They have to be superficial, or else the researchers would be overwhelmed by information that cannot adequately be analyzed.

As we will see throughout this course material, each approach has its own advantages and disadvantages. Ideally, a two-pronged approach that employs both quantitative and qualitative techniques can be employed. However, practically speaking, limitations of resources and time often prohibit such an exhaustive endeavor. Therefore, it is best to match the particular research goal to the research strategy that will help achieve that goal. If a large, accurate sample that will be generalize to the larger population is desired, quantitative research would be preferred.

1.4.2 Qualitative Research

Qualitative research stresses the validity of multiple meanings of events with 'reality' not a fixed stable entity but a variable that can only be discerned through an analysis of multiple understandings and meanings held by different persons. For example, qualitative research has made managers realize they must become more sensitive to individual needs and motivations of employees in order to have more productive and satisfied staff.

Qualitative research enables researchers to gather and analyze information conveyed through language and behaviour exhibited in natural settings. It captures expressive information not conveyed in quantitative data about perceptions, values, needs, feelings, and motivations that underlie behaviour at an individual level. Qualitative methods are used to learn directly from employees and customers what is important to them, to provide the context necessary to understand quantitative findings, and to identify variables important for future quantitative studies.

Qualitative approaches tend to use thoughtful reflection and analysis of verbal/written content. With specific questions in mind, qualitative researchers immerse themselves in an environment to discover the meanings, conventions of behaviour, and ways of thinking important to individuals of a group as they emerge in unrehearsed encounters.

The essential task is to observe study subjects in their natural settings. They can do so as silent background observers or as 'participant-observers' who ask questions as they accompany study subjects in their activities. In either role they collect data in both unstructured and structured ways. They can write spontaneous 'field'

notes that detail what they see and hear, or organize their observations around categories, checklists, or rating scales that they bring to the setting. Beyond observing, they conduct in-depth open-ended interviews and learn from well-positioned individuals who can provide useful information (also called 'key informant' interviews); to understand experiences especially important to shaping perceptions and decisions ('critical incident' reports); or to generate new information from groups of employees and customers in focus groups. Audiotaping or videotaping these interactions helps guarantee that expressive data are captured accurately and completely as they emerge.

The use of more than one evaluator helps ensure the reliability of qualitative data, as does a detailed accounting of how a study analysis is performed. Researchers can be reasonably assured of the validity of their findings by collecting data from independent sources, presenting preliminary findings to study participants for their feedback, and fully examining unusual information. These strategies are likely to become increasingly standardized as consensus emerges around the need for greater methodological rigour in qualitative research, and the methods are appropriate for practical situations in which a fuller understanding of behaviour, the meanings and contexts of events, and the influence of values on choices might be useful for managers and businesses.

1.4.2.1. Limitations of the qualitative research method

i Problems of generalization

Qualitative studies are valuable tools to understand and describe the world of human experience. However, this world is often dismissed as 'subjective' and regarded with suspicion by scientifically inclined researchers. It is difficult to apply conventional standards of reliability and validity, yet subjective qualitative studies have the redeeming quality in the depth to which explorations are conducted and descriptions written. Contexts, situations, events, conditions and interactions cannot be replicated to any extent nor can generalizations be made to a wider context than the one studied with any confidence. This difficulty of applying the usual scientific criteria does not, however, make such understandings any less real or valid for that participant, and the explanatory function of such understandings for that person's behaviour is highly predictive.

ii Time commitment

Perhaps one of the major limitations of qualitative research and

evaluation is the time required for data collection, analysis and interpretation. There is a critical need for the researcher to spend a considerable amount of time on the factory floor, at company meetings, or in the employees' cafeteria in order to observe, holistically and individually, the interactions, reactions and minute-by-minute activities, or conduct unstructured interviews (conversations) with numerous subjects.

Sample sizes are usually small and non-random, and therefore the findings may not generalize to the larger population from which the sample was drawn. Furthermore, the samples are often non-random, and thus the people who participate may not be similar to the larger population.

1.4.2.2. Advantages of qualitative research methods

i Awareness of complexity

Because qualitative investigation is like the net of a deep-sea explorer, trawling up unexpected and striking things on which to gaze with the investigator maintaining close association with both participants and activities within the business setting, an insider's view of the field can be obtained. This proximity to the field often allows the evaluator to see (and document) the qualities of human motivation, needs and pressures too often missed by scientific, more positivistic inquiries. Such propinquity can reveal subtleties and complexities that could go undetected using more standardized measures.

ii As a preliminary to a quantitative study

Qualitative open-ended surveys, focus groups, in-depth interviews and observational techniques can play the important role of suggesting possible relationships, causes, effects, and dynamic processes in business settings, and provide the bases for possible hypotheses that can be subjected to more detailed and controlled quantitative scientific scrutiny on large representative samples using reliable and valid measuring instruments. Qualitative methods can highlight, for example, subtleties in employee behaviour in response to variations in managers' management and leadership styles that could then be subject to more formal investigation. This link between the two approaches will be raised again in discussing inductive and deductive methods later.

After determining from a large-scale controlled investigation that there are considerable differences between individuals on a particular behaviour, the selection of a few subjects from each end of the spectrum for detailed qualitative study, say using open-ended

interviews, can tease out some of the important but rather subtle reasons for the differences in the range of responses from the large-scale scientific study

1.4.3. Other Types of Research

1.4.3.1. Experimental Research

Experimental research takes place in laboratory settings. Here, the researcher manipulates the level of the independent variable and observes any corresponding change in the dependent variable. The purpose is to determine if there is a causal relationship between the two variables. Experimental studies require strict control of all variables and are sometimes called laboratory studies, in contrast to field studies that occur in natural uncontrolled situations like observing a management meeting or shop floor interactions. The goal is to advance knowledge, extend a theory into a new area, and provide evidence to support or refute a theory. However, they are costly in time and money with control often difficult to achieve.

The major advantage of the experimental study is the degree of control it provides. In an experiment, every participant is exposed to the same environment— including the characteristics of the room, the experimenters, and the instructions the participants receive. The one aspect of the study that is not the same is the independent variable, that is, the variable that is systematically controlled by the researcher to determine the effect of that variable. By systematically changing the independent variable and holding all other variables constant, the researchers can be confident that any change in the dependent variable—the outcome the researchers are measuring—is actually due to the effect of the independent variable. Such control cuts down on random variation that makes it difficult to interpret the results.

One important disadvantage of experimental studies is that the nature of the experiment may be very unlike what people actually experience in the real world. Although experimental studies benefit from exerting control, they suffer from being conducted in artificial settings.

1.4.3.2. Descriptive studies

Here the researcher attempts to document what is actually occurring. The study may be either qualitative (descriptions in words) such as records of a business meeting, or shop floor interactions, or quantitative (descriptions in numbers) such as variations in sales by month or changes in the client base. Surveys, census data, trade figures are common sources of information. Summarization by descriptive statistics is the major form of analysis for numerical data. Some marketing research would fall into this category. The

researcher has no control over the phenomena of study, but simply records what is observed or reported. Again, like exploratory techniques, they offer information for further research, but additionally offer help in making very simple decisions. The major strength is that quite accurate information is provided although causal links cannot be established.

Descriptive research is just what it sounds like: it describes the attitudes and behaviors observed during the investigation. This approach to research is in many ways the converse of experimental research with respect to advantages and disadvantages. Whereas experimental research exhibits much control over the setting in which the participants' behavior is observed, descriptive research take place in natural, real-life settings. A common descriptive research technique is **naturalistic observation**, which involves collecting data where people are ordinarily found.

1.4.3.3. Survey Research

Surveys provide the advantage of sampling a large group of randomly selected people to measure their attitudes and behaviors. For a relatively low cost in time and money, a researcher can collect self-reported attitudes and behaviors about virtually any social issue. Furthermore, with the data analysis training provided in this course material or in a more comprehensive data analysis class, even undergraduate students can download survey data or perform analyses right at the websites of major survey organizations. This means that researchers may not need to collect original survey data; rather, they can perform **secondary data analyses**—data analysis on previously collected data—as part of their investigations. If researchers do indeed construct and administer their own surveys, they have several options for administering them. Like most decisions regarding research designs, each option has both advantages and disadvantages.

Researchers who design and administer their own surveys should use the techniques for randomly selecting participants. After a sample has been selected, the researcher must make a decision about how to gather the data. The most common survey methods are telephone surveys, mail surveys, email surveys, and face-to-face interviews.

Telephone surveys produce a relatively high response rate, but there is the risk of selection bias regarding those without land lines or those who have caller ID and screen calls. Mail surveys are inexpensive and efficient, but are even more likely to suffer from low response rates or non-response bias than phone surveys. Email surveys are even less expensive, but have a sampling bias toward those with greater computer

access. Face-to-face interviews produce the highest response rates, but are the costliest in money and researchers' time. As with most decisions regarding research, each technique has advantages and disadvantages.

1.4.3.4. Quasi-experiment

In terms of control, a **quasi-experiment** falls somewhere between naturalistic observation and experimental research. A quasi-experiment involves conducting an experiment, usually in a real-life setting, without the benefit of random assignment of participants to conditions or other controls. Because quasi-experiments are usually done in real-life settings rather than in laboratory settings, they are often considered not truly experimental research, but rather **correlational research**, which involves identifying statistical relationships between two variables rather than causal relationships. Thus, while the researchers have control over the independent variable in a quasi-experiment, they do not have control over other factors in the environment. A quasi- experiment involves some control in that the independent variable is monitored by the researcher. However, it occurs in a naturalistic setting and the experimenter may not have control over when the independent variable occurs.

1.4.3.5. Correlational Study

A correlational study leads only to interpretations about the degree to which certain things tend to co-occur or are related to each other. For example, does an increase in the sales force increase the number of items sold? The purpose is to measure the strength of the association between variables. It is not to use values in one variable to predict values in another. Prediction takes us beyond correlation into the realms of regression. The researcher has only moderate, if any, control over the variables in this type of study. The correlational study is the most often used approach in business as well as in many areas of the social and behavioural sciences and is typically fairly easy to conduct. The major disadvantage is that the actual reason for the associations found remains quite unclear *as correlation does not imply causality*. This is because no independent variables are being manipulated and the researcher therefore has no control over variables. The cause of a relationship may be a third unmeasured variable. For example, there is a close relationship between the number of umbrellas raised and the number of people putting on rain coats and the like – the cause is wet weather.

A **correlation** is a statistical measure of association between two variables. The measure of association that is used to assess the association between variables is called the **correlation coefficient**. A

correlation coefficient has both a direction and a magnitude. The direction can either be *positive* or *negative*. A positive correlation indicates that high scores on one variable co-occur with high scores on another variable in the study. An example is the relationship between shoe size and height. In general, people who wear large shoes tend to be taller, and those who wear small shoes tend to be shorter. A negative correlation indicates that high scores on one measure co-occur with low scores on another variable in the study.

1.4.3.6 Exploratory studies

Exploratory research explains the phenomenon using hypotheses and theories.
When the study area is new or vague some initial exploration is needed before a conceptual and theoretical framework can be devised. It is like a fishing expedition which will give insights and suggested directions but not conducted with sufficient rigour for decision making and hypothesis testing. The goal is to improve the final research design by becoming familiar with basic facts and concerns, developing a picture of what is occurring, generating tentative conjectures and determining the feasibility and sense of direction for more rigorous follow-up. Exploratory designs therefore tend to be mainly qualitative, using in-depth interviews, observation, focus groups, and pilot studies as a preliminary step in the research process.

Their advantage is that they are quick and cheap and clarify the direction the research should take, however, they lack experimental control, adequate sampling, so interpretation of results tends to be judgmental.

1.5 Research and Scientific Method

Science can be defined as a methodological and systematic approach to the acquisition of new knowledge. This definition of science highlights some of the key differences between how scientist and non-scientists go about acquiring new knowledge. Specifically, rather than relying on more causal observations and on informal approach to learn about the world, scientist attempt to gain new knowledge by making careful observations and using systematic, controlled and methodical approaches (Shanghnessy and Zechmeister, 1997). By doing so, scientists are able to draw valid and reliable conclusions about what they are studying. In addition, scientific knowledge is based on objective data that were reliably obtained in the context of a carefully designed research study. In short, scientific knowledge is based on the accumulation of empirical evidence (Kadzin.2002). The decoding

characteristic of scientific research is the scientific method.

The scientific method is best thought of as an approach to the acquisition of new knowledge and this approach effectively distinguishes science from non-science. The scientific method is not actually a single method, as the name would erroneously lead one to believe but rather an overarching perspective on how scientific investigations should proceed. It is a set of research principles and methods that help researchers obtain valid results on their research studies. Because the scientific method deals with the general approach to research rather than the content of specific research studies, it is used by researchers in all different scientific disciplines. The biggest benefit of the scientific method is that it provides a set of clear and agreed - upon guidelines for gathering, evaluating and reporting information in the context of a research study (Cozby 1993). Although some disagreement exists regarding the exact characteristics of the scientific method, most agree that it is characterized by the following:

1. Empirical
2. Observations
3. Questions
4. Hypothesis
5. Experiment
6. Analysis
7. Conclusion
8. Replication

The scientific method is firmly based on the empirical approach. The empirical approach is an evidence based on that approach that relies on direct observation of new knowledge (Kazchin 2003). In the empirical approach, scientific decisions are made based on the data derived from direct observation and experimentation. The empirical approach with emphasis on direct observation is best thought of as the guideline principle behind all research conducted in accordance with scientific methods.

An important component of scientific investigation is observation. In this sense observation refers to two distinct concepts being aware of the world around us and making careful measurements. Observations of the world around us often give rise to the questions that are addressed through scientific research. In the context of science, observation means more than just observing the world around us to get research ideas. Observation also refers to the process of making careful and accurate measurement which is a distinguishing feature of well-conducted scientific investigations.

An important aspect of measurement is an operational definition.

Researchers derive key concept and terms with context of their research studies by using operational definitions. By using operational definitions, researchers ensure that everyone is talking about the same phenomenon. Having a clear definition of terms also ensures that researchers study can be replicated by other researchers.

The scientific method is thus based on certain basic postulates which can be stated as follows:

1. It relies on empirical evidence
2. It utilizes relevant concepts
3. It is committed to only objective considerations
4. It presupposes ethnical neutrality ie it aims at nothing but making only
   adequate and correct statement about population objects.
5. It results into probabilistic predictions.
6. Its methodology is made known to all concerned for critical scrutiny
   and for use in testing the conclusion through replication.
7. It aims at formulating most general axioms or what can be termed as scientific theories.

The scientific method encourages a rigorous, impersonal mode of procedure dictated by the demands of logical and objective procedure. Accordingly, scientific method implies an objective, logical and systematic method ie. a method free from personal bias or prejudice, a method to ascertain diminishable qualities of a phenomenon capable of being verified, a method where in the researcher is guided by the rules of logical reasoning, a method where in the investigation proceeds in an orderly manner and a method that implies consistency.

1. 6 Basic Research Concepts

We look at the two often used research concepts:

(i) the Variables; and,
(ii) the Hypotheses

1.6.1. Variables

A variable is an empirically applicable concept that takes on two or more values.

Most variables investigated in the social sciences are however, not dichotomous. They are instead, characterized by a large number of values. In many studies, we manipulate one variable and note the effects of the manipulation on another variable. For example, you could manipulate the amount of overtime to be worked and measure

the effect on employee motivation, or vary the price of a product and assess the change in demand. The variable that is varied such as management style, overtime or price is termed the **independent variable** or **IV.**

These variations are often termed different conditions of the variable. The variable that is measured or observed to chart the effect of the manipulation, *e.g.* retention rate in the above examples, is the **dependent variable** or **DV.** Changes in the dependent variable depend on variations in the independent variable.

A third type of variable is the **moderating variable** which affects the nature of the relationship between the independent and dependent variables. For example, the effect of varying levels of stress in different employees act to influence the relationship between the management style and retention in that it is likely that the more stressed an employee is by the management style the more likely he is to leave. *Gender* and *Age* are often moderating variables. **The mediating variable** is one that lies between the effect of the IV on the DV. Whereas the moderating variable affects the IV-DV relationship through the different levels of the moderating variable, it is the variations in the IV's that influence the effect of the mediating variable on the DV. Here staff turnover and availability of training both influence the level of job related skills, which in turn affect the performance of the employees. The moderating variable is almost a DV for the original IV's and then converts into another IV in its effect on the DV.

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 hypothesized 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.

1.6.2 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 1.1 contains examples of qualitative and quantitative variables.

Table 1.1: 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

Figure 1.2: Generation of Qualitative and Quantitative Data

Data Type	Question Type	Responses
Qualitative	Do you own company shares	Yes --- No ---
Quantitative:		
Discrete	How many Cigas do you smoke a day?	Number -----
Continuous	How tallare you?	Number-------

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.

1.6.3. 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).

1.6.4. 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.

1.6.5 Induction

Research involves both description and explanation. If the research starts with specific observations/descriptions followed by analysis that produces explanation of the observations/explanations we have an **inductive process.** This develops theory from initial data – a bottom-up approach. This is open-ended and exploratory, major characteristics of the qualitative interpretive approach. Inductive procedure essentially reverses the process found in deductive approach. The inductive approach involves the researcher formulating a hypothesis as a generalization from observed relationships. These empirical observations can be based on many factors, for example, they can simply be based on personnel experience. This reasoning process should be followed by an examination of previous research to determine what findings other investigations have reported on the problem. For instance, a researcher has observed a high degree of anxiety that is rounded by his classroom text and believes that this has an adverse effect on student's performance. Further, he has noticed that when he gives the student opportunity to write comments about objective questions, their test performance seems to improve.

1.6.6 Deduction

If, however, the sequence is reversed, starting with a theory or hypothesis from which certain other things should logically follow, these implications can be tested and on the basis of the results the initial theory/hypothesis can be supported or rejected. This process is the **deductive process** – a top-down strategy, working from the general to the specific Positivist researchers, by the very nature of their approach, tend to be deductive rather than inductive while interpretive researchers generally emphasize induction. You can see a link between the scientific approach and the qualitative method here, since the conclusions of an inductive approach (a developing theory) can be further evaluated with a view to confirming it by the deductive approach. Conversely, a quantitative deductive study may unearth some unexpected and hard to explain result which could be explored using an inductive approach. For example, a study might be investigating the problems of being a single parent who can only find

part-time work. This is an inductive qualitative study as it employs one-to-one interviews to tease out the issues. These issues form patterns and themes which lead to two different general propositions about single male and single female parents. Then a more controlled study can be designed to test these two propositions or theories among a properly selected sample to seek confirmation that significant differences are substantial between the two gender groups over particular part-time work issues. Much research, as indicated earlier, will involve both inductive and deductive stages as investigators cycle and recycle observations up to theories and down again to observations and back up to revamped theories. This is often termed the

Research Cycle.

1.6.7 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 proposes 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.

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.

Self -Assessment Exercises 1

1. Define research and enumerate the characteristics of research
2. Discuss the major classifications of variables.
3. Enumerate the basic postulates on which the scientific method is based

1.7 Scientific Explanations in 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 Correlation 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 are 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 another phenomenon. For example, studies have shown that the correlation between urbanization and democratic development is non spurious. To establish that urbanization is casually related to democratic development, it must also be demonstrated that the former precedes the later.

iv Theorizing. 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.

1.8 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:

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).

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 concretization. This is attained by hypotheses. Hypotheses are regarded as tentative answers to researchable problems. The researcher breaks down a 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:

- the inclination to enroll at university increases with the motivation to study;

- an individual's financial state co-varies with his or her propensity to study at the university;
- youth from relatively well - to-do families tend to enroll at universities;
- the greater the encouragement to study at university given by peers, the stronger the tendency to do so; and
  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.

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

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, percentage introduced as subjects or objects in sentences, or employed as elements in graphs and diagrams.
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.

Data Analysis. At this stage, all available data is analyzed according to 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.

Empirical Generalizations. An empirical generalization is a statement asserting universal connection between variables of interest. The logic whereby observations are transformed into empirical generalization is referred toas 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 taken to be well established if, while it has not been refuted by experience, alternative hypothesis have been so refuted.

Self -Assessment Exercises 2

1. Explain the seven principal types of activities involved in the research process
2. Describe the four distinct operations in scientific operations.

1.9 Summary

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.

Research can begin with an intuition that you want to subject to scientific scrutiny. It can also begin with a business's or organization's need for a specific answer to a specific question. The research process involves generating hypotheses, collecting data to test the hypotheses, then analyzing and interpreting the results of your investigation. Research can be quantitative or qualitative in nature, depending on whether you want to collect statistical information or narrative information.

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, or 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; and, (vii) empirical generalization.

1.10 References/Further Readings/Web Resources

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1.11 Possible Answers to Self-Assessment Exercises

Self -Assessment Exercise 1

i **Define research and enumerate the characteristics 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.

From the above statement, we can conclude that the process that is called research should have the following features:

i) It should be undertaken in a scientific manner, biases and subjectivity should be avoided;
ii) The process should follow valid and verifiable tools, techniques and procedures;
iii) The process follows the logical and sequential procedures that are established by the academic discipline in which you are conducting research.

ii **Discuss the major classifications of variables.**

The variable that is varied such as management style, overtime or price is termed the **independent variable** or **IV.**

These variations are often termed different conditions of the variable. The variable that is measured or observed to chart the effect of the manipulation, *e.g.* retention rate in the above examples, is the **dependent variable** or **DV.** Changes in the dependent variable depend on variations in the independent variable.

A third type of variable is the **moderating variable** which affects the nature of the relationship between the independent and dependent variables. For example, the effect of varying levels of stress in different employees act to influence the relationship between the management style and retention in that it is likely that the more stressed an employee is by the management style the more likely he is to leave. *Gender* and *Age* are often moderating variables. **The mediating variable** is one that lies between the effect of the IV on the DV. Whereas the moderating variable affects the IV-DV relationship through the different levels of the moderating variable, it

is the variations in the IV's that influence the effect of the mediating variable on the DV.

iii. Enumerate the basic postulates on which the scientific method is based

1. It relies on empirical evidence
2. It utilizes relevant concepts
3. It is committed to only objective considerations
4. It presupposes ethnical neutrality ie it aims at nothing but making only adequate and correct statement about population objects.
5. It results into probabilistic predictions.
6. Its methodology is made known to all concerned for critical scrutiny and for use in testing the conclusion through replication.

It aims at formulating most general axioms or what can be termed as scientific theories.

Self -Assessment Exercises 2

i Explain the seven principal types of activities involved in the research process

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).

Statement of Hypotheses about the Identified Problem(s

Hypotheses are regarded as tentative answers to researchable problems. The researcher breaks down a problem into a set of concrete hypotheses and investigates each separately

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

Measurement: Measurement can be defined as any procedure whereby observations are systematically assigned symbols.

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.

Data Analysis. At this stage, all available data is analyzed according to 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.

Empirical Generalizations. An empirical generalization is a statement asserting universal connection between variables of interest. The logic whereby observations are transformed into empirical generalization is referred to as induction.

ii Describe the four distinct operations in scientific operations.

i. Demonstrating Co-variation: Co-variation simply means that two or more phenomena (or variables) vary together. In scientific research, the notions of co-variation are expressed through measures of relationships, commonly referred to as Correlation or Association.

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

iii. Establishing the Time Order of Occurrences: This requires the researcher
to demonstrate that one phenomenon occurs first or changes prior another phenomenon.

iv Theorizing. 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.

UNIT 2 BASIC OPERATIONS IN SCIENTIFIC RESEARCH PROCESS

Unit Structure

2.1 Introduction

In this unit, you will be introduced to the basic operations in research process. The unit will be mostly beneficial for beginners and those involved in undergraduate and postgraduate thesis.

2.2 Learning Outcomes (Los)

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

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

2.3 Research Topic And Problem

This section examines in detail the necessary activities for a research project. These include: (i) choice of a research topic; and, (ii) the research problem

2.3.1 Choosing a 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. Researchers choose topics that they study in a variety of ways, and these decisions are necessarily influenced by several factors.. It would be difficult for a researcher in one scientific field to undertake a research study involving a topic in an entirely different scientific field.

Once the research problem is defined, all that is required is to be able to choose a topic. A good research title should be able to convey what the study in general is all about, the objectives of the study and the methodology to be used in the stud. (Bunge,1967) An experienced researcher should be able to tell what the problem of study is from the title.

2.3.2 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.

2.3.3 Guidelines For Choosing 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:

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
iv. The topic must be significant. The topic must be capable of contributing to existing knowledge
v. The research into the problem must be feasible. The research should ensure that data are available.
vi. The topic must be consistent with the researcher's competence, interest and circumstance.

2.3.4 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:

i. In your field of interest, what practical problems do you think have to be met by those individuals doing the actual work?

ii. What problems are under active attack in the recent research?

iii. What facts, principles, generalizations and other findings have resulted from research in your field?

iv What practical implication for school, work can you draw from the results?

v. To what extent have the findings of research actually been applied to your field?

vi. What problems remain to be subjected to research and what problems are now emerging?

vii What are the difficulties to be met in prosecuting the research yet to be conducted in your field?

viii. What are the relationships between research in your field and research in adjacent field?
ix. What research techniques or procedures have been developed in your field?
x What concepts are being operative, either explicitly or implicitly in the research in your field?

Self -Assessment Exercises 1

i. The most difficult aspect of a research project or dissertation is the choice of a research topic. Discuss

ii. Discuss the various factors instrumental to an individual choosing a research topic.

2.4 The Research Problem

What assumptions have been implicit in the research in you field? The success of research depends largely on the care taken with the preliminary preparations to identify what has been done in that direction already. Considerable thought needs to be given to choosing the problem, much of which involves searching the literature to determine whether it has already been solved and, if not, whether it is feasible (Patton ,1980). Once we have performed a literature search and refined our problem, then the study can be designed. This initial stage often takes up a considerable amount of the total time invested in the research study.

2.4.1 Sources of Problem

There are no set rules for finding a problem, but frequent sources of ideas are:

.i. **Experience:** Topic choice must be very personal so that it engenders your deep interest or considerable curiosity. There is little merit in choosing something that doesn't engage you as boredom and declining motivation will impede completion. So your own business and marketing experiences, either as an employee, or on work placement, or simply through observation when in a shop, or involved with the delivery of some service, often will generate ideas.

i i. **Theory:** There are numerous theories in the management sciences and many of their implications need to be specified more clearly. We often find that theories and models are really only abstractions from reality.

iii. Journal articles: Papers in reputable academic peer reviewed journals are stimulating sources of ideas. Most researchers will include in their Discussion/Conclusion section some thoughts about further research in the topic. For example, many studies are conducted in specific industries; do the findings hold in a range of other industries and contexts?

iv. **Discussion with colleagues and peers:** Tutorial groups, staff room coffee chats and brainstorming sessions are all useful ways of turning up ideas.

Developing a focused research topic is an important first step in order to undertake an effective literature review, leading to a well-planned and successful research project. Selecting a good topic can be hard as the topic must be narrow and therefore need a bit of massaging to fit specific situations – one size does not fit all.
It must be focused enough to be interesting, yet broad enough so that relevant information can be found.

Once the topic is selected you then need to explore it and move towards the research itself. The following steps, from seeking a research topic to commencing the study, will help act as a guide:

1 Read the general background information to gain an overview and identify useful keywords for the literature search.
2 Conduct a preliminary literature search. This can be an evolving process – as the literature review will locate relevant research articles that may offer other keywords.
3 Refine the topic following an initial literature review and define the topic as a research question within a conceptual and theoretical framework.
4 Research the literature on the narrowed research question/framework.
5 Formulate testable hypotheses .

2.4.2 Evaluation of the Problem

After the researcher has selected a problem, there is need to evaluate the problem to be sure that the problem area is of sufficient importance to warrant investigation. There are certain criteria that should be used in this process of evaluating problem's significance. (Meyer,1991).

1. The problem should be one whose solution will make a contribution to the body of organized knowledge. One should show that the study is likely to fill in gaps in present knowledge or help solve some of the inconsistencies in previous research. Perhaps the study can improve upon earlier studies in such a way that more reliable knowledge could be made available.

   Certain problems may make contributions to both theory and practice. However, if the problem lacks apparent theoretical implications, then it must at least have some practical implications. The researcher should be able to answer the question "so what?" with respect to his study. Would the solution of the problem make any difference to his field of practice? Would other people be interested in the findings? Would the findings have wide generalization? Unless these question can be

answered clearly and affirmatively, the problem should be abandoned.

2. The problem should be one that will lead to new problems and to further researches. This is much more likely to occur if the researcher can begin by linking his problem to organized knowledge and give some considerations to the type of study that might logically follow this. A good study while arriving at an answer to one question, usually generates a number of other questions that need investigations.

3. The problem must be one that is researchable. Although these criteria would seem self evidence in practice, many problems do not involve questions that can be subjected to scientific investigation. To be researchable, a problem must be concerned with the relations existing between two or more variables that can be defined and measured.

4. The problem must be suitable for the particular research. It may be an excellent problem from the point of view of the criteria mentioned but yet not be an appropriate problem for the individual.

2.4.3 Stating the Problem

Many researched issues do not stem from theory and may only reflect a local ‘problem’. In this case, we must define the problem carefully to ensure the right questions are asked and answered. If this stage is not done correctly, the remainder of the research effort may be flawed. If we can state the problem or goal precisely and accurately then we can design a strategy to solve the problem or achieve the goal. Defining a problem can be done by following a series of steps.

The first step is to make a broad statement of the problem as you see it. While we use the word ‘problem’ this does not necessarily mean something serious but more usually that management is faced with a decision or uncertainty and feel that some research might clarify the issue better. A statement of the problem must be original in content and context. (Nachmias and Nachmias, 1996), A few citations should be made in the statement of the problem to buttress the existence, significances and/or magnitude of the problem to be investigated.

It involves a definition of the terms involved that is, operationalizing the variables. Further in stating the problem, the researcher must strive for a balance between generality and specificity.

Imagine a CEO visits you and wants research to come up with a solution to the declining sales of the organization. As a competent researcher, you would not rush into this. You need to clarify whether the CEO has really defined the right problem. For instance, could other factors be causing the sales slump, and what other information and people need you contact to clarify what the real problem is?. By talking to other staff, you may arrive at the conclusion that a variety of factors have combined to cause the decline, such as cheap import competition, loss of sales staff, inventory shortages. You need to focus on these problems. Where the problem is unclear or ambiguous you will need to conduct some preliminary exploratory research using more qualitative techniques such as focus groups, observation, or in-depth interviews with relevant people, and in some cases secondary data analysis like company reports.

This problem is then translated into a research problem, *i.e.* becomes potentially researchable. This too should be stated in question form. Thus, the research problem asks what information you need to be able to answer the problem.

Self -Assessment Exercise 2

i Discuss four sources of research problem

ii Explain four major ways of evaluating problem's significance

2.5 Summary

You have been informed on the necessary guidelines for choosing a research topic, sources of research topic and how to identify a research problem. Choosing a research topic will obviously be largely influenced by the scientific field within which the researcher works

This unit focused on how to choose a research topic and sources of research topic. Guidelines for selecting a research topic was also discussed in this unit. The unit also treated sources of problem and how to identify research problems

2.6 References/Further Readings/Web Resources

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2.7 Possible Answers to Self-Assessment Exercises

Self -Assessment Exercise 1

i. **The most difficult aspect of a research project or dissertation is the choice of a research topic. Discuss**

Researchers choose topics that they study in a variety of ways, and these decisions are necessarily influenced by several factors.. It would be difficult for a researcher in one scientific field to undertake a research study involving a topic in an entirely different scientific field.

Once the research problem is defined, all that is required is to be able to choose a topic. A good research title should be able to convey what the study in general is all about, the objectives of the study and the methodology to be used in the stud. (Bunge,1967) An experienced researcher should be able to tell what the problem of study is from the title.

iii. Discuss the various factors instrumental to an individual choosing a research topic.

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
iv. The topic must be significant. The topic must be capable of contributing to existing knowledge
v. The research into the problem must be feasible. The research should ensure that data are available.
vi. The topic must be consistent with the researcher's competence, interest and circumstance.

Self -Assessment Exercise 11

i Discuss four sources of research problem

i. **Experience:** Topic choice must be very personal so that it engenders your deep interest or considerable curiosity.
i i. **Theory:** There are numerous theories in the management sciences and many of their implications need to be specified more clearly.
Iii **Journal articles:** Papers in reputable academic peer reviewed journals are stimulating sources of ideas.
iv. **Discussion with colleagues and peers:** Tutorial groups, staff room coffee chats and brainstorming sessions are all useful ways of turning up ideas.

ii Explain four major ways of evaluating problem's significance

1. The problem should be one whose solution will make a contribution to the body of organized knowledge. One should show that the study is likely to fill in gaps in present knowledge

2. The problem should be one that will lead to new problems and to further researches. This is much more likely to occur if the researcher can begin by linking his problem to organized knowledge

3. The problem must be one that is researchable. To be researchable, a problem must be concerned with the relations existing between two or more variables that can be defined and measured.

4. The problem must be suitable for the particular research. It may be an excellent problem from the point of view of the criteria mentioned but yet not be an appropriate problem for the individual.

UNIT 3 REVIEW OF RELATED LITERATURE

Unit Structure

3.1 Introduction

Unit 4 is aimed at informing you about review of related literature and how it can be done by researchers. You will also learn about the different types of literature review, sources of literature and how to organize the literature.

3.2 Learning Outcomes

By working through this unit, you will be able to:

1. Understand the purpose of literature review
2. Understand the content and types of literature review
3. Know how you can evaluate the quality of literature

3.3 Procedure for Literature Review

A review of literature is an account of what has been published on a topic by accredited scholars and researchers. A literature review is more than a descriptive annotated bibliography, summarizing and

listing each relevant finding. (Kennedy,2007) It is a **critical review** of what has been done, pulling disparate strands together, and identifying relationships and contradictions between previous research findings. From this you can then establish your hypotheses to investigate. This initial step, prior to conducting any research, generally requires a great amount of time in order to gather, collate and evaluate necessary information so that a thorough review of the relevant literature can be written.

The end product should be a critical analysis of collated and integrated information, not a chronological sequence of uncoordinated fragments of material. After developing a rough idea for research, you begin to examine how others have already thought about and researched on the topic. In research, the review of the literature serves a variety of background functions preparatory to the actual collection of data. In these research approaches, the literature is reviewed to create the context from the past for the new study to be conducted with new subjects and newly gathered data. Reviewing the literature has two phases. The first phase includes identifying all the relevant published material in the problem area and reading that part of it with which we are not thoroughly familiar. The second phase of the review of related literature involves writing this foundation of ideas into a section of the research report. This section is for the joint benefit of the researcher and the readers. For the researcher, it establishes the background in the field.

The literature review is important because:

- It describes how the proposed research is related to prior research in statistics.
- It shows the originality and relevance of your research problem. Specifically, your research is different from other statisticians.
- It justifies your proposed methodology.
- It demonstrates your preparedness to complete the research.

The literature review performs a number of important functions:

- It demonstrates that the student has read a large amount of statistical literature to prove that the student is aware of the wide range of research in theory and methodology related to the proposed research topic.
- It provides proof that the student has an deep understanding of the published statistical research related to the topic of the dissertation.
- It should convince the reader that the student can communicate this understanding of the statistical literature and its relationship to the proposed research.

- It should support the originality and relevance for research problem. – This is done by identifying specific gaps in the statistical literature. That is, the student identifies statistical questions that have not been answered and problems that have not been solved

Literature Review is more than a summary of publications. It provides evidence that your research will be an original and relevant contribution to statistics.

3.3.1 Importance of a Good Literature Review

The Purpose of a literature review include:

1. Place each work in the context of its contribution to understanding the research problem being studied.
2. Describe the relationship of each work to the others under consideration.
3. Identify new ways to interpret prior research.
4. Reveal any gaps that exist in the literature.
5. Resolve conflicts amongst seemingly contradictory previous studies.
6. Identify areas of prior scholarship to prevent duplication of effort.
7. Point the way in fulfilling a need for additional research.
8. Locate your own research within the context of existing literature [very important].

3.3.2 Types of Literature Reviews

It is important to think of knowledge in a given field as consisting of three layers. First, there are the primary studies that researchers conduct and publish. Second are the reviews of those studies that summarize and offer new interpretations built from and often extending beyond the primary studies. Third, there are the perceptions, conclusions, opinion, and interpretations that are shared informally that become part of the lore of field.

In composing a literature review, it is important to note that it is often this third layer of knowledge that is cited as "true" even though it often has only a loose relationship to the primary studies and secondary literature reviews. Given this, while literature reviews are designed to provide an overview and synthesis of pertinent sources you have explored, there are a number of approaches you could adopt depending upon the type of analysis underpinning your study.

3.3.2.1 Argumentative Review

This form examines literature selectively in order to support or refute an argument, deeply imbedded assumption, or philosophical problem already established in the literature. The purpose is to develop a body of literature that establishes a contrarian viewpoint. Given the value-laden nature of some social science research [e.g., educational reform; immigration control], argumentative approaches to analyzing the literature can be a legitimate and important form of discourse. However, note that they can also introduce problems of bias when they are used to make summary claims of the sort found in systematic reviews [see below].

3.3.2.2 Integrative Review

Considered a form of research that reviews, critiques, and synthesizes representative literature on a topic in an integrated way such that new frameworks and perspectives on the topic are generated. The body of literature includes all studies that address related or identical hypotheses or research problems. A well-done integrative review meets the same standards as primary research in regard to clarity, rigor, and replication. This is the most common form of review in the social sciences.

3.3.2.3 Historical Review

Few things rest in isolation from historical precedent. Historical literature reviews focus on examining research throughout a period of time, often starting with the first time an issue, concept, theory, phenomena emerged in the literature, then tracing its evolution within the scholarship of a discipline. The purpose is to place research in a historical context to show familiarity with state-of-the-art developments and to identify the likely directions for future research.

3.3.2.4 Methodological Review

A review does not always focus on what someone said [findings], but how they came about saying what they say [method of analysis]. Reviewing methods of analysis provides a framework of understanding at different levels [i.e. those of theory, substantive fields, research approaches, and data collection and analysis techniques], how researchers draw upon a wide variety of knowledge ranging from the conceptual level to practical documents for use in fieldwork in the areas of ontological and epistemological consideration, quantitative and qualitative integration, sampling, interviewing, data collection, and data

analysis. This approach helps highlight ethical issues which you should be aware of and consider as you go through your own study.

3.3.2.5 Systematic Review

This form consists of an overview of existing evidence pertinent to a clearly formulated research question, which uses pre-specified and standardized methods to identify and critically appraise relevant research, and to collect, report, and analyze data from the studies that are included in the review. The goal is to deliberately document, critically evaluate, and summarize scientifically all of the research about a clearly defined research problem. Typically it focuses on a very specific empirical question, often posed in a cause-and-effect form, such as "To what extent does A contribute to B?" This type of literature review is primarily applied to examining prior research studies in clinical medicine and allied health fields, but it is increasingly being used in the social sciences.

3.3.2.6 Theoretical Review

The purpose of this form is to examine the corpus of theory that has accumulated in regard to an issue, concept, theory, phenomena. The theoretical literature review helps to establish what theories already exist, the relationships between them, to what degree the existing theories have been investigated, and to develop new hypotheses to be tested. Often this form is used to help establish a lack of appropriate theories or reveal that current theories are inadequate for explaining new or emerging research problems. The unit of analysis can focus on a theoretical concept or a whole theory or framework.

The literature review should logically lead to research problem, purpose and questions, which in turn leads to the identification of the research approach and design.

Also guiding the study is the researchers theoretical or conceptual framework according to Maxwell (2005), “The point is not to summarize what has already been done in the field. Instead, it is to ground the proposed study in the relevant previous work and to give the reader a clear sense of the researcher’s theoretical approach to the phenomenon that the research proposes to study”.

The conceptual and theoretical framework should serve two purposes:

1. Show how the research fits into what is already known (relationship to existing theory and research).
2. Show how research makes a contribution on the topics to the field (its intellectual goals).

It also informs the research questions and methodology and helps the researcher justify the research problem (shows why the research is important). “In quantitative studies, one uses theory deductively and places it towards the beginning of the plans for a study. The objective is to test or verify theory.

The literature review and theoretical framework are the foundation for your research plan and needs to be conducted prior to proposing a research plan.

The researcher should try to relate the assumptions to the selected theory to the study to show the relevance of the study. It is a good practice to anchor a study on a theory for a mixture of theories. There is also a review of empirical literature. Here the researcher reviews studies thereby other scholars in related fields of study. In doing this, the researcher reviews the purpose of the study, the methodology used for the study, the findings as well as conclusions and recommendations by the scholars. (Randolph, 2009)

3.3.3 Contents of a Literature Review:

- Overview of the subject and the objective(s) of the review.
- Analysis of works in favor, works against, and works with neutral views on the subject. These should be clearly divided.
- Explanations of the similarities and differences between the works.
- Comparison of different views held by other authors.
- Critique of the methodology.
- Examination of gaps in the research.
- Evaluation of how each study contributes to the argument in question.
- Conclusion that summarizes the literature review.

3.4 Preparing for your Literature

i Review APA Guidelines:

The APA format is standard for literature reviews, as it is for dissertations, theses, or published academic articles. Acquaint yourself with the core elements of this writing style, including fonts, margins, spacing, body text format, title pages, abstracts, text citations, bibliography, and quotations.

ii Decide on a Topic:

If you haven't already decided on a topic, you need to start researching now. Topic selection is an extremely important step whenever you are writing or reviewing theses. The topic should be neither too broad nor too narrow. A narrow topic with sufficient study to support your review is acceptable. However, a topic that is too vast will make it extremely difficult for you to cover the wide range of works that should all be given due consideration to form a conclusion. University students prefer selecting topics that relate to their fields of study or their final thesis projects. (Ridley, 2012)

iii **Select your literature:**

There is a plethora of online databases and content that you use to find and select published material. If you belong to an institution, your research instructors will be a better guide for where you can look for literature. If the literature review is something you are doing on your own, then you will need to figure out relevant databases related to your field of study. (Taylor, 2012) You can look up scholarly material using academic search engines such as Google Scholar or Academic Info. They will provide links and direct you to digital and printed resources on a particular subject.

Very often, it is during the research phase that you realize the topic is too broad or too narrow. If need be, refine your topic to make it is suitable for your review. If you are going to form a thesis statement or an objective, this is a good time to do so.

iv Analyze and Prepare the Literature:

First, give your selected literature a brief overview. Skim through the content and get the gist of what the author is trying to prove or disprove. It would be a good idea to read the abstract and first few paragraphs of the introduction in this step. You can also take notes during this step.
Next, based on what you read, arrange your material and think over the headings, subheadings, and divisions you will use for your review. While taking notes you should:

- Define key terms
- Look at the statistics
- Identify key patterns
- Check emphases, strengths, and weaknesses
- Check for gaps in the literature
- Identify relationships between studies
- Evaluate the methodologies used

While writing the review, start by summarizing the literature. You may do this in a table or concept map format if you wish to make it easier. (Randolph, 2009) The tables can include analyses of the summaries and interpretations. Any word processor or spreadsheet program (such as Microsoft Word or Excel) would be good for this purpose. The charts can also include dates, authors, methodology used, definitions of key terms, and of course, summaries.

v Write Your Review:

Start by identifying the problem statement or your objective (or thesis). Explain why this area of study is important. Give your reasons for selecting the research or literature you chose as opposed to "other" material that may or may not have been relevant. (Jesson,2011) Also, discuss other literature reviews written on your topic. Explain how your study fills in gaps in the existing reviews or why the repetition is necessary. Make sure you cite all your references! Also include as many subheadings as possible to ensure a well organized and coherent essay.

At the end of the review, write a conclusion. There is no hard-and-fast rule for writing a good conclusion. It depends on your objective in reviewing the area of study. (Sutton, 2016) Your conclusion could provide support for an allegation made in the introduction, rebut a hypothesis, or simply critique the study to encourage more work in the area.

When constructing a literature review, the researcher should ensure that it does the following:

- Provides contexts of the study and clarifies the relationship between the proposed research and previous research, both empirical and theoretical.
- Show how the proposed study is unique from previous research Convince the reader that the study is timely and worthwhile.
- Demonstrate the researcher's critical ability as a scholar, not his knowledge of other works the researcher should formulate an argument from his perspective
- Make assertions and convince reader of their legitimacy by providing logical and empirical support.

3.5 Sources of Literature

i Primary and secondary sources

Primary data is that collected by the researcher for analysis; it is new data. Secondary data is the important type for literature reviews as it is information that already exists, for example, company data on sales, trade associations, government records such as census data and

previous research studies located through database and library searches. Secondary sources are consulted before any research design is considered as they shed light on the research topic, relevant methodologies and existing knowledge. Secondary data can also be the initial trigger for the recognition of a research problem or opportunity.
Major sources of information include:

ii Journal articles

Effective literature searching needs a methodical approach and some advanced planning. There is heavy emphasis in this text on searching the journal literature as this is the most complex and crucial literature area to access. Journal articles provide the most up-to-date source of published research and often cover subjects not readily found in book format. Some articles, known as review articles, provide overviews of a subject with extensive reference lists and make excellent starting places for research. You may frequently have to search beyond the confines of your subject area to find relevant literature, so consider journals in related subject areas such as psychology, sociology, politics, economics, education, *etc*. to locate relevant business related material.

iii Peer-reviewed journal articles

Peer-reviewed articles are the most credible of all documents to peruse as they are subjected to numerous evaluations and revisions prior to publication. A reputable journal editor will ensure the article has been scrutinized by several knowledgeable researchers familiar with the field of investigation and acknowledged as worthy of publication, before actual publication.

iv Journals on the Web

Increasingly, journals provide the full text of the journal on the Web, although you often need a subscription before accessing though abstracts are generally always available. Most journal websites also list the contents of recent issues. Even where an institution has online access to the full text of journals, access may only be possible while on site. License arrangements may preclude off site access to the full text of journals.

v Indexes

Major indexes to the literature normally have a highly structured arrangement, usually an alphabetical list by topic and/or author

indicating the source either in printed format or as a database. Obviously, many journals have their own annual indexes to their content but, for a more extensive search, you will need to use more comprehensive indexes that locate relevant literature in journals, books and a variety of other sources. The main method of search is based on the selection of a keyword, often your topic name or an important author in the area. Different forms of indexes exist.

(a) Abstracting indexes: These provide the normal details of any bibliographical index but also give you an abstract that summarizes the content of the article. This information can be crucial in deciding whether the article is valuable to read in entirety.

(b) Citation indexes: These can be used for normal subject or author searches but also have a unique function. Having found a key author and paper it is possible to find out subsequent authors who have referred to this original work, possibly building on it or even criticizing it. One major citation index is the Social Science Citation Index

Most of the printed indexes are also available as databases, accessible either via the Internet or through CD-ROM based systems. Clearly, being able to search for information using a computer has many advantages. For instance, search terms can be combined for more complex topics, something that printed indexes cannot easily provide and thousands of records can be scanned very rapidly.

vi Textbooks

Textbooks can be valuable in providing an overview of a subject and a distillation of knowledge on a subject. The major drawbacks are that books date very rapidly and there may be nothing specifically published on your topic. Books can be searched for in individual library catalogues, most of which are now computer-based or through a range of bibliographies, either general or subject specific.

vii Directories

Directories provide useful information on organizations or individuals and are useful guides to other sources of information. There are a number of directories that list ongoing research and it is wise to check that your research is not going to duplicate an existing research project.

viii The Internet

The World Wide Web provides a multimedia interface to the Internet and Web pages provide links to information and documents. The

Internet can access library catalogues, online databases and to browse through publications, such as journals, in electronic format. The major problem with using the Internet has been locating relevant information and at times it can feel like being left in a jungle without a guide and a compass! Increasingly organizations are developing Web pages that provide information plus hypertext links to other sites of interest.

Self -Assessment Exercise 1

i What is the purpose of literature review in research?

3.6 Structure and Writing Style

The structure of a literature review should include the following:

Step 1: Search for relevant literature
Before you begin searching for literature, you need a clearly defined topic.

If you are writing the literature review section of a dissertation or research paper, you will search for literature related to your research problem and questions.

If you are writing a literature review as a stand-alone assignment, you will have to choose a focus and develop a central question to direct your search. Unlike a dissertation research question, this question has to be answerable without collecting original data. You should be able to answer it based only on a review of existing publications.

Use your keywords to begin searching for sources.
To identify the most important publications on your topic, take note of recurring citations. If the same authors, books or articles keep appearing in your reading, make sure to seek them out.

Receive feedback on language, structure and layout
Professional editors proofread and edit your paper by focusing on:

Academic style
Vague sentences
Grammar
Style consistency

Step 2: Evaluate and select sources
You probably won’t be able to read absolutely everything that has

been written on the topic—you'll have to evaluate which sources are most relevant to your questions.
For each publication, ask yourself:

What question or problem is the author addressing?
What are the key concepts and how are they defined?
What are the key theories, models and methods? Does the research use established frameworks or take an innovative approach?
What are the results and conclusions of the study?
How does the publication relate to other literature in the field? Does it confirm, add to, or challenge established knowledge?
How does the publication contribute to your understanding of the topic? What are its key insights and arguments?
What are the strengths and weaknesses of the research?
Make sure the sources you use are credible, and make sure you read any landmark studies and major theories in your field of research.

You can find out how many times an article has been cited on Google Scholar—a high citation count means the article has been influential in the field, and should certainly be included in your literature review.

The scope of your review will depend on your topic and discipline: in the sciences you usually only review recent literature, but in the humanities you might take a long historical perspective (for example, to trace how a concept has changed in meaning over time).

Take notes and cite your sources
As you read, you should also begin the writing process. Take notes that you can later incorporate into the text of your literature review.

It is important to keep track of your sources with citations to avoid plagiarism. It can be helpful to make an annotated bibliography, where you compile full citation information and write a paragraph of summary and analysis for each source. This helps you remember what you read and saves time later in the process. (Onwuegbuzie, and Rebecca, 2016)

Step 3: Identify themes, debates, and gaps
To begin organizing your literature review's argument and structure, you need to understand the connections and relationships between the sources you've read. Based on your reading and notes, you can look for:

Trends and patterns (in theory, method or results): do certain approaches become more or less popular over time?

Themes: what questions or concepts recur across the literature?
Debates, conflicts and contradictions: where do sources disagree?
Pivotal publications: are there any influential theories or studies that changed the direction of the field?
Gaps: what is missing from the literature? Are there weaknesses that need to be addressed?
This step will help you work out the structure of your literature review and (if applicable) show how your own research will contribute to existing knowledge..

Step 4: Outline your literature review's structure
There are various approaches to organizing the body of a literature review. You should have a rough idea of your strategy before you start writing.

Depending on the length of your literature review, you can combine several of these strategies (for example, your overall structure might be thematic, but each theme is discussed chronologically).

a) Chronological
The simplest approach is to trace the development of the topic over time. However, if you choose this strategy, be careful to avoid simply listing and summarizing sources in order.

Try to analyze patterns, turning points and key debates that have shaped the direction of the field. Give your interpretation of how and why certain developments occurred.

b) Thematic
If you have found some recurring central themes, you can organize your literature review into subsections that address different aspects of the topic.

For example, if you are reviewing literature about inequalities in migrant health outcomes, key themes might include healthcare policy, language barriers, cultural attitudes, legal status, and economic access.

c) Methodological
If you draw your sources from different disciplines or fields that use a variety of research methods, you might want to compare the results and conclusions that emerge from different approaches. For example:

Look at what results have emerged in qualitative versus quantitative research
Discuss how the topic has been approached by empirical versus

theoretical scholarship
Divide the literature into sociological, historical, and cultural sources
Theoretical
A literature review is often the foundation for a theoretical framework. You can use it to discuss various theories, models, and definitions of key concepts.

You might argue for the relevance of a specific theoretical approach, or combine various theoretical concepts to create a framework for your research.

Step 5: Write your literature review
Like any other academic text, your literature review should have an introduction, a main body, and a conclusion. What you include in each depends on the objective of your literature review.

3.6.1 Writing Your Literature Review

i Writing the introduction

In the introduction, you should:

i. Define or identify the general topic, issue, or area of concern, thus providing an appropriate context for reviewing the literature.
ii. Point out overall trends in what has been published about the topic; or conflicts in theory, methodology, evidence, and conclusions; or gaps in research and scholarship; or a single problem or new perspective of immediate interest.
iii. Establish the writer's reason (point of view) for reviewing the literature; explain the criteria to be used in analyzing and comparing literature and the organization of the review (sequence); and, when necessary, state why certain literature is or is not included (scope).

ii Writing the body
In the body, you should:

i. Group research studies and other types of literature (reviews, theoretical articles, case studies, etc.) according to common denominators such as qualitative versus quantitative approaches, conclusions of authors, specific purpose or objective, chronology, etc.

ii. Summarize individual studies or articles with as much or as little detail as each merits according to its comparative

importance in the literature, remembering that space (length) denotes significance.

iii. Provide the reader with strong "umbrella" sentences at beginnings of paragraphs, "signposts" throughout, and brief "so what" summary sentences at intermediate points in the review to aid in understanding comparisons and analyses.

iii Writing the conclusion

In the conclusion, you should:

i. Summarize major contributions of significant studies and articles to the body of knowledge under review, maintaining the focus established in the introduction.

ii. Evaluate the current "state of the art" for the body of knowledge reviewed, pointing out major methodological flaws or gaps in research, inconsistencies in theory and findings, and areas or issues pertinent to future study.

iii. Conclude by providing some insight into the relationship between the central topic of the literature review and a larger area of study such as a discipline, a scientific endeavor, or a profession.

3. 7 Citations and Referencing Styles

For any research of professional standard, consistent referencing of all sources of information used is vital. The Harvard style is the most common referencing style in use in universities around the world but other styles like the APA style do exist. The APA citation style gives the author's name and the copyright date of the text first in a citation. Both pieces of information appear in text citations as well as on the reference paper which is the end of the paper. The author must include an in-text citation in every sentence that includes information from an outside resource. APA in-text citations require the author's name, the publication date, and if you are including a paraphrase or direct quote, a page number with the lowercase letter "P" and a period.

3.7.1 APA Format Citation Guide

This is a complete guide to APA (American Psychological Association) in-text and reference list citations.

1. APA Referencing Basics: Reference List

A reference list is a complete list of references used in a piece of writing

including the author name, date of publication, title and more. An APA reference list must:

- Be on a new page at the end of the document
- Be centred
- Be alphabetically by name of first author (or title if the author isn't known, in this case a, an and the should be ignored)
  If there are multiple works by the same author these are ordered by date, if the works are in the same year they are ordered alphabetically by the title and are allocated a letter (a,b,c etc) after the date
- Contain full references for all in-text references used

2. APA Referencing Basics: In-Text Citation

In-text references must be included following the use of a quote or paraphrase taken from another piece of work.
In-text citations are citations within the main body of the text and refer to a direct quote or paraphrase. They correspond to a reference in the main reference list. These citations include the surname of the author and date of publication only. Using an example author James Mitchell, this takes the form:

Mitchell (2017) states… Or …(Mitchell, 2017).
The structure of this changes depending on whether a direct quote or parenthetical used:

- Direct Quote: The citation must follow the quote directly and contain a page number after the date, for example (Mitchell, 2017, p.104). This rule holds for all of the variations listed.
- Parenthetical: The page number is not needed.

Two Authors:

The surname of both authors is stated with either 'and' or an ampersand between. For example:
Mitchell and Smith (2017) state… Or …(Mitchell & Smith, 2017).

Three, Four or Five Authors:

For the first cite, all names should be listed:
Mitchell, Smith, and Thomson (2017) state… Or …(Mitchell, Smith, & Thomson, 2017).
Further cites can be shorted to the first author's name followed by et al:
Mitchell et al (2017) state… Or …(Mitchell et al, 2017).

Six or More Authors:

Only the first author's surname should be stated followed by et al, see the above example.

No Authors:

If the author is unknown, the first few words of the reference should be used. This is usually the title of the source.
If this is the title of a book, periodical, brochure or report, is should be italicised. For example:
(*A guide to citation*, 2017).
If this is the title of an article, chapter or web page, it should be in quotation marks. For example:
("APA Citation", 2017).

Citing Authors With Multiple Works From One Year:
Works should be cited with a, b, c etc following the date. These letters are assigned within the reference list, which is sorted alphabetically by the surname of the first author. For example:
(Mitchell, 2017a) Or (Mitchell, 2017b).

Citing Multiple Works in One Parentheses:
If these works are by the same author, the surname is stated once followed by the dates in order chronologically. For instance:
Mitchell (2007, 2013, 2017) Or (Mitchell, 2007, 2013, 2017)
If these works are by multiple authors then the references are ordered alphabetically by the first author separated by a semicolon as follows:
(Mitchell & Smith 2017; Thomson, Coyne, & Davis, 2015).

Citing a Group or Organisation:
For the first cite, the full name of the group must be used. Subsequently this can be shortened. For example:
First cite: (International Citation Association, 2015)
Further Cites: (Citation Association, 2015)
Citing a Secondary Source:
In this situation the original author and date should be stated first followed by 'as cited in' followed by the author and date of the secondary source. For example:
Lorde (1980) as cited in Mitchell (2017) Or (Lorde, 1980, as cited in Mitchell, 2017)

3. How to Cite Different Source Types

- In-text citation doesn't vary depending on source type, unless the author is unknown.

- Reference list citations are highly variable depending on the source.

How to Cite a Book (Title, not chapter) in APA Format

Book referencing is the most basic style; it matches the template above, minus the URL section. So the basic format of a book reference is as follows

Self -Assessment Exercise 11

i. Discuss the three main types of literature sources and the key differences between them
ii. Discuss the three major parts of a literature review

3.8 Summary

This unit informed us that the literature review is where the researcher identifies theories and previous research which influenced his choice of research topic and the methodology he is choosing to adapt. The literature could be used to support the researcher's identification of a problem to research or illustrate that there is a gap in previous research that needs to be filled.

3.9 References/Further Readings/Web Resources

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3.10 Possible Answers To Self-Assessment Exercises

Self -Assessment Exercise 1

i What is the purpose of literature review in research?

The Purpose of a literature review include:

1. Place each work in the context of its contribution to understanding the research problem being studied.
2. Describe the relationship of each work to the others under consideration.
3. Identify new ways to interpret prior research.
4. Reveal any gaps that exist in the literature.
5. Resolve conflicts amongst seemingly contradictory previous studies.
6. Identify areas of prior scholarship to prevent duplication of effort.
7. Point the way in fulfilling a need for additional research.
8. Locate your own research within the context of existing literature

Self -Assessment Exercise 11

i. Discuss the three main types of literature sources and the key differences between them Primary and secondary sources

Primary data is that collected by the researcher for analysis; it is new data. Secondary data is the important type for literature reviews as it is information that already exists, for example, company data on sales, trade associations, government records such as census data and previous research studies located through database and library searches. Secondary sources are consulted before any research design is considered as they shed light on the research topic, relevant methodologies and existing knowledge. Secondary data can also be the initial trigger for the recognition of a research problem or opportunity.

Major sources of information include: Journals, books, internet etc.

ii. Discuss the three major parts of a literature review

i Writing the introduction

In the introduction, you should:

i. Define or identify the general topic, issue, or area of concern, thus providing an appropriate context for reviewing the literature.

ii. Point out overall trends in what has been published about the topic; or conflicts in theory, methodology, evidence, and conclusions; or gaps in research and scholarship; or a single problem or new perspective of immediate interest.
iii. Establish the writer's reason (point of view) for reviewing the literature; explain the criteria to be used in analyzing and comparing literature and the organization of the review (sequence); and, when necessary, state why certain literature is or is not included (scope).

ii Writing the body

In the body, you should:

i. Group research studies and other types of literature (reviews, theoretical articles, case studies, etc.) according to common denominators such as qualitative versus quantitative approaches, conclusions of authors, specific purpose or objective, chronology, etc.
ii. Summarize individual studies or articles with as much or as little detail as each merits according to its comparative importance in the literature, remembering that space (length) denotes significance.
iii. Provide the reader with strong "umbrella" sentences at beginnings of paragraphs, "signposts" throughout, and brief "so what" summary sentences at intermediate points in the review to aid in understanding comparisons and analyses.

iii Writing the conclusion

In the conclusion, you should:

i. Summarize major contributions of significant studies and articles to the body of knowledge under review, maintaining the focus established in the introduction.
ii. Evaluate the current "state of the art" for the body of knowledge reviewed, pointing out major methodological flaws or gaps in research, inconsistencies in theory and findings, and areas or issues pertinent to future study.
Iii Conclude by providing some insight into the relationship between the central topic of the literature review and a larger area of study such as a discipline, a scientific endeavor, or a profession

UNIT 4 HYPOTHESIS (PART ONE)

Unit Structure

4.1 Introduction

The statement of hypotheses has been an important part of a research proposal, especially in Management Sciences. 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.

4.2 Intended Learning Outcomes

At the end of this unit, you will be able to:
1. Understand what hypotheses are all about
2. Understand the statement of research hypotheses
3. Know the different classifications of hypotheses
4. Understand the classical methods or strategies for testing hypotheses

5. State and test hypotheses relevant to your research activities

4.3 Definition of Hypothesis, Types of Hypotheses, and Hypotheses Testing

4.3.1 Definition and Sources of Hypothesis

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. (Patton, 2002). Hypothesis helps you ensure that 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 (Krueger,1994).

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 (Denzin, & Lincoln,1998) This only happens when the hypotheses is not appropriate and comprehensive enough.

4.3.2 Sources of Hypotheses

Research hypotheses can be obtained from the following sources:

i Experience: what you know about the problem under investigation

ii The Literature: from the review of related literature, you can obtain useful ideas relating to possible solutions to the problem under investigation

iii Theory: from theories you can derive hypotheses through the process of deductive reasoning, for example, “if A is true then B

will be true."

iv 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.

4.3.3 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. Hypotheses 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.

4.4 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.

4.4.1 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. (Onwe,2007) Research hypotheses may take any of the following forms:

(i) The use of minimum deposit requirements will facilitate real banking in Nigeria.

(2) 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.

4.4.2 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 (Denzin & Lincoln,1994) 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: (i) as null hypothesis, or (ii) as alternate hypothesis.

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.

Self -Assessment Exercise 1

i Discuss briefly the Sources of Hypotheses

ii. What is a statistical hypothesis?

4.6 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.

4.6.1 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;
($n \leq 30$). 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

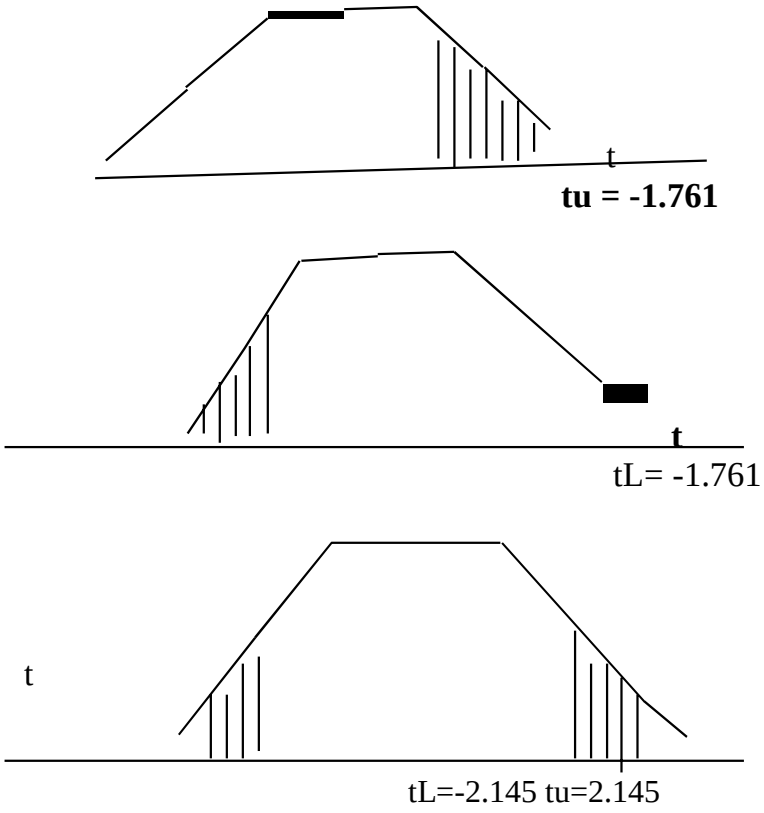
The aim of any hypothesis testing is to either accept or reject a given null hypothesis. The decision to either accept or reject any hypothesis is based on
two values of the test statistic, in this case the t-statistic. These two values are referred to as the decision values, including:

1. The critical or rejection value
2. The calculated or statistical value.

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 and the number of degrees freedom, n-1, where n represents the number of observations.
Assume n=15 observation 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 4.1)

Figure 4.1: Rejection Values of t



2. The Calculated Value of t (tc)

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

$$tc = \frac{X-\mu 0}{s\,X}$$

Where $\overline{X}$ = sample mean
μ_0 = the hypothesized population mean
S_X = the standard error of the sample mean.

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

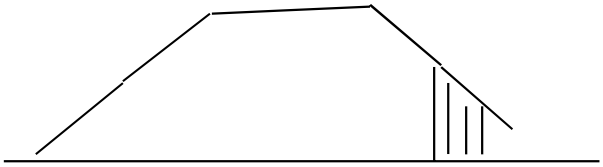
Recall that S = Sample Standard deviation.
Having obtained the two values of the test-statistic, we compare them to know whether or not the null hypothesis should be rejected.
If tc > tu, reject Ho (the null hypothesis) If tc < tu, accept Ho(the null hypothesis)
And

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 receivable were:
N4, 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 a = 0.01 and
n-1 = 10-1 = 9 degrees of freedom

t 

The calculated value of t is obtained as follows: tc = $\frac{\bar{X} - \mu_o}{SX}$
where $\bar{X} = \frac{S X}{n} = \frac{166}{10} = 11.6$

tu = 2.821

n 10
μ o = 15
$\bar{X} = \frac{S X}{n} = S$
vn
$S = \sqrt{\frac{X_2 S - S(X_2)/n}{n-1}}$

X	X2
4	16
5	25
7	49
7	49
9	81
10	100
11	121
12	144
18	324
33	1089
X =116	X2 = 1998

$$\frac{(X)}{n} = \frac{(116)}{10} = 13456 = 1345.6$$

$$10$$

$$X2 = 1998$$

$$S = \sqrt{\frac{1998-1345.6}{9}} = \sqrt{72.49}$$

$$= 8.51$$

$$\text{Thus, } S\bar{X} = \frac{S}{\sqrt{n}} = \frac{8.51}{\sqrt{10}} = 0.851$$

It follows that,

$$tc = \frac{\bar{X}-\mu_o}{S\bar{X}}$$

$$= \frac{11.6-15}{0.8} = -3.995$$

Decision

Since tc(-3.995) < tu(2.82), we accept the null hypotheses (Ho = N15), and conclude that on the average, the account receivable is not significantly greater than ₦.

Self -Assessment Exercise 11

i. Define hypothesis
ii What are the two basic parametric tools for testing statistical or parametric hypothesis.

4.7 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 (Patton, 2002)

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.

4.8 References/Further Readings/Web Resources

Denzin, N., & Lincoln, Y. (1994). *Handbook of qualitative research*. Thousand Oaks, CA: Sage

Denzin, N., & Lincoln, Y. (Eds.). (1998). *Collecting and interpreting qualitative materials*. Thousand Oaks, CA: Sage.

Krueger, R. A. (1994). *Focus groups. A practical guide for applied research* (2nd ed.). London: Sage.

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

Patton, M. Q. (2002). *Qualitative research and evaluation methods* (3d ed.). Thousand Oaks, CA: Sage

4.9 Possible Answers To Self-Assessment Exercises

Self -Assessment Exercise 1

i. Discuss briefly the Sources of Hypotheses

Research hypotheses can be obtained from the following sources:

i Experience: what you know about the problem under investigation

ii The Literature: From the review of related literature, you can obtain useful ideas relating to possible solutions to the problem under investigation

iii Theory: from theories you can derive hypotheses through the process of deductive reasoning, for example, "if A is true then B will be true."

iv 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.

ii. What is a statistical hypothesis?

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

Self -Assessment Exercise 11

i. Define hypothesis

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.

ii What are the two basic parametric tools for testing statistical or parametric hypothesis.

These include 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;
($n \leq 30$).

MODULE 2 METHODOLOGY

UNIT 1 RESEARCH DESIGN

Unit Structure

1.1 Introduction

A **research design** is a blueprint or plan for the collection, measurement, and analysis of data, created to answer your research questions.

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. The

quality of a research design depends on how carefully you choose the appropriate design alternatives, taking into consideration the specific objectives, research questions, and constraints of the project, such as access to data, time, and/or money.

We often describe a design using a concise notation that enables us to summarize 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.

1.2 Intended Learning Outcomes

By the time you go through this unit, you will be able to:
1. Understand what research designs are all about
2. Understand why a research design is necessary in research
3. activities
4. Understand when a research design is valid and acceptable
5. Choose the appropriate design for your research activities

1.2 Features of a Good Design Elements of the Research Design, Types of Research Designs and their Validities

In this section, we discuss the elements of research designs. The discussions will lead us to the different types of research designs and their validities.

1. 3.1 Features of a Good Design

A good design is often characterized by adjectives like flexible, appropriate, efficient, economical and so on. Generally, the design which minimizes bias and maximizes the reliability of the data collected and analyzed is considered a good design. The design which gives the smallest experimental error is supposed to be the best design in many investigations. Similarly, a design which yields maximal information and provides an opportunity for considering many different aspects of a problem is considered most appropriate and efficient design in respect of many research problems. Thus, the question of good design is related to the purpose or objective of the research problem and also with the nature of the problem to be studied. A design may be quite suitable in one case, but may be found wanting in one respect or the other in the context of some other research problem. One style design cannot serve the purpose of all types of research problems.

In determining a research appropriate for a particular research problem, the researcher needs to consider the following:

i. The means of obtaining information.
ii. The availability and skills of the researcher and his staff, if any;
iii. The objective of the problem to be studied;
iv. The nature of the problem to be studied; and
v. The availability of time and money for the research work.

If the research study happens to be an exploratory or a formulative one, wherein the major emphasis is on discovery of ideas and insights, the research design most appropriate must be flexible enough to permit the consideration of many different aspects of a phenomenon. But when the purpose of a study is accurate description of a situation or of an association between variables (or in what are called the descriptive studies) accuracy becomes a major consideration. A research design which minimizes bias and maximizes the reliability of the evidence collected is considered a good design (Tashakkori,& Teddlie,2009) Studies involving the testing of a hypothesis of a causal relationship between variables require a design which will permit inferences about causality in addition to the minimization of bias and maximization of reliability. But in practice it is the most difficult task to put a particular study in a particular group, for a given research may have in it elements of two or more of the functions of different studies. It is only on the basis of its primary function that a study can be categorized as an exploratory or descriptive or hypothesis-testing study and accordingly the choice of a research design may be made in case of a particular study. Besides, the availability of time, money, skills of the research staff, the means of obtaining the information must be given due weightage while working out the relevant details of the research design such as experimental design, survey design, sample design and the like.

1.4 Elements of a Research design

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

1. Observations or Measures

These are symbolized 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 symbolized 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.

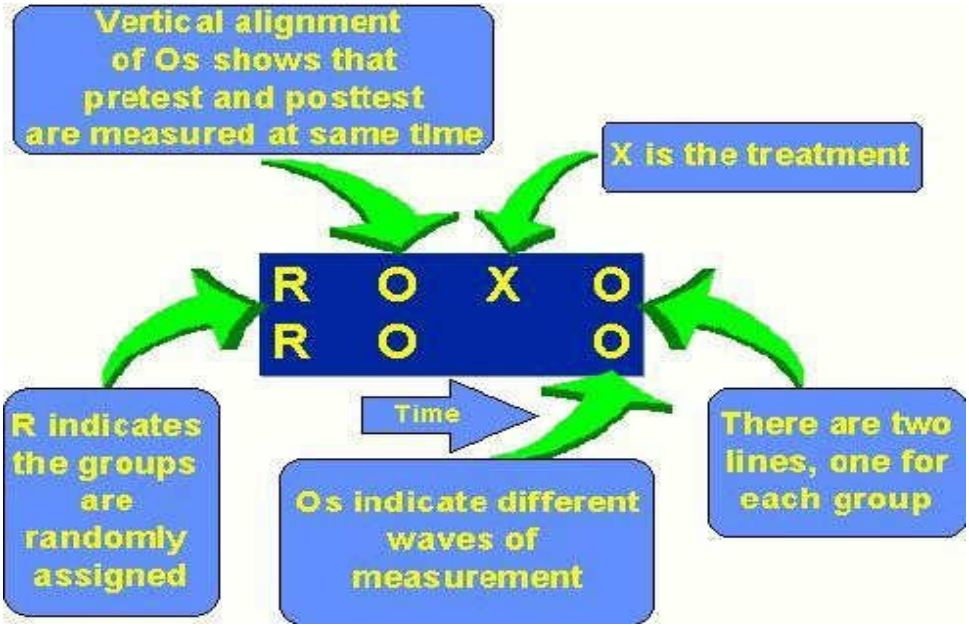
4. Assignment to Group

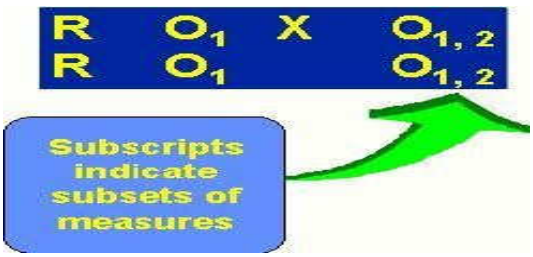
Assignment to group is designated by a letter at the beginning of each line (i.e., group) that describes how the group was assigned. The major types of assignment are:

R = random assignment N = nonequivalent groups C = assignment by cutoff

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.





1.1 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 pretest-posttest (or before- ***after) treatment versus comparison group randomized experimental design. Let us go*** through each of the parts of the design. There are two lines in the notation, so you should realize 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 pretest -- and two Os taken after the treatment is given -- the posttest. 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 posttest. This means that there was some measure or set of measures that were collected only at the posttest.

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 recognize as easily without the notation.

1.5 Types of Research Design.

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

1.5.1 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.

1.5.2 Survey Research Design.

This is a research design in which a group of people or items is studied by collecting and analyzing sample data or data from the entire population. A **survey** is a *system* for collecting information from or about people to describe, compare, or explain their knowledge, attitudes, and behavior. The survey strategy is very popular in business research, because it allows the researcher to collect quantitative and qualitative data on many types of research questions. Indeed, surveys are commonly used in exploratory and descriptive research to collect data about people, events, or situations. For instance, in a business context, surveys are often taken on the subject of consumer decision making, customer satisfaction, job satisfaction, the use of health services, management information systems, and the like. A large number of such surveys are one□time surveys. Other surveys are continuing, allowing the researcher to observe changes over time. The questions in survey instruments are typically arranged into self□administered questionnaire that a respondent completes on his or her own, either on paper or via the computer. (Punch, 1998) 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:

- Procedure – Based Survey including:
  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).

- Purpose – Based:
  These are surveys classified by purposes they intend to accomplish and include:

Developmental Survey – which seeks to ascertain how some dimensions, variables and characteristics of a given population change with time.
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.

Correlation Survey seeks to establish what relationship exists between two or more variables. The extent of **interference** by the researcher has a direct bearing on whether the study undertaken is correlational or causal. A correlational study is conducted in a natural environment (for instance, a supermarket or the factory floor) with minimal interference by the researcher with the normal flow of events. For example, if a researcher wants to study the factors influencing training effectiveness (a correlational study), all that the individual has to do is delineate the relevant variables, collect the relevant data, and analyze them to come up with the findings. Though there is some disruption to the normal flow of work in the system as the researcher interviews employees and administers questionnaire in the workplace, the researcher's interference in the routine functioning of the system is minimal as compared to that caused during causal studies and experimental designs.

In studies conducted to establish cause□and□effect relationships, the researcher tries to manipulate certain variables so as to study the effects of such manipulation on the dependent variable of interest. In other words, the researcher deliberately changes certain variables in the setting and interferes with the events as they normally occur. As an example, a researcher might want to study the influence of lighting on worker performance; hence he manipulates the lighting in the work situation to varying intensities. Here, there is considerable researcher interference with the natural and normal setting. In other cases the researcher might even want to create an altogether new artificial setting where the cause□and□effect relationships can be studied by manipulating certain variables and tightly controlling certain others, as in a laboratory. Thus, there could be varying degrees of interference by the researcher in the manipulation and control of variables in the research study, either in the natural setting or in an artificial lab setting.

Public Opinion Survey – designed to find out the opinion of people in a given area towards an issue of interest.

1.5.3 Case Study Research Design.

Case studies focus on collecting information about a specific object, event or activity, such as a particular business unit or organization. In case studies, the case is the individual, the group, the organization, the event, or the situation the researcher is interested in. The idea behind a case study is that in order to obtain a clear picture of a problem one must examine the real□life situation from various angles and perspectives using multiple methods of data collection. Along these lines, one may

define a case study as a research strategy that involves an empirical investigation of a particular contemporary phenomenon within its real life context using multiple methods of data collection (Yin, 2009). It should be noted that case studies may provide both qualitative and quantitative data for analysis and interpretation. As in experimental research, hypotheses can be developed in case studies as well. However, if a particular hypothesis has not been substantiated in even a single other case study, no support can be established for the alternate hypothesis developed.

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 generalized to the population.

1.5.4 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 variable causative agents.

1.5.5 Experimental Research Design: Experiments are usually

associated with a hypothetico deductive approach to research. The purpose of an experiment is to study causal relationships between variables. Experimental designs are less useful or appropriate for answering exploratory and descriptive research questions.

In an experiment, the researcher *manipulates* the independent variable to study the effect of this manipulation on the dependent variable. In other words, the researcher deliberately changes a certain variable (or certain variables), for instance “reward system”, to establish whether (and to what extent) this change will produce a change in another variable, in this example “productivity”. The simplest experimental design is a two group, post test only, randomized experiment, where one group gets a treatment, for instance “piece wages”. The other group (the comparison group, in this example the “hourly wages” group) does not get the treatment. Subjects (workers) are randomly assigned to the groups and hence the researcher is able to determine whether the productivity of the two groups is different after the treatment.

An experimental design is a very strong design to use. However, experimental designs are not always feasible in an applied research context where the researcher tries to solve a management problem. For instance, we do not want (for obvious reasons) to assign customers to a low service quality treatment to study the effect of service quality on

customer retention or assign workers to highly stressful situations to investigate the effect of work□related stress on personal and professional relations. In such cases, we may opt for an alternative research strategy to answer the research questions of their study.
This also establishes cause and effect relationships, except that it uses control groups.

One important disadvantage of experimental studies is that the nature of the experiment may be very unlike what people actually experience in the real world. In the Laughlin et al. (1991) experiment, the problem-solving tasks the participants attempted were artificial and unlike what people might actually do in everyday life. In this way, what experiments gain in control they lose in *mundane realism*. So, although experimental studies benefit from exerting control, they suffer from being conducted in artificial settings.

Self -Assessment Exercise 1

i. Briefly discuss five major classifications of research designs
ii. Elements of a research design can be outlined in five ways. Explain

1.6 Validity of A Research Design

Conclusions drawn from analyzing 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 is intended to measure. Researchers often use their own definition when it comes to what is considered valid. 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. Research depends on a commitment to testing and increasing the validity as well as the reliability of your research results. (Kothari, 2004)
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. (Leavy, 2022) 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.

1.6.1 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 it. The administer asks a group of random people, untrained observers, if the questions appear valid to them. In research its 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.

1.6.2 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.

1.6.3 Construct Validity

A construct represents a collection of behaviors 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 behaviors 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. (Creswell, 2014)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:

Convergent Validity - the degree to which an operation is similar to other operations it should theoretically be similar to.

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.
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

Multitrait- Multimethod Matrix - six major considerations when examining
Construct Validity according to Campbell and Fiske. This includes evaluations of the convergent validity and discriminative validity. The others are trait method unit, multi-method/trait, truley different methodology, and trait characteristics.

1.6.4 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.

1.6.5 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.

1.6.6 External Validity

This refers to the extent to which the results of a study can be generalized 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 generalized.

1.6.7 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. (Williams, Malcolm, 2022). And be aware that appropriate criteria do not always exist. What you are doing is checking the performance of your research design against a criteria. The criteria you use as a standard of judgment accounts for the different approaches you would use:

Predictive Validity – design's ability to predict what it is theoretically able to predict. The extent to which a measure predicts expected outcomes.

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 is.

Self -Assessment Exercise 11

i. Explain why validity is important in the choice of a research design.
ii. What is a construct?

1.7 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:

1. Historical research
2. Case study research
3. Causal comparative research
4. Experimental research

Conclusions drawn from analyzing 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.
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:

1. Face validity
2. Content validity
3. Construct validity
4. Internal and external validity
5. Statistical validity
6. Criterion- related validity.

1.8 References/Further Readings/Web Resources

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1.9. Possible Answers to Self-Assessment Questions

Self -Assessment Exercise 1

i. Briefly discuss five major classifications of research Designs

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.

Survey Research Design.

This is a research design in which a group of people or items is studied by collecting and analyzing sample data or data from the entire population. A **survey** is a *system* for collecting information from or about people to describe, compare, or explain their knowledge, attitudes, and behavior. The survey strategy is very popular in business research, because it allows the researcher to collect quantitative and qualitative data on many types of research questions.

Case Study Research Design.

Case studies focus on collecting information about a specific object, event or activity, such as a particular business unit or organization. In case studies, the case is the individual, the group, the organization, the event, or the situation the researcher is interested in. The idea behind a case study is that in order to obtain a clear picture of a problem one must examine the real□life situation from various angles and perspectives using multiple methods of data collection.

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 variable causative agents.

Experimental Research Design:
Experiments are usually associated with a hypothetico□deductive approach to research. The purpose of an experiment is to study causal relationships between variables. Experimental designs are less useful or appropriate for answering exploratory and descriptive research questions.
In an experiment, the researcher *manipulates* the independent variable to

study the effect of this manipulation on the dependent variable

ii. Elements of a research design can be outlined in five ways.

Explain

Observations or Measures

These are symbolized 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.

Treatments or Programs

These are symbolized 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.

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.
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 assignment are:
R = random assignment N = nonequivalent groups C = assignment by cutoff Time.
Time moves from left to right.

Self -Assessment Exercise 11

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

Conclusions drawn from analyzing 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 is intended to measure. Researchers often use their own definition when it comes to what is

considered valid. 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.

ii. What is a construct?

A construct represents a collection of behaviors 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 behaviors such as over sleeping, loss of appetite, difficulty concentrating, etc.

UNIT 2 COMPONENTS OF A RESEARCH DESIGN

Unit Structure

2.1 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 criteria of causality and criterion of generalisability.

2.2 Intended Learning Outcomes

At the end of this unit, you should be able to:
1. Be armed with the basic components of a research design
2. Come up with and manage relevant research designs
3. Be better equipped with research principles than before looking at this unit.

2.2 Components of A Classic Research Design

As noted in our introduction, a research design has four major components including:

(i) Comparison; (ii) Manipulation; (iii) control; and (iv) Generalisation.

2.3.1 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 thatin order to assess the joint occurrence of the teaching 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. (Kothari,2004). In the first case, a group is compared with itself; in the latter case, an experimental group is compared with a control group.

2.3.2 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 to 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. (Cooper, and Schindler, 2001) 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.

2.3.3 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 jeopardizing 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:

2.3.3.1 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 theoretically designated as selection factors that produce differences in the two comparison groups prior to the research activity.

2.3.3.2 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:

1. 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. As an 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 be in form of differential exposure to the material, or from events that occurred during this period (Leavy, 2022). .
2. 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 records the students‟ achievement before and after the teaching method has been introduced.

Between the pretest and the posttest, 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.

3. 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.
4. Instrumentation. Instrumentation designates changes in the measuring instruments between the pretest and the posttest. To associate the difference between posttest and pretest scores with the independent variable, you need to assume that 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.
5. Testing. The process of testing may change the phenomenon being measured. The effect of being pretested might sensitize the subjects and improve their scoring on the posttest. A difference between posttest and pretest scores could thus be attributed not necessarily to the experimental stimulus but rather to the experience gained by the subject while taking the pretest.

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.

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: (i) by precision or pair wise matching; and, (ii) 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 (Nachimias, and Nachimias,1976) 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.

Randomization. Randomization is a process through which subjects are randomly assigned to the experimentaland control groups. You can do randomization 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.

2.3.4 Generalization

Apart from internal validity, another significant research question concerns the generalization of the research findings. External validity of research designs refers to the ability to generalize the research results. Two sources of external validity which can limit the generalization of research findings have been discussed in the literature, including representativeness of the finding of the sample and the reactive arrangements in the
research procedure.

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 sampling can make generalisations to larger and clearly defined populations possible.

Reactive Arrangements. *Results of a study should be generalized 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 generalizations 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 pretest 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 generalization of the results can be improved by avoiding highly artificial situations.

Self -Assessment Exercise 1

i	What are the two methods of control that can be employed to counteract the effect of extrinsic factors
ii	Discuss the five major intrinsic factors discussed in this unit

2.4 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. (Creswell, 2014). You should be more interested in understanding and controlling relationships between variables than you should be discussing and discerning causes.

There are three possible relationships that you will observe between two variables. The relationship may be: (i) symmetrical; (ii) reciprocal; or (iii) asymmetrical. We look at these possible in a much more understandable for as follows:

2.4.1 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.

2.4.2 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.

2.4.3 Asymmetrical Relationship

Most research analysis seek 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:

1. The degree to which each variable may be altered. The relatively unalterable variable is the independent variable such as age, social status.
2. The time order between the variables. The independent variable precedes dependent variable.

In table 3.1 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 research involve relationships between properties, dispositions, and behaviours.

Table 2.1: Types of Asymmetrical Causal Relationships

Type of Relationship	***Nature of Relationship***	E*xamples*
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 11

i. What are the four types of asymmetrical relationships described here?
ii Enumerate and briefly discuss the four components of a research design

2.5 Summary

A research design has four major components including:
(i) Comparison;
(ii) manipulation;
(iii) control; and
(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; or (iii) asymmetrical.
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2.6 References/Further Readings/Web Resources

Creswell, J. W. (2014). Research design: Qualitative, quantitative, and mixed methods approaches. Thousand Oaks, CA: SAGE Publications.

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2.7 Possible Answers To Self-Assessment Exercises

Self -Assessment Exercise 1

i What are the two methods of control that can be employed to counteract the effect of extrinsic factors

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.

ii Discuss the five major intrinsic factors discussed in this unit

1. 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.
2. 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 astime passes. These changes could influence the dependent variable and confound the research results.
3. 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.
4. Instrumentation. Instrumentation designates changes in the measuring instruments between the pretest and the posttest. To associate the difference between posttest and pretest scores with the independent variable, you need to assume that measurements with the same measurement instrument under constant conditions will yield the same result.
5. Testing. The process of testing may change the phenomenon being measured. The effect of being pretested might sensitize the subjects and improve their scoring on the posttest. A difference between posttest and pretest scores could thus be attributed not necessarily to the experimental stimulus but rather to the experience gained by the subject while taking the pretest.

Self -Assessment Exercise 11

i. What are the four types of asymmetrical relationships described here?

They are;

(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 research involve relationships between properties, dispositions, and behaviours.

ii Enumerate and briefly discuss the four components of a research design

A research design has four major components including:
(i) Comparison; (ii) Manipulation; (iii) control; and (iv) Generalisation.

Comparison
The process of comparison focuses on the concept of co-variation and association between two or more variables.

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 to determining force, and the other is a determined response.

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.

Generalization

Apart from internal validity, another significant research question concerns the generalization of the research findings. External validity of research designs refers to the ability to generalize the research results.

UNIT 3 OVERVIEW OF DATA COLLECTION AND SAMPLE SELECTION

Unit Structure

3.1 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.

3.2 Intended Learning Outcomes

At the end of this unit, you should be equipped with how:
1. To choose a data collection method
2. To identify and classify the variables you want to collect data for
3. To select a suitable sample

3.3 Overview of Data Collection Process

Data collection methods are used in that section or research activity which is dedicated to collecting data. To conduct good research, it is vital to construct meaningful variables and to measure the variables properly. Many research projects are allowed to use more than one method. The different possible methods of data collection can be listed as:
1. The critical incident method
2. Diaries
3. Focus group method
4. Interview method
5. Observation method
6. Protocol analysis
7. Questionnaires method
8. Inspection
9. 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.“

3.3.1 Interview

A widely used method of collecting data in business research is to

interview respondents to obtain information on an issue of interest. An interview is a guided, purposeful conversation between two or more people. There are many different types of interviews. Individual or group interviews may be unstructured or structured, and conducted face to face, by telephone, or online.

3.3.1.1 Unstructured interviews

Unstructured interviews are so labeled because the interviewer does not enter the interview setting with a planned sequence of questions to be asked of the respondent. A possible objective of an unstructured interview is to bring some preliminary issues to the surface so that the researcher can determine what factors need further in□depth investigation. In Chapter 3, in the discussion of the "broad problem area," we saw several situations where the manager might entertain a vague idea of certain changes taking place in the situation without knowing what exactly they are. Such situations call for unstructured interviews with the people concerned.

Suppose that a manager is interested in solving a problem in the work setting. In order to understand the situation in its totality, the researcher may interview employees at several levels. In the initial stages, only broad, open□ended questions should be asked, and the replies to them should inform the researcher of the perceptions of the individuals. The type and nature of the questions asked of the individuals might vary according to the job level and type of work done by them. For instance, top and middle□level managers might be asked more direct questions about their perceptions of the problem and the situation. Employees at lower levels may have to be approached differently.

Clerical and other employees at lower hierarchical levels may be asked broad, open□ended questions about their jobs and the work environment during unstructured interviews. Supervisors may be asked broad questions relating to their department, the employees under their supervision, and the organization.

The following question, for instance, may be put to them during the unstructured interview stage:
Tell me something about your unit and department, and perhaps even the organization as a whole, in terms of work, employees, and whatever else you think is important.

Such a question might elicit an elaborate response from some people; others may just say that everything is fine. Following the leads from the more vocal persons is easy, especially when the interviewer listens carefully to the important messages that they might convey in a very

casual manner while responding to a general, global question. As managers and researchers, we should train ourselves to develop these listening skills and identify the critical topics that are touched on. However, when some respondents give a monosyllabic, crisp, short reply that is not informative, the interviewer will have to ask questions that call for details and cannot be answered in one or two words. Such questions might be phrased like the one below:

I would like to know something about your job. Please describe to me in detail the things you do in your job on a typical day, from eight in the morning to four in the afternoon.

3.3.1.2 Structured interviews

Structured interviews are those conducted when it is known at the outset what information is needed. The content of a structured interview can be prepared in advance, and usually consists of:

- an introduction: the interviewer introduces him or herself, the purpose of the interview, assures confidentiality, asks permission to record the interview;
- a set of topics (usually questions) in a logical order: first "warm up" questions (which are easy to answer and non threatening) and then the main questions covering the purpose of the interview;
- suggestions for probing questions (Box 7.2): follow up questions that are used when the first answer is unclear or incomplete, the interviewer does not fully understand the answer, or in any other case where the interviewer requires more specific or in depth information.

As the respondents express their views, the researcher notes them down. The same questions will be asked of everybody in the same manner. Sometimes, however, based on the exigencies of the situation, the experienced researcher might take a lead from a respondent's answer and ask other relevant questions not on the interview protocol. Through this process, new factors might be identified, resulting in a deeper understanding. However, to be able to recognize a probable response, the interviewer must comprehend the purpose and goal of each question. This is particularly important when a team of trained interviewers conducts the survey.

Visual aids such as pictures, line drawings, cards, and other materials are also sometimes used in conducting interviews. The appropriate visuals are shown to the interviewees, who then indicate their responses to the questions posed. Marketing research, for example, benefits from such techniques in order to capture the likes and dislikes of customers

with regard to different types of packaging, forms of advertising, and so on. Visual aids, including painting and drawing, are particularly useful when children are the focus of marketing research. Visual aids also come in handy while endeavoring to elicit certain thoughts and ideas that are difficult to express or awkward to articulate.

When a sufficient number of structured interviews has been conducted and adequate information obtained to understand and describe the important factors operating in the situation, the researcher stops the interviews. The information is then tabulated and the data analyzed. This helps the researcher to accomplish the task he set out to achieve, such as describing the phenomena, or quantifying them, or identifying the specific problem and evolving a theory of the factors that influence the problem, or finding answers to the research question. Much qualitative research is done in this manner .

3.3.1.3 Review of unstructured and structured interviews

The main purpose of the unstructured interview is to explore and probe into the several factors in the situation that might be central to the broad problem area. During this process it might become evident that the problem, as identified by the client, is but a symptom of a more serious and deep□rooted problem. Conducting unstructured interviews with many people could result in the identification of several critical factors in the situation. These would then be pursued further during structured interviews for eliciting more in□depth information on them. This helps identify the critical problem as well as ways of solving it. In applied research, a tentative theory of the factors contributing to the problem is often conceptualized on the basis of the information obtained from unstructured and structured interviews.

3.3.2 Training interviewers

When several long interviews are to be conducted, it is often not feasible for one individual to conduct all the interviews. A team of trained interviewers then becomes necessary. Interviewers have to be thoroughly briefed about the research and trained in how to start an interview, how to proceed with the questions, how to motivate respondents to answer, what to look for in the answers, and how to close an interview. They also need to be instructed about taking notes and coding the interview responses. The tips for interviewing, discussed later, should become a part of their repertoire for interviewing.

Good planning, proper training, offering clear guidelines to interviewers, and supervising their work all help in profitably utilizing the interviewing technique as a viable data collection mechanism.

Personal interviews provide rich data when respondents spontaneously offer information, in the sense that their answers do not typically fall within a constricted range of responses, as in a questionnaire. However, personal interviews are expensive in terms of time, training costs, and resource consumption.

3.3.3 Some tips to follow when interviewing

The information obtained during the interviews should be as free as possible of bias. **Bias** refers to errors or inaccuracies in the data collected. Bias could be introduced by the interviewer, the interviewee, or the situation. The interviewer could bias the data if proper trust and rapport are not established with the interviewee, or when the responses are either misinterpreted or distorted, or when the interviewer unintentionally encourages or discourages certain types of response through gestures and facial expressions.

Listening attentively to the interviewee, evincing keen interest in what the respondent has to say, exercising tact in questioning, repeating and/or clarifying the questions posed, and paraphrasing some of the answers to ensure their thorough understanding go a long way in keeping alive the interest of the respondent throughout the interview. Recording the responses accurately is equally important.
Interviewees can bias the data when they do not come out with their true opinions but provide information that they think is what the interviewer expects of them or would like to hear. Also, if they do not understand the questions, they may feel diffident or hesitant to seek clarification. They may then answer questions without knowing their importance, and thus introduce bias.

Some interviewees may be turned off because of personal likes and dislikes, or the dress of the interviewer, or the manner in which the questions are put. They may, therefore, not provide truthful answers, but instead, deliberately offer incorrect responses. Some respondents may also answer questions in a socially acceptable manner rather than indicating their true sentiments.

Biases could be situational as well, in terms of (1) nonparticipants, (2) trust levels and rapport established, and (3) the physical setting of the interview. Nonparticipation, either because of unwillingness or the inability of the interviewee to participate in the study, can bias data inasmuch as the responses of the participants may be different from those of the nonparticipants (which implies that a biased, rather than a representative, set of responses is likely to result). Bias also occurs when different interviewers establish different levels of trust and rapport with their interviewees, thus eliciting answers of varying degrees of

openness. The actual setting in which the interview is conducted might sometimes introduce bias. Some individuals, for instance, may not feel quite at ease when interviewed at the workplace and therefore may not respond frankly and honestly.

In door□to□door or telephone interviews, when the respondent cannot be reached due to unavailability at that time, callbacks and further contacts should be attempted so that the sample does not become biased (discussed in Chapter 13 on Sampling). The interviewer can also reduce bias by being consistent with the questioning mode as each person is interviewed, by not distorting or falsifying the information received, and by not influencing the responses of the subjects in any manner.

The above biases can be minimized in several ways. The following strategies will be useful for the purpose.

3.3.4 Establishing credibility and rapport, and motivating individuals to respond

The projection of professionalism, enthusiasm, and confidence is important for the interviewer. For instance, a manager hiring outside researchers to deal with a problem within an organization would be interested in assessing their abilities and personality predispositions. Researchers must establish rapport with, and gain the confidence and approval of, the hiring client before they can even start their work in the organization. Knowledge, skills, ability, confidence, articulateness, and enthusiasm are therefore qualities a researcher must demonstrate in order to establish credibility with the hiring organization and its members.

To obtain honest information from the respondents, the researcher/interviewer should be able to establish rapport and trust with them. In other words, the researcher should be able to make the respondent sufficiently at ease to give informative and truthful answers without fear of adverse consequences. To this end, the researcher should state the purpose of the interview and assure complete confidentiality about the source of the responses. Establishing rapport with the respondents may not be easy, especially when interviewing employees at lower levels. They are likely to be suspicious of the intentions of the researchers; they may believe that the researchers are on the management's "side," and therefore likely to propose a reduction in the labor force, an increase in the workload, and so on. Thus, it is important to ensure that everyone concerned is aware of the researchers' purpose as being one of merely understanding the true state of affairs in the organization. The respondents must be tactfully made to understand that the researchers do not intend to take sides; they are not there to harm the

staff, and will provide the results of research to the organization only in aggregates, without disclosing the identity of the individuals. This should encourage the respondents to feel secure about responding.
The researcher can establish rapport by being pleasant, sincere, sensitive, and non evaluative. Evincing a genuine interest in the responses and allaying any anxieties, fears, suspicions, and tensions sensed in the situation will help respondents to feel more comfortable with the researchers. If the respondent is told about the purpose of the study and how he or she was chosen to be one of those interviewed, there should be better communication between the parties. Researchers can motivate respondents to offer honest and truthful answers by explaining to them that their contribution will indeed help, and that they themselves may stand to gain from such a survey, in the sense that the quality of life at work for most of them may improve significantly.

3.3.5 Advantages and Disadvantages of Interviews

Interviews are one method of obtaining data; they can be either unstructured or structured, and can be con- ducted face to face, over the telephone, or via the computer. Interviews may be conducted on an individual basis, but also on a group basis. Unstructured interviews are usually conducted to obtain definite ideas about what is, and is not, important and relevant to particular problem situations. Structured interviews give more in□depth information about specific variables of interest. To minimize bias in responses, the interviewer must establish rapport with the respondents and ask unbiased questions. The face□to□face interview and that conducted over the telephone have their advantages and disadvantages, and both have their uses in different circumstances. Computer□assisted interviewing, which entails heavy initial investment, is an asset for interviewing and for the analysis of qualitative, spontaneous responses. Computer interactive interviews have become an increasingly important mode of data collection in recent years

3.4 Observation

Observation concerns the planned watching, recording, analysis, and interpretation of behavior, actions, or events. Various approaches of observation have been used in business research. These may be distinguished by four key dimensions that characterize the way observation is conducted: (1) control (are the observations con- ducted in an artificial or in a natural setting?), (2) whether the observer is a member of the group that is observed or not (participant versus nonparticipant observation), (3) structure (to what extent the observation is focused, predetermined, systematic, and quantitative in nature), and (4) concealment of observation (are the members of the social group

under study told that they are being studied or not?). These key dimensions that distinguish particular methods of observation are discussed next.

3.4.1 Four Key Dimensions That Characterize the Type of Observation

3.4.1.1. Controlled versus uncontrolled observational studies

A distinction can be made between observation conducted in controlled (or artificial) versus uncontrolled (or natural) settings. Observation is often conducted in a natural setting. However, observation is also a potential method of data collection within an experimental, controlled research tradition.

An observational study is said to be high in control when the situation or setting is manipulated or contrived by the researcher; the exposure of subjects (for instance, consumers, employees, or investors) to a certain situation or condition (for instance a specific store layout, specific labor conditions, or a certain amount of time pressure) allows the researcher to observe differences between individual behavioral reactions to the situation. Controlled observation may be carried out in a laboratory (for instance, a simulated store environment or trading room) or in the field (for instance, a store).

Controlled observation occurs when observational research is carried out under carefully arranged conditions. Uncontrolled observation is an observational technique that makes no attempt to control, manipulate, or influence the situation. Events are running their natural course and the researcher observes these events without interfering in the real□life setting. An advantage of uncontrolled observation is that people can be observed in their natural shopping or work environment. A major drawback of uncontrolled observation is, however, that it is usually difficult to untangle the often complex situation since we do not control any factor in this. Accordingly, it is very hard to distinguish the causes of events, actions, and behavior.

3.4.1.2 Participant versus nonparticipant observation

The researcher can play one of two roles while gathering observational data – that of a nonparticipant or a participant observer. In the case of nonparticipant observation, the researcher is never directly involved in the actions of the actors, but observes them from outside the actors' visual horizon, for instance via a one□way mirror or a camera. Participant observation is an approach that has frequently been used in case studies, ethnographic studies,

and grounded theory studies. In participant observation the researcher gathers data by participating in the daily life of the group or organization under study.

Spradley (1980) has developed a typology to describe a continuum in the degree of participation of researchers. The lowest level of participant observation is passive participation. Passive participation allows the researcher to collect the required data without becoming an integral part of the (organizational) system. For example, the researcher might sit in the corner of an office and watch and record how a merchant bank trader spends her time. Moderate participation occurs when the researcher does not actively participate and only occasionally interacts with the social group under study. In new research settings, in which the researcher is not familiar with the activities, habits, and/or the jargon of the group, many researchers begin at the level of moderate participation until a more active role is possible. Active participation is when the researcher actually engages in almost everything that the group under study is doing as a means of trying to learn about their behavior. The researcher may also play the role of the complete participant□observer. In complete participant observation, the researcher becomes a member of the social group under study. Complete participant observation involves "immersion" in the social group under study. For instance, if a researcher wants to study group dynamics in work organizations, then she may join the organization as an employee and observe the dynamics in groups while being a part of the work organization and work groups. Like this, complete participant observation aims to generate an understanding of a social group from an "insider's point of view" (Hume & Mulcock, 1994).

3.4.1.3 Structured versus unstructured observational studies

As we have seen, observational studies can be of either the nonparticipant□observer or the participant□observer type. Both of these, again, can be either structured or unstructured. Where the observer has a predetermined set of categories of activities or phenomena planned to be studied, it is a structured observational study. Formats for recording the observations can be specifically designed and tailored to each study to suit the goal of that research. Structured observation is generally quantitative in nature.

Usually, matters that pertain to the feature of interest, such as the duration and frequency of an event (for instance, how long does it take to get a meal at a fast□food restaurant?), as well as certain activities that precede and follow it, are recorded. Environmental conditions (for instance, labor conditions) and any changes in setting are also noted, if

considered relevant. Task□relevant behaviors of the actors, their perceived emotions, verbal and nonverbal communication, and the like, may also be recorded. Observations that are recorded in worksheets or field notes are then systematically analyzed.

At the beginning of a study, it is also possible that the observer has no definite ideas of the particular aspects that need focus. Observing events as they take place may also be a part of the plan as in many other forms of exploratory and qualitative research. In such cases, the observer will record practically everything that is observed. Such a study will be an unstructured observational study. Unstructured observational studies are claimed to be the hallmark of qualitative research. Qualitative data analysis (Chapter 16) is used to analyze and interpret what the researcher has seen.

Unstructured observation may eventually lead to a set of tentative hypotheses that are tested in subsequent research that is deductive in nature. Hence, inductive discovery via observation can pave the way for subsequent theory building and hypotheses testing.

3.4.1.4 Concealed versus unconcealed observation

Concealment of observation relates to whether the members of the social group under study are told that they are being investigated. A primary advantage of concealed observation is that the research subjects are not influenced by the awareness that they are being observed. Indeed, reactivity or the extent to which the observer affects the situation under observation could be a major threat to the validity of the results of observational studies. Unconcealed observation is more obtrusive, perhaps upsetting the authenticity of the behavior under study.

Concealed observation has some serious ethical drawbacks. While less reactive, concealed observation raises ethical concerns since it may violate the principles of informed consent, privacy, and confidentiality (Burgess 1989; Lauder 2003). For this reason concealed observation may harm the subjects in several ways. However, in some situations, for instance when a (marketing) researcher watches a service encounter between a bus driver and a bus passenger, the researcher is likely to be less culpable than in other situations, for instance when the researcher immerses herself in a certain social group such as a specific department within an organization (cf. Grove and Fisk, 1992). Note that there are no strict rules for assessing the ethicality of concealed observational research. Instead, a careful, well□judged assessment of the potential harmful consequences of concealed observational research should be made by the researcher. Frederichs and Ludtke (1975, p. 12) provide an elegant guideline for such an assessment: the research plan “should be

able to justify itself to the members of the scientific community as well as to those involved in the study."

3.4.2 Two Important Approaches To Observation

We have just briefly discussed the key dimensions that differentiate various approaches to observation. Two important, distinct approaches to observation are participant observation and structured observation. The remaining part of this chapter will discuss these two approaches in more detail.

3.4.2.1 Participant observation: Introduction

Earlier in this chapter we have explained that the researcher can play one of two roles while gathering observational data: that of a nonparticipant or a participant observer. A key characteristic of participant observation is that the researcher gathers data by participating in the daily life of the group or organization under study. This enables the researcher to learn about the activities of the group under study in a natural setting from an insider's point of view through observing and participating in these activities. When Malinowski introduced this method in his influential work Argonauts of the Western Pacific he argued that it puts the researcher in a position "to grasp the native's point of view, his relation to life, to realize his vision of his world" (Malinowksi, 1992, p. 25). Today, this is still regarded as the key objective and one of the main strengths of participant observation. Since the time of Malinowski, the method of participant observation has been thoroughly developed and refined. It is now common to distinguish between two basic ways of conceiving of the method (Zahle, 2012). It may be narrowly identified as participation in the way of life of the social group under study combined with observing what is going on. Or, it may be labeled more broadly to involve not only participation and observation but also the use of other methods such as interviews. In this chapter, we take on a more narrow view of participant observation; we look at participant observation as one of several qualitative research methods aiming to understand the nature of phenomena.

The participatory aspect of participant observation

Participant observation combines the processes of participation and observation. Nonetheless, participant observation should be distinguished from both pure observation and pure participation (Bernard, 1994). Pure observation seeks to remove the researcher from the observed actions and behavior; the researcher is never directly involved in the actions and behavior of the group under study. Pure participation has been described as "going native"; the researcher

becomes so involved with the group under study that eventually every objectivity and research interest is lost (Jorgensen, 1989; DeWalt & DeWalt, 2002). Within these two extremes, participant observation has been successfully employed by many researchers engaged in business research.

A distinctive feature of participant observation is that the researcher participates in the social group under study. As we have explained earlier in this chapter, the researcher may do so to different extents. The highest degree of participation occurs with complete participation. In this case, the researcher lives or works with the subjects under study and tends to assume a pre□established role (for instance, the role of coworker). In complete participation, the researcher may conceal that she is an observer, behaving as naturally as possible and seeking to become an accepted member of the social group. This technique assures close intimacy with the subjects; the researcher interacts with the subjects and also carries out their activities. A disadvantage of this method is that complete participation may limit freedom of movement outside the adopted role: it is difficult to abandon the role of complete participant as the research proceeds. What's more, the methodological problem of "going native" may result in a fading research perspective and an increased likelihood of biased research findings. Finally, there are important ethical problems with concealed complete participation. Becoming a member of a social group and deliberately deceiving the members of this group is regarded as unethical by many. For these reasons, complete participation has become increasingly rare.

In many situations, observational studies are based on moderate participation. In the case of moderate participation, the researcher assumes an intermediate position between being a complete insider (a complete participant) and being a complete outsider (as in nonparticipation observational studies). In moderate participation, the researcher observes the scene under study, maintaining a certain distance from it and never intervening. Indeed, the role of the researcher is often the role of a passive witness or bystander. Another technique that is sometimes used is "shadowing." Shadowing implies that the researcher closely follows a subject (for instance, a manager or a Wall Street broker) engaged in his or her daily routine.

3.4.2.2 Advantages And Disadvantages Of Observation

One of the main advantages of observation is its directness. Whereas interviews and questionnaires elicit verbal responses about actions and behavior from the subjects (which merely allows behavior to be inferred from these verbal responses), observation allows the researcher to gather behavioral data without asking questions. People can be observed in

their natural work environment or in the lab setting, and their activities and behaviors or other items of interest can be noted, recorded, analyzed, and interpreted. Apart from the activities performed by the individuals under study, their movements, work habits, the statements made and meetings conducted by them, other – environmental – factors such as layout, work flow patterns, the closeness of the seating arrangement, and the like, can also be noted. In observational studies, it is also relatively easy to discern situational factors such as the weather (hot, cold, rainy), the day of the week (midweek as opposed to Monday or Friday), and other factors that might have a bearing on, for example, productivity, the sales of a product, traffic patterns, absenteeism, and the like. These factors can be recorded and meaningful patterns might emerge from this type of data. However, note that it is often very difficult to establish the specific effects of situational factors on behavior and actions of the subjects under study. As we explained earlier in this chapter, it is often difficult to untangle the often complex situation. Accordingly, it is sometimes very difficult to establish cause and effect relationships between situational factors and events, actions, and behavior.

Another advantage of observation is that is possible to observe certain groups of individuals – for example, very young children and extremely busy executives – from whom it may be otherwise difficult to obtain information. Children can be observed as to their interests and attention span with various stimuli, such as their involvement with different toys. Such observation would help toy manufacturers, child educators, day care administrators, and others deeply involved in or responsible for children's development, to design and model ideas based on children's interests, which are more easily observed than traced in any other manner. The data obtained through observation of events as they normally occur are generally more reliable and free from respondent bias.

Observation is not without challenges and difficulties. The following drawbacks of observational studies have to be noted. Reactivity (the extent to which the observer affects the situation under study) could be a major threat to the validity of the results of observational studies, because those who are observed may behave differently during the period of the study. Observational research may be particularly vulnerable to reactivity if the observations are confined to a short period of time.

3.5 Questionnaire

Questionnaire is generally designed to collect large numbers of quantitative data. They can be administered personally, distributed

electronically, or mailed to the respondents. Questionnaire is generally less expensive and time consuming than interviews and observation, but they also introduce a much larger chance of non- response and nonresponse error. An overview of the advantages and disadvantages of the questionnaire (and other methods of data collection) and a section on when to use each of these methods is provided later in this chapter.

3.5.1. Personally administered questionnaire

When the survey is confined to a local area a good way to collect data is to personally ad.3minister the questionnaires. The main advantage of this is that the researcher or a member of the research team can collect all the completed responses within a short period of time. Any doubts that the respondents might have on any question can be clarified on the spot. The researcher also has the opportunity to introduce the research topic and motivate the respondents to offer their frank answers. Administering questionnaires to large numbers of individuals at the same time is less expensive and consumes less time than interviewing; equally, it does not require as much skill to administer a questionnaire as it does to conduct interviews. Wherever possible, questionnaires are best administered personally because of these advantages. A disadvantage of personally administered questionnaires is that the researcher may introduce a bias by explaining questions differently to different people; participants may be in fact answering different questions as compared to those to whom the questionnaire was mailed. What's more, personally administered questionnaires take time and a lot of effort. For this reason, electronic questionnaires are widely used these days.

3.5.2. Mail questionnaire

A mail questionnaire is a self□administered (paper and pencil) questionnaire that is sent to respondents via the mail. This method has long been the backbone of business research, but with the arrival of the Internet, mobile phones, and social networks, mail questionnaires have become redundant or even obsolete. Instead, online questionnaire are posted on the Internet or sent via email.

3.5.3. Electronic and online questionnaire

The distribution of electronic or online questionnaire is easy and fast. All you have to do is to email the invitations to complete a survey, post a link on a website or personal blog, or use social networks. Online questionnaire are usually created as "web forms" with a database to store the answers and statistical software to provide statistical analysis. Until recently, conducting online surveys was a time□consuming and tedious task requiring familiarity with web authoring programs, HTML

codes, and/or scripting programs. Today, survey development software packages and online survey services make online survey research much easier and more accessible.

Online questionnaire are often used to gain a deeper understanding of consumers' opinions and preferences. A big advantage of online survey research is that it makes the most of the ability of the Internet to provide access to groups and individuals who would be difficult, if not impossible, to reach through other channels. Virtual communities flourish online, and hundreds of thousands of people regularly participate in discussions about almost every conceivable issue and interest (Wright, 2005). A second advantage of online questionnaire is that a wide geographical area can be covered in the survey. A (link to the) questionnaire is sent to the respondents, who can complete it at their convenience, in their homes, and at their own pace. The automatic processing of the survey saves further costs, time, and energy.

However, there are also important disadvantages to online questionnaire. When conducting online research, researchers often encounter problems with regard to sampling. For instance, self□selection and extremely low response rates make it difficult to establish the representativeness of the sample and to generalize the findings, because those responding to the survey may not at all represent the population they are supposed to. Indeed, the return rates of such questionnaire are typically low. A 30% response rate is considered acceptable, and in many cases even exceptional.

Posting invitations to participate in a survey on social networks, discussion groups, and chat rooms is often perceived as rude or offensive. This is another drawback of online questionnaires. Many people consider this type of posting to be "spam", and the researcher may be flooded with emails from angry members of a virtual community. Researchers sending email invitations to participate in a study may face similar issues. An unwanted email is often considered an invasion of privacy and the invitation for the survey may be deleted, or the researcher may receive email from participants complaining about it (Wright, 2005). A final disadvantage of electronic questionnaires is that any doubts the respondents might have cannot be clarified.

The choice of using the questionnaire as a data gathering method might be restricted if the researcher has to reach subjects with very little education. Adding pictures to the questionnaires, if feasible, might be of help in such cases. For most business research, however, after the variables for the research have been identified and the measures therefore found or developed, the questionnaire is a convenient data collection mechanism. Survey research, case study research, and

experimental designs often use questionnaires to measure the variables of interest. Because questionnaires are in common use, it is necessary to know how to design them effectively. A set of guidelines for questionnaire construction follows.

Self -Assessment Exercise 1

i Enumerate the different possible methods of data collection
ii What is a questionnaire
iii What are the two major approaches to observation

3.6 Guidelines for Questionnaire Design

Sound questionnaire design principles should focus on three areas. The first relates to the wording of the questions. The second refers to the planning of issues with regard to how the variables will be categorized, scaled, and coded after receipt of the responses. The third pertains to the general appearance of the questionnaire. All three are important issues in questionnaire design because they can minimize bias in research.

Principles of wording
The principles of wording refer to such factors as:

1. The appropriateness of the content of the questions.
2. How questions are worded and the level of sophistication of the language used.
3. The type and form of questions asked.
4. The sequencing of the questions.
5. The personal data sought from the respondents. Each of these is explained below.

3.6.1 Content and purpose of the questions

The nature of the variable tapped – subjective feelings or objective facts – will determine what kinds of questions are asked. If the variables tapped are of a subjective nature (e.g., satisfaction, involvement), where respondents' beliefs, perceptions, and attitudes are to be measured, the questions should tap the dimensions and elements of the concept. Where objective variables, such as age and educational levels of respondents, are tapped, a single direct question – preferably one that has an ordinal scaled set of categories – is appropriate. Thus, the purpose of each question should be carefully considered so that the variables are adequately measured and yet no superfluous questions are asked.

3.6.2 Language and wording of the questionnaire

The language of the questionnaire should approximate the level of understanding of the respondents. The choice of words will depend on

their educational level, the usage of terms and idioms in the culture, and the frames of refer- ence of the respondents. For instance, even when English is the spoken or official language in two cultures, certain words may be alien to one culture. Terms such as “working here is a drag” and “she is a compulsive worker” may not be interpreted the same way in different cultures. Some blue□collar workers may not understand terminology such as “organizational structure.” Thus, it is essential to word the questions in a way that can be understood by the respondent. If some questions are either not understood or are interpreted differently by the respondent, the researcher will obtain the wrong answers to the questions, and responses will thus be biased. Hence, the questions asked, the language used, and the wording should be appropriate to tap respondents’ attitudes, perceptions, and feelings.

3.6.3 Type and form of questions

The type of question refers to whether the question is open□ended or closed. The form of the question refers to whether it is positively or negatively worded.

Open-ended versus closed questions Open□ ended questions allow respondents to answer them in any way they choose. An example of an open□ended question is asking the respondent to state five things that are interesting and challenging in the job. Another example is asking what the respondents like about their supervisors or their work environment. A third example is to invite their comments on the investment portfolio of the firm. A closed question, in contrast, asks the respondents to make choices among a set of alternatives given by the researcher (Kothari, 2004). For instance, instead of asking the respondent to state any five aspects of the job that she finds interesting and challenging, the researcher might list 10 or 15 aspects that might seem interesting or challenging in jobs and ask the respondents to rank the first five among these in the order of their preference. All items in a questionnaire using a nominal, ordinal, Likert or ratio scale are considered closed.

Closed questions help the respondents to make quick decisions to choose among the several alternatives before them. They also help the researcher to code the information easily for subsequent analysis. Care has to be taken to ensure that the alternatives are mutually exclusive and collectively exhaustive. If there are overlapping categories, or if all possible alternatives are not given (i.e., the categories are not exhaustive), the respondents might get confused and the advantage of their being enabled to make a quick decision is thus lost.

Some respondents may find even well□delineated categories in a closed

question rather confining and might avail themselves of the opportunity to make additional comments. This is the reason why many questionnaires end with a final open-ended question that invites respondents to comment on topics that might not have been covered fully or adequately. The responses to such open-ended questions have to be edited and categorized for subsequent data analysis.

Positively and negatively worded questions Instead of phrasing all questions positively, it is advisable to include some negatively worded questions as well, so the tendency in respondents to mechanically circle the points toward one end of the scale is minimized. For example, let us say that a set of six questions is used to tap the variable "perceived success" on a five-point scale, with 1 being "very low" and 5 being "very high" on the scale. A respondent who is not particularly interested in completing the questionnaire is more likely to stay involved and remain alert while answering the questions when positively and negatively worded questions are interspersed in it. For instance, if the respondent has circled 5 for a positively worded question such as, "I feel I have been able to accomplish a number of different things in my job," he cannot circle number 5 again to the negatively worded question, "I do not feel I am very effective in my job." The respondent is now shaken out of any likely tendency to mechanically respond to one end of the scale. In case this does still happen, the researcher has an opportunity to detect such bias. A good questionnaire should therefore include both positively and negatively worded questions. The use of double negatives and excessive use of the words "not" and "only" should be avoided in negatively worded questions because they tend to confuse respondents. For instance, it is better to say "Coming to work is not great fun" than to say "Not coming to work is greater fun than coming to work." Likewise, it is better to say "The rich need no help" than to say "Only the rich do not need help."

Double-barreled questions A question that lends itself to different possible responses to its subparts is called a double-barreled question. Such questions should be avoided and two or more separate questions asked instead. For example, the question "Do you think there is a good market for the product and that it will sell well?" could bring a "yes" response to the first part (i.e., there is a good market for the product) and a "no" response to the latter part (i.e., it will not sell well for various other reasons). In this case, it would be better to ask two questions: (1) "Do you think there is a good market for the product?" and (2) "Do you think the product will sell well?" The answers might be "yes" to both, "no" to both, "yes" to the first and "no" to the second, or "yes" to the second and "no" to the first. If we combined the two questions and asked a double-barreled question, we would confuse the respondents and obtain ambiguous responses. Hence, double-barreled questions

should be eliminated.

Ambiguous questions Even questions that are not double□barreled might be ambiguously worded and the respondent may not be sure what exactly they mean. An example of such a question is "To what extent would you say you are happy?" Respondents might find it difficult to decide whether the question refers to their state of feelings in the workplace, or at home, or in general. Thus, responses to ambiguous questions have built□in bias inasmuch as different respondents might interpret such items in the questionnaire differently.

The result is a mixed bag of ambiguous responses that do not accurately provide the correct answer to the question.

Recall-dependent questions Some questions might require respondents to recall experiences from the past that are hazy in their memory. Answers to such questions might have bias. For instance, if an employee who has had 30 years' service in the organization is asked to state when he first started working in a particular department and for how long, he may not be able to give the correct answers and may be way off in his responses. A better source for obtaining that information would be the personnel records.

Leading questions should not be phrased in such a way that they lead the respondents to give the responses that the researcher would like them to give. An example of such a question is: "Don't you think that in these days of escalating costs of living, employees should be given good pay rises?" By asking a leading question, we are signaling and pressuring respondents to say "yes." Tagging the question to rising living costs makes it difficult for most respondents (unless they are the top bosses in charge of budget and finances) to say, "No; not unless their productivity increases too!" Another way of asking the question about pay rises to elicit less biased responses would be: "To what extent do you agree that employees should be given higher pay rises?" If respondents think that the employees do not deserve a higher pay rise at all, their response will be "Strongly Disagree"; if they think that respondents should definitely be given a high pay rise, they will respond to the "Strongly Agree" end of the scale, and the in□between points will be chosen depending on the strength of their agreement or disagreement. In this case, the question is not framed in a suggestive manner as in the previous instance.

Loaded questions Another type of bias in questions occurs when they are phrased in an emotionally charged manner. An example of such a loaded question is asking employees: "To what extent do you think management is likely to be vindictive if the union decides to go on strike?" The words "strike" and "vindictive" are emotionally charged

terms, polarizing management and unions. Hence, asking a question such as the above would elicit strongly emotional and highly biased responses. If the purpose of the question is twofold – that is, to find (1) the extent to which employees are in favor of a strike and (2) the extent to which they fear adverse reactions if they do go on strike – then these are the two specific questions that need to be asked. It may turn out that the employees are not strongly in favor of a strike and they also do not believe that management would retaliate if they did go on strike!

Social desirability Questions should not be worded such that they elicit socially desirable responses. For instance, a question such as "Do you think that older people should be laid off?" would elicit a response of "no," mainly because society would frown on a person who said that elderly people should be fired even if they are capable of performing their jobs satisfactorily. Hence, irrespective of the true feelings of the respondent, a socially desirable answer would be provided. If the purpose of the question is to gauge the extent to which organizations are seen as obligated to retain those above 65 years of age, a differently worded question with less pressure toward social desirability would be: "There are advantages and disadvantages to retaining senior citizens in the workforce. To what extent do you think companies should continue to keep the elderly on their payroll?"

Sometimes certain items that tap social desirability are deliberately introduced at various points in the questionnaire and an index of each individual's social desirability tendency is calculated therefrom. This index is then applied to all other responses given by the individual in order to adjust for social desirability bias (.Rose., McKinley and Baffoe-Djan, 2020)

Length of questions Finally, simple, short questions are preferable to long ones. As a rule of thumb, a question or a statement in the questionnaire should not exceed 20 words, or exceed one full line in print (Horst, 1968; Oppenheim, 1986).

3.6.4 Sequencing of questions

The sequence of questions in the questionnaire should be such that the respondent is led from questions of a general nature to those that are more specific, and from questions that are relatively easy to answer to those that are progressively more difficult. This funnel approach, as it is called facilitates the easy and smooth progress of the respondent through the items in the questionnaire. The progression from general to specific questions might mean that the respondent is first asked questions of a global nature that pertain to the issue, and then is asked more incisive questions regarding the specific topic. Easy questions might relate to

issues that do not involve much thinking; the more difficult ones might call for more thought, judgment, and decision making in providing the answers. In determining the sequence of questions, it is advisable not to place contiguously a positively worded and a negatively worded question tapping the same element or dimension of a concept. For instance, placing two questions such as the following, one immediately after the other, is not only awkward but might also seem insulting to the respondent.

I have opportunities to interact with my colleagues during work hours.
I have few opportunities to interact with my colleagues during work hours.

First, there is no need to ask the very same question in both a positive and a negative way. Second, if for some reason this is deemed necessary (e.g., to check the consistency of the responses), the two questions should be placed in different parts of the questionnaire, as far apart as possible.

The way questions are sequenced can also introduce certain biases, frequently referred to as ordering effects. Though randomly placing the questions in the questionnaire reduces any systematic bias in the responses, it is very rarely done, because of subsequent confusion while categorizing, coding, and analyzing the response (Hussey and Hussey, 1997)

In sum, the language and wording of the questionnaire focus on such issues as the type and form of questions asked (i.e., open□ended and closed questions, and positively and negatively worded questions), as well as avoiding double□barreled questions, ambiguous questions, leading questions, loaded questions, questions prone to tap socially desirable answers, and those involving distant recall. Questions should also not be unduly long. Using the funnel approach helps respondents to progress through the questionnaire with ease and comfort.

3.6.5 Classification data or personal information

Classification data, also known as personal information or demographic questions, elicit such information as age, educational level, marital status, and income. Unless absolutely necessary, it is best not to ask for the name of the respondent. If, however, the questionnaire has to be identified with the respondents for any reason, then the questionnaire can be numbered and connected by the researcher to the respondent's name, in a separately maintained, private document. (Frechtling,(2002). This procedure should be clearly explained to the respondent. The reason for using the numerical system in questionnaires is to ensure the

anonymity of the respondent.

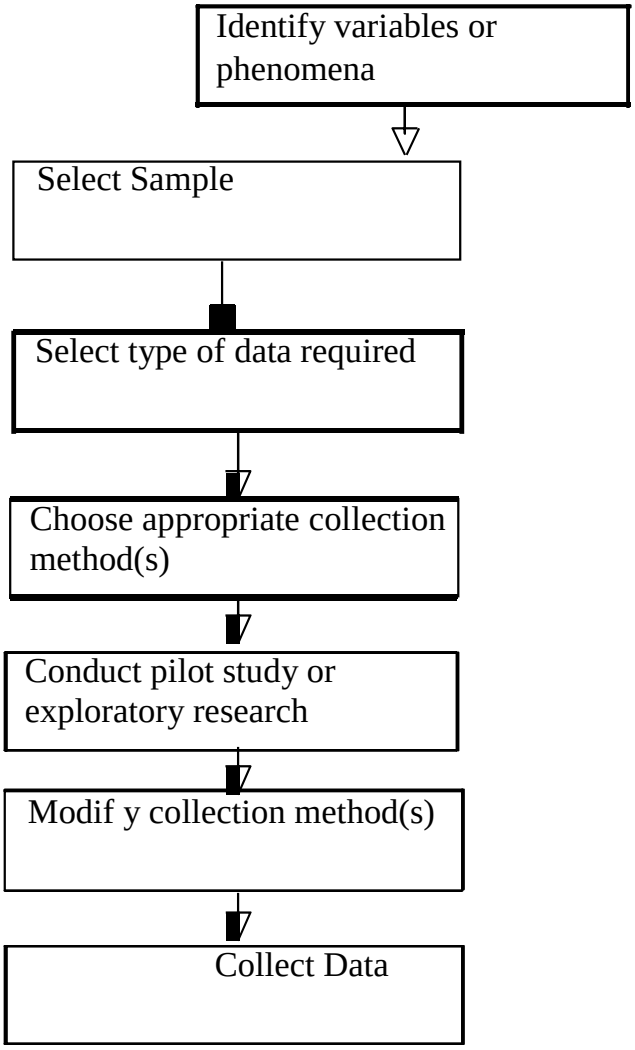
Whether questions seeking personal information should appear at the beginning or at the end of the questionnaire is a matter of choice for the researcher. Some researchers ask for personal data at the end rather than the beginning of the questionnaire (Oppenheim, 1986). Their reasoning may be that by the time the respondent reaches the end of the questionnaire he or she has been convinced of the legitimacy and genuineness of the questions framed by the researcher and, hence, is more inclined and amenable to share personal information.

Researchers who prefer to elicit most of the personal information at the very beginning may opine that once respondents have shared some of their personal history, they may have psychologically identified themselves with the questionnaire, and may feel a commitment to respond. Thus, whether one asks for this information at the beginning or at the end of the questionnaire is a matter of individual choice. However, questions seeking details of income, or other highly sensitive information – if deemed necessary – are best placed at the very end of the questionnaire. Even so, it is a wise policy to ask for such information by providing a range of response options, rather than seeking exact figures.

A good introduction A proper introduction that clearly discloses the identity of the researcher and conveys the purpose of the survey is absolutely necessary. It is also essential to establish some rapport with the respondents and motivate them to respond to the questions in the questionnaire wholeheartedly and enthusiastically. Assurance of confidentiality of the information provided by them will allow for less biased answers. The introduction section should end on a courteous note, thanking the respondent for taking the time to respond to the survey.

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

Figure 3.1: Overview of the Data Collection Process



3.7 Sources of Data

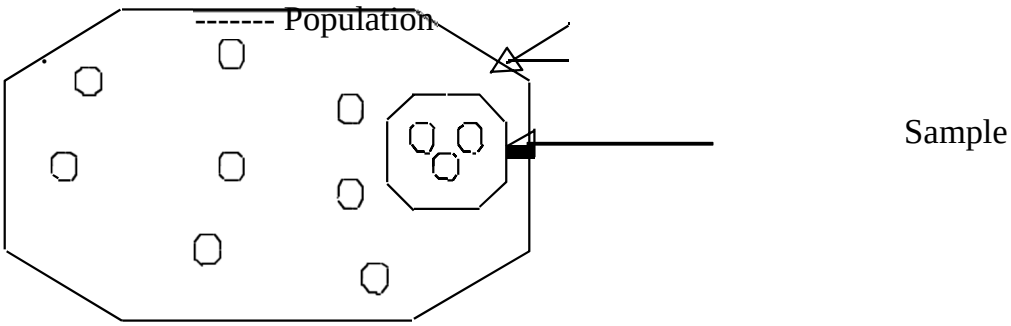
Sources of data include:

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.

3.8 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. (Hox, & Boeije,2005) 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 3.3 illustrate the difference between a sample and a population

Figure 3.3: 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 criteria. 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.

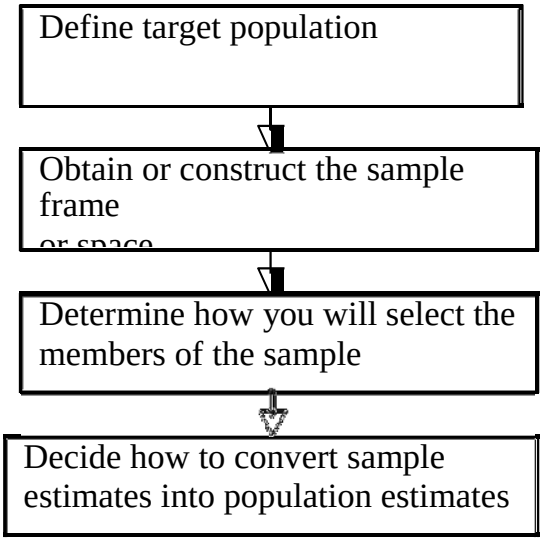
A good and representative sample for the entire population is one in which the results obtained from the sample can be taken to be true for the entire population. It is the one in which you can generalise from the

results. In scientific research, it has been said that a good sample must be:

1. Chosen at random that is, every member of the population must have a chance of being selected
2. Large enough to satisfy the needs of the investigation being undertaken
3. 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.

Figure 3.4: Selecting a Sample



Self -Assessment Exercise 11

i. Explain what you understand by the following:

ii. With the aid of a table, describe how to select a sample

3.9 Summary

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

1. The critical incident method, widely used during in-depth interviews to generate qualitative data.
2. Diaries, a daily record of events or thoughts used in capturing what people do, think and feel.

3. 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
4. Interview method
5. Observation method
6. Protocol analysis, used in ascertaining the way people behave and think in a given situation.
7. 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.
referred to as a numerical attribute of an individual or object.

quantitative variable can be

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:

1. Chosen at random that is, every member of the population must have a chance of being selected
2. Large enough to satisfy the needs of the investigation being undertaken
3. Unbiased.

3.10 References/Further Readings/Web Resources

Frechtling, J. (2002). An overview of quantitative and qualitative data collection methods The 2002 user-friendly handbook for project evaluation (pp. 43-62).

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3.11 Possible Answers To Self-Assessment Exercises

Self -Assessment Exercise 1

i Enumerate the different possible methods of data collection

The different possible methods of data collection can be listed as:
1. The critical incident method
2. Diaries
3. Focus group method
4. Interview method
5. Observation method
6. Protocol analysis
7. Questionnaires method
8. Inspection
9. Abstract from existing records

ii What is a questionnaire

Questionnaire is generally designed to collect large numbers of quantitative data. They can be administered personally, distributed electronically, or mailed to the respondents. Questionnaire is generally less expensive and time consuming than interviews and observation, but they also introduce a much larger chance of non- response and nonresponse error.

iii What are the two major approaches to observation

Participant observation and Non participant observation**:** A key characteristic of participant observation is that the researcher gathers data by participating in the daily life of the group or organization under study. This enables the researcher to learn about the activities of the group under study in a natural setting from an insider's point of view through observing and participating in these activities.
Participant observation combines the processes of participation and observation. A distinctive feature of participant observation is that the researcher participates in the social group under study.

Self -Assessment Exercise 11

i. Explain what you understand by the following:
(a) A good representative sample
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. A good sample must be:

1. Chosen at random that is, every member of the population must have a chance of being selected
2. Large enough to satisfy the needs of the investigation being undertaken
3. Unbiased.

(b) A sampling frame

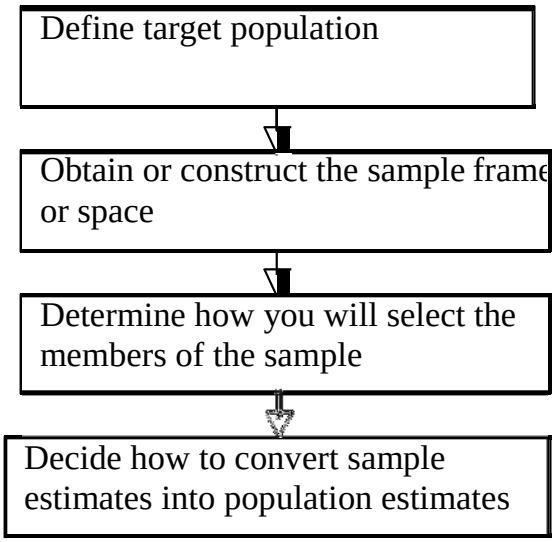
A sampling frame refers to a list of other records of the population from which all the sampling units are drawn. This is sometimes called the sample space. In a large business organisation, for example, you may have a list of all the employees and this forms the sample frame or space from which you can obtain a sample of employees in the organisation.

A population

A population may refer to a body of people or collection of items under consideration for a given research purpose.

ii. With the aid of a table, describe how to select a sample

Selecting a Sample



UNIT 4 TYPES OF SAMPLING (1)

Unit Structure

4.1 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 importance 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.

4.2 Intended Learning Outcomes

After completing this unit, you should be able to:

- Compare and contrast specific probability sampling designs.
- Discuss the role of several probability sampling techniques

4.3 Probability Sampling

When elements in the population have a known, nonzero chance of being chosen as subjects in the sample, we resort to a probability sampling design. Probability sampling can be either unrestricted (simple random sampling) or restricted (complex probability sampling) in nature.

4.4 Unrestricted or simple random sampling

In the **unrestricted probability sampling** design, more commonly known as **simple random sampling**, every element in the population has a *known and equal* chance of being selected as a subject. Let us say there are 1000 elements in the population, and we need a sample of 100. Suppose we were to drop pieces of paper in a hat, each bearing the name of one of the elements, and draw 100 of those from the hat with our eyes closed. We know that the first piece drawn will have a 1/1000 chance of being drawn, the next one a 1/999 chance of being drawn, and so on. In other words, we know that the probability of any one of them being chosen is 1 in the number of the population, and we also know that each single element in the hat has the same or equal probability of being chosen. We certainly know that computers can generate random numbers and one does not have to go through the tedious process of pulling out names from a hat!

When we thus draw the elements from the population, it is most likely that the distribution patterns of the characteristics we are interested in investigating in the population are also likewise distributed in the subjects we draw for our sample. This sampling design, known as simple random sampling, has the least bias and offers the most generalizability. However, this sampling process could become cumbersome and expensive; in addition, an entirely updated listing of the population may not always be available. For these and other reasons, other probability sampling designs are often chosen instead.

4.5 Restricted or complex probability sampling

As an alternative to the simple random sampling design, several **complex probability sampling** (**restricted probability**) designs can be used. These probability sampling procedures offer a viable, and sometimes more efficient, alternative to the unrestricted design we just discussed. Efficiency is improved in that more information can be obtained for a given sample size using some of the complex probability sampling procedures than the simple random sampling design. The five most common complex probability sampling designs – systematic sampling, stratified random sampling, cluster sampling, area sampling, and double sampling – will now be discussed.

4.6 Systematic sampling

The **systematic sampling** design involves drawing every *n*th element in the population starting with a randomly chosen element between 1 and *n*. The procedure can be exemplified as thus.

If we wanted a sample of 35 households from a total population of 260 houses in a particular locality, then we could sample every seventh house starting from a random number from 1 to 7. Let us say that the random number was 7, then houses numbered 7, 14, 21, 28, and so on, would be sampled until the 35 houses were selected. The one problem to be borne in mind in the systematic sampling design is the probability of a systematic bias creeping into the sample. In the above example, for instance, let us say that every seventh house happened to be a corner house. If the focus of the research study conducted by the construction industry was to control "noise pollution" experienced by residents through the use of appropriate filtering materials, then the residents of corner houses may not be exposed to as much noise as the houses that are in between. Information on noise levels gathered from corner house dwellers might therefore bias the researcher's data. The likelihood of drawing incorrect conclusions from such data is thus high. In view of the scope for such systematic bias, the researcher must consider the plans carefully and make sure that the systematic sampling design is appropriate for the study, before deciding on it. For market surveys, consumer attitude surveys, and the like, the systematic sampling design is often used, and the telephone directory frequently serves as the sampling frame for this sampling design

4.7 Stratified random sampling

While sampling helps to estimate population parameters, there may be identifiable subgroups of elements within the population that may be expected to have different parameters on a variable of interest to the researcher. For example, to the human resources management director interested in assessing the extent of training that the employees in the system feel they need, the entire organization will form the population for study. But the extent, quality, and intensity of training desired by middle□level managers, lower□level managers, first□line supervisors, computer analysts, clerical workers, and so on will be different for each group. Knowledge of the kinds of differences in needs that exist for the different groups will help the director to develop useful and meaningful training programs for each group in the organization. Data will therefore have to be collected in a manner that will help the assessment of needs at each subgroup level in the population. The unit of analysis then will be at the group level and the stratified random sampling process will come in handy.

4.7.1 Stratified random sampling, as its name implies, involves a process of stratification or segregation, followed by random selection of subjects from each stratum. The population is first divided into mutually exclusive groups that are relevant, appropriate, and meaningful in the context of the study. For instance, if the president of a company is

concerned about low motivational levels or high absenteeism rates among the employees, it makes sense to stratify the population of organizational members according to their job levels. When the data are collected and the analysis is done, we may find that, contrary to expectations, it is the middle-level managers that are not motivated. This information will help the president to focus on action at the right level and devise better methods to motivate this group. Tracing the differences in the parameters of the subgroups within a population would not be possible without the stratified random sampling procedure. If either the simple random sampling or the systematic sampling procedure were used in a case like this, then the high motivation at some job levels and the low motivation at other levels would cancel each other out, thus masking the real problems that exist at a particular level or levels.

Stratification also helps when research questions such as the following are to be answered:

a. Are the machinists more accident prone than clerical workers?

b. Are Hispanics more loyal to the organization than Native Americans?

Stratifying customers on the basis of life stages, income levels, and the like to study buying patterns and stratifying companies according to size, industry, profits, and so forth to study stock market reactions are common examples of the use of stratification as a sampling design technique.

Stratification is an efficient research sampling design; that is, it provides more information with a given sample size. Stratification should follow the lines appropriate to the research question. If we are studying consumer preferences for a product, stratification of the population could be by geographical area, market segment, consumers' age, consumers' gender, or various combinations of these. If an organization contemplates budget cuts, the effects of these cuts on employee attitudes can be studied with stratification by department, function, or region. Stratification ensures homogeneity within each stratum (i.e., very few differences or dispersions on the variable of interest within each stratum), but heterogeneity (variability) between strata. In other words, there will be more between-group differences than within-group differences.

4.7.2 Proportionate and disproportionate stratified random sampling

Once the population has been stratified in some meaningful way, a sample of members from each stratum can be drawn using either a simple random sampling or a systematic sampling procedure. The

subjects drawn from each stratum can be either proportionate or disproportionate to the number of elements in the stratum. For instance, if an organization

Proportionate and disproportionate stratified random sampling

Job level	Number of elements	Number of subjects in the sample of Proportionate sampling (20% of the elements)	Disproportionate sampling
Top management	10	2	7
Middle□level management	30	6	15
Lower□level management	50	10	20
Supervisors	100	20	30
Clerks	500	100	60
Secretaries	20	4	10
Total	710	142	142

employs 10 top managers, 30 middle managers, 50 lower□level managers, 100 supervisors, 500 clerks, and 20 secretaries, and a stratified sample of about 140 people is needed for some specific survey, the researcher might decide to include in the sample 20% of members from each stratum. That is, members represented in the sample from each stratum will be *proportionate* to the total number of elements in the respective strata. This would mean that two from the top, six from the middle, and ten from the lower levels of management would be included in the sample. In addition, 20 supervisors, 100 clerks, and four secretaries would be represented in the sample, as shown in the third column of Table 4.1. This type of sampling is called a **proportionate stratified random sampling** design.

In situations like the one above, researchers might sometimes be concerned that information from only two members at the top and six from the middle levels would not truly reflect how all members at those levels would respond. Therefore, a researcher might decide, instead, to use a **disproportionate stratified random sampling** procedure. The number of subjects from each stratum would now be altered, while keeping the sample size unchanged. Such a sampling design is illustrated in the far right□hand column in Table 4.1. The idea here is that the 60 clerks might be considered adequate to represent the population of 500 clerks; seven out of ten managers at the top level might also be considered representative of the top managers, and likewise 15 out of the 30 managers at the middle level. This

redistribution of the numbers in the strata might be considered more appropriate and representative for the study than the previous proportionate sampling design.

Disproportionate sampling decisions are made either when some stratum or strata are too small or too large, or when there is more variability suspected within a particular stratum. As an example, the educational levels among supervisors, which may be considered to influence perceptions, may range from elementary school to master's degrees. Here, more people will be sampled at the supervisory level. Disproportionate sampling is also sometimes done when it is easier, simpler, and less expensive to collect data from one or more strata than from others.

In summary, stratified random sampling involves stratifying the elements along meaningful levels and taking proportionate or disproportionate samples from the strata. This sampling design is more efficient than the simple random sampling design because, for the same sample size, each important segment of the population is better represented, and more valuable and differentiated information is obtained with respect to each group.

Self -Assessment Exercise 1

i Describe the systematic sampling method

.

ii. Define Probability Sampling

4.8 Cluster sampling

Cluster samples are samples gathered in groups or chunks of elements that, ideally, are natural aggregates of elements in the population. In **cluster sampling**, the target population is first divided into clusters. Then, a random sample of clusters is drawn and for each selected cluster either all the elements or a sample of elements are included in the sample. Cluster samples offer more heterogeneity within groups and more homogeneity among groups – the reverse of what we find in stratified random sampling, where there is homogeneity within each group and heterogeneity across groups.

A specific type of cluster sampling is **area sampling**. In this case, clusters consist of geographic areas such as counties, city blocks, or particular boundaries within a locality. If you wanted to survey the residents of a city, you would get a city map, take a sample of city blocks and select respondents within each city block. Sampling the needs of consumers before opening a 24□hour convenience store in a

particular part of town would involve area sampling. Location plans for retail stores, advertisements focused specifically on local populations, and TV and radio programs beamed at specific areas could all use an area sampling design to gather information on the interests, attitudes, predispositions, and behaviors of the local area people.

Area sampling is less expensive than most other probability sampling designs, and it is not dependent on a sampling frame. A city map showing the blocks of the city is adequate information to allow a researcher to take a sample of the blocks and obtain data from the residents therein. Indeed, the key motivation for cluster sampling is cost reduction. The unit costs of cluster sampling are much lower than those of other probability sampling designs of simple or stratified random sampling or systematic sampling. However, cluster sampling exposes itself to greater bias and is the least generalizable of all the probability sampling designs, because most naturally occurring clusters in the organizational context do not contain heterogeneous elements. In other words, the conditions of intra cluster heterogeneity and inter cluster homogeneity are often not met.

For these reasons, the cluster sampling technique is not very common in organizational research. Moreover, for marketing research activities, naturally occurring clusters, such as clusters of residents, buyers, students, or shops, do not have much heterogeneity among the elements. As stated earlier, there is more intra- cluster homogeneity than heterogeneity in such clusters. Hence, cluster sampling, though less costly, does not offer much efficiency in terms of precision or confidence in the results. However, cluster sampling offers convenience. For example, it is easier to inspect an assortment of units packed inside, say, four boxes (i.e., all the elements in the four clusters) than to open 30 boxes in a shipment in order to inspect a few units from each at random.

4.8.1 Single-stage and multistage cluster sampling We have thus far discussed single□stage cluster sampling, which involves the division of the population into convenient clusters, randomly choosing the required number of clusters as sample subjects, and investigating all the elements in each of the randomly chosen clusters. Cluster sampling can also be done in several stages and is then known as **multistage cluster sampling**. For instance, if we were to do a national survey of the average monthly bank deposits, cluster sampling would first be used to select the urban, semi□urban, and rural geographical locations for study. At the next stage, particular areas in each of these locations would be chosen. At the third stage, banks within each area would be chosen. In other words, multistage cluster sampling involves a probability sampling of the primary sampling units; from each of these primary units, a probability sample of the secondary sampling units is then drawn; a

third level of probability sampling is done from each of these secondary units, and so on, until we have reached the final stage of breakdown for the sample units, when we sample every member in those units.

4.9 Double sampling

This plan is resorted to when further information is needed from a subset of the group from which some information has already been collected for the same study. A sampling design where initially a sample is used in a study to collect some preliminary information of interest, and later a subsample of this primary sample is used to examine the matter in more detail, is called **double sampling**. For example, a structured interview might indicate that a subgroup of the respondents has more insight into the problems of the organization. These respondents might be interviewed again and asked additional questions. This research adopts a double sampling procedure.

4.10 Summary

There are two basic probability sampling plans: the unrestricted or simple random sampling, and the restricted or complex probability sampling plans. In the simple random sampling design, every element in the population has a known and equal chance of being selected as a subject. The complex probability plan consists of five different sampling designs. Of these five, the cluster sampling design is probably the least expensive as well as the least dependable, but is used when no list of the population elements is available. The stratified random sampling design is probably the most efficient, in the sense that for the same number of sample subjects, it offers precise and detailed information. The systematic sampling design has the built□in hazard of possible systematic bias. Area sampling is a popular form of cluster sampling, and double sampling is resorted to when information in addition to that already obtained by using a primary sample has to be collected using a subgroup of the sample.

Self -Assessment Exercise 11

i. What are cluster samples?

4.11 References

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4.12 Possible Answers to Self-Assessment Exercises

Self -Assessment Exercise 1

i. Describe the systematic sampling method.

The **systematic sampling** design involves drawing every *n*th element in the population starting with a randomly chosen element between 1 and *n*. The procedure can be exemplified as thus.
If we wanted a sample of 35 households from a total population of 260 houses in a particular locality, then we could sample every seventh house starting from a random number from 1 to 7. Let us say that the random number was 7, then houses numbered 7, 14, 21, 28, and so on, would be sampled until the 35 houses were selected.

ii. Define Probability Sampling

When elements in the population have a known, nonzero chance of being chosen as subjects in the sample, we resort to a probability sampling design. Probability sampling can be either unrestricted (simple random sampling) or restricted (complex probability sampling) in nature.

Self -Assessment Exercise 11

i. What are cluster samples?

Cluster samples are samples gathered in groups or chunks of elements that, ideally, are natural aggregates of elements in the population. In **cluster sampling**, the target population is first divided into clusters. Then, a random sample of clusters is drawn and for each selected cluster either all the elements or a sample of elements are included in the sample. Cluster samples offer more heterogeneity within groups and more homogeneity among groups – the reverse of what we find in stratified random sampling, where there is homogeneity within each group and heterogeneity across groups

UNIT 5 TYPES OF SAMPLING (PART 2)

Unit Structure

5.1 Introduction

In the previous unit, you were introduced to Probability Sampling technique where we discussed Probability sampling, unrestricted or simple random sampling, Restricted or complex probability sampling, Systematic sampling, Stratified random sampling, Cluster sampling and double sampling. In this unit, we shall discuss on Non-Probability type of sampling in extensively.

5.2 Intended Learning Outcomes

After completing this unit, you should be able to:

- Compare and contrast specific nonprobability sampling designs.
- Discuss the role of several nonprobability sampling techniques.

5.3 Nonprobability Sampling

In **nonprobability sampling** designs, the elements in the population do not have any probabilities attached to their being chosen as sample subjects. This means that the findings from the study of the sample cannot be confidently generalized to the population. As stated earlier, however, researchers may, at times, be less concerned about generalizability than obtaining some preliminary information in a quick and inexpensive way. They might then resort to nonprobability sampling. Sometimes nonprobability sampling is the only way to obtain data, as discussed later.

Some of the nonprobability sampling plans are more dependable than others and could offer some important leads to potentially useful information with regard to the population (Bart, Fligner, and Notz, 1998). Nonprobability sampling designs, which fit into the broad categories of convenience sampling and purposive sampling, are discussed next.

5.4 Convenience sampling

As its name implies, **convenience sampling** refers to the collection of information from members of the population who are conveniently available to provide it. One would expect the “Pepsi Challenge” contest to have been administered on a convenience sampling basis. Such a contest, with the purpose of determining whether people prefer one product to another, might be held at a shopping mall visited by many shoppers. Those inclined to take the test might form the sample for the study of how many people prefer Pepsi over Coke or product X to product Y. Such a sample is a convenience sample.

Consider another example. A convenience sample of five officers who attended a competitor's showcase demonstration at the county fair the previous evening offered the vice president of the company information on the “new” products of the competitor and their pricing strategies, which helped the VP to formulate some ideas on the next steps to be taken by the company.

Convenience sampling is most often used during the exploratory phase of a research project and is perhaps the best way of getting some basic information quickly and efficiently.

5.5 Purposive sampling

Instead of obtaining information from those who are most readily or conveniently available, it might some- times become necessary to obtain information from specific target groups. The sampling here is confined to specific types of people who can provide the desired information, either because they are the only ones who have it, or they conform to some criteria set by the researcher. This type of sampling design is called **purposive sampling**, and the two major types of purposive sampling – judgment sampling and quota sampling – will now be explained.

5.6 Judgment sampling

Judgment sampling involves the choice of subjects who are most

advantageously placed or in the best position to provide the information required. For instance, if a researcher wants to find out what it takes for women managers to make it to the top, the only people who can give first-hand information are the women who have risen to the positions of presidents, vice presidents, and important top-level executives in work organizations. They could reasonably be expected to have expert knowledge by virtue of having gone through the experiences and processes themselves, and might perhaps be able to provide good data or information to the researcher. Thus, the **judgment sampling** design is used when a limited number or category of people have the information that is sought. In such cases, any type of probability sampling across a cross-section of the entire population is purposeless and not useful (Brewer and Hanif,1983).

Judgment sampling may curtail the generalizability of the findings, due to the fact that we are using a sample of experts who are conveniently available to us. However, it is the only viable sampling method for obtaining the type of information that is required from very specific pockets of people who alone possess the needed facts and can give the information sought. In organizational settings, and particularly for market research, opinion leaders who are very knowledgeable are included in the sample. Enlightened opinions, views, and knowledge constitute a rich data source. Judgment sampling calls for special efforts to locate and gain access to the individuals who do have the requisite information. As already stated, this sampling design may be the only useful one for answering certain types of research question.

5.7 Quota sampling

Quota sampling, a second type of purposive sampling, ensures that certain groups are adequately represented in the study through the assignment of a quota. Generally, the quota fixed for each subgroup is based on the total numbers of each group in the population. However, since this is a nonprobability sampling plan, the results are not generalizable to the population.

Quota sampling can be considered a form of proportionate stratified sampling, in which a predetermined proportion of people are sampled from different groups, but on a convenience basis (Sekaran & Bougie, 2016) For instance, it may be surmised that the work attitude of blue-collar workers in an organization is quite different from that of white-collar workers. If there are 60% blue-collar workers and 40% white-collar workers in this organization, and if a total of 30 people are to be interviewed to find the answer to the research question, then a quota of 18 blue- collar workers and 12 white-collar workers will form the sample, because these numbers represent 60% and 40% of the sample

size. The first 18 conveniently available blue□collar workers and 12 white□collar workers will be sampled according to this quota. Needless to say, the sample may not be totally representative of the population; hence the generalizability of the findings will be restricted. However, the convenience it offers in terms of effort, cost, and time makes quota sampling attractive for some research efforts. Quota sampling also becomes a necessity when a subset of the population is underrepresented in the organization – for example, minority groups, foremen, and so on. In other words, quota sampling ensures that all the subgroups in the population are adequately represented in the sample. Quota samples are basically stratified samples from which subjects are selected non random (Barry and Welsh, 2001)

In a workplace (and society) that is becoming increasingly heterogeneous because of the changing demo- graphics, quota sampling can be expected to be used more frequently in the future. For example, quota sampling can be used to gain some idea of the buying predispositions of various ethnic groups, to get a feel of how employees from different nationalities perceive the organizational culture, and so on.
Although quota sampling is not generalizable like stratified random sampling, it does offer some information, based on which further investigation, if necessary, can proceed. That is, it is possible that the first stage of research will use the nonprobability design of quota sampling, and once some useful information has been obtained, a probability design will follow. The converse is also entirely possible. A probability sampling design might indicate new areas for research, and nonprobability sampling designs might be used to explore their feasibility.

Self -Assessment Exercise 1

i. What is quota sampling?
Ii Describe Judgment sampling

5.8 Review of nonprobability sampling designs

There are two main types of nonprobability sampling design: convenience sampling and purposive sampling. Convenience sampling is the least reliable of all sampling designs in terms of generalizability, but sometimes it may be the only viable alternative when quick and timely information is needed, or for exploratory research purposes. Purposive sampling plans fall into two categories: judgment and quota sampling designs (Barnett, 1991). Judgment sampling, though restricted in generalizability, may sometimes be the best sampling design choice,

especially when there is a limited population that can supply the information needed. Quota sampling is often used on considerations of cost and time and the need to adequately represent minority elements in the population. Although the generalizability of all nonprobability sampling designs is very restricted, they have certain advantages and are sometimes the only viable alternative for the researcher Cooper and Schindler, 2001)

Table 5.1 summarizes the probability and nonprobability sampling designs discussed thus far, and their advantages and disadvantages. Figure 5.4 offers some decision choice points as to which design might be useful for specific research goals.

Probability and nonprobability sampling designs

Sampling design	Description	Advantages	Disadvantages
Probability sampling			
1. Simple random Sampling	All elements in the population are considered and each element has an equal chance of being chosen as the subject.	High generalizability of findings.	Not as efficient as stratified sampling.
2. Systematic Sampling	Every *n*th element in the population is chosen starting from a random point in the sampling frame.	Easy to use if sampling frame is available.	Systematic biases are possible.
3. Stratified random sampling (Str.R.S.) Proportionate Str.R.S. Disproportionate	Population is first divided into meaningful segments; thereafter subjects are drawn in proportion to their original	Most efficient among all probability designs. All groups are adequately sampled and comparisons	Stratification must be meaningful. More time consuming than simple random

Str.R.S.	numbers in the population. Based on criteria other than their original population numbers.	among groups areor systematic possible.	sampling sampling. Sampling frame for each stratum is essential.
4. Cluster sampling	Groups that have heterogeneous members are first identified; then some are chosen at random; all the members in each of the randomly chosen groups are studied.	In geographic clusters, costs of data collection are low.	The least reliable and efficient among all Probability sampling designs since subsets of clusters are more homogeneous than heterogeneous.
5. Area Sampling	Cluster sampling within a particular area or locality.	Cost□effective. Useful for decisions relating to a particular location.	Takes time to collect data from an area.
6. Double sampling	The same sample or a subset of the sample is studied twice.	Offers more detailed information on the topic of study.	Original biases, if any, will be carried over. Individuals may not be happy responding a second time.
Nonprobability sampling			
7. Convenience Sampling	The most easily accessible members are chosen as subjects.	Quick, convenient, less expensive.	Not generalizable at all.

8. Judgment sampling	Subjects selected on the basis of their expertise in the subject investigated.	Sometimes, the only meaningful way to investigate.	Generalizability is questionable; not generalizable to entire population.
9. Quota sampling	Subjects are conveniently chosen from targeted groups according to some predetermined number or quota.	Very useful where minority participation in a study is critical.	Not easily generalizable.

5.9. 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:

5.9.1. Sample Size for Mean Values.

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

where n = the sample size $n = \frac{Z^2 s^2}{e^2}$,
Z = the Z – value corresponding to the desired confidence Level s = 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 = 2Zs2 , = 2 (2.58(0) .8) = 426
e2
The required sample size is 426 subjects.
(0.1)2

5.9.2 Sample Size for Proportions.

The sample size for statistical estimations and test of hypotheses involving proportions is formulated as:
n = Z2 pq,
e2
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 are 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.
Thus, n = Z2 pq = pZ(1-p) = (2.528) (0.5)=(0.51).6641
e2 e2
= 2662.56 or 2663.
(0.025)2 0.000625
The required sample size would be approximately 2663 subjects.

5.9.3 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:

$$n = \frac{N}{1 + Ne2} = \frac{500}{1 + 500\,(0.05)2}$$

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

Thus, the required sample size is approximately 222 subjects.

Self -Assessment Exercise 11

i. What is a convenience sampling?

ii Identify and describe two main types of nonprobability sampling design

5.10 Summary

In learning how representative data can be collected, a few terms have to be understood. The population refers to the entire group of people, events, or things of interest that the researcher wishes to investigate.

An element is a single member of the population. A sample is a subset of the population. The sampling unit is the element or set of elements that is available for selection in some stage of the sampling process.

A subject is a single member of the sample, just as an element is a single member of the population.

5.11 References/Further Readings/Web Resources

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5.12 Possible Answers To Self-Assessment Exercises

Self -Assessment Exercise 1

i. What is quota sampling?

Quota sampling, a second type of purposive sampling, ensures that certain groups are adequately represented in the study through the assignment of a quota. Generally, the quota fixed for each subgroup is based on the total numbers of each group in the population. However, since this is a nonprobability sampling plan, the results are not generalizable to the population.
Quota sampling can be considered a form of proportionate stratified sampling, in which a predetermined proportion of people are sampled from different groups, but on a convenience basis.

ii. Describe Judgment sampling

Judgment sampling involves the choice of subjects who are most advantageously placed or in the best position to provide the information required.
The **judgment sampling** design is used when a limited number or category of people have the information that is sought. In such cases, any type of probability sampling across a cross□section of the entire population is purposeless and not useful.
Judgment sampling may curtail the generalizability of the findings, due to the fact that we are using a sample of experts who are conveniently available to us.

Self -Assessment Exercise 11

i. What is a convenience sampling?
A **convenience sampling** refers to the collection of information from members of the population who are conveniently available to provide it. One would expect the "Pepsi Challenge" contest to have been administered on a convenience sampling basis. Such a contest, with the purpose of determining whether people prefer one product to another, might be held at a shopping mall visited by many shoppers. Those inclined to take the test might form the sample for the study of how many people prefer Pepsi over Coke or product X to product Y. Such a sample is a convenience sample

i. Identify and describe two main types of nonprobability sampling design
There are two main types of nonprobability sampling design:

convenience sampling and purposive sampling. Convenience sampling is the least reliable of all sampling designs in terms of generalizability, but sometimes it may be the only viable alternative when quick and timely information is needed, or for exploratory research purposes. Purposive sampling plans fall into two categories: judgment and quota sampling designs. Judgment sampling, though restricted in generalizability, may sometimes be the best sampling design choice, especially when there is a limited population that can supply the information needed. Quota sampling is often used on considerations of cost and time and the need to adequately represent minority elements in the population.

UNIT 6 MEASURMENT SCALES

Unit Structure

6.1 Introduction

In the previous chapter, we explained that measurement is the assignment of numbers or other symbols to characteristics (or attributes) of objects according to a pre specified set of rules. Now that we have learned how to operationally define (or operationalize) a concept (or variable), we need to assign numbers (or other symbols) to it in some manner. Note that it is important that the rules for assigning numbers to characteristics of objects should be standardized and applied in a consistent manner.

Numbers allow us to perform statistical analysis on the resulting data

and (in deductive research) to test the hypotheses that we have developed. What's more, they facilitate the communication of our research results.

In this chapter we will examine the types of scales that can be applied to assign numbers to characteristics of objects and subsequently see how we actually apply them. We will first discuss four different types of scales (nominal, ordinal, interval, and ratio scales) and point out that the statistical analysis we can perform later on in the research process is directly related to the type of scales we use. We will also discuss two main categories of attitudinal scales (not to be confused with the four different types of scales, discussed first in this chapter) – the rating scale and the ranking scale. **Rating scales** have several response categories and are used to elicit responses with regard to the object, event, or person studied. **Ranking scales**, on the other hand, make comparisons between or among objects, events, or persons and elicit the preferred choices and ranking among them.

6.2 Learning Objectives

After completing this Unit, you should be able to:

1. Describe the characteristics and power of the four types of scales – nominal, ordinal, interval, and ratio.
2. Describe and know how and when to use different forms of rating scales.
3. Describe and know how and when to use different forms of ranking scales.
4. Discuss international dimensions of scaling.

6.3 Four Types Of Scales

Measurement means gathering data in the form of numbers. To be able to assign numbers to attributes of objects we need a scale. A **scale** is a tool or mechanism by which individuals are distinguished as to how they differ from one another on the variables of interest to our study. Scaling involves the creation of a continuum on which our objects are located.

Suppose that we want to measure consumer attitudes toward soft drink consumption. After we have developed one or more scale items or questions, the next step in measurement is to decide on a scale that allows us to assign numbers to the attribute (attitude toward soft drink consumption) of our objects (consumers). This allows us to subsequently classify our objects (consumers) in terms of how unfavorable or favorable they are toward drinking a soft drink. One of the many options we have to classify consumers is a **Likert scale**. The

Likert scale is a scale designed to examine how strongly respondents agree with a statement (such as "*I enjoy having a soft drink*") on a five-point scale with the following anchors: 1 = Strongly Disagree, 2 = Disagree, 3 = Neither Agree Nor Disagree, 4 = Agree, 5 = Strongly Agree (further on in this chapter we will thoroughly discuss a wide variety of rating and ranking scales, including the Likert scale). Hence, the Likert scale allows us to distinguish consumers in terms of how they differ from one another in their attitude toward soft drinks, each respondent being assigned a number indicating a more or less unfavorable, neutral, or more or less favorable.

What is the *meaning* of the numbers 1, 2, 3, 4, and 5?
Does the scale that we have used allow us for instance to rank our objects (2 is more than 1)? Does it allow us to compare differences between objects (in other words is the difference between 1 and 2 the same as the difference between 2 and 3? And does it allow us to calculate certain statistics such as a mean (or average) and a standard deviation? The answer is: it depends. It depends on the type of scale (that is, the *basic* scale type) that we have used.
There are four basic types of scales: nominal, ordinal, interval, and ratio. The degree of sophistication to which the scales are fine-tuned increases progressively as we move from the nominal to the ratio scale. That is why information on the variables can be obtained in greater detail when we employ an interval or a ratio scale rather than using the other two scales. As the calibration or fine-tuning of the scale increases in sophistication, so does the power of the scale. With more powerful scales, increasingly sophisticated data analyses can be per- formed, which, in turn, means that more meaningful answers can be found to our research questions. However, certain variables lend themselves with greater ease to more powerful scaling than others. Let us now examine each of these four scales.

6.3.1 Nominal scale

A **nominal scale** is one that allows the researcher to assign subjects to certain categories or groups. For example, with respect to the variable of gender, respondents can be grouped into two categories – male and female. These two groups can be assigned code numbers 1 and 2. These numbers serve as simple and convenient category labels with no intrinsic value, other than to assign respondents to one of two non overlapping, or mutually exclusive, categories (Davison. & Sharma, 1988) Note that the categories are also collectively exhaustive. In other words, there is no third category into which respondents would normally fall. Thus, nominal scales categorize individuals or objects into mutually exclusive and collectively exhaustive groups. The information that can be generated from nominal scaling is the calculation of the percentage

(or frequency) of males and females in our sample of respondents. For example, if we had interviewed 200 people, and assigned code number 1 to all male respondents and number 2 to all female respondents, then computer analysis of the data at the end of the survey may show that 98 of the respondents are men and 102 are women. This frequency distribution tells us that 49% of the survey's respondents are men and 51% women. Other than this marginal information, such scaling tells us nothing more about the two groups. Thus, the nominal scale gives some basic, categorical, gross information. Let us take a look at another variable that lends itself to nominal scaling – the nationality of individuals. We could nominally scale this variable in the following mutually exclusive and collectively exhaustive categories. American, Japanese, Australian Polish, Chinese, Russian, German, Swiss, Indian, Zambian, Others. Note that every respondent has to fit into one of the above 11 categories and that the scale allows computation of the numbers and percentages of respondents.

6.3.2 Ordinal scale

An ordinal scale not only categorizes the variables in such a way as to denote differences among the various categories, it also rank-orders the categories in some meaningful way. With any variable for which the categories are to be ordered according to some preference, the ordinal scale would be used. The preference would be ranked (e.g., from best to worst; first to last) and numbered 1, 2, and so on. For example, respondents might be asked to indicate their preferences by ranking the importance they attach to five distinct characteristics in a job that the researcher might be interested in studying. Such a question might take the form shown in the following example. The ordinal scale helps the researcher to determine the percentage of respondents who consider interaction with others as most important, those who consider using a number of different skills as most important, and so on. Such knowledge might help in designing jobs that are seen as most enriched by the majority of the employees.

We can now see that the ordinal scale provides more information than the nominal scale. The ordinal scale goes beyond differentiating the categories to providing information on how respondents distinguish them by rank-ordering them. Note, however, that the ordinal scale does not give any indication of the magnitude of the differences among the ranks. For instance, in the job characteristics example, the first-ranked job characteristic might be only marginally preferred over the second-ranked characteristic, whereas the characteristic that is ranked third might be preferred in a much larger degree than the one ranked fourth. Thus, in ordinal scaling, even though differences in the ranking of objects, persons, or events investigated are clearly known, we do not know their magnitude. This deficiency is overcome by interval scaling, which is discussed next.

6.3.3 Interval scale

In an **interval scale**, or *equal* interval scale, numerically equal distances on the scale represent equal values in the characteristics being measured. Whereas the nominal scale allows us only to qualitatively distinguish groups by categorizing them into mutually exclusive and collectively exhaustive sets, and the ordinal scale to rank-order the preferences, the interval scale allows us to compare differences between objects. The difference between any two values on the scale is identical to the difference between any other two neighboring values of the scale. The clinical thermometer is a good example of an interval-scaled instrument; it has an arbitrary origin and the magnitude of the difference between 98.6 degrees (supposed to be the normal body temperature) and 99.6 degrees is the same as the magnitude of the difference between 104 and 105 degrees. Note, however, that one may not be seriously concerned if one's temperature rises from 98.6 to 99.6, but one is likely to be so when the temperature goes up from 104 to 105 degrees!

The interval scale, then, taps the differences, the order, and the equality of the magnitude of the differences in the variable. As such, it is a more powerful scale than the nominal and ordinal scales, and has for its measure of central tendency the arithmetic mean. Its measures of dispersion are the range, the standard deviation, and the variance.

6.3.4 Ratio scale

The ratio scale overcomes the disadvantage of the arbitrary origin point of the interval scale, in that it has an absolute (in contrast to an arbitrary) zero point, which is a meaningful measurement point. Thus, the **ratio scale** not only measures the magnitude of the differences between points on the scale but also taps the proportions in the differences.(Gaito, 1980) It is the most powerful of the four scales because it has a unique zero origin (not an arbitrary origin) and subsumes all the properties of the other three scales. The weighing balance is a good example of a ratio scale. It has an absolute (and not arbitrary) zero origin calibrated on it, which allows us to calculate the ratio of the weights of two individuals. For instance, a person weighing 250 pounds is twice as heavy as one who weighs 125 pounds. Note that multiplying or dividing both of these numbers (250 and 125) by any given number will preserve the ratio of 2:1. The measure of central tendency of the ratio scale may be either the arithmetic or the geometric mean and the measure of dispersion may be either the standard deviation, or variance, or the coefficient of variation. Some examples of ratio scales are those pertaining to actual age, income, and the number of organizations individuals have worked for.

The properties of the scales, as fine-tuning is increasingly achieved, are

summarized in Table 6.1. We may also see from the table how the power of the statistic increases as we move away from the nominal scale (where we group subjects or items under some categories), to the ordinal scale (where we rank-order the categories), to the interval scale (where we tap the magnitude of the differences), to the ratio scale (which allows us to measure the proportion of the differences). You must have surmised by now that some variables, such as gender, can be measured only on the nominal scale, while others, such as temperature, can be measured on an ordinal scale (hot/medium/low), or the interval scale through a thermometer. Whenever it is possible to use a more powerful scale, it is wise to do so.

6.3.5 Ordinal or interval?

Likert scales (discussed later in this chapter) are a commonly used way of measuring opinions and attitudes. They measure the extent to which participants agree or disagree with a given statement, and typically range from 1 (strongly disagree) to 5 (strongly agree) with a neutral point in the middle (e.g. neither agree nor disagree). Whether this scale is ordinal or interval in nature is a subject of much debate. Some people argue that a Likert scale is ordinal in nature. They correctly point out that one cannot assume that all pairs of adjacent levels are equidistant (of the same distance). Nonetheless, Likert scales (and a few other scales, that is, the semantic differential scale and the numerical scale – also discussed later on in this chapter) are generally treated as if they were interval scales, because it allows researchers to calculate averages and standard deviations and to apply other, more advanced statistical techniques (for instance, to test hypotheses).

Properties of the four scales

Scale	Highlights Unique Difference	Order	Distance	origin	Measures of central tendency	Measures of dispersion	Some tests of significance
Nominal	Yes	No	No	No	Mode	—	χ^2
Ordinal	Yes	Yes	No	No	Median	Semi-interquartile range	Rank-order correlations
Interval	Yes	Yes	Yes	Yes	Arithmetic mean	Standard deviation, variance, coefficient of variation	*t*, *F*
Ratio	Yes	Yes	Yes	Yes	Arithmetic or geometric mean	Standard deviation or variance or coefficient of variation	*t*, *F*

Note: The interval scale has 1 as an arbitrary starting point. The ratio scale has the natural origin 0, which is meaningful.
An example of a Likert scale is provided next. How would you treat this scale?

Indicate the extent to which you agree with the follow-statements as they relate to your job, by circling the appropriate number against each, using the scaleing given below.

	Strongly Disagree 1	**Disagree** 2	**Neither Agree Nor Disagree** 3	**Agree**	**Strongly Agree**
The following opportunities offered by the job are very important to me:					
a. Interacting with others	1	2	3	4	5
b. Using a number of different skills	1	2	3	4	5
c. Completing a task from beginning to end	1	2	3	4	5
d. Serving others	1	2	3	4	5
e. Working independently	1	2	3	4	5

6.4 Review of scales

The four scales that can be applied to the measurement of variables are the nominal, ordinal, interval, and ratio scales. The nominal scale highlights the differences by classifying objects or persons into groups, and provides the least amount of information on the variable. The ordinal scale provides some additional information by rank-ordering the categories of the nominal scale. The interval scale not only ranks, but also provides us with information on the magnitude of the differences in the variable. The ratio scale indicates not only the magnitude of the differences but also their proportion. Multiplication or division would preserve these ratios. As we move from the nominal to the ratio scale, we obtain progressively increasing precision in quantifying the data, and greater flexibility in using more powerful statistical tests. Hence, whenever possible and appropriate, a more powerful rather than a less powerful scale should be used to measure the variables of interest (Maxwell & Delaney1985)

The specific scaling techniques commonly used in business research can be classified into rating scales and the ranking scales. In rating scales each object is scaled independently of the other objects under study

(Michell,1986).Ranking scales, on the other hand, make comparisons between or among objects and elicit the preferred choices and ranking among them. Specific rating and ranking scales are discussed next.

6.5 Rating Scales

The following rating scales are often used in business research:

- Dichotomous scale
- Category scale
- Semantic differential scale
- Numerical scale
- Itemized rating scale
- Likert scale
- Fixed or constant sum rating scale
- Stapel scale
- Graphic rating scale
- Consensus scale

Other scales, such as the Thurstone Equal Appearing Interval Scale, and the multidimensional scale, are less frequently used. We will briefly describe each of the above attitudinal scales.

6.5.1 Dichotomous scale

The **dichotomous scale** is used to elicit a Yes or No answer, as in the example below. Note that a nominal scale is used to elicit the response.

6.5.2 Category scale

The **category scale** uses multiple items to elicit a single response, as per the following example. This also uses the nominal scale.

6.5.3 Semantic differential scale

Several bipolar attributes are identified at the extremes of the scale, and respondents are asked to indicate their attitudes, on what may be called a semantic space, toward a particular individual, object, or event on each of the attributes. The bipolar adjectives used might employ such terms as Good–Bad; Strong–Weak; Hot–Cold. The **semantic differential scale** is used to assess respondents' attitudes toward a particular brand, advertisement, object, or individual. The responses can be plotted to obtain a good idea of their perceptions. A semantic differential scale is ordinal in nature. However, it is often treated as an interval scale. An example of the semantic differential scale follows.

6.5.4 Numerical scale

*The **numerical scale** is similar to the semantic differential scale, with the difference that numbers on a five-point or seven-point scale are provided, with bipolar adjectives at both ends, as illustrated below. This scale is also often treated as an interval scale,*

	Not at All Interested	**Somewhat Interested**	**Moderately Interested**	**Very Much Interested**
	1	**2**	**3**	**4**
How would you rate your interest in changing	1	2	3	4

6.5.5 Itemized rating scale

A five-point or seven-point scale with anchors, as needed, is provided for each item and the respondent states the appropriate number on the side of each item, or circles the relevant number against each item, as per the examples that follow. The responses to the items are then summed. This uses an interval scale.

The itemized rating scale provides the flexibility to use as many points in the scale as considered necessary (4, 5, 7, 9, or whatever), and it is also possible to use different anchors (e.g., Very Unimportant to Very Important; Extremely Low to Extremely High). When a neutral point is provided, it is a balanced rating scale, and when it is not, it is an **unbalanced rating scale**.

Research indicates that a five-point scale is just as good as any, and that an increase from five to seven or nine points on a rating scale does not improve the reliability of the ratings (Elmore & Beggs, 1975).
The itemized rating scale is frequently used in business research, since it adapts itself to the number of points the researcher wishes to use, as well as the nomenclature of the anchors, as is considered necessary to accommodate the needs of the researcher for tapping the variable.

6.5.6 Likert scale

The Likert scale is designed to examine how strongly subjects agree or disagree with statements on a five-point scale with the following anchors:

Strongly Disagree	Disagree	Neither nor Disagree	Agree	Agree Strongly Agree
1	2	3	4	5

The responses over a number of items tapping a particular concept or variable can be analyzed item by item, but it is also possible to calculate a total or summated score for each respondent by summing across items. The summated approach is widely used, and therefore the Likert scale is also referred to as a summated scale.

In the following example, the scores on the second item have to be reversed before calculating the summated score, because a high score on this item reflects an unfavorable attitude to work, whereas a high score on items 1 and 3 reflects a favorable attitude to work. This will lead to high total scores for respondents who have a favorable attitude toward work and to low total scores for respondents who have an unfavorable attitude toward work. Example

Using the preceding Likert scale, state the extent to which you agree with each of the following statements:

My work is very interesting	1	2	3	4	5
I am not engrossed in my work all day	1	2	3	4	5
Life without my work would be dull	1	2	3	4	5

Whether a Likert scale is an ordinal or an interval scale is a subject of much debate. People who treat a Likert scale as an ordinal scale argue that one cannot assume that all pairs of adjacent levels are equidistant. Nonetheless, Likert scales are generally treated as interval scales.

6.5. 7 Fixed or constant sum scale

The respondents are here asked to distribute a given number of points across various items as per the example below. This is more in the nature of an ordinal scale.

6.5.8 Stapel scale

This scale simultaneously measures both the direction and intensity of the attitude toward the items under study. The characteristic of interest to the study is placed at the center with a numerical scale ranging, say,

from +3 to −3, on either side of the item, as illustrated in the example below. This gives an idea of how close or distant the individual response to the stimulus is. Since this does not have an absolute zero point, this i1

EXAM

On a scale of 1 to 10, how wouldyou rate your supervisor?	–	10 Excellent
	–	
	–	
	–	
	–	5Adequate
	–	
	–	
	–	
	–	1 Very bad

This scale is easy to respond to. The brief descriptions on the scale points are meant to serve as a guide in locating the rating rather than representing discrete categories. The **faces scale**, which depicts faces ranging from smiling to sad (illustrated in Chapter 9), is also a graphic rating scale used to obtain responses regarding people's feelings with respect to some aspect – say, how they feel about their jobs.

6.5.10 Consensus scale

Scales can also be developed by consensus, where a panel of judges selects certain items, which in its view measure the relevant concept. The items are chosen particularly based on their pertinence or relevance to the concept. Such a **consensus scale** is developed after the selected items have been examined and tested for their validity and reliability. One such consensus scale is the Thurstone Equal Appearing Interval Scale, where a concept is measured by a complex process followed by a panel of judges. Using a pile of cards containing several descriptions of the concept, a panel of judges offers inputs to indicate how close or not the statements are to the concept under study. The scale is then developed based on the consensus reached. However, this scale is rarely used for measuring organizational concepts because of the time necessary to develop it.

Self- Assessment Exercise 1

i. Describe the four types of scales.
Ii What is a dichotomous scale

6.6 Other Scales

There are also some advanced scaling methods such as multidimensional scaling, where objects, people, or both, are visually scaled, and a conjoint analysis is performed. This provides a visual image of the relationships in space among the dimensions of a construct.
It should be noted that the Likert or some form of numerical scale is the one most frequently used to measure attitudes and behaviors in business research.

6.7 International Dimensions of Scaling

Apart from sensitivity to operational definition of concepts in other cultures, the issue of scaling also needs to be addressed in cross-cultural research. Different cultures react differently to issues of scaling. For instance, a five-point or a seven-point scale may make no difference in the United States, but could in the responses of subjects in other countries (see Sekaran & Martin, 1982; Sekaran & Trafton, 1978). Barry (1969), for instance, found that in some countries, a seven-point scale is more sensitive than a four-point scale in eliciting unbiased responses.
Recent research has shown that people from different countries differ in both their tendency to use the extremes of the rating scale (for instance 1 and 5 or 1 and 7) and to respond in a socially desirable way (De Jong, 2006). These findings illustrate that analyzing and interpreting data that are collected in multiple countries is an extremely challenging undertaking.

6.8 Goodness of Measures

Now that we have seen how to operationally define variables and apply different scaling techniques, it is important to make sure that the instrument that we develop to measure a particular concept is indeed accurately measuring the variable, and that, in fact, we are actually measuring the concept that we set out to measure. This ensures that in operationally defining perceptual and attitudinal variables, we have not overlooked some important dimensions and elements or included some irrelevant ones. The scales developed can often be imperfect, and errors are prone to occur in the measurement of attitudinal variables. The use of better instruments will ensure more accuracy in results, which in turn will enhance the scientific quality of the research (Velleman & Wilkinson, 1993) Hence, in some way, we need to assess the "goodness" of the measures developed. That is, we need to be reasonably sure that the instruments we use in our research do indeed measure the variables they are supposed to, and that they measure them accurately.

Let us now examine how we can ensure that the measures developed are reasonably good. First, an item analysis of the responses to the questions tapping the variable is carried out, and then the reliability and validity of the measures are established, as described below.

6.9 Item analysis

Item analysis is carried out to see if the items in the instrument belong there or not. Each item is examined for its ability to discriminate between those subjects whose total scores are high and those with low scores. In item analysis, the means between the high-score group and the low-score group are tested to detect significant differences through the *t*-values. The items with a high *t*-value (test which is able to identify the highly discriminating items in the instrument) are then included in the instrument. Thereafter, tests for the reliability of the instrument are carried out and the validity of the measure is established.

Very briefly, **reliability** is a test of how consistently a measuring instrument measures whatever concept it is measuring. **Validity** is a test of how well an instrument that is developed measures the particular concept it is intended to measure. In other words, validity is concerned with whether we measure the right concept, and reliability with stability and consistency of measurement. Validity and reliability of the measure attest to the scientific rigor that has gone into the research study. These two criteria will now be discussed.

Self- Assessment Exercise 11

What is the dichotomous scale used for?

6.10 Summary

To be able to assign numbers to attributes of objects we need a scale. A scale is a tool or mechanism by which individuals are distinguished as to how they differ from one another on the variables of interest to our study. Scaling involves the creation of a continuum on which our objects are located. There are four basic types of scales: nominal, ordinal, interval, and ratio. The degree of sophistication to which the scales are fine- tuned increases progressively as we move from the nominal to the ratio scale.

For learning objective 2 we sought to know how and when to use different forms of rating scales. In rating scales each object is scaled independently of the other objects under study. The following rating

scales are often used in business research: dichotomous scale, category scale, semantic differential scale, numerical scale, itemized rating scale, and Likert scale, fixed or constant sum rating scale, Stapel scale, graphic rating scale, and consensus scale. The Likert scale or some form of numerical scale is the one most frequently used to measure attitudes and behaviors in business research.

For Learning objective 3, we seek to know how and when to use different forms of ranking scales. Ranking scales are used to tap preferences between two or among more objects or items. The paired comparison scale is used when, among a small number of objects, respondents are asked to choose between two objects at a time. The forced choice enables respondents to rank objects relative to one another, among the alternatives provided. The comparative scale provides a benchmark or a point of reference to assess attitudes toward the current object, event, or situation under study.

Finally, for learning objective 4, we discussed international dimensions of scaling where different cultures react differently to issues of scaling. What's more, recent research has shown that people from different countries differ in both their tendency to use the extremes of the rating scale (for instance 1 and 5 or 1 and 7) and to respond in a socially desirable way. These findings illustrate that analyzing and interpreting data that are collected in multiple countries is a challenging task

6.11 References/Further Readings/Web Resources

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6.12 Possible Answers To Self-Assessment Exercise(S)

Self- Assessment Exercise 1

i. **Describe the four types of scales.**

There are four basic types of scales: nominal, ordinal, interval, and ratio.

Nominal scale

A **nominal scale** is one that allows the researcher to assign subjects to certain categories or groups. For example, with respect to the variable of gender, respondents can be grouped into two categories – male and female. These two groups can be assigned code numbers 1 and 2. These numbers serve as simple and convenient category labels with no intrinsic value, other than to assign respondents to one of two non overlapping, or mutually exclusive, categories.

Ordinal scale

An ordinal scale not only categorizes the variables in such a way as to denote differences among the various categories, it also rank-orders the categories in some meaningful way. With any variable for which the categories are to be ordered according to some preference, the ordinal scale would be used. The preference would be ranked (e.g., from best to worst; first to last) and numbered 1, 2, and so on.

Interval scale

In an **interval scale**, or *equal* interval scale, numerically equal distances on the scale represent equal values in the characteristics being measured. Whereas the nominal scale allows us only to qualitatively distinguish groups by categorizing them into mutually exclusive and collectively exhaustive sets, and the ordinal scale to rank-order the preferences, the interval scale allows us to compare differences between objects. The difference between any two values on the scale is identical to the difference between any other two neighboring values of the scale.

Ratio scale

The ratio scale overcomes the disadvantage of the arbitrary origin point of the interval scale, in that it has an absolute (in contrast to an arbitrary) zero point, which is a meaningful measurement point. Thus, the **ratio scale** not only measures the magnitude of the differences between points on the scale but also taps the proportions in the differences. It is the most powerful of the four scales because it has a unique zero origin (not an

arbitrary origin) and subsumes all the properties of the other three scales.

ii. What is a dichotomous scale

The **dichotomous scale** is used to elicit a Yes or No answer, as in the example below. Note that a nominal scale is used to elicit the response.

Self- Assessment Exercise 11

What is the dichotomous scale used for?

The **dichotomous scale** is used to elicit a Yes or No answer, as in the example below. Note that a nominal scale is used to elicit the response.

How and when do you use the Likert?

The Likert scale is designed to examine how strongly subjects agree or disagree with statements on a five-point scale with the following anchors

Strongly Disagree	**Disagree**	**Neither Disagree**	**Agree nor**	**Agree**	**Strongly Agree**
1	2	3		4	5

MODULE 3 DATA ACQUISITION AND PROCEDURE

UNIT 1 DATA ACQUISITION/COLLECTION AND PROCEDURE

Unit Structure

1.1 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.

1.2 Intended Learning Outcomes

At the end of this unit, you should be equipped with how:
1. To choose a data collection method
2. To identify and classify the variables you want to collect data for
3. To select a suitable sample

1.3 Data Acquisition/Collection and Procedure

1.4 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:

- The critical incident method
- Diaries
- Focus group method
- Interview method
- Observation method
- Protocol analysis
- Questionnaire method
- Inspection
- Abstract from existing records

These methods will be discussed in much more detail in this unit.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.“

1.5 Types of Data

There are basically two types of data used in research studies. These are primary and secondary data.

1.6 Primary Data and Secondary Data

Primary data are data obtained first hand and originally by the researcher. Primary data does not actually exist until and unless they are generated through the research process as part of the dissertation or project. Primary data are data specifically collected in a research by the researcher and his agent.

Secondary data are data generated by someone else and is in existence (Saylor 2012) Secondary data are information which already exists in

some form or other but which were not primarily collected at least initially for the purpose of the project. Secondary data are searched for and obtained from many different samples. Acquiring secondary data is less expensive and saves time than collecting primary data. Secondary data include both raw and published summaries. Some of these data, in particular documents such as company minutes are only available from the orgnisations which produce them and so access will need to be negotiated. Others include government surveys such as population census which are widely available in published form.

In using secondary data, the researcher may encounter some of these problems

i Secondary data may not meet the needs of the problem at hand for various reasons.

ii Units of measurement may be different; aggregated data does not provide the details required by the researcher, iii classifications of data may not match the requirements of the problem at hand; and the period for which the data are available may not suit the overall research needs.

iv All the data required for research analysis may not be available.

v Matching part of data obtained by primary data collection methods with that collected by secondary sources may be very difficult.

vi The accuracies of data are not known and in some cases of rigorous search, analysis may cause difficulties in valuation and reliability estimates.

A researcher may not use primary and secondary data in the same research as both (i) may yield different results and (ii) may evolve from different assumptions. Only in a research case involving multiple methods/designs could two different types of data be used.

Secondary data include both qualitative and quantitative data and can be used in descriptive and explanatory research. Quantitative data is often thought of as being more objective and scientific than qualitative data and are therefore associated with the more traditional scientific approaches to research as used in the physical sciences. Because quantitative data is in the form of numbers, it can often be analyzed using statistical techniques. Quantitative data implies that what is being measured or researched can be quantitative and measured. Qualitative data on the other hand relates to data that cannot be subjected to qualitative or numerical analysis. It is therefore associated with phenomena that cannot be or is difficult to qualify.

Increasingly, it is recognized that there is much overlap between qualitative and quantitative data and research techniques and that at

least, each type of data can make valuable contributions towards the development of knowledge or in the solving of specific problems.

1.7 Methods of Data Collection

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.
Many methods and procedures have been developed to help in acquiring data. They make use of different means of describing and quantifying data. Each of these is suitable in specific situations of source and types of data.

Primary Data Collection Methods

The primary data relevant to a problem is collected by one of the standard methods of research experiments, surveys, field studies, cases studies, system studies etc. The basic tools and methods for data collection for research include observation, questionnaire, interviews and prospective techniques. The employment of any of these tools of data collection depends on the type of research that is being undertaken and the time and resources available to the researcher.

1.7.1 Interviews

One of the most popular qualitative research tools is interviewing. Beginning researchers typically recognize the need to learn the skills of experimental design or content analysis, but many erroneously presume that interviewing is like chatting. In reality, interviewing requires a great deal of knowledge, experience, skill, and finesse.

Types of Interviews There are basically three types of interviews: informal, guided, and structured. An informal interview allows the researcher to go with the flow and create impromptu questions as the interview progresses. Although there is no preset list of questions, an informal interview, as with every type of data collection, requires preparation and focus to be effective. The researchers need to have objectives clearly in mind as to what they hope to accomplish. Moreover, the interviewer must have the preparation and skill to direct the interview in fruitful directions depending on the response of the participant. The advantage of the informal interview is that the researcher's *a priori* theories are less likely to bias the data collection. The generation of a list of questions in a structured interview necessarily directs the interview in preplanned ways toward specific researcher

goals; the direction of the informal interview is much more dependent on the responses of the interviewee (Holbrook, Green&Krosnick, 2003). Informal interviews, therefore, are more likely to yield serendipitous (unexpected) discoveries. The disadvantages of an informal interview are that interviews with different people are not comparable and the data are not generalizable. In addition, informal interviews, because of their lack of structure, typically take more time to conduct and more time to analyze. Because the data gleaned may vary greatly from one interview to the next, it is a challenge to identify consistent themes and form interpretations or draw conclusions.

A **structured interview** follows a set of prescribed questions. The structured inter- view is written with probes, transitions, and follow-up questions. This takes some of the pressure off the researcher, who in an informal interview has to think of probes and follow-ups on the spot. In this sense, the structured interview provides more data- collection control than the informal interview, and it is less dependent on the intuition and skill of the interviewer. Because the questions in a structured interview are the same for each and every interview, the data from one interview to another are comparable. It is therefore more likely that themes and patterns that emerge across a number of respondents may be generalizable to others. Compared to informal interviews, the data are also easier to synthesize and analyze. In addition, the structured interview is typically more time-efficient than the informal interview, because the interviewer and respondent are kept on track by the prepared questions.

The primary limitation of the structured interview is, as you might guess, the diminished opportunity to pursue serendipitous discoveries that emerge from unexpected and interesting responses. Given the emergent discovery process inherent to qualitative research, there is also the risk that the researcher's agenda will unduly shape the data collection when using a structured interview. The questions asked, and consequently the topics discussed in the interview, may be more reflective of the salient features of the researcher's interpretation of the situation than of the respondent's. The structured interview also carries the researcher's agenda into the data-collection process (Ryan&Dundon, 2008)

A compromise technique that has some of the benefits of both informal and structured interviews is called the guided interview**.** The guided interview follows an outline of questions, but not all of the prescribed probes, transitions, and follow-ups are established prior to the interview. The interviewer is given freedom to deviate from the interview questions as needed to pursue serendipitous findings and fruitful directions.

Interview Format and Types of Questions Once you have decided whether to prepare an informal, guided, or structured interview, you should consider the *format* of the interview. It typically makes sense to begin with background information to establish the context. Background informationincludes such personal information as demographics (e.g., age, marital status, education level, socioeconomic status), pertinent personal history with the group or program under study, and factual information questions that will help you to understand the operations of the culture, group, or program under study. Demographic and factual questionsare typically easy to answer, and beginning with this type of question can help to put the respondent at ease.

The second part of the interview should address the respondent's *experience* with the group, culture, or program under study. In this part of the interview, descriptionquestions are used: "What is your job description?" "You've just walked in the door of your office. Describe what you do first. What do you do next, and next?" "You said you prepare for the morning conference. How do you prepare for the conference meeting?" Sensory questions are a specific type of description question. Sensory questions ask respondents what they see, hear, smell, touch, and taste as part of the experience under study. The researcher must play the naïve observer in this part of the interview. Sometimes the most obvious of questions regarding the experience or description of a setting can yield rich understandings.

The third part of the interview should explore the respondent's *meanings, interpretations,* and *associations* in regard to the experiences described. To get at these underlying constructions of meaning, it is sometimes helpful to ask comparison questions. To understand the meaning and experiences of skater culture, one might ask, "How is a set [series of moves] that is 'smooth' different from a set that is 'diamonds'? How is a set that is 'sick' better or worse than a set that is 'smooth'?" To ascertain meanings, interpretations, and associations, it is also helpful to ask feeling questions("How do you feel about . . ."), opinion questions ("What do you think or believe about . . ."), and value questions("To what extent is this good/moral or bad/immoral?").

Seidman (1991) recommends using a three-interview format, with each interview dedicated to one of the three foci: background, experience, and meaning. This allows the researcher to use the background information to develop questions about the experience and to use the understanding of the experience to develop questions about the meanings and associations of key concepts.

In checking your format, you should be attentive to past, present, and

future perspectives on background, experience, and meaning. Imagine the education researcher who assesses a student's present performance and misses the significant dip in performance revealed by a comparison to previous test scores. Imagine the clinical psychologist who is comforted by a client's lack of past self-injurious behavior but fails to assess current suicidal ideation. Imagine the forensic psychologist who fails to assess homicidal intent. While it is said that past behavior is the best predictor of future behavior, it would be folly to ignore the impact of vision, goals, and ideation on future behavior.

Sequencing

Each interview requires a setup, the building of rapport, and a closing. Each of these components serve important functions for the interviewer-respondent relationship.

The setupinforms the participant of the roles and expectations for the interviewer and interviewee. The purpose of the interview, the estimated length of the interview, and the type of questions to be explored should be previewed. This communication of expectations helps the respondents know how to act, reduces apprehension, and helps to establish rapport with the respondent. The level of disclosure in an interview increases as the interviewer moves from descriptive questions to meanings, interpretations, and associations.

Affirmation and feedback are particularly important to build rapport**.** As the respondent reveals more personal information, the nonverbal of the interviewer must communicate interest, respect, appreciation, empathy, and acceptance. Head-nodding, a forwardlean, and no fluencies such as "uh-huh" are useful feedback techniques when used subtly and in moderation. Verbal feedback may, in certain situations, be appropriate, but should be used with caution. Too much verbal response from the interviewer can shift the focus of the interview away from the respondent. Interviewer responses can also have the effect of being evaluative or judgmental. Either a shift in focus or perceived evaluation can effectively shut down respondent disclosure.

The closing of the interview should bring the respondent back to the present environment. This means that you cannot leave a respondent in the depths of interpretation and disclosure. The skillful interviewer gradually decreases the intensity of the questions in the closing process. Author Johnston recently witnessed an interview that neglected the closing technique by following the respondent's intimate disclosure of the tragic death of her daughter with an abrupt, "Well! That's all the questions I have. Thanks."

The closing offers the opportunity to affirm the respondent's contribution to the research. This can be done through a direct statement and also by employing a closing question. The use of a closing questionis consistent with the values of qualitative research. When an interview is structured, the researcher's agenda takes precedence over the respondent's agenda. An open-ended closing question such as "Is there anything else that you'd like to add?" or "Is there anything that I haven't covered in the interview that you'd like to talk about?" gives the respondent an opportunity to address, redirect, and/or correct the research agenda.

The closing of an interview should also clarify the future relationship between the interviewer and respondent. This might include future interviews or meetings, but should at the least involve a commitment to provide research results to the respondent. If the interview marks the closure of a long-term field involvement, the conclusion of this relationship should be fully discussed and acknowledged. If the interview brought up particularly personal or sensitive disclosures, the interviewer should provide information on and/or arrange for appropriate referrals for counseling, employee support, or legal or governmental intervention.

1.7.2 Observation

Another common qualitative research technique is direct observation. The ultimate trade- off between interview and observation techniques is reliance on participants' perceptions or reliance on the researcher's perceptions. Sometimes, such as when researching socially undesirable, traumatic, or highly ego-involved behavior, people are not accurate reporters of their own experience, and their reports are subject to selective perception and filtering. In such a situation the researcher might opt for direct observation. It is necessary to remember, however, that observation, in turn, is subject to the bias of the researcher's perception, interpretation, and analysis.

Observation is, of course, dependent upon access to the group you wish to study. The role of the researcher may vary a great deal depending on the nature of the group being studied. If the researcher has natural membership in the group, this is called full immersion**.** If the researcher interacts with the group as a researcher, this is called artificial immersion**.** With full immersion, the advantage is connection and rapport. Conversely, with artificial immersion, the advantage is some degree of objective separation or distance. The risk of full immersion is over enmeshment with the group that prevents awareness of some processes that are occurring. Conversely, the risk of artificial immersion is that the researcher can never fully be a group participant; the

perspective of the researcher is for- ever that of an outsider looking in. "The ideal in evaluation is to design and negotiate that degree of participation that will yield the most meaningful data about the program given the characteristics of the participants, the nature of the staff-participant interactions, the socio-political context of the program, and the information needs of intended evaluation users" (Patton, 2002).

The researcher's role can vary from complete participant, to primary participant and secondary observer, to primary observer and secondary participant, to complete observer (Busse& Fuchs, 2012).). Some of the richest data are ascertained from participant observation whereby the researcher assumes the role of a group member.

Once group access is attained and the researcher's role is determined, the process of observation begins. First, the researcher simply observes, attending to the details of the setting, people, and activities. Next, the researcher strives to describe the setting, people, and activities of the group. The third step is to attempt to understand the meaning of these activities for individual participants and/or the group identity. Throughout these three stages the researcher is taking copious field notes**,** which are characterized by "thick description**.**" Efforts are made to record participants' own voices as closely as possible. For this reason, video camera recording is increasingly being used to document observation research. Even with the availability of audio and video recording, many qualitative researchers also incorporate handwritten field notes. The benefits of field notes are that they can be less intrusive than recording equipment and thereby encourage participants to actually talk to the researcher, not the camera or recorder. Field notes also provide the opportunity for reflection, interpretation, and analysis as these thoughts occur to the researcher.

There are three ethical considerations unique to observation research. First, is the observation overt or covert? In other words, do the people being observed know that they are being observed? This is particularly problematic when recording equipment is being used. Second, is it ethical to pretend to share the values and goals of a particular group in order to infiltrate the group? Third, if you are to some degree a participant of the group, does leaving the group raise ethical questions?
Observation research is a cyclical process whereby the researcher swings from a sociocultural perspective to a self perspectivein relation to what is being observed. In this cyclical process, the researcher repeatedly moves from the social and cultural analysis of what is being observed to an active reflection of the impact of what is being observed (self-analysis). The researcher's self-knowledge and self-identity affect the perception and interpretation of what is observed. Qualitative

researchers recognize that the impact of observation and participation on the researcher enriches the data.

1.7.3 Questionnaire Design

The questionnaire is 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 to eliciting reliable responses from your chosen sample. The questionnaire is derived from specific research questions because it is the responses that provide answers to the research questions. The aim of the questionnaire is to find out what selected group of participants do, think or feel about a given research issue.

The questionnaireis the most frequently used instrument for the collection of primary dataorinformation, especially in survey research. Every question in the questionnaire must produce responses that will help answer the stated research questions.
A questionnaire design is concerned with the type of questions, their wordinThe reliability and validity of the responses. Since questionnaire design is a crucial elementof 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:

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:

Structured or Fixed Response Questionnaire. This is the type of questionnaire in which
respondents are given response alternatives by the researcher.

Unstructured or Open– Ended Questionnaire. In this type of questionnaire, 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 byrespondents, 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.

1.7.3.1 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 minimized if the researcher is interested in a high response rate
The researcher may also be guided by the following:
Avoid questions which do not relate to the research objectives, research questions and research hypotheses.
Avoid such leading questions as those questions, beginning with such terms as “In view of the fact that”
Avoid unnecessary presumptions about the respondents.
The format to be adopted will depend on the dept of the information required.

1.7.3.2 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.

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.

1.7.3.3 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:
* Relevance
* Consistency
* Usability
* Clarity
* Quantifiability
* Legibility.

The questionnaireis 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 3.1 below, we summarized the overview of the data collection process. It is however important you realize that the research process is less rigid than the figure suggests, especially in a phenomenological study.

Here, we summarized the major decisions or considerations when using a questionnaire as data collection instrument.

Figure 1.1: Major Decisions/Considerations in the Use of Questionnaire

- Samplesize
- Type of questions
- Wording of the questions and how to ensure that they are 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

Figure 1.2: General Rule f or Designing the Questionnaire Questions

- Explain the purpose of the interview or questionnaire to allparticipants
- Keep your questions as simple aspossible
- Avoid the use of jargon or specialistlanguage
- Phrase each question so that only one meaning ispossible
- Avoidvague,descriptivewordssuchas„large‟‟and„small‟‟
- Avoid asking negative questions as these can easily bemisinterpreted
- Only ask one question at atime
- Include relevant questions only (unless needed and necessary, avoidquestions sex or gender andage)
- Include questions which serve as cross-checks on answers to the otherquestions
- Avoid questions which require the respondents to performcalculations
- Avoid leading orvalue- laden questions whichimplywhat the

required
answermight 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 allthe questions required to cover your research purpose and/or answer your research questions and test your stated research hypotheses.
- Minimize the number of open-ended questions to ensure good return and response rate.

1.7.3.4 Administration of the Questionnaire

Three traditional modes of administering the questionnaire include:

(i) Personal Interview - Involves a face – to – face interview whereby the researcher presentsthe questions to the respondents with the aim of helping in theclarification of the questions. This has the highest response rate.

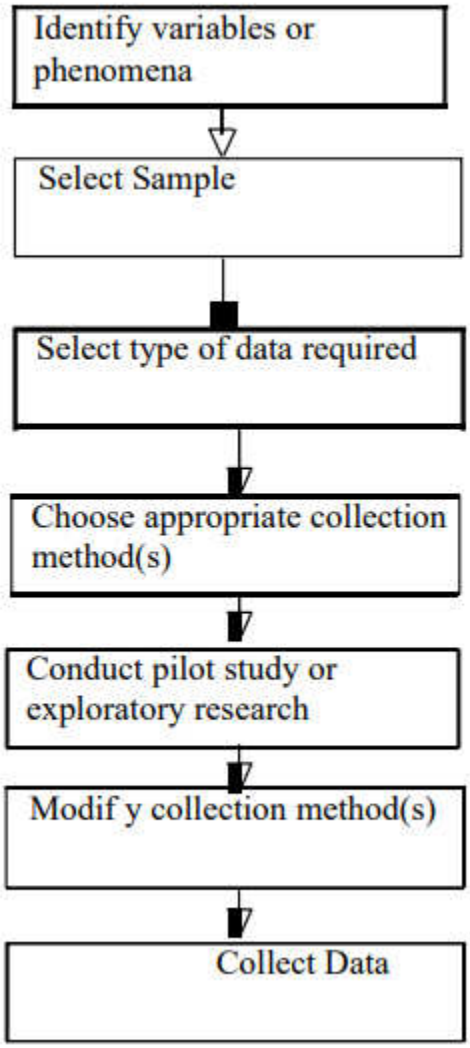
(ii) Telephone Interview - Involves phone calls to the respondents. This mode is not very feasible, especially in developing countries with clumsy telephone services.

(i) Mail- This is the least costly mode. It however has the least rate of response.

Self -Assessment Exercise 1

i. What are the basic tools and methods for data collection for research?
iiWhat are the three traditional modes of administering the questionnaire

Figure 1.3: Overview of the Data Collection Process



1.8 Sources of Data

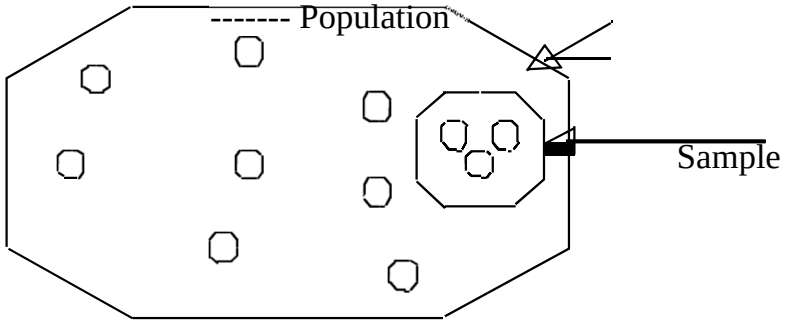
Sources of data include:
Publications. These include published data from such government agencies as the Federal Office of Statistics (FOS), Nigeria Deposit Insurance Corporation (NDIC), Central Bank of Nigeria (CBN), and the World Bank.These are the major sources of secondary data.
Experimentation: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

1.9 Sample Selection

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 3.3 illustrate the difference between a sample and a population

Figure 1.4: Pictorial Representation of the Difference BetweenPopulation 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 criteria. 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.

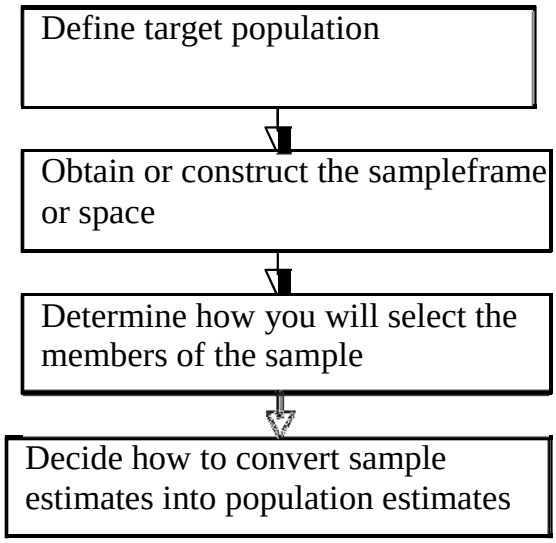
A good and representative sample for the entire population is one in which the results obtained from the sample can be taken to be true for the entire population. It is the one in which you can generalise from the results. In scientific research, it has been said that a good sample must be:

1 Chosen at random that is, every member of the population must have a chance of being selected
2 Large enough to satisfy the needs of the investigation being undertaken

3 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.

Figure 1.5: Selecting a Sample



Self -Assessment Exercise 11

i. How do you describe a good and representative sample
ii. Enumerate and briefly discuss the two major types of questionnaire

1.10 Summary

The different possible methods of data collection has been listed as:
The critical incident method, widely used during in-depth interviews to generate qualitative data.

Diaries, a daily record of events or thoughts used in capturing what people do, think and feel.

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
Interview method

Observation method
Protocol analysis, used in ascertaining the way people behave and think in a given situation.

Questionnaires method
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:

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:

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 give provide the response alternatives.

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) Quantifiability; and,
(vi) Legibility.

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

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 isreferred 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 referredto as a non-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.

1.11 References/Further Readings/Web Resources

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1.12 Possible Answers To Self Assessment Exercises

Self -Assessment Exercise 1

i. **What are the basic tools and methods for data collection for research?**
They are observation, questionnaire, interviews and prospective techniques.

ii. Design a research question of your choice and construct five questionnaire questions from the research question.

i. What are the three traditional modes of administering the questionnaire

Three traditional modes of administering 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 11

ii. How do you describe a good and representative sample

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:

1. Chosen at random that is, every member of the population must have a chance of being selected
2. Large enough to satisfy the needs of the investigation being undertaken
3. Unbiased.

ii. Enumerate and briefly discuss the two major types of questionnaire

Two major types of questionnaire were discussed as including the open-ended type and the fixed- response or closed-ended type.

UNIT 2 VALIDITY AND RELIABILITY

Unit Structure

2.1 Introduction

Conclusions drawn from analyzing 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 is intended to measure and to approximate the truthfulness of result. Researchers often use their own definition when it comes to what is considered valid. In quantitative research, testing for validity and reliability is important. However 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. Research depends on a commitment to testing and increasing the validity as well as the reliability of your research results.

2.2 Intended Learning Outcomes

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

1. Know the need for validity and reliability tests in research
2. Understand how to conduct these two tests
3. Know the consequences of not testing for validity and reliability before using an instrument

2.3 Validity and Reliability Tests

It is not enough simply to create a numeric measure. The measure must be *truthful*— it must accurately reflect the construct. If researchers create a measure of intelligence, they must be sure that this measure actually reflects intelligence. They must also create a measure that is *consistent*—it must yield the same results across time, circumstances, and groups of people. Creating a truthful (valid) and consistent (reliable) quantitative measure is the focus of this unit..

2.4 Validity

Validity is about truthfulness. A measure shows validityif it actually measures what it claims (or is intended) to measure. To illustrate, consider a study by Good, Aronson, and Inzlicht. They developed an intervention designed to improve female, minority, and low-income students' mathematics achievement. The intervention was a mentoring program in which college students encouraged the young people in this study to view intelligence as changeable rather than fixed and to attribute academic difficulties to the novelty of the educational environment rather than to personal inadequacies. The results showed that the middle-school students who took part in the mentoring program showed significant improvement on a standardized mathematics achievement test. This study made an important contribution to understanding how to improve mathematics achievement among groups that have traditionally not done well in math.

The results of this study would have been meaningless without valid measures. The key measure in this study was mathematics achievement, and these researchers needed to show that their measure of mathematics achievement indeed measured that construct. We will describe different types of validity and how it can be established.

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.**(**Carmines &Zeller, 1979).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.

2.4.1 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 administered. The administrator asks a group of random people, untrained observers, if the questions appear valid to them. In research its 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.

2.4.2 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.

2.4.3 Construct Validity

A construct represents a collection of behaviors 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 behaviors 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 evidencethat 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:

Convergent Validity - the degree to which an operation is similar to otheroperations it should theoretically be similar to.

Discriminative Validity - if a scale adequately differentiates itself or does notdifferentiate between groups that should differ or not differ based on theoretical reasons or previous research.

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

Multitrait-Multimethod Matrix - six major considerations when examining
Construct Validity according to Campbell and Fiske. This includes evaluations of the convergent validity and discriminative validity. The others are trait method unit, multi-method/trait, truly different methodology, and trait characteristics.

2.4.4 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.

2.4.5 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.

2.4.6 External Validity

This refers to the extent to which the results of a study can be generalized 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 generalized.

2.4.7 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 (Schwab-Stone, Shaffer, Dulcan, Jensen, Fisher & Bird,1996). 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 criteria.The criteria you use as a standard of judgment accounts for the different approaches you would use:

Predictive Validity –design's ability to predict what it is theoretically abletoPredict. The extent to which a measure predicts expected outcomes.

Concurrent Validity – design's ability to distinguish between groups ittheoretically 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.

Researchers can also establish predictive validity by showing a negative correlation with a measure that is thought to be the opposite of bullying. For example, high predictive validity would exist if scores on the Bullying Index were *negatively* correlated with students' scores on a conflict-avoidance scale. Notice that predictive validity is slightly different from convergent validity. Convergent validity shows a relationship between two measures designed to measure the same

construct (intelligence, bullying).
Predictive validity shows a relationship between the construct in question (bullying) and a related measure, but not one that measures the same construct (detentions).

Self -Assessment Exercise 1

i. Define Internal validity
ii Enumerate and discuss different types of validity

2.5 Reliability

Reliability is the extent to which a measure yields the same scores across different times, groups of people,or versions of the instrument. Reliability is about consistency. If a per- son takes an intelligence test several times, and each time the test produces a similar intelligence test score, that intelligence test has high reliability. (Shaughnessy, Zechmeister, & Zechmeister,2006). Most commercially produced instruments (for example, ACT, SAT) have high reliability. Interestingly, a measure can have high reliability but low validity. Imagine we decide that a measure of intelligence should be the length of one's ear lobe.

Although this measure clearly has no validity, it will have high reliability—ear-lobe length will be
consistent upon repeated measurements. Here we discuss different ways to determine the reliability of a measure.

Cronbach's alpha is the most common way to assess the reliability of self-report items. Cronbach'salpha measures the degree to which the items in an instrument are related. It has a maximum value of 1.0.Values closer to 1.0 reflect a stronger relationship between the test items. For an instrument with a high alpha, participants who score high on one item on the test would also score high on other items on the test. Similarly, participants who score low on one item of the test would also score low on the other items on the test. Tests with low alphas would indicate that there was little similarity of responses.

2.5.1 Test-retest reliability measures the similarity of participants' scores at two different times. The greater the similarity between the two sets of scores, the higher the test-retest reliability. This method of determining reliability is often used for measures of achievement and other types of performance. For example, educators would want intelligence test scores to remain similar over time. Tests on which students' scores were similar across repeated testing sessions would have high test-retest reliability. This procedure can be time-consuming

because it requires you to administer the instrument two times. Also, if the questions are very memorable or
if only a short amount of time has passed between the two test administrations, the test-retest procedure might not work. Instead, two versions of the test may be needed.

An instrument has high **parallel-forms reliability** if similar, but not identical, versions of the same instrument have the same measurement characteristics. The parallel-forms approach solves the problems associated with assessing test-retest reliability. If people's scores on the two different versions are similar, the measure has parallel- forms reliability.(Crocker&Algina,2008) This method of determining reliability is often used when you are trying to determine if a measure changes over time. For example, if you assess student achievement at the beginning and end of a semester with two different achievement tests, the forms will have to be parallel

Self -Assessment Exercise 11

When is an instrument said to have high parallel forms reliability?
Discuss different ways of testing for reliability

2.6 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.
Conclusions drawn from analyzing 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 towhat is considered valid.

To be guided, you can consider the following types of validity:
Face validity
Content validity
Construct validity
Internal and external validity
Statistical validity
Criterion- related validity.

2.7 References/Further Readings/Web Resources

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2.8 Possible Answers To Self-Assessment Exercises

Self -Assessment Exercise 1

i. Define 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.

ii Enumerate and discuss different types of validity

Face validity
Content validity
Construct validity
Internal and external validity
Statistical validity
Criterion- related validity.

Self -Assessment Exercise 11

i. When is an instrument said to have high parallel forms reliability?

An instrument has high **parallel-forms reliability** if similar, but not identical, versions of the same instrument have the same measurement characteristics. The parallel-forms approach solves the problems associated with assessing test-retest reliability. If people's scores on the two different versions are similar, the measure has parallel- forms reliability. This method of determining reliability is often used when you are trying to determine if a measure changes over time.

ii. Discuss different ways of testing for reliability

Cronbach's alpha is the most common way to assess the reliability of self-report items. Cronbach's alpha measures the degree to which the items in an instrument are related. It has a maximum value of 1.0. Values closer to 1.0 reflect a stronger relationship between the test items. **Test-retest reliability** measures the similarity of participants' scores at two different times. The greater the similarity between the two sets of scores, the higher the test-retest reliability. This method of determining reliability is often used for measures of achievement and other types of performance.

UNIT 3 RESEARCH PROPOSAL

Unit Structure

3.1 Introduction

Unit 4 is aimed at informing 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.

3.2 Intended Learning Outcomes

After working through this unit, you will be able to:
1. Understand the purpose of a research proposal
2. Understand the content and types of research proposals
3. Know how you can evaluate the quality of a research proposal

3.3 Introduction to Research Proposals

A research proposal is the blueprint for conducting and controlling research. Writing a proposal is a critical part of the research process. The research proposal reveals the plans of the researcher. Here the researcher demonstrates that he knows what he is seeking, how he will see if it is there, and why the search is worthwhile (Patton, 2002). His inspiration and insight are translated into a step-by-step plan for discovering new knowledge. This may be the relatively informal outline offered by a student to satisfy the requirements of an introduction to research class, dissertation proposal presented to a committee, or a finding request to a foundation or governmental agency. This unit is designed to expose the reader to various aspects of research proposal.

3.4 Purpose of Research Proposal.

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

(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 managementquestions
(iii) To 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 wouldinclude potential problems that may be encountered along the way and methods for avoiding or working around them.

3.5 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 emphasized. The proposal displays the researcher's discipline, organisation, and logic(Robbins,2016).It therefore allows

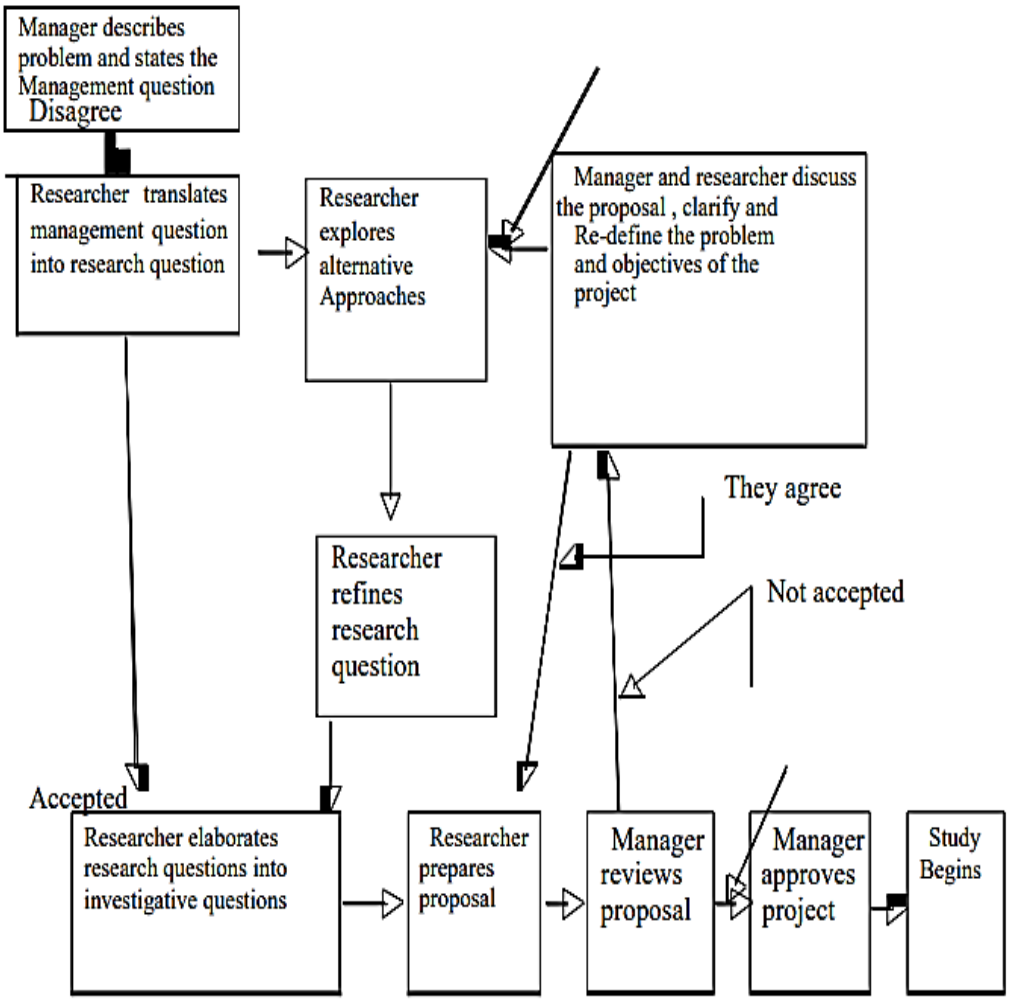
the sponsor of the research to assess both the researcher and the proposed research design, to compare them against competing proposals on current organizational, scholastic, or scientific needs, and to make the best selection for the project.
Comparison of the results of the research project is one of the first steps

in the process of evaluating the overall research. By comparing the final product with the 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. The research proposal acts as a catalyst for discussion between the person conducting the research and the manager (Strauss, & Corbin, 1990)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 ofthe management question, the manager may discover that the interpretation of problem does not reflect all the original symptoms. The proposal thus serves as the basisfor 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 thencalls for an alternative design, such as qualitative or policy analysis studyresearch 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 authorizes 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 comparedto other researchers with competing proposals.

Figure 3.1: The Proposal Development Process

Figure 3.1: The Proposal Development Process



3.6 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

(McCombes, 2019).

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 organized proposal can damage a researcher's reputation more than the decision not to submit a proposal.

Self -Assessment Exercise 1

i. What is a research proposal?
ii. What are the objectives of a business research proposal?

3.7 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 organizations, 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:
(i) Exploratory studies
(ii) Small-Scale studies
(iii) Large-Scale studies.
An exploratory study generates the most simple research proposal. The more complex and common in business is the small-scale study. The large-scale professional study is the most complex proposal.

3.7.1 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 (Van Ekelenburg,2010).

Regardless of the intended audience, in the small-scale proposal, the literature review 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.

3.7.2 External Proposals

An external proposal is either solicited or unsolicited. A solicited proposal is usually inresponse 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 thatproposes 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 organization's management(Patton,2002). 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.

3.8 Contents of students Research Proposal

Preliminary pages

a. Title page
b. Table of contents

Main Body
This section consists of

Chapter 1: Introduction
1.1 Background of the study
1.2 Statement of the problem
1.3 Objective of the study
1.4 Research Question
1.5 Hypothesis
1.6 Significance of the study
1.7 Scope of the study
1.8 Definition of Terms

Chapter 2: Review of Related Literature
2.1 Conceptual Review
2.2 Theoretical Framework
2.3 Empirical Review

Chapter 3; Methodology
3.1 Research Design
3.2 Population of the study
3.3 Sample Size and sampling Techniques
3.4 Method of Data collection
3.5 Validity of the Instrument
3.6 Reliability of the Instrument
3.7 Method of Data Analysis

References
Appendices

Although it is not necessary to follow this rigidly, it should provide a useful outline for the
writing of any proposal. A careful consideration of each category is needed in writing a proposal (Wallwork& Southern,2020)..
Before leaving this unit, take a little time 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 3.1: Proposal Modules: A Comparison of Management-Oriented Proposals and Student Proposals.

Proposal Management Type/Proposal Modules	Internal		External			Government	Student		
	Exploratory Study (ES)	Small-Scale Study (SS)	Large-Scale Study (LS)			Contract	Term Paper	MS Thesis	Ph.D Thesis
Executive Summary	v v v v								
Problem Statement	v v v v v v	v v							
Research Objectives	v v v v v v	v v v							
Literature Review			v			v		v v	
Benefits of Study			v v v v	v					v
Research Design	v v v v	v v v v v							
Data Analysis						v v			v
Nature and form of Results		v v v v	v v v						
Qualification of Researchers				v v v	v				
Budget	v v v v	v v							
Schedule	v v v v	v v v v							v
facilities and Special Resources			v vvv	v vvv					
Project Management						v v			
Bibliography			v			v v	v vv		
Appendices			v			v v	v v		
Measurement			V			v v			V

Assessment Exercise 11

i. Discuss briefly the qualities of an acceptable research proposal?
ii. How does internal research proposal differ from an external research proposal?

3.9 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 were 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 organizations, or corporations can be further classified as either solicited or unsolicited. The larger the project, the more complex the proposal.

3.10 References/Further Readings/Web Resources

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

McCombes, S. (2019). *How to Write a Research Proposal | Guide and Template*.

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Van Ekelenburg, H. (2010). The art of writing good research proposals.*Science Progress*, *93*(4), 429–442.

Wallwork, A., & Southern, A. (2020). *100 Tips to Avoid Mistakes in Academic Writing and Presenting*.Springer International Publishing.

Strauss, A., & Corbin, J. (1990).*Basics of qualitative research: Grounded theory procedures and techniques*

3.11 Possible Answers To Self-Assessment Exercises

Self -Assessment Exercise 1

i. What is a research proposal?

A research proposal is the blueprint for conducting and controlling research. Writing a proposal is a critical part of the research process. The research proposal reveals the plans of the researcher. Here the researcher demonstrates that he knows what he is seeking, how he will see if it is there, and why the search is worthwhile

ii. What are the objectives of a business research proposal?

The objectives of a business research proposal include:

(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.

In presenting your research proposal, you should make your research plan clear and simple.

Self -Assessment Exercise 11

i. Discuss briefly the qualities of an acceptable research proposal?

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.

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

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 organizations, or corporations can be further classified as either solicited or unsolicited. The larger the project, the more complex will be the proposal.

UNIT 4 STRUCTURE AND EVALUATION OF A RESEARCH PROPOSAL

Unit Structure

4.1 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.

4.2 Intended Learning Outcomes

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

4. Know how an acceptable research proposal can be structured
5. Understand the necessary parts of a research proposal
6. Know how to impress a research sponsor and win a research grant

4.3 Structure and Evaluation of Research Proposal

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; and,
(x) The Budget

4.3.1 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 aninformative 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 **(**Singh, Cameron &Duff , 2005).. 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?

4.3.2 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.

4.3.3 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 studythe objectives can be restated as hypothesis(Sandelowski&Barroso 2003).

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 objectives 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.

4.3.4 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.

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.

4.3.5 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.

4.3.6 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.

4.3.7 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 **(**Krathwohl, 2005).

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.

4.3.8 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.

4.3.9 Qualifications of the Research Crew

This module should begin with the principal investigator followed by similar information on all individuals involved with the project. There

are two critical elements here:

1. Professional research competence including relevant research experience, the highest academic degree held, and membership in business and technical societies; and,
2. 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 concisedescription of similar projects that you undertook. Highest degree usually follows your name. 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 specialize 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.

4.3.9 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 (Cooper and Schindler,2001). 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 4.1: 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**

4.3.10 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.

4.3.11 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 specialized 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.

4.3.12 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:

1. The research team's organisation
2. Management procedures and controls for executing the research plan
3. Examples of management and technical reports
4. The research team's relationship with the sponsor
5. Financial and legal responsibility
6. 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.

4.3.13 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 acronyms 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.

Self -Assessment Exercise 1

i. Enumerate the factors that contribute to the acceptance and funding of a research proposal

4.4 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

1. Development of review criteria, using the request for proposal (RFP) guidelines
2. Assignment of points on each criterion, using a universal scale.
3. Assignment of a weight for each criterion, based on the importance of each criterion
4. 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:

1. Neatness
2. Organisation, in terms of being both logical and easily understood
3. Completeness in fulfilling the request for proposal's (RFP‟s) specifications, including budget and time schedule
4. Appropriateness of writing style
5. 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 endavour 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 11

I What are the aims of an executive summary needed for a research proposal?
iiResearch proposals are usually subject to formal or informal reviews.
Iii Discuss the review processes

4.5 Summary

This unit informs you 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; and,
(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

1. Development of review criteria, using the request for proposal (RFP) guidelines
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4. Generation of a score for each proposal, representing the sum of all weighted criterion scores.

Many factors do contribute to the acceptance and funding of a research proposal.

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Among these factors are:

1. Neatness
2. Organisation, in terms of being both logical and easily understood
3. Completeness in fulfilling the request for proposal's (RFP‟s) specifications, including budget and time schedule
4. Appropriateness of writing style
5. Submission within the RFP‟s timeline.

4.6 References/Further Readings/Web Resources

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

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Sandelowski M, Barroso J. Writing the proposal for a qualitative research methodology project. Qual Health Res. 2003;13:781–820

4.7 Possible Answers To Self-Assessment Exercises

Self -Assessment Exercise 1

i. Enumerate the factors that contribute to the acceptance and funding of a research proposal

Among these factors are:
1. Neatness
2. Organisation, in terms of being both logical and easily understood
3. Completeness in fulfilling the request for proposal's (RFP‟s) specifications, including budget and time schedule
4. Appropriateness of writing style
5. Submission within the RFP‟s timeline.

It is important to stress the importance of the technical writing style.

Self -Assessment Exercise 11
i What are the aims of an executive summary needed for a research proposal?

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.

ii Research proposals are usually subject to formal or informal reviews. Discuss the review processes

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

MODULE 4 DATA PRESENTATION AND ANALYSIS

UNIT 1 PRESENTATION AND ANALYSIS OF DATA

1.1 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.

1.2 Intended Learning Outcomes

By the time you must have gone through this unit, you will be able to:

1. Know the first things to do before presenting and analysing a research data
2. Be equipped with the acceptable tools for presentation and analysis of data
3. Effectively present and analyse your data for a given research.

1.3 Data analysis

In the data analysis step, the data gathered are statistically analyzed to see if the hypotheses that were generated have been supported. For instance, to see if unresponsiveness of employees affects customer switching, we might want to do a correlational analysis to determine the relationship between these variables.
Hypotheses are tested through appropriate statistical analysis.

1.4 Interpretation of Data

Now we must decide whether our hypotheses are supported or not by interpreting the meaning of the results of the data analysis. For instance, if it was found from the data analysis that increased responsiveness of employees was negatively related to customer switching (say, 0.3), then we can deduce that if customer retention is to be increased, our employees have to be trained to be more responsive (Creswell&Plano Clark,2011). Another inference from this data analysis is thatresponsiveness of our employees accounts for (or explains) 9% of the variance in customer switching (0.32). Based on these deductions, we are able to make recommendations on how the "customer switching" problem may be solved (at least to some extent); we have to train our employees to be more flexible and communicative. Note that even if the hypothesis on the effect of unresponsiveness on customer switching is not supported,our research effort has still been worthwhile(Bishop, Fienberg, &Holland, 1975). Hypotheses that are not supported allow us to refine our theory by thinking about why it is that they were not supported. We can then test our refined theory in future research.
In summary, there are seven steps involved in identifying and resolving a problematic issue. To make sure that the seven steps of the hypothetico-deductive method are properly understood, let us briefly review an example in an organizational setting and the course of action taken in the seven steps.

1.5 Getting the Data Ready for Analysis

After data are obtained through questionnaires, they need to be coded, keyed in, and edited. That is, a categorization scheme has to be set up before the data can be typed in. Then, outliers, inconsistencies, and blank responses, if any, have to be handled in some way. Each of these stages of data preparation is dis- cussed below.

1.5.1 Coding and data entry

The first step in data preparation is data coding. **Data coding** involves assigning a number to the participants' responses so they can be entered into a database. Earlier, we discussed the convenience of electronic surveys for collecting questionnaire data; such surveys facilitate the entry of the responses directly into the computer without manual keying in of the data. However, if, for whatever reason, this can- not be done, then it is perhaps a good idea to use a coding sheet first to transcribe the data from the questionnaire and then key in the data (Neuendorf,2002).. This method, in contrast to flipping through each questionnaire for each item, avoids confusion, especially when there are many questions and a large number of questionnaire as well.

1.5.1.1. Coding the responses

Assuming we have 22 items measuring perceived equity, job enrichment, burn- out, job satisfaction, and intention to leave, and six demographic variables,in a sample questionnaire.

The responses of this particular employee (participant #1 in the data file) to the first 22 questions can be coded by using the actual number circled by the respondent (1, 2, 3, 1, 4, 5, 1, 3, 3, etc.). Coding the demographic variables is somewhat less obvious. For instance, tenure is a special case, because it is a two□category variable. It is possible to use a coding approach that assigns a 1 = part□time and a 2 = full□time. However, using 0 = part□time and 1 = full□time (this is called *dummy coding*) is by far the most popular and recommended approach because it makes our lives easier in the data analysis stage. Hence, we code tenure (full□time) with 1 for participant #1. Work shift (third shift) can be coded 3, department (production) 2, and age 54. Gender can be coded 0 (male). Finally, education (less than high school) can be coded 1.

At this stage you should also think about how you want to code nonresponses. Some researchers leave non- responses blank, others assign a “9,” a “99” or a “.” All the approaches are fine, as long as you code all the nonresponses in the same way.

Human errors can occur while coding. At least 10% of the coded questionnaires should therefore be checked for coding accuracy. Their selection may follow a systematic sampling procedure. That is, every *n*th form coded could be verified for accuracy. If many errors are found in the sample, all items may have to be checked.

1.5.2 Data entry

After responses have been coded, they can be entered into a database. Raw data can be entered through any soft- ware program. For instance, the SPSS Data Editor, which looks like a spreadsheet can enter, edit, and view the contents of the data file.

Each row of the editor represents a case or observation, and each column represents a *variable.*. It is important to always use the first column for identification purposes; assign a number to every questionnaire, write this number on the first page of the questionnaire, and enter this number in the first column of your data file. This allows you to compare the data in the data file with the answers of the participants, even after you have rearranged your data file.

Then, start entering the participants' responses into the data file.

Self -Assessment Exercise 1

1. What is the first step in data preparation?
2. Editing process will enable you discover and correct possible errors in the data you collected. Identify these errors

1.6 Editing data

After the data are keyed in, they need to be edited. For instance, the blank responses, if any, have to be handled in some way, and inconsistent data have to be checked and followed up. **Data editing** deals with detecting and correcting illogical, inconsistent, or illegal data and omissions in the information returned by the participants of the study. An example of an *illogical response* is an **outlier** response. An outlier is an observation that is substantially different from the other observations. An outlier is not always an error even though data errors (entry errors) are a likely source of outliers. Because outliers have a large impact on the research results they should be investigated carefully to make sure that they are correct. You can check the dispersion of nominal and/or ordinal variables by obtaining minimum and maximum values and frequency tables. This will quickly reveal the most obvious outliers. For interval and ratio data, visual aids (such as a scatterplot or a boxplot) are good methods to check for outliers. *Inconsistent responses* are responses that are not in harmony with other information. For instance, a participant in our study might have answered the perceived equity statements. . Note that all the answers of this employee indicate that the participant finds that the benefits she receives from the organization balance the efforts she puts into her job, except for the answer to the third statement. From the other four responses we might infer that the participant in all probability feels that, for the efforts she puts into the organization, she *does* get much in return and has made a mistake in responding to this particular statement. The response to this statement could then be edited by the researcher.

It is, however, possible that the respondent deliberately indicated that she does not get much in return for the efforts she puts into the organization. If such were to be the case, we would be introducing a bias by editing the data. Hence, great care has to be taken in dealing with inconsistent responses such as these. Whenever possible, it is desirable to follow up with the respondent to get the correct data, even though this is an expensive solution. *Illegal codes* are values that are not specified in the coding instructions. For example, a code of "6" in question 1 (I invest more in my work than I get out of it) would be an illegal code.

The best way to check for illegal codes is to have the computer produce a frequency distribution and check it for illegal codes.

Not all respondents answer every item in the questionnaire. *Omissions* may occur because respondents did not understand the question, did not know the answer, or were not willing to answer the question.

If a substantial number of questions – say, 25% of the items in the questionnaire – have been left unanswered, it may be a good idea to throw out the questionnaire and not include it in the data set for analysis (Lomb,1976).. In this event, it is important to mention the number of returned but unused responses due to excessive missing data in the final report submitted to the sponsor of the study. If, however, only two or three items are left blank in a questionnaire with, say, 30 or more items, we need to decide how these blank responses are to be handled.

One way to handle a blank response is to ignore it when the analyses are done. This approach is possible in all statistical programs and is the default option in most of them (Creswell, Plano Clark&Garrett,2008)..

A disadvantage of this approach is that, of course, it will reduce the sample size, sometimes even to an inappropriate size, whenever that particular variable is involved in the analyses. Moreover, if the missing data are not missing completely at random, this method may bias the results of your study. For this reason, ignoring the blank responses is best suited to instances in which we have gathered a large amount of data, the number of missing data is relatively small, and relationships are so strong that they are not affected by the missing data (Hair, Anderson, Tatham & Black, 1995).

An alternative solution would be to look at the participant's pattern of responses to other questions and, from these answers, deduce a logical answer to the question for the missing response. A second alternative solution would be to assign to the item the mean value of the responses of all those who have responded to that particular item. In fact, there are many ways of handling blank responses (see Hair *et al*., 1995), each of them having its own particular advantages and disadvantages.

Note that if many of the respondents have answered "don't know" to a particular item or items, further investigation may well be worth- while. The question might not have been clear or, for some reason, participants could have been reluctant or unable to answer the question.

1.7 Data Transformation

Data transformation, a variation of data coding, is the process of changing the original numerical representation of a quantitative value to another value. Data are typically changed to avoid problems in the next stage of the data analysis process. For example, economists often use a logarithmic transformation so that the data are more evenly distributed. If, for instance, income data, which are often unevenly distributed, are reduced to their logarithmic value, the high incomes are brought closer to the lower end of the scale and provide a distribution closer to a normal curve.

Another type of data transformation is reverse scoring. Take, for instance, the perceived inequity measure of the Excelsior Enterprises case. Perceived inequity is measured by five survey items: (1) "I invest more in my work than I get out of it"; (2) "I exert myself too much considering what I get back in return"; (3) "For the efforts I put into the organization, I get much in return" (reversed); (4) "If I take into account my dedication, the organization ought to give me a better practical training"; and (5) "In general, the benefits I receive from the organization outweigh the effort I put in" (reversed). For the first, second, and fourth items, a score indicating high agreement would be negative, but for the third and fifth questions, a score indicating high agreement would be positive. To maintain consistency in the meaning of a response, the first, second, and fourth items have to be reverse scored (note that we are measuring equity and not inequity). In this case, a 5 ("I completely agree") would be trans- formed to a 1 ("I completely disagree"), a 4 to a 2, and so forth.

Data transformation is also necessary when several questions have been used to measure a single concept. In such cases, scores on the original questions have to be combined into a single score (but only *after* we have established that the inter item consistency is satisfactory (see Testing goodness of data, later on in this Unit). For instance, because five items have been used to measure the concept "perceived equity", a new "perceived equity" score has to be calculated from the scores on the five individual items (but only after items 1, 2, and 4 have been reverse coded). This involves calculating the summed score (per case/participant) and then dividing it by the number of items (five in this case). For example, our employee #1 has circled, respectively, 1, 2, 3, 1, and 4 on the five participation in decision-making questions; his (employee #1 is a man) scores on the items, once items 1, 2, and 4 have been reverse coded, are 5, 4, 3, 5, and 4. The combined score on perceived equity would be 5 4 3 5 4 21/5 4.2). This

combined score is included in a new column in SPSS. It is easy to compute the new variables, using the *Compute* dialog box, which opens when the *Transform* icon is chosen.

Note that it is useful to set up a scheme for categorizing the responses such that the several items measuring a concept are all grouped together. If the questions measuring a concept are not contiguous but scattered over various parts of the questionnaire, care has to be taken to include all the items without any omission or wrong inclusion.

Self -Assessment Exercise 11

1. Describe the two types of data analysis discussed in this unit
2. What is data transformation?

1.8 Summary

This unit has worked on the necessary preliminaries in the processing, presentation, and analysis of research data. You were informed on the Some Basic Preliminaries in the Analysis and Presentation of Data, Coding and data entry, data editing, data transformation, data analysis and interpretation of data.

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 are used according to the nature of information obtained, as well as the type of analysis required by the research.

1.9 References/Further Readings/Web Resources

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1.10 Possible Answers To Self Assessment Exercises

Self -Assessment Exercise 1

i What is the first step in data preparation?

The first step in data preparation is data coding. **Data coding** involves assigning a number to the participants' responses so they can be entered into a database. Earlier, we discussed the convenience of electronic surveys for collecting questionnaire data; such surveys facilitate the entry of the responses directly into the computer without manual keying in of the data.

i. Editing process will enable you discover and correct possible errors in the data you collected. Identify these errors

The errors can be either of the followings: numeric errors, errors of transposition, errors of inappropriate response, and errors of omission.

Self -Assessment Exercise 11

i. Describe the two types of data analysis discussed in this unit

Two types of data analysis are 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.

ii. **What is data transformation?**

Data transformation, a variation of data coding, is the process of changing the original numerical representation of a quantitative value to another value. Data are typically changed to avoid problems in the next stage of the data analysis process. For example, economists often use a logarithmic transformation so that the data are more evenly distributed.

UNIT 2 PRESENTATION OF STUDENT'S ACADEMIC RESEARCH REPORT

Unit Structure

2.1 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.

2.2 Intended Learning outcomes

At the end of this unit, you will be guided on:
1. Plan of the research report
2. Setting a time table
3. Content of individual sections of the report

2.3 Guidance on Presentation of Research Reports

In this section, you will be guided on the required activities in the presentation of research reports including, planning of the report; setting a timetable; and, arranging the content of individual sections of the

report.

2.4 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 (Palys & Atchison,2014). 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.

2.4.1 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 summarized in exhibit 2.1 below.

Exhibit 2.1: Guide to Report Design

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 standardized 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 throughout a report.
- Avoid the combination of red and green for adjacent data, which can be a problem Forcolour-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?*

2.4.2 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 2.1 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.(Hussey and Hussey,1997) 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.

2.4.3 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 (Sheppard & Fennell,2019). 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.

2.5 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 coinciding with when you have finished writing up the report(Schutt,2012).(. 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 2.1 gives a breakdown of the main tasks for a full-time Ph. D student.

Table 2.2: 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, Appendices, etc	1
Consultation with Supervisors and/or others and revision	n s 2
Editing, Proof reading, and Binding	3
TOTAL	**24**

The time schedule shown in table 2.2 assumes that some preliminary work has been done, for example, most of the references 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.

Self -Assessment Exercise 1

i. Describe five strategies that can be adopted when writing a final research report.
ii. The overall structure of your final research report, dissertation or thesis must be logical and clear.Explain.

2.6 Content of Individual Sections of the Research Report

The research report is presented in a particular format. The format varies from place toplace 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:
(i) The Preliminaries
(ii) The Main Body (chapters 1 to 5)
(iii) The Appendix

2.6.1 Preliminary Pages

Title page ---------- (i)
Certification ---------- (ii)
Dedication---------- (iii)
Acknowledgement--------- (iv)
Table of Content---------- (v)
List of Tables---------- (vi)
List of Figures ---------- (vii)
Abstract---------- (viii)

Abstract

The abstract is a summary of the research project. The abstract appears first because it allows readers to decide whether the topic is of enough interest to continue reading more of the paper. Different publication outlets will specify different lengths for the abstract. In general, abstracts are limited to 150 words. Some researchers think
this is the hardest part of the paper to write. Many find it easier to write the abstract last, because writing the whole paper gives you an idea of what ideas are important enough to be included in the abstract (Patton,2015).

The abstract should contain one-sentence summaries of the main sections of the paper: introduction, method, results, and discussion.

2.6.2 The Main Body

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. The introductionsets the stage for the research. If you are writing an article that you would like other professional researchers or practitioners to read, the introduction should contain a review of the research literature that is relevant to the current investigation.
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.

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

1.3 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.

1.4 Statement of Hypotheses – Hypotheses refers to intelligent guesses which the researcher formulates to guide his or her search for the solution to the problem.

1.5 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.

1.6 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.

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

Chapter 2: Review of Related Literature.

Research supervisors' preferences as to the literature reviewvary: some would like a full (near-exhaustive) review of the literature,

whereas others want the introduction to look more like it is ready to go out for journal publication. For a conference presentation or a journal manuscript, the literature review should not be exhaustive; rather, it should set the stage for the upcoming study. Some journals suggest about seven manuscript pages for the literature review. For an undergraduate honor's, master's dissertation or Ph.D thesis, the literature review will be much longer, perhaps 15 to 20 pages.

In addition to reviewing the literature (that is, existing published research studies upon which your research is building), the purpose of this section is to introduce the area being studied and make the case for why we should care about research in this area. Specifically, the APA *Publication Manual* suggests that writers: (1) state why the problem is important, (2) link the research method to be used to the area of inquiry, and (3) describe the theoretical implications of the proposed investigation. The *Publication Manual* recommends that these questions be answered in one or two paragraphs.

This chapter presents the review of a literature relevant to the research topic usually organized 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.

The methodology sectionis the recipe for the study, and all the ingredients of the study and instructions regarding how these ingredients were combined and processed must be included. We described previously the emphasis on precision and accuracy in social scientific writing, and it is perhaps nowhere more important than in the method section. Precision is crucial because it allows prior researchers to compare their methods to yours and will allow future researchers to use your study as a basis for planning their own studies (Saylor Academy, 2012)

This chapter is made up of the following sections:

3.1 Restatement of The Relevant Research Questions and Hypotheses: This is 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 population is 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 analyzes 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 relatedto either the research questions or hypotheses, but relevant in the study will be presented and analyzed in this section.

Chapter 5 Summary of Findings, Recommendations And Conclusions.

The relevantsections in this chapter include:
5.1 Summary of Findings
5.2 Recommendations Based On Research Findings
5.3 Conclusion.

Self -Assessment Exercise 11

i. Briefly describe the abstract page
ii. Identify the three major sections of a research report

2.7 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(Pyrczak, & Bruce,2005). 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 havea 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:

The Preliminaries

The Main Body (chapters 1 to 5) The Appendix

2.8 References/Further Readings/Web Resources

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2.9 Possible Answers To Self Assessment Exercises

Self -Assessment Exercise 1

iii. Describe five strategies that can be adopted when writing a 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
   Revising full drafts

iv The overall structure of your final research report, dissertation or thesis must be logical and clear. Explain.

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 2.1 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.

Self -Assessment Exercise

i. Briefly describe the abstract page

The abstractis a summary of the research project. The abstract appears

first because it allows readers to decide whether the topic is of enough interest to continue reading more of the paper. Different publication outlets will specify different lengths for the abstract. In general, abstracts are limited to 150 words. Some researchers think this is the hardest part of the paper to write. Many find it easier to write the abstract last, because writing the whole paper gives you an idea of what ideas are important enough to be included in the abstract. The abstract should contain one-sentence summaries of the main sections of the paper: introduction, method, results, and discussion.

ii. Identify the three major sections of a research report

Essentially, research report comprises three major sections as follows:
The Preliminaries
The Main Body (chapters 1 to 5) The Appendix

MODULE 5 CONTEMPORARY ISSUES IN RESEARCH

UNIT 1 ETHICS IN BUSINESS RESEARCH

Unit Structure

1.1 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.

1.2 Intended Learning Outcomes

At the end of this unit, you should be able to:
1. Understand what ethics in research is all about
2. Know how to treat respondents and subjects in an ethical manner
3. Know your ethical responsibility to your team members in your research activities
4. Understand professional ethics standards.

1.3 The Research Ethics

There appears to be no single approach to research ethics.

Advocating single adherenceto a set of laws appears difficult due to the observed unforeseen constraints put onresearchers. Nevertheless, our discussions touch on important and global ethical issues in research.

These issues revolve around treatment of respondents and subjects, the research sponsors, the research team members, and professional standards.

1.4 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 safeguarded (Barnes, 1977). 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.
Explain the benefits of the research
Explain the respondent rights and protections
Obtain informed consent

1.4.1 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, to know the person they are speaking with, and motivate them to give accurate answers to the questionnaire questions (Cooper and Schindler,2001).
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.

1.4.2 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:

- To prevent biasing the respondents before the survey or experiment; and,
- 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.

1.4.3 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 (Israel 2006). 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 1.1 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.

Exhibit 1.1: Informed Consent Procedures for Surveys

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.

Source: Adapted from Surveys conducted by Indiana University Centre for Survey Research

1.5 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.

1.5.1 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 dissociateitself 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.

1.5.2 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:
Provision of a research design appropriate for the research question
Maximisation of the sponsor's value for the resources expended
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 (Shamoo, Adil, and Resnik2015)..

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

Self -Assessment Exercise 1

1. Enumerate any five unethical behaviours a research specialist should avoid.
2. Discuss three guidelines recommended to safeguard against unethical treatment of respondents and subjects

1.6 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

respondent (Francis 2014)

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 (Kimmel 1988).

1.7 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 11

1. i Define deception
2. iiWhat is the aim of ethics in research?

1.8 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 ormentally. To safeguard against these, the following guidelines have been recommended.

- Explain the benefits of the research
- Explain the respondent rights and protections
- 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.

1.9 References/Further Readings/Web Resources

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1.10 Possible Answers to Self Assessment Exercises

Self -Assessment Exercise 1

i. Enumerate any five unethical behaviours a research specialist should avoid.

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

ii. Discuss three guidelines recommended to safeguard against unethical treatment of respondents and subjects

iii.

a. Explain the benefits of the research
b. Explain the respondent rights and protections
c. Obtain informed consent

Self -Assessment Exercise 11

i Define 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:

a. To prevent biasing the respondents before the survey or experiment; and,
b. 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.

ii What is the aim of ethics in research?

The aim of ethics in research is to ensure that no one is harmed or suffers adverse consequences from research activities.

UNIT 2 PROBLEMS OF RESEARCH IN DEVELOPING COUNTRIES

Unit Structure

2.1 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.

2.2 Intended Learning Outcomes

At the end of this unit, you will be able to:
Know the problems facing researchers in developing countries in general and, specifically, in Nigeria.
Come up with an acceptable research proposal on the research environment of developing countries
Make propositions on the way forward on carrying out research in developing countries in general and specifically, in Nigeria.

2.3 Enumerating the Problems of Research in Developing countries

There are several dimensions in the discussion of the problems of research in developing countries but, as a starting point, let us just bring to lime light the basis for the problems. This ranges from scarcity of research data to research attitudes of the private business sub-sectors.

2.3.1 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.

2.3.2 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 organized businesses (Nwogu,2006). 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.

2.3.3 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 this 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 meager salaries to fund their individual research activities. They must either publish or perish.

2.3.4 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 equipments 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.

2.3.5 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 (Adams, Gurney, Hook andLeydesdorff 2014). 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.

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.

2.3.7 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(Harle 2010). 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.

2.3.8 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 (Adams .King .and Hook 2010). This situation can make follow-up studies on these people impossible.

2.3.9 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 well being. This attitude has been observed even among literate members of the society (Harle, 2011. 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.

Self -Assessment Exercise 1

a. What are the major implications of the observed lack of research and development culture among Nigerian business organizations?
b. Do you think that the crave for publications in the University systems of developing countries appears to be doing more harm than good in the field of research. Why?.

2.4 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 organizations appear to feel completely alienated from research. This explains their look warm attitude to research and development activities(Kothari,2004). 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 commercialization 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 organizations. Major scientific and technological breakthroughs are not easily and promptly commercialized in most developing countries. There exists cases where major scientific and technological breakthroughs by some individuals in Nigeria, for example, died almost immediately for lack of interest by business organizations. Businesses appear not to be willing to fund commercialization of such breakthroughs, or even to support further research on them. Though these developing countries think of catching up with developed countries, they have not shown sign of interest in research activities leading to economic progress.

Self -Assessment Exercise 11

I Discuss briefly with examples two major problems of research in Nigeria.

2.5 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; and, (x) the busiest 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.

2.6 References/Further Readings/Web Resources

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2.7 Possible Answers To Self Assessment Exercises

Self -Assessment Exercise 1

i. What are the major implications of the observed lack of research and development culture among Nigerian business organizations?

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.

ii Do you think that the crave for publications in the University systems of developing countries appears to be doing more harm than good in the field of research. Why?.

Yes. 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

Self -Assessment Exercise 11

i Discuss briefly with examples two major problems of research in Nigeria.

The various problems of research in Nigeria 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; and, (x) the busiest sector factor.

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 equipments 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.

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

UNIT 3 SPSS OPERATIONS IN RESEARCH

Unit Structure

3.1 Introduction

In this unit we will show you a variety of SPSS operations. SPSS is a Windows based program that can be used to perform data entry and analysis and to create tables and graphs. SPSS is capable of handling large amounts of data and can perform all of the analyses covered in the text and much more. We feel it will be important to be aware of the importance of SPSS in research

3.2 Intended Learning Outcomes

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

- Learn about SPSS
- Open SPSS
- Review the layout of SPSS
- Become familiar with Menus and Icons
- Exit SPSS

3.3 Introduction to SPSS

This is a user-friendly and powerful statistics package that isavailable on most university campuses. There are various options for statistical computing, however, and much of what we teach in this book could be performed with the spread- sheet program Microsoft Excel. In this section we show you a variety of SPSS operations. These are the basic operations, and may look

familiar to anyone who is proficient with spreadsheet programs.

3.3.1. What is SPSS?

SPSS is a Windows based program that can be used to perform data entry and analysis and to create tables and graphs. SPSS is capable of handling large amounts of data and can perform all of the analyses covered in the text and much more. SPSS is commonly used in the Social Sciences and in the business world, so familiarity with this program should serve you well in the future(Pallant,2015).. SPSS is updated often. This document was written around an earlier version, but the differences should not cause any problems..

3.3.2. Opening SPSS

Depending on how the computer you are working on is structured, you can open SPSS in one of two ways.

1. If there is an SPSS shortcut like this on the desktop, simply put the cursor on it and double click the left mouse button.

2. Click the left mouse button on the button on your screen, then put your cursor on Programs or All Programs and left click the mouse. Select SPSS 17.0 for Windows by clicking the left mouse button. (For a while that started calling the program PASW Statistics 17, but they seem to have given that up as a dumb idea when everyone else calls it SPSS. The version number may change by the time you read this.) Either approach will launch the program.

Use one of these approaches to open SPSS yourself.
You will see a screen that looks like the image on the next page. The dialog box that appears offers choices of running the tutorial, typing in data, running queries, or opening an existing data source. The window behind this is the Data Editor window which is used to display the data from whatever file you are using. You could select any one of the options on the start-up dialog box and click OK, or you could simply hit Cancel. If you hit Cancel, you can either enter new data in the blank Data Editor or you could open an existing file using the File menu bar as explained later.
Click Cancel, and we'll get acquainted with the layout of SPSS.

3.3.3. Layout of SPSS

The *Data Editor* window has two views that can be selected from the lower left hand side of the screen. *Data View* is where you see the data you are using. *Variable View* is where you can specify the format of

your data when you are creating a file or where you can check the format of a pre-existing file. The data in the *Data Editor* is saved in a file with the extension .save.
Start-up dialog box
Icons
Menu bar
The other most commonly used SPSS window is the *SPSS Viewer* window which displays the output from any analyses that have been run and any error messages (Field, 2009). Information from the Output Viewer is saved in a file with the extension .spo. Let's open an output file and look at it.

On the File menu, click Open and select Output. Select *appendixoutput.spo*from the files that can be found at http://www.uvm.edu/~dhowell/fundamentals7/SPSSManual/SPSSLongerManual/DataForSPSS/. (At the moment this set of web pages is the most recent version whichever of my books you are using.) Click Ok. The following will appear. The left hand side is an outline of all of the output in the file. The right side is the actual output. To shrink or enlarge either side put your cursor on the line that divides them. When the double headed arrow appears, hold the left mouse button and move the line in either direction. Release the button and the size will be adjusted.
Finally, there is the *Syntax* window which displays the command language used to run various operations. Typically, you will simply use the dialog boxes to set up commands, and would not see the Syntax window. The Syntax window would be activated if you pasted the commands from the dialog box to it, or if you wrote you own syntax--something we will not focus on here. Syntax files end in the extension .
SPSS Menus and Icons
Now, let's review the menus and icons.

Review the options listed under each menu on the Menu Bar by clicking them one at a time. Follow along with the below descriptions.
File includes all of the options you typically use in other programs, such as open, save, exit. Notice, that you can open or create new files of multiple types as illustrated to the right.
Edit includes the typical cut, copy, and paste commands, and allows you to specify various options for displaying data and output.

Click on Options, and you will see the dialog box to the left. You can use this to format the data, output, charts, etc. These choices are rather overwhelming, and you can simply take the default options for now. The author of your text (me) was too dumb to even know these options could easily be set.
View allows you to select which toolbars you want to show, select font size, add or remove the gridlines that separate each piece of data, and to

select whether or not to display your raw data or the data labels.
Data allows you to select several options ranging from displaying data that is sorted by a specific variable to selecting certain cases for subsequent analyses.

Transform includes several options to change current variables. For example, you can change continuous variables to categorical variables, change scores into rank scores, add a constant to variables, etc.
Analyze includes all of the commands to carry out statistical analyses and to calculate descriptive statistics. Much of this book will focus on using commands located in this menu.

Graphs includes the commands to create various types of graphs including box plots, histograms, line graphs, and bar charts.
Utilities allows you to list file information which is a list of all variables, there labels, values, locations in the data file, and type.
Add-ons are programs that can be added to the base SPSS package. You probably do not have access to any of those.

Window can be used to select which window you want to view (i.e., Data Editor, Output Viewer, or Syntax). Since we have a data file and an output file open, let's try this.

Select Window/Data Editor. Then select Window/SPSS Viewer.
Help has many useful options including a link to the SPSS homepage, a statistics coach, and a syntax guide. Using topics, you can use the index option to type in any key word and get a list of options, or you can view the categories and subcategories available under contents. This is an excellent tool and can be used to troubleshoot most problems.
The Icons directly under the Menu bar provide shortcuts to many common commands that are available in specific menus. Take a moment to review these as well.

Place your cursor over the Icons for a few seconds, and a description of the underlying command will appear. For example, this icon is the shortcut for Save. Review the others yourself.
In the chapters that follow, we will review many specific functions available through these Menus and Icons, but it is important that you take a few moments to familiarize yourself with the layout and options before beginning.

3.3.4. Exiting SPSS

To close SPSS, you can either left click on the close button located on the upper right hand corner of the screen or select Exit from the File menu.

Choose one of these approaches.

A dialog box like the one below will appear for every open window asking you if you want to save it before exiting. You almost always want to save data files. Output files may be large, so you should ask yourself if you need to save them or if you simply want to print them.
Click No for each dialog box since we do not have any new files or changed files to save.

Self Assessment Exercises1

i. What is SPSS?
ii. Describe the two views that can be selected from the lower left hand side of the screen

3.4. Importance of SPSS in Research & Data Analysis Programs:

SPSS is revolutionary software mainly used by research scientists which help them process critical data in simple steps. Working on data is a complex and time consuming process, but this software can easily handle and operate information with the help of some techniques. These techniques are used to analyze, transform, and produce a characteristic pattern between different data variables(Henseler, Ringle, & Sarstedt,2015). In addition to it, the output can be obtained through graphical representation so that a user can easily understand the result. Read below to understand the factors that are responsible in the process of data handling and its execution.

1. Data Transformation: This technique is used to convert the format of the data. After changing the data type, it integrates same type of data in one place and it becomes easy to manage it. You can insert the different kinds of data into SPSS and it will change its structure as per the system specification and requirement. It means that even if you change the operating system, SPSS can still work on old data.

2. Regression Analysis: It is used to understand the relation between dependent and interdependent variables that are stored in a data file. It also explains how a change in the value of an interdependent variable can affect the dependent data. The primary need of regression analysis is to understand the type of relationship between different variables.

3. ANOVA(Analysis of variance): It is a statistical approach to compare events, groups or processes, and find out the difference

between them. It can help you understand which method is more suitable for executing a task. By looking at the result, you can find the feasibility and effectiveness of the particular method.

4. MANOVA(Multivariate analysis of variance): This method is used to compare data of random variables whose value is unknown. MANOVA technique can also be used to analyze different types of population and what factors can affect their choices (Finch & French,2013).
5. T-tests: It is used to understand the difference between two sample types, and researchers apply this method to find out the difference in the interest of two kinds of groups. This test can also understand if the produced output is meaningless or useful.

   This software was developed in 1960, but later in 2009, IBM acquired it. They have made some significant changes in the programming of SPSS and now it can perform many types of research task in various fields. Due to this, the use of this software is extended to many industries and organizations, such as marketing, health care, education, surveys, etc.

3.5 Getting Started

After you open SPSS, you are asked which of several things you would like to do. Most of the time you will want to select either *Type in data* (if you need to create a dataset) or *Open an existing data source* (if you have already entered data or were given a dataset). If you type in data, the interface is almost identical to that of a spreadsheet program (with one added feature, discussed next). If you want to edit an existing dataset, it is easy to browse for your file. You can also open other types of documents, including Excel, Lotus, or SAS files. Because using SPSS is similar to using a spreadsheet, common operations, such as Copy, Cut, Save As, and others, can be used in both Mac and Windows platforms.

3.6 Variable View versus Data View

SPSS allows you to view your spreadsheet in one of two ways: Data View or Variable View. *Data View* arranges the names of the variables in the columns (down) and the cases (participants who filled out or completed your data) across the rows. This is the standard way in which most spreadsheets are viewed. *Variable View* allows you to see the list of variables and their features but not the actual cells of the spreadsheet. To select this option, click on the *Variable View* button in the bottom left-h3nd corner of the screen. *Variable View* is convenient if you have a dataset with hundreds of variables. Instead of scrolling across the screen to find the name of the variable you need, *Variable View* shows all of

the variables in the first column.

3.7 Types of Variables

The two most common types of variables in SPSS are *string variables* and *numeric variables*. You should specify a numeric variable for quantitative variables and a string vari- able for variables that include text (for example, male, female). The variable name can have a maximum of eight characters, regardless of whether it is string or numeric. String variables can have a maximum of 32,760 characters as the data input. Numeric variables have a maximum of 40 numeric values in front of the decimal place and 16 values beyond the decimal point. *Numeric variable* is the default selection, but the type of variable can be changed by left-clicking the gray box inside the variable type column (the second column in *Variable View*).
To enter data, go to *Data View* and begin typing as in any other spreadsheet. You can also cut and paste data from a text file or spreadsheet file. For numeric variables, simply enter the values from your computer's numeric keypad. For string variables, type the characters (for example, *male*) in the appropriate cell.

3.8 Labels and Values

After you have entered the data, SPSS allows you to enter variable labels (called *Labels*) when in *Variable View*. Because the name of the variable can be only eight characters, the label is very helpful in identifying the variable. Imagine a survey question that asks, "All things considered, how happy would you consider your life to be?" The name of the variable must be less than eight characters; perhaps you could call it *lifesat*. The *Label* field, however, allows you to type in the whole survey question. This is particularly helpful when you have many variables or when your collaborators use the data but do not know or remember the exact items.

The *Values* field allows you to use words to describe your numeric values. Imagine a survey that has a five-point scale with 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, and 5 = strongly agree. In the cells of the data file you would enter the appropriate numbers (Hair, Ringle & Sarstedt, 2011). To help you and other researchers identify what those numbers correspond to, you would enter the descriptive words (for example, "strongly agree") in the *Label* column (see Figure 1.3). This assists the researchers in identifying what the numbers mean. These values also get printed on any output that is produced, making it easier to read the results.

SPSS
Open SPSS.
Select *Type in data.*
Go to *Variable View.*

Enter the following variable names: ID (numeric), gender (string), act (numeric), gpa (numeric), yearsch (numeric), satis (numeric).
Enter the following labels for the six variables: student ID number, student gender, ACT score, cumulative college GPA, year in school, satisfaction with school measure.

Enter the following as values for the variable *satis:* (1 = I'm very dissatisfied with this university, 2 = I'm fairly dissatisfied with this university, 3 = I'm undecided with this university, 4 = I'm fairly satisfied with this university, 5 = I'm very satisfied with this university).
Enter the following as values for the variable *yearsch:* 1 = freshman, 2 = sophomore, 3 = junior, 4 = senior.
Enter the following data as sample entries:

ID	gender	ACT	GPA	Yearsch	satis
001	male	23	3.2	1	3
002	female	24	3.4	3	4

Self Assessment Exercises11

a.	What are the two most common types of variables in SPSS?
b.	Enumerate the factors that are responsible in the process of data handling and its execution.

3.9 Summary

Research can begin with an intuition that you want to subject to scientific scrutiny. It can also begin with a business's or organization's need for a specific answer to a specific question. The research process involves generating a question (hypothesis), collecting data to test that hypothesis, then analyzing and interpreting the results of your investigation. Research can be quantitative or qualitative in nature, depending on whether you want to collect statistical information or narrative information. Whatever the purpose or strategy of research, it all must be conducted and understood through an ethical lens, which sees research participants as worthy of respect and protection, and considers that the purpose of the research is ultimately to try to benefit humankind. Researchers can analyze quantitative data with statistical-

computing packages such as SPSS, the basics of which were shown in this unit. More advanced techniques are shown in subsequent chapters.

3.10 References/Further Readings/Web Resources

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3.11 Possible Answers To Self Assessment Exercises

Self Assessment Exercises1

i. What is SPSS?

SPSS is a Windows based program that can be used to perform data entry and analysis and to create tables and graphs. SPSS is capable of handling large amounts of data and can perform all of the analyses covered in the text and much more. SPSS is commonly used in the Social Sciences and in the business world, so familiarity with this program should serve you well in the future. SPSS is updated often. This document was written around an earlier version, but the differences should not cause any problems.

ii. Describe the two views that can be selected from the lower left hand side of the screen

The *Data Editor* window has two views that can be selected from the lower left hand side of the screen. *Data View* is where you see the data you are using. *Variable View* is where you can specify the format of your data when you are creating a file or where you can check the format of a pre-existing file.

Self Assessment Exercises11

i What are the two most common types of variables in SPSS?

The two most common types of variables in SPSS are *string variables* and *numeric variables*. You should specify a numeric variable for quantitative variables and a string vari- able for variables that include text (for example, male, female). The variable name can have a maximum of eight characters, regardless of whether it is string or numeric. String variables can have a maximum of 32,760 characters as the data input. Numeric variables have a maximum of 40 numeric values in front of the decimal place and 16 values beyond the decimal point. *Numeric variable* is the default selection, but the type of variable can be changed by left-clicking the gray box inside the variable type column (the second column in *Variable View*)

ii Enumerate the factors that are responsible in the process of data handling and its execution.

1. Data Transformation: This technique is used to convert the format of the data. After changing the data type, it integrates same type of data in one place and it becomes easy to manage it.

2. Regression Analysis: It is used to understand the relation between dependent and interdependent variables that are stored in a data file. It also explains how a change in the value of an interdependent variable can affect the dependent data..

3. ANOVA(Analysis of variance): It is a statistical approach to compare events, groups or processes, and find out the difference between them. It can help you understand which method is more suitable for executing a task.

4. MANOVA(Multivariate analysis of variance): This method is used to compare data of random variables whose value is unknown. MANOVA technique can also be used to analyze different types of population and what factors can affect their choices.

5. T-tests: It is used to understand the difference between two sample types, and researchers apply this method to find out the difference in the interest of two kinds of groups.

Unit 4 Introduction to PLS-SEM Analysis Using Smart PLS

Unit Structure

4.1 Introduction

In any marketing research project, an ideal data set should have a large sample size and be normally distributed. Unfortunately, the reality is that many applied research projects have limited participants because of the nature of the project. Insufficient resources and tight project timelines further prevent researchers from obtaining a decent data set for proper statistical analysis, particularly in the structural equation modeling (SEM) of latent variables where LISREL (linear structural relations) and AMOS (analysis of moment structures) have strict data assumptions. Some researchers have taken the risk of drawing incorrect or limited inferences by ignoring the data set requirements, while others have resorted to testing simplified versions of complex hypotheses. This Unit introduces an emerging multivariate analysis approach called "partial least squares structural equation modeling" (PLS-SEM), which is a good solution to these problems, if it is used properly.

SEM is a better way to measure Customer Satisfaction as Companies strive to increase their bottom-line performance through increasing

customer satisfaction levels. However, a single question (e.g., Are you satisfied with our product?) may provide marketers with little value, because customer satisfaction is multi-dimensional, and this latent variable is not directly observable. A better way to measure satisfaction is to consider survey responses to several manifest variables on a continuous (multi-point) scale. Marketers are often interested in identifying the key operational processes and product attributes that drive customer satisfaction so that they can prioritize resources to improve these areas. SEM is designed for testing theoretically supported linear and additive causal models. It is ideal for examining the relationship between customer satisfaction and other variables.

4.2 Intended Learning Objectives

By end of this unit, you should be able to:

- Evaluate different approaches to SEM
- Understand the Strengths of PLS-SEM
- Evaluate the weaknesses of PLS-SEM
- Differentiate between Formative and Reflective measurement Model

4.3 Different Approaches to SEM

There are several distinct approaches to SEM: The first approach is the widely applied Covariance-based SEM (CB-SEM), using software packages such as AMOS, EQS, LISREL and MPlus. The second approach is Partial Least Squares (PLS), which focuses on the analysis of variance and can be carried out using ADANCO, PLS-Graph, VisualPLS, SmartPLS, and WarpPLS. It can also be employed using the PLS module in the "r" statistical software package. The third approach is a component-based SEM known as Generalized Structured Component Analysis (GSCA); it is implemented through VisualGSCA or a web-based application called GeSCA. Another way to perform SEM is called Nonlinear Universal Structural Relational Modeling (NEUSREL), using NEUSREL's Causal Analytics software.

Faced with various approaches to path modeling, one has to consider their advantages and disadvantages to choose an approach to suit.

4.3.1 CB-SEM

CB-SEM has been widely applied in the field of social science during the past several decades, and is still the preferred data analysis method today for confirming or rejecting theories through testing of hypothesis, particularly when the sample size is large, the data is normally

distributed, and most importantly, the model is correctly specified. That is, the appropriate variables are chosen and linked together in the process of converting a theory into a structural equation model (Hair, Ringle, & Smarted, 2011; Hwang et al., 2010; Reinartz, Haenlein, & Henseler, 2009). However, many industry practitioners and researchers note that, in reality, it is often difficult to find a data set that meets these requirements. Furthermore, the research objective may be exploratory, in which we know little about the relationships that exist among the variables. In this case, marketers can consider PLS.

4.3.2 PLS-SEM

PLS is a soft modeling approach to SEM with no assumptions about data distribution[7] (Vinzi et al., 2010). Thus, PLS-SEM becomes a good alternative to CB-SEM for many researchers. In reality, PLS is found to be useful for structural equation modeling in applied research projects, especially when there are limited participants and that the data distribution is skewed, e.g., surveying female senior executive or multinational CEOs (Wong, 2011). PLS-SEM has been deployed in many fields, such as behavioral sciences (e.g., Bass et al, 2003), marketing (e.g., Henseler et al., 2009), organization (e.g., Sosik et al., 2009), management information system (e.g., Chin et al., 2003), and business strategy (e.g., Hulland, 1999).

4.3.3. GSCA & Other Approaches

If overall measures of model fit are really important to the researcher, or in projects where many non-linear latent variables exist and have to be accommodated, GSCA may be a better choice than PLS for running structural equation modeling (Hwang et al., 2010). And for data sets that demonstrate significant nonlinearities and moderation effects among variables, the NEUSREL approach may be considered (Frank and Hennig-Thurau, 2008).

However, since GSCA and NEUSREL are relatively new approaches in SEM, the amount of literature for review is relatively limited. Marketers may find it difficult to locate sufficient examples to understand how these emerging SEM approaches can be used in different business research scenarios.

4.3.4 Why not LISREL or Amos?

Since the 1970s, marketers have used Scientific Software International's LISREL and SmallWaters/SPSS's Amos statistical software packages to build causal models. Although these covariance-based SEM software packages are great for estimating and testing model parameters using

maximum likelihood, they have some disadvantages from a user's perspective. For example, a large sample size of 500 or more participants is usually required to generate stable estimation of the parameters. The dataset has to be normally distributed, or else standard errors must be used with care when the assumptions of multivariate normality are not met. The researcher also needs at least three manifest variables per latent variable to avoid identification problems.

4.4 The Birth of PLS-SEM

In the mid-1960s, the renowned econometrician and statistician Herman Wold developed the concept of a predictive causal system called "partial least squares." This new variance-based SEM approach extended the principal component and canonical correlation analysis to the next level. Unlike LISREL or AMOS, it is designed to provide flexibility for exploratory modeling. PLS is well known for its soft modeling approach, using ordinary least squares (OLS) multiple regression, which makes no distributional assumptions in computation of the model parameters. Because PLS fits each part of the model separately, it reduces the number of cases required. However, please note that a larger sample size always helps to improve parameter estimation and reduce average absolute error rates. PLS favours the outer measurement model that deals with the relations between latent variables and their manifest variables. Statistically speaking, the objective of PLS is to get score values of latent variables for prediction purposes. It is a component-based technique in which latent variables are calculated as exact weighted linear combinations of the manifest variables. This methodology is called "partial" least squares because its iterative procedure involves separating the parameters instead of estimating them simultaneously. Key resampling procedures include bootstrapping, jackknifing and blindfolding.

4.5 Evolution of PLS-SEM Software

Although developed in the mid-1960s (Wold, 1973, 1985), there has been a lack of advanced yet easy-to-use PLS path modeling software (not to be confused with PLS regression as it is different from PLS-SEM) until mid 2000s. The first generation of PLS-SEM software that was commonly used in the 1980s included LVPLS 1.8, but it was a DOS-based program. The subsequent arrival of PLS-Graph and VisualPLS added a graphical interface but they have received no significant updates since their initial releases. PLS-SEM can be performed in "r" but it requires certain level of programming knowledge. Therefore, it may not be suitable for those marketers who do not have strong computer science background. The remaining standalone PLS-SEM software packages, still in active development,

include ADANCO, SmartPLS, and WarpPLS. Please refer to Chapter 13 for a full list of available PLS-related software packages.

This book focuses on SmartPLS because it is widely used in the academic community. This software not only releases updates regularly, but also maintains an active online discussion forum[9], providing a good platform for knowledge exchange among its users.

4.6 Growing Acceptance of PLS-SEM

Although PLS was developed more than five decades ago, it did not gain the attention of the academic community until the late 1990s, because of a lack of PLS software and documentation. In the last two decades, the situation has improved significantly with the launch of graphical PLS software such as PLS-Graph, VisualPLS, SmartPLS, WarpPLS, and ADANCO. The first international PLS conference was conducted in 1999, and the first PLS handbook was published by Springer in 2010. With increased use of the PLS method in top-tier, peer-reviewed journal papers (particularly in the Journal of Management Information Systems) and in the marketing and behavioural science fields, it is a good time to give this innovative approach serious consideration. As PLS has been utilized by researchers in many studies based on the American Customer Satisfaction Index (ACSI), having a good understanding of PLS methodology helps researchers to compare their research results with those of prior studies.

4.7 Strengths of PLS-SEM

A substantial amount of research on the benefits of the PLS path modelling approach has been published (Bacon, 1999; Hwang et al., 2010; Wong, 2010). Among these benefits are the following:

- Small sample size requirement
- Hypotheses that are less probabilistic
- No assumptions about the distribution of the variables
- Insensitivity to non-normality, heteroscedasticity, and autocorrelation of the error terms
- No parameter identification problem
- No need for observations to be independent
- Ability to explore the relationship between a latent variable and its manifest variables in both formative and reflective ways
- Effectiveness in analysing moderation effects and identification of potential moderators
- Production of scores both for overall and for individual cases
- Ability to handle large model complexity (up to 100 latent and 1,000 manifest variables)

Suitability for research when improper or non-convergent results are likely.

4.8 Weaknesses of PLS-SEM

Marketing researchers are urged to evaluate PLS's strengths and weaknesses carefully before adopting the approach. As experts would agree, there is no magic bullet in any particular statistical procedure. Among the weaknesses of PLS are the following:
Requirement for high-valued structural path coefficients when using small sample sizes
Inability to handle the multicollinearity problem well
Inability to provide ways of modelling undirected correlation
Possibility of resulting in biased estimates of component loadings and path coefficients, due to a lack of complete consistency in scores on latent variables
Possible generation of large mean square errors of loading estimates and large mean square errors of path coefficient estimates.

Self -Assessment Exercise 1

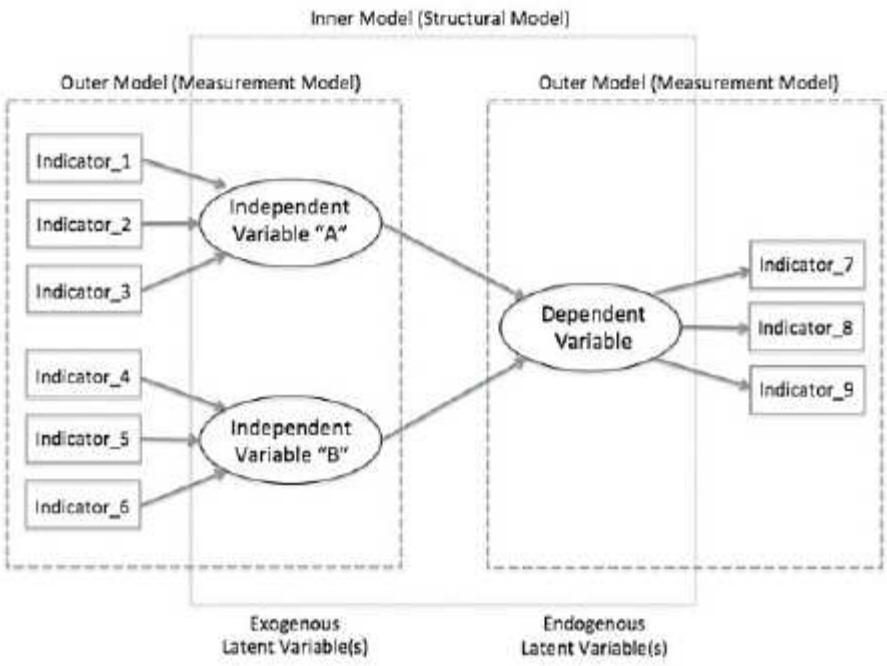
a. Briefly explain the evolution of SEM
b. List 5 merits and demerits of SEM

4.9 The PLS-SEM Components

4.9.1 Inner (Structural) and Outer (Measurement) Models

Partial Least Squares Structural Equation Modeling (PLS-SEM) is a second-generation multivariate data analysis method that is often used in marketing research because it can test theoretically supported linear and additive causal models (Chin, 1998; Haenlein & Kaplan, 2004; Statsoft, 2013). With PLS-SEM, marketers can visually examine the relationships that exist among variables of interest in order to prioritize resources to better serve their customers. The fact that unobservable, hard-to-measure latent variables[10] can be used in SEM makes it ideal for tackling business research problems.

There are two sub-models in a structural equation model; the inner model[11] specifies the relationships between the independent and dependent latent variables, whereas the outer model[12] specifies the relationships between the latent variables and their observed indicators[13] (see Figure 1). In SEM, a variable is either exogenous or endogenous. An exogenous variable has path arrows pointing outwards and none leading to it. Meanwhile, an endogenous variable[14] has at least one path leading to it and represents the effects of other variable(s).



4.9.2 Determination of Sample Size in PLS-SEM

No matter which PLS-SEM software is being used, some general guidelines should be followed when performing PLS path modeling. This is particularly important, as PLS is still an emerging multivariate data analysis method, making it easy for researchers, academics, or even journal editors to let inaccurate applications of PLS-SEM go unnoticed. Determining the appropriate sample size is often the first headache faced by researchers.

In general, one has to consider the background of the model, the distributional characteristics of the data, the psychometric properties of variables, and the magnitude of their relationships when determining sample size. Hair et al. (2013) suggest that sample size can be driven by the following factors in a structural equation model design:

- The significance level
- The statistical power
- The minimum coefficient of determination (R2 values) used in the model
- The maximum number of arrows pointing at a latent variable

In practice, a typical marketing research study would have a significance level of 5%, a statistical power of 80%, and R^2 values of at least 0.25. Using such parameters, the minimum sample size required can be looked up from the guidelines suggested by Marcoulides& Saunders (2006), depending on the maximum number of arrows pointing at a latent variable as specified in the structural equation model.

Although PLS is well known for its capability of handling small sample

sizes, it does not mean that your goal should be to merely fulfill the minimum sample size requirement. Prior research suggests that a sample size of 100 to 200 is usually a good starting point in carrying out path modeling (Hoyle, 1995). Please note that the required sample size will need to be increased if the research objective is to explore low-value factor intercorrelations with indicators that have poor quality.

4.9.3 Formative vs. Reflective Measurement Scale

There are two types of measurement scale in structural equation modeling; it can be formative or reflective.

4.9.4 Formative Measurement Scale

If the indicators cause the latent variable and are not interchangeable among themselves, they are formative. In general, these formative indicators can have positive, negative, or even no correlations among each other (Haenlein & Kaplan, 2004; Petter et al., 2007). As such, there is no need to report indicator reliability, internal consistency reliability, and discriminant validity if a formative measurement scale is used. This is because outer loadings, composite reliability, and square root of average variance extracted (AVE) are meaningless for a latent variable made up of uncorrelated measures.

A good example of formative measurement scale is the measurement of employee's stress level. Since it is a latent variable that is often difficult to measure directly, researchers have to look at indicators that can be measured, such as divorce, job loss, and car accidents. Here, it is obvious that a car accident does not necessarily have anything to do with divorce or job loss, and these indicators are not interchangeable.

When formative indicators exist in the model, the direction of the arrows has to be reversed. That is, the arrow should be pointing from the yellow-color formative indicators to the blue-color latent variable in SmartPLS. This can be done easily by right clicking on the latent variable and selecting "Invert measurement model" to change the arrow direction.

4.9.5 Reflective Measurement Scale

If the indicators are highly correlated and interchangeable, they are reflective and their reliability and validity should be thoroughly examined (Haenlein & Kaplan, 2004; Hair et al., 2013). For example, in the next chapter, we will introduce you to a case study that is related to conducting survey in a restaurant. The latent variable Perceived Quality (QUAL) in our restaurant dataset is made up of three observed

indicators: food taste, server professionalism, and bill accuracy. Their outer loadings, composite reliability, AVE and its square root should be examined and reported.

In a reflective measurement scale, the causality direction is going from the blue-color latent variable to the yellow-color indicators. It is important to note that by default, SmartPLS assumes the indicators are reflective when the model is built, with arrows pointing away from the blue-color latent variable.[18] One of the common mistakes that researchers make when using SmartPLS is forgetting to change the direction of the arrows when the indicators are formative instead of reflective. Since all of the indicators in this restaurant example are reflective, there is no need to change the arrow direction. In case you are not 100% sure if a measurement model should be reflective or formative, the Confirmatory Tetrad Analysis (CTA-PLS) can be performed to find it out quantitatively.

Self -Assessment Exercise 11

i. Discuss the two types of measurement scale in structural equation modeling.

4.10 Summary

In this Unit, you were introduced to the concept of SEM using SmartPLS. Several Approaches to SEM were discussed. Further, we learned about the Strengths and weaknesses of PLS-SEM. Differences between Formative and Reflective measurement Model were also discussed.

4.11 References/Further Readings/Web Resources

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4.12 Possible Answers To Self Assessment Exercises

Self -Assessment Exercise 1

i Briefly explain the evolution of SEM

In the mid-1960s, the renowned econometrician and statistician Herman Wold developed the concept of a predictive causal system called "partial least squares." This new variance-based SEM approach extended the principal component and canonical correlation analysis to the next level. Unlike LISREL or AMOS, it is designed to provide flexibility for exploratory modeling. PLS is well known for its soft modeling approach, using ordinary least squares (OLS) multiple regression, which makes no distributional assumptions in computation of the model parameters. Because PLS fits each part of the model separately, it reduces the number of cases required.

Self -Assessment Exercise 11

i. Discuss the two types of measurement scale in structural equation modeling.

Formative Measurement Scale

If the indicators cause the latent variable and are not interchangeable among themselves, they are formative. In general, these formative indicators can have positive, negative, or even no correlations among each other. As such, there is no need to report indicator reliability, internal consistency reliability, and discriminant validity if a formative measurement scale is used. This is because outer loadings, composite reliability, and square root of average variance extracted (AVE) are meaningless for a latent variable made up of uncorrelated measures.
A good example of formative measurement scale is the measurement of employee's stress level. Since it is a latent variable that is often difficult to measure directly, researchers have to look at indicators that can be measured, such as divorce, job loss, and car accidents. Here, it is obvious that a car accident does not necessarily have anything to do with divorce or job loss, and these indicators are not interchangeable.

Reflective Measurement Scale

If the indicators are highly correlated and interchangeable, they are reflective and their reliability and validity should be thoroughly examined. For example, in a case study that is related to conducting survey in a restaurant. The latent variable Perceived Quality (QUAL) in our restaurant dataset is made up of three observed indicators: food taste, server professionalism, and bill accuracy. Their outer loadings, composite reliability, AVE and its square root should be examined and reported.

In a reflective measurement scale, the causality direction is going from the blue-color latent variable to the yellow-color indicators. It is important to note that by default, SmartPLS assumes the indicators are reflective when the model is built, with arrows pointing away from the blue-color latent variable.

UNIT 5 EVALUATING PLS-SEM RESULTS IN SMARTPLS

5.1 Introduction

Recall that, in the previous unit, you were introduced to SEM using Smart-PLS software. In this Unit, we shall learn how to evaluate PLS-SEM Model using Reflective Measurement and how to assess the measurement and structural model in SEM

5.2 Intended Learning Outcomes

By end of this unit, you should be able to:
Evaluate PLS-SEM Model using Reflective Measurement
Assess the Measurement model in SEM
Assess the Structural model in SEM

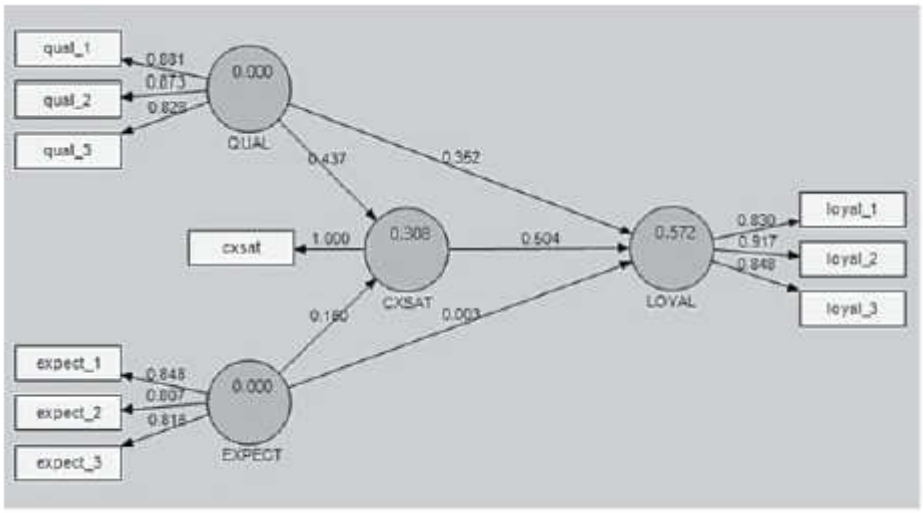
5.3 The Colorful PLS-SEM Estimations Diagram

SmartPLS presents path modeling estimations not only in the Modeling Window but also in a text-based report which is accessible via the "Report" menu. In the PLS-SEM diagram, there are two types of

numbers:
Numbers in the circle: These show how much the variance of the latent variable is being explained by the other latent variables.

Numbers on the arrow: These are called the path coefficients. They explain how strong the effect of one variable is on another variable. The weight of different path coefficients enables us to rank their relative statistical importance.[32]

Figure 5.1: PLS-SEM Results



Among all estimation results, the 3 key information that SmartPLS can inform you about the model are:

- Outer loadings (in reflective measurement model) or outer weights (in formative measurement model)
- Path coefficients for the structural model relationship
- R^2 values of the latent endogenous variables
- We will focus on exploring these estimations results for model with reflective measurement scale in this unit

5.4 Initial Assessment Checklist

5.4.1. Model with Reflective Measurement

For an initial assessment of PLS-SEM, some basic elements should be covered in your research report. If a reflective measurement scale is used, as in our restaurant example, the following topics have to be discussed:

- Multicollinearity Assessment
- Model's f Effect Size
- Predictive Relevance: The Stone-Geisser's (Q^2) Values
- Total Effect Value

Note: Indicator reliability, internal consistency reliability, and discriminant validity are only applicable to model having a reflective

measurement scale.

5.4.2. Model with Formative Measurement

On the other hand, if the model uses a formative measurement scale, the following should be reported instead:

- Explanation of target endogenous variable variance
- Inner model path coefficient sizes and significance
- Outer model weight and significance
- Convergent validity
- Collinearity among indicators
- Checking Structural Path Significance in Bootstrapping
- Multicollinearity Assessment
- Model's f^2 Effect Size
- Predictive Relevance: The Stone-Geisser's (Q^2) Values
- Total Effect Value

5.5 Evaluating PLS-SEM Model with Reflective Measurement

By looking at the PLS-SEM estimation diagram in Figure 15, we can make the following preliminary observations:

5.5.1. Explanation of Target Endogenous Variable Variance

The coefficient of determination, R^2, is 0.572 for the LOYAL endogenous latent variable. This means that the three latent variables (QUAL, EXPECT, and CXSAT) moderately[34] explain 57.2% of the variance in LOYAL.

QUAL and EXPECT together explain 30.8% of the variance of CXSAT.[35] Inner Model Path Coefficient Sizes and Significance
The inner model suggests that CXSAT has the strongest effect on LOYAL (0.504), followed by QUAL (0.352) and EXPECT (0.003).
The hypothesized path relationship between QUAL and LOYAL is statistically significant.

The hypothesized path relationship between CXSAT and LOYAL is statistically significant.

However, the hypothesized path relationship between EXPECT and LOYAL is not statistically significant. This is because its standardized path coefficient (0.003) is lower than 0.1. Thus, we can conclude that: CXSAT and QUAL are both moderately strong predictors of LOYAL, but EXPECT does not predict LOYAL directly.

5.5.2. Outer Model Loadings and Significance

To view the correlations between the latent variable and the indicators in its outer model, go to “Report” in the menu and choose “Default Report”. Since we have a reflective model in this restaurant example, we look at the numbers as shown in the “Outer Loadings”— window (PLS-» Calculation Results -» Outer Loadings). We can press the “Toggle Zero Values” icon to remove the extra zeros in the table for easier viewing of the path coefficients.

Figure 5.2: Path Coefficient Estimation in the Outer Model

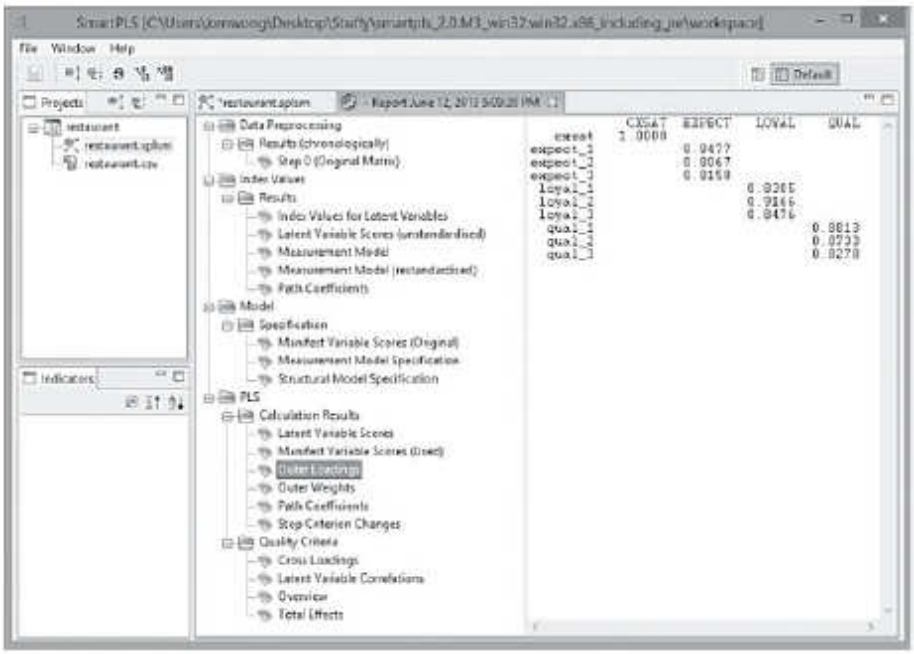


Figure 5.2

Figure 5.2: Path Coefficient Estimation in the Outer Model

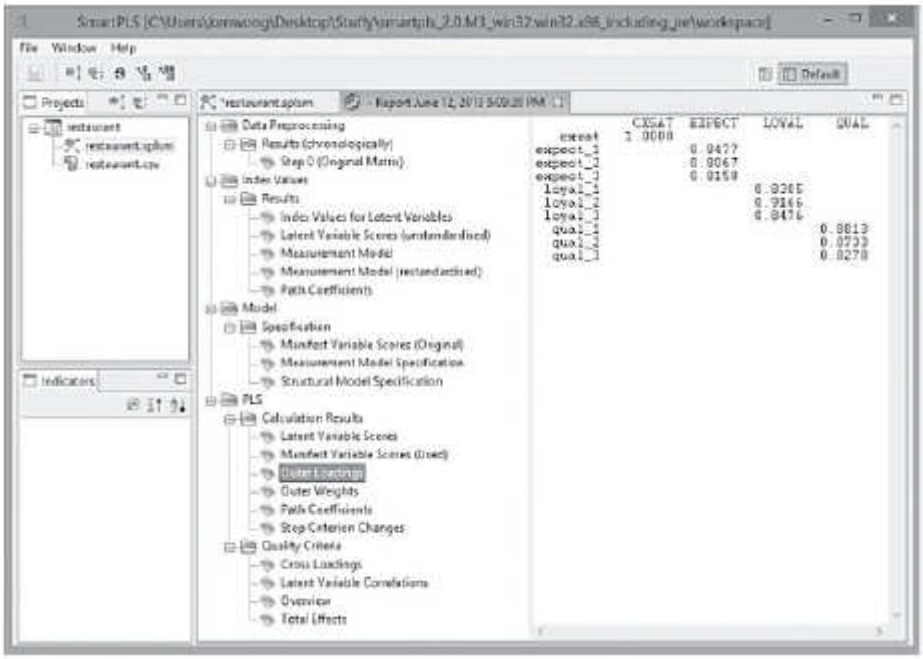


Figure 5.2

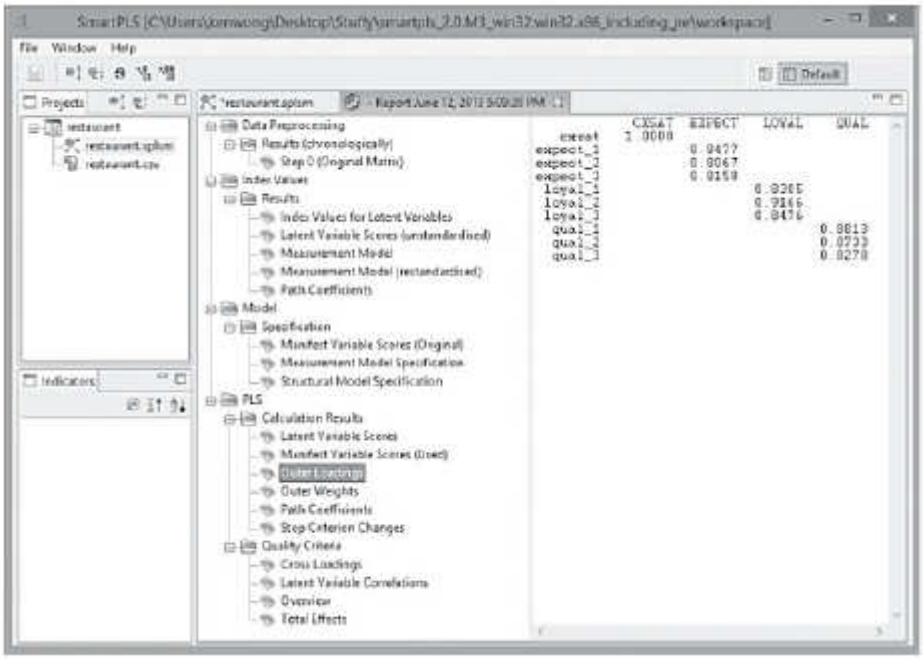


Figure 5.3

In SmartPLS, the software will stop the estimation when (i) the stop criterion of the algorithm was reached, or (ii) the maximum number of iterations has reached, whichever comes first. Since we intend to obtain a stable estimation, we want the algorithm to converge before reaching the maximum number of iterations. To see if that is the case, go to "Stop Criterion Changes" to determine how many iterations have been carried out. In this restaurant example, the algorithm converged only after 4 iterations (instead of reaching 300), so our estimation is good.

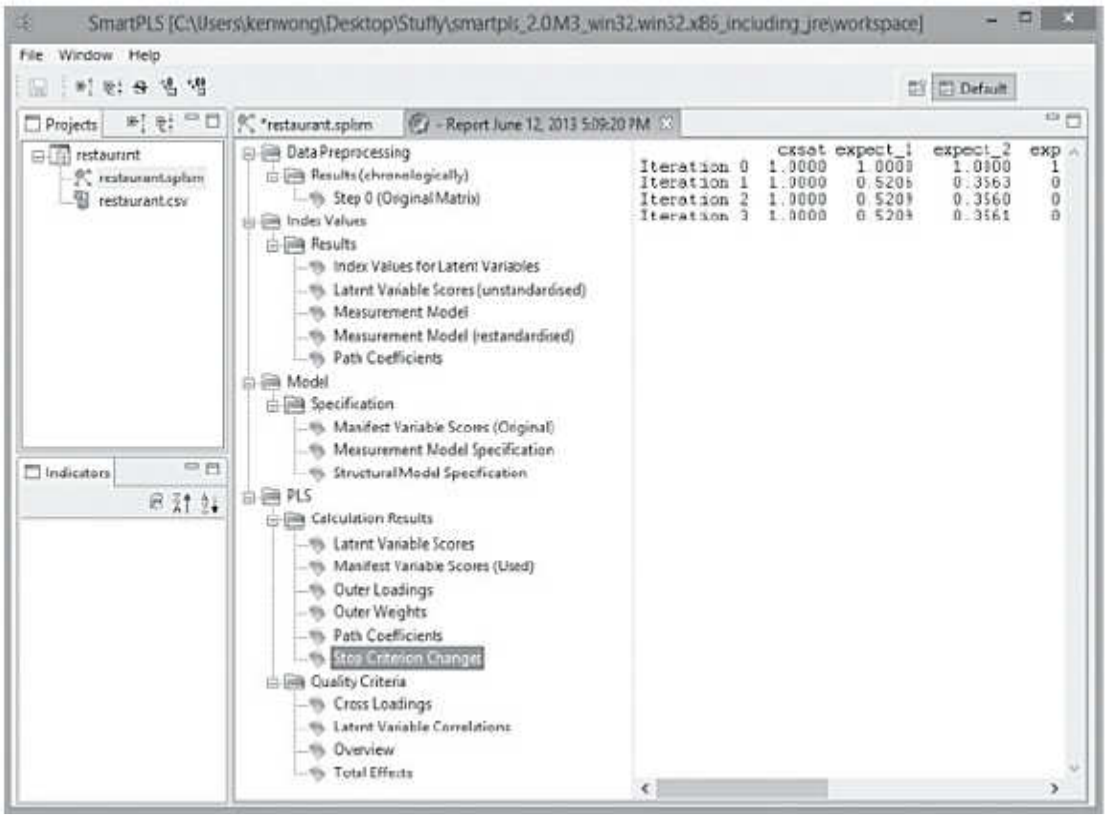


Figure 5.3

5.6 Indicator Reliability

Just like all other marketing research, it is essential to establish the reliability and validity of the latent variables to complete the examination of the measurement model. The following table shows the various reliability and validity items that we must check and report when conducting a PLS-SEM (see Figure 22.2).

What to check?	*What to look for in SmartPLS?*	*Where is it in the report?*	*Is it OK?*
Reliability			
Indicator Reliability	"Outer loadings" numbers	PLS→Calculation Results →Outer Loadings	Square each of the outer loadings to find the indicator reliability value. **0.70 or higher** is preferred. If it is an exploratory research, 0.4 or higher is acceptable. (Hulland, 1999)
Internal Consistency Reliability	"Reliability" numbers	PLS→Quality Criteria →Overview	Composite reliability should be **0.7 or higher**. If it is an exploratory research, 0.6 or higher is acceptable. (Bagozzi and Yi, 1988)
Validity			
Convergent validity	"AVE" numbers	PLS→Quality Criteria →Overview	It should be **0.5 or higher** (Bagozzi and Yi, 1988)
Discriminant validity	"AVE" numbers and Latent Variable Correlations	PLS→Quality Criteria →Overview (for the AVE number as shown above) PLS→Quality Criteria →Latent Variable Correlations	Fornell and Larcker (1981) suggest that the "**square root**" of AVE of each latent variable should be greater than the correlations among the latent variables

Figure 5.4 Checking Reliability and Validity

To report these reliability and validity figures, tables are often used for reporting purpose (see Figure 5.5).

Figure 5.5: Results Summary for Reflective Outer Models

Latent Variable	Indicators	Loadings	Indicator Reliability (i.e., loadings^2)	Composite Reliability	AVE
QUAL	qual_1	0.881	0.777	0.8958	0.7415
	qual_2	0.873	0.763		
	qual_3	0.828	0.685		
EXPECT	expect_1	0.848	0.719	0.8634	0.6783
	expect_2	0.807	0.650		
	expect_3	0.816	0.666		
LOYAL	loyal_1	0.831	0.690	0.8995	0.7494
	loyal_2	0.917	0.840		
	loyal_3	0.848	0.718		

The first one to check is "Indicator Reliability" (see Figure 5.5). It can be seen that all of the indicators have individual indicator reliability values that are much larger than the minimum acceptable level of 0.4 and close to the preferred level of 0.7.

5.7 Internal Consistency Reliability

Traditionally, "Cronbach's alpha" is used to measure internal consistency reliability in social science research but it tends to provide a

conservative measurement in PLS-SEM. Prior literature has suggested the use of "Composite Reliability" as a replacement (Bagozzi and Philip 1982; Hair et al., 2012). From Figure 19, such values are shown to be larger than 0.6, so high levels of internal consistency reliability have been demonstrated among all three reflective latent variables.

That said, the modern view of PLS suggests that instead of using Cronbach's alpha and composite reliability, one should consider using "rho_A" coefficient to check the reliability of PLS construct scores, as defined in Dijkstra and Henseler (2014b). In SmartPLS v3, the "rho_A" value can be found in the Results Report (Quality Criteria -? Construct Reliability and Validity) once the PLS or PLSc Algorithm is performed. Generally speaking, a "rho_A" value of 0.7 or larger is preferred to demonstrate composite reliability. Meanwhile, a "rho_A" value above 1 is abnormal and should not occur in the model.

5.8 Convergent Validity

To check convergent validity, each latent variable's Average Variance Extracted (AVE) is evaluated. Again from the above Figure, it is found that all of the AVE values are greater than the acceptable threshold of 0.5, so convergent validity is confirmed.

5.9 Discriminant Validity

There are two ways to check discriminant validity: the Fomell-Larcker Criterion and HTMT. The classical approach is proposed by Fornell and Larcker (1981) who suggest that the square root of AVE in each latent variable can be used to establish discriminant validity, if this value is larger than other correlation values among the latent variables. To do this, a table is created in which the square root of AVE is manually calculated and written in bold on the diagonal of the table. The correlations between the latent variables are copied from the "Latent Variable Correlation" section of the default report and are placed in the lower left triangle of the table (see Figure 5.6).

	QUAL	EXPECT	CXSAT	LOYAL
QUAL	**0.861**			
EXPECT	0.655	**0.824**		
CXSAT	0.542	0.446	**Single item construct**	
LOYAL	0.626	0.458	0.695	**0.866**

Figure 5.6 (Discriminant Validity)

For example, the latent variable EXPECT's AVE is found to be 0.6783 (from Figure 19) hence its square root becomes 0.824. This number is

larger than the correlation values in the column of EXPECT (0.446 and 0.458) and also larger than those in the row of EXPECT (0.655). Similar observation is also made for the latent variables QUAL, CXSAT and LOYAL. (Fornell & Bookstein,1982) The result indicates that discriminant validity is well established. The modern approach to check discriminant validity is to use Heterotrait-monotrait ratio of correlations (HTMT) that is proposed by Henseler, Ringle and Sarstedt (2015). This procedure can be performed in SmartPLS v3 easily.

Self -Assessment Exercise 1

1. Differentiate between how to check Convergent and Discriminant Validity

5.10 Checking Structural Path Significance in Bootstrapping

SmartPLS can generate T-statistics for significance testing of both the inner and outer model, using a procedure called bootstrapping. In this procedure, a large number of subsamples (e.g., 5000) are taken from the original sample with replacement to give bootstrap standard errors, which in turn gives approximate T-values for significance testing of the structural path. The Bootstrap result approximates the normality of data.
To do this, go to the “Calculate” menu and select “Bootstrapping”. In SmartPLS, sample size is known as Cases within the Bootstrapping context, whereas the number of bootstrap subsamples is known as Samples. Since there are 400 valid observations[42] in our restaurant data set, the number of “Cases” (not “Samples”) in the setting should be increased to 400. The other parameters remain unchanged:
Sign Change: No Sign Changes
Cases: 400
Samples: 5000

It worth noting that if the bootstrapping result turns out to be insignificant using the “No Sign Changes” option, but opposite result is achieved using the “Individual Sign Changes” option, you should subsequently re-run the procedure using the middle “Construct Level Changes” option and use that result instead. This is because this option is known to be a good compromise between the two extreme sign change settings.

Figure 5.3: Bootstrapping Algorithm

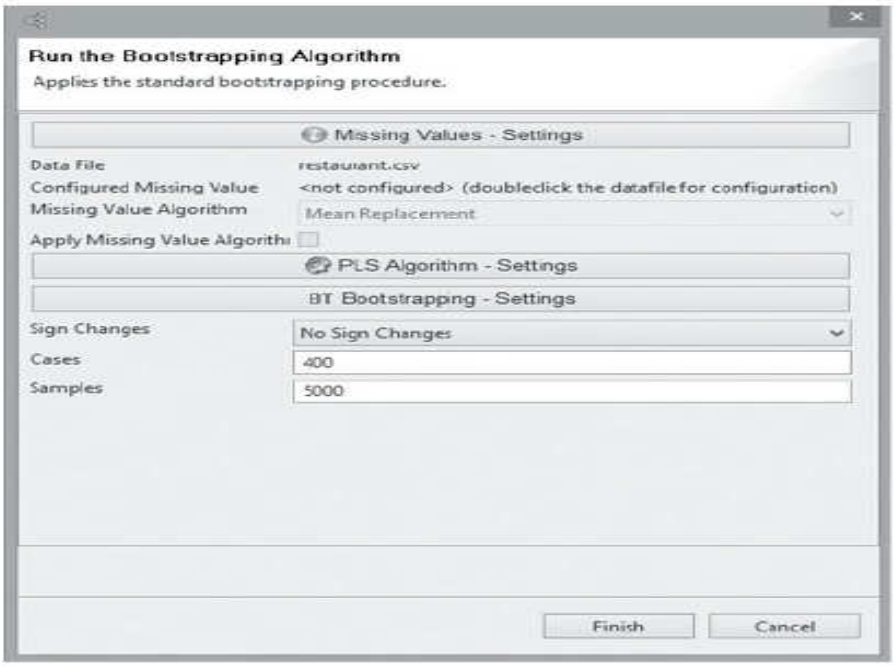


Figure 5.7

Once the bootstrapping procedure is completed, go to the “Path Coefficients (Mean, STDEV, T-Values) window located within the Bootstrapping section of the Default Report. Check the numbers in the ‘T-Statistics” column to see if the path coefficients of the inner model are significant or not. Using a two-tailed t-test with a significance level of 5%, the path coefficient will be significant if the T-statistics is larger than 1.96. In our restaurant example, it can be seen that only the “EXPECT – LOYAL” linkage (0.0481) is not significant. This confirms our earlier findings when looking at the PLS-SEM results visually. All other path coefficients in the inner model are statistically significant

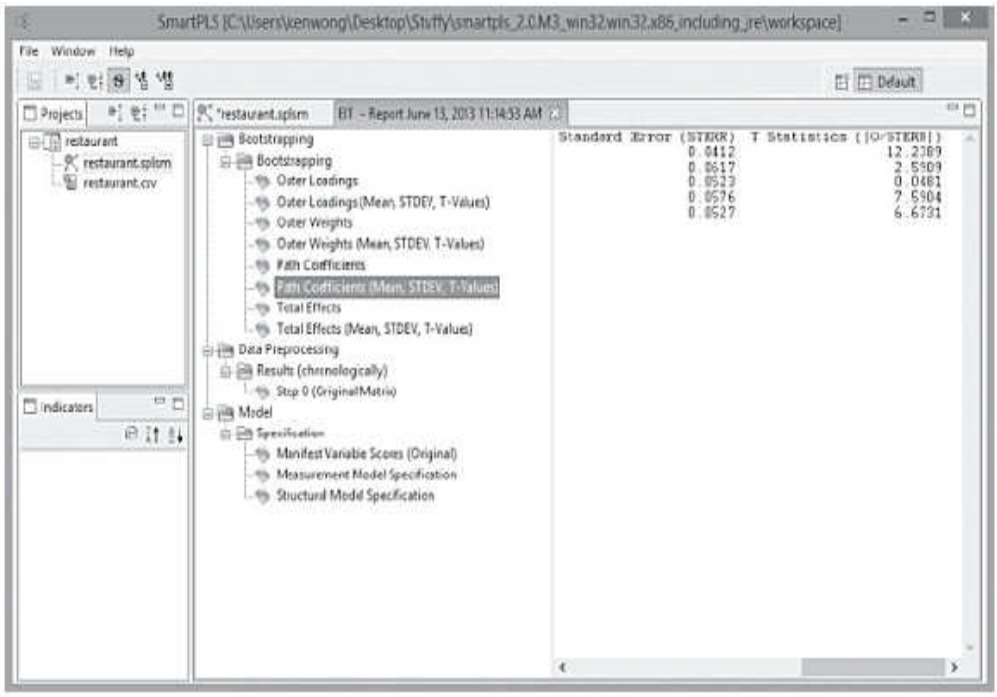


Figure 5.8: T-Statistics of Path Coefficients (Inner Model)

	T-Statistics
CXSAT → LOYAL	12.2389
EXPECT → CXSAT	2.5909
EXPECT → LOYAL	0.0481
QUAL → CXSAT	7.5904
QUAL → LOYAL	6.6731

Figure 5.9

After reviewing the path coefficient for the inner model, we can explore the outer model by checking the T- statistic in the “Outer Loadings (Means, STDEV, T-Values)” window. As presented in Figure 24, all of the T- Statistics are larger than 1.96 so we can say that the outer model loadings are highly significant. All of these results complete a basic analysis of PLS-SEM in our restaurant example.

	QUAL	EXPECT	CXSAT	LOYAL
qual_1	57.5315			
qual_2	55.2478			
qual_3	37.0593			
expect_1		42.7139		
expect_2		32.4697		
expect_3		28.9727		
cxsat			Single item construct	
loyal_1				36.3623
loyal_2				97.6560
loyal_3				39.1145

Figure 5.10: T-Statistics of Outer Loadings

5.11 Multicollinearity Assessment

The depth of the PLS-SEM analysis depends on the scope of the research project, the complexity of the model, and common presentation in prior literature. For example, a detailed PLS-SEM analysis would often include a multicollinearity assessment. That is, each set of exogenous latent variables in the inner model[44] is checked for potential collinearity problem to see if any variables should be eliminated, merged into one, or simply have a higher- order latent variable developed.

To assess collinearity issues of the inner model, the latent variable scores (PLS -> Calculation Results Latent Variable Scores) can be used as input for multiple regression in IBM SPSS Statistics to get the tolerance or Variance Inflation Factor (VIF) values, as SmartPLS does not provide these numbers. First, make sure the data set is in .csv file format. Then, import the data into SPSS and go to Analyze Regression -> Linear. In the linear regression module of SPSS, the exogenous latent variables (the predictors) are configured as independent variables, whereas another latent variable (which does not act as a predictor) is configured as the dependent variable (Dijkstra & Henseler,2011). VIF is calculated as "1/Tolerance". As a rule of thumb, we need to have a VIF of 5 or lower (i.e., Tolerance level of 0.2 or higher) to avoid the collinearity problem (Hair et al., 2011).

5.12 Model's —Effect Size

In addition to checking collinearity, there can be a detailed discussion of the model's f^2 effect size which shows how much an exogenous latent variable contributes to an endogenous latent variable's R^2 value. In

simple terms, effect size assesses the magnitude or strength of relationship between the latent variables. Such discussion can be important because effect size helps researchers to assess the overall contribution of a research study. Chin, Marcolin, and Newsted (1996) have clearly pointed out that researcher should not only indicate whether the relationship between variables is significant or not, but also report the effect size between these variables.

5.13 Predictive Relevance: The Stone-Geisser's (Q2) Values

Meanwhile, predictive relevance is another aspect that can be explored for the inner model. The Stone-Geisser's (Q^2) values (i.e., cross-validated redundancy measures) can be obtained by the Bindfolding procedure in SmartPLS (Calculate ->Bindfolding). In the Bindfolding setting window, an omission distance (OD) of 5 to 10 is suggested for most research (Hair et al., 2012). The q^2 effect size for the Q^2 values can also be computed and discussed.

5.14 Total Effect Value

If a mediating latent variable exists in the model, one can also discuss the Total Effect of a particular exogenous latent variable on the endogenous latent variable. Total Effect value can be found in the default report (PLS Quality Criteria -> Total Effects). The significance of Total Effect can be tested using the T-Statistics in the Bootstrapping procedure (Bootstrapping Total Effects (Mean, STDEV, T-Values)). Also, unobserved heterogeneity may have to be assessed when there is little information about the underlying data, as it may affect the validity of PLS-SEM estimation.

5.15. Guidelines for Correct PLS-SEM Application

In relation to other path modeling approaches, PLS-SEM is still relatively new to many researchers. Through extensive critical reviews of this methodology in the last several years, the academic community has developed some guidelines for correct PLS-SEM application. First of all, research should develop a model that is consistent with the theoretical knowledge currently available. As in other research projects, proper data screening should be performed to ensure accuracy of input. In order to determine the sample size necessary for adequate power (e.g., 0.8), the distributional characteristics of the data, the psychometric properties of variables, and the magnitude of the relationships between the variables have to be examined carefully.

Although PLS-SEM is well known for its ability to handle small sample sizes, that is not the case when moderately non-normal data are used,

even if the model includes highly reliable indicators. As a result, researchers are strongly advised to check the magnitude of the standard errors of the estimates and calculate the confidence intervals for the population parameters of interest. If large standard errors and wide confidence intervals are observed, they are good indications that the sample size is not large enough for proper analysis. Prior research has indicated that a sample size of 100 to 200 is a good start in carrying out PLS procedures. The required sample size will further increase if you are examining low-value-factor intercorrelations with poor quality indicators.

PLS is still considered by many as an emerging multivariate data analysis method, and researchers are still exploring the best practices of PLS-SEM. Even so, some general guidelines have been suggested in the literature. Figure 3 displays some of guidelines that should be considered.

Self -Assessment Exercise 11

I What are the two ways of checking discriminant Validity?
II Explain how to check convergent validity

5.16 Summary

In this Unit, we learned how to evaluate PLS-SEM Results in SmartPLS. Both the Structural and Measurement Models were discussed extensively. Further, we also learnt that SmartPLS displays path modeling estimates in the Modeling Window and a text-based report accessible from the "Report" menu. PLS-SEM has two types of numbers:

Circle numbers show how much latent variable variance is explained by other latent variables.

Arrow numbers are path coefficients. They show how one variable affects another. The weight of different path coefficients lets us rank their statistical importance.

5.17 References/Further Readings/Web Resources

Evaluating PLS-SEM Results in SmartPLS – HKT Consultant. (2021). Retrieved 30 June 2022, from https://phantran.net/chapter-4-evaluating-pls-sem-results-in-smartpls/

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5.18 Possible Answers To Self Assessment Exercises

Self -Assessment Exercise 1

i. Differentiate between how to check Convergent and Discriminant Validity

To check convergent validity, each latent variable's Average Variance Extracted (AVE) is evaluated. Again from the above Figure, it is found that all of the AVE values are greater than the acceptable threshold of 0.5, so convergent validity is confirmed.

There are two ways to check discriminant validity: the Fomell-Larcker Criterion and HTMT. The classical approach is proposed by Fornell and Larcker (1981) who suggest that the square root of AVE in each latent variable can be used to establish discriminant validity, if this value is larger than other correlation values among the latent variables. To do this, a table is created in which the square root of AVE is manually calculated and written in bold on the diagonal of the table

Self -Assessment Exercise 11

i What are the two ways of checking discriminant Validity?

There are two ways to check discriminant validity: the Fomell-Larcker Criterion and HTMT. The classical approach is proposed by Fornell and Larcker (1981) who suggest that the square root of AVE in each latent variable can be used to establish discriminant validity, if this value is larger than other correlation values among the latent variables. To do this, a table is created in which the square root of AVE is manually calculated and written in bold on the diagonal of the table

ii Explain how to check convergent validity

To check convergent validity, each latent variable's Average Variance Extracted (AVE) is evaluated. Again from the above Figure, it is found that all of the AVE values are greater than the acceptable threshold of 0.5, so convergent validity is confirmed.