PERIYAR UNIVERSITY

(NAAC 'A++' Grade with CGPA 3.61 (Cycle - 3)

State University - NIRF Rank 56 - State Public University Rank 25)

SALEM - 636 011

CENTRE FOR DISTANCE AND ONLINE EDUCATION

(CDOE)

M.A SOCIOLOGY

SEMESTER - I

CORE III: RESEARCH METHODOLOGY

(Candidates admitted from 2025 onwards)

PERIYAR UNIVERSITY

CENTRE FOR DISTANCE AND ONLINE EDUCATION (CDOE)

M.A Sociology 2025 admission onwards

CORE III

Research Methodology

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LIST OF CONTENTS

References Books (Latest Editions)	
1	Kothari, C.R., Quantitative Techniques, Vikas Publishing House (Pvt) Ltd. New Delhi – 1978.
2	Kothari C.R., Research Methodology – Methods and Techniques, wiley eastern limited, Madras, 1985.
3	Hunt, Morton: Profiles of Social Research, Russell Sage Foundation, New York, 1920.
4	Michael S. Lewis – Beck, (Ed) Experimental Design & Methods, Sage Publications, Toppan, Publishing United Kingdom, 1990.
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Unit – I

Introduction to Research: Definition Scientific Research: Science and Its Characteristics. Features, Purpose, and Assumptions of Scientific Method. Steps in Scientific Method. Types of Social Research- Pure/Basic/Fundamental, Applied, Action and Policy Research. Theory and Research. Induction and Deduction.

Overview

The unit Introduction to Research provides a foundational understanding of scientific inquiry and its role in social science. It begins by defining research as a systematic and objective investigation aimed at discovering facts, establishing relationships, and formulating laws or theories. Scientific research is characterized by its empirical nature, objectivity, logical reasoning, and replicability. The scientific method, central to research, is outlined through its key features—such as its rational approach, empirical testing, and focus on measurable outcomes—and its underlying assumptions like determinism, objectivity, and value neutrality. The unit elaborates on the purpose of scientific research, which includes explanation, prediction, and control of phenomena. It details the sequential steps involved in the scientific method, including identifying a problem, formulating hypotheses, collecting and analyzing data, and drawing conclusions. Various types of social research are discussed: Pure or Basic Research, which seeks knowledge for its own sake; Applied Research, which addresses specific practical issues; Action Research, aimed at solving immediate problems; and Policy Research, which influences policy decisions. The relationship between theory and research is explored, highlighting how theory guides research and how research refines theory. The concepts of induction and deduction are also introduced as reasoning processes that either move from specific observations to general theories (inductive) or apply general principles to specific cases (deductive). This chapter lays the groundwork for understanding the systematic and scientific approach to studying social phenomena.

Learning objective

- Define research and explain the meaning and significance of scientific research in social sciences.
- Describe the key characteristics of science such as objectivity, verifiability, ethical neutrality, and systematic observation.
- Identify the Features and Purpose of the Scientific Method
- Understand the essential features of the scientific method including precision, logical reasoning, empirical evidence, and predictability.
- Recognize its purpose in discovering knowledge and solving problems.
- Outline and explain the sequential steps such as identifying the problem, forming a hypothesis, collecting data, analyzing results, and drawing conclusions.
- Differentiate among Pure/Basic/Fundamental research, Applied research.
- Explain the interdependence between theory and research, emphasizing how theory guides research and how research contributes to theory-building.

Introduction

Word ‘Research’ is comprises of two words = Re+Search. It means to search again. So research means a systematic investigation or activity to gain new knowledge of the already existing facts.

Research is an intellectual activity. It is responsible for bringing to light new knowledge. It is also responsible for correcting the present mistakes, removing existing misconceptions and adding new learning to the existing fund of knowledge. Researches are considered as a combination of those activities which are removed from day to day life, and are pursued by those persons who are gifted in intellect and sincere in pursuit of knowledge. But it is not correct to say that the research is restricted to such type of persons, however, it is correct to say that major contribution of research comes from highly gifted and committed workers. Thus the research is not at all mysterious and is carried on by hundreds of thousands of average individuals.

Research is also considered as the application of scientific method in solving the problems. It is a systematic, formal and intensive process of carrying on the scientific method of analysis. There are many ways of obtaining knowledge. They are intuition, revelation, and authority, logical manipulation of basic assumptions, informed guesses, observation, and reasoning by

analogy. One of the branches of research known as empirical research is highly goal-oriented technique.

Definitions of Research:

The following are the important definitions of research:

“Research is an endeavor / attempt to discover, develop and verify knowledge. It is an intellectual process that has developed over hundreds of years ever changing in purpose and form and always researching to truth.”

J. Francis Rummel

“Research is an honest, exhaustive, intelligent searching for facts and their meanings or implications with reference to a given problem. The product or findings of a given piece of research should be an authentic, verifiable contribution to knowledge in the field studied.”

P.M. Cook

“Research may be defined as a method of studying problems whose solutions are to be derived partly or wholly from facts.”

W.S. Monroes

“Research is considered to be the more formal, systematic intensive process of carrying on the scientific method of analysis. It involves a more systematic structure of investigation, usually resulting in some sort of formal record of procedures and a report of results or conclusion.”

John W. Best

“Research comprises defining and redefining problems ,formulating hypothesis or suggested solutions, collecting ,organizing and evaluating data, making deductions and reaching conclusions and at last careful testing the conclusions to determine whether they fit the formulated hypothesis.”

Clifford Woody

“Research is a systematic effort to gain new knowledge.”

Scientific research

The implementation of the scientific method to produce knowledge is carried out by scientific research:

- Scientific research is the process of investigating natural phenomena using the scientific method for the purpose of discovering new facts and developing scientific theory.

Scientific research also aims at the review of facts, laws and theories in view of newly discovered facts, and the practical applications of such facts, laws and theories. Therefore, scientific research is the continuous search for knowledge and understanding of reality carried out through the scientific method. Its result is scientific knowledge.

Scientific research can have a purely cognitive objective, that is, the generation of scientific knowledge without an immediate application purpose, or a practical objective, that is, the generation of knowledge for immediate application:

- Scientific research with purely cognitive objective is called pure research or basic research, and with practical objective, applied research or technological research.

Characteristics of Research:

The scientific method is a systematic approach used by scientists and researchers to study and understand the natural world. It involves a series of steps and principles that help ensure the reliability and validity of scientific investigations. The key characteristics of the scientific method include:

Empirical Observation: The scientific method relies on objective observations of the natural world. Scientists use their senses or instruments to gather data about phenomena or events.

Formulation of a Hypothesis: A hypothesis is a testable statement or prediction that proposes an explanation for a specific observation or phenomenon. It serves as the basis for conducting experiments or making observations.

Testing and Experimentation: Scientists design experiments or observational studies to test the validity of their hypotheses. These experiments are structured to gather data and provide evidence for or against the proposed hypothesis.

Data Collection and Analysis: During experimentation, scientists collect data, which may be qualitative or quantitative. Data is then analyzed using statistical methods or other analytical techniques to draw meaningful conclusions.

Reproducibility and Verification: One of the hallmarks of the scientific method is that experiments and observations should be reproducible. Other researchers should be able to replicate the study and obtain similar results to validate the findings.

Peer Review: Before research findings are published, they usually undergo a peer-review process, where other experts in the field evaluate the study's methodology, results, and conclusions. This helps ensure the quality and credibility of scientific work.

Revision and Refinement: The scientific method is an iterative process. New evidence or data may lead to the revision of hypotheses or theories, and scientific understanding evolves over time.

Objectivity and Impartiality: Scientists strive to maintain objectivity and impartiality during their investigations, minimizing bias and personal beliefs that could influence the results.

Falsifiability: Scientific hypotheses and theories must be testable and falsifiable. This means that there should be the possibility of obtaining evidence that contradicts or refutes the proposed explanation.

Theory Building: Successful and widely accepted hypotheses, after undergoing rigorous testing and validation, may contribute to the development of scientific theories, which provide a comprehensive explanation of natural phenomena.

By following these principles, the scientific method ensures a systematic and reliable approach to studying and understanding the natural world, leading to the advancement of knowledge and the development of various fields of science.

Purpose of Research:

The purpose of research is to discover answers to questions through the application of scientific procedure. The main aim of research is to find out the truth which is hidden and which has not been discovered as yet.

Though each research study has its own specific purpose, some general objectives of research below:

i)To gain familiarity with a phenomenon or to achieve new insights into it. (Studies with this object in view are termed as exploratory or formative research studies).

(ii) To portray accurately the characteristics of a particular individual, situation or a group.(Studies with this object in view are known as descriptive research studies).

(iii) To determine the frequency with which something occurs or with which it is associated with something else. (Studies with this object in view are known as diagnostic research studies).

(iv) To test a hypothesis of a causal relationship between variables. (Such studies are known as hypothesis-testing research studies).

Assumptions of Science

All of science is based on a few major assumptions that no scientist can prove.

First is that the universe is orderly and lawful. Science assumes that every event that occurs in the universe, including human behavior, has an antecedent cause and follows natural laws.

The second is the assumption that there are natural causes (never supernatural ones) for everything that happens in the world around us. That is, all events are caused by things in the material world and not, for example, the supernatural world.

The third is the assumption that this order and causes of events in the universe are discoverable.

The fourth is that evidence from the natural world can be used to learn or discover this order and causes.

The fifth is that the human brain is capable of doing the discovery.

All of the amazing wonders of science, from antibiotics to planes and landing humans on the moon, are built on those assumptions. Although built on assumptions that no human being is capable of proving, science has been shown to be a process of knowing that works.

Some sources and what they say

“All scientists make two fundamental assumptions. One is determinism—the assumption that all events in the universe, including behavior, are lawful or orderly. The second assumption is that this lawfulness is discoverable. Notice that the first assumption does not necessarily imply the

second assumption. In other words, we can assume that behavior is lawful without presuming that we will discover this lawfulness" (Lammers 2004, ch3).

"The process of building scientific knowledge relies on a few basic assumptions that are worth acknowledging. Science operates on the assumptions that:
There are natural causes for things that happen in the world around us.

Evidence from the natural world can be used to learn about those causes.
There is consistency in the causes that operate in the natural world." (U. C. Berkeley).
"Every scientist must make two assumptions which are quite unproveable, even in theory. The first is that the universe is orderly and the second is that man's brain is capable of unravelling the mysteries of that order. No scientist I know ever thinks about these assumptions, still less worries about them. They in no significant sense influence practical scientific activity. Nevertheless, they are made and they are worth examining briefly because the conclusions of science cannot be more reliable than the fundamental assumptions on which science is based" (Horrobin 1969, n.p.)

Scientific method :

Science is scientific study of Mystry of Nature. Science includes both a goal and the means for obtaining that goal. Briefly, the goal of science is a theory., By "theory" we mean a 'verifiable generalization of a high order which in some sense explains observed phenomena."
According to karl Pearson : "There is no short cut to truth, no way to gain knowledge, of the universe except through this gateway of scientific method."
Science goes with the method, not with the subject matter. Some important elements of science are-

(1) Observation
(2) Verification and Classification
(3) Generalization
(4) Prediction
(5) Scientific Attitude

The scientific method involves developing and testing theories about the world based on empirical evidence. If is defined by its commitment to systematic observation of the empirical

world and strives to be objective, critical, skeptical and logical. The scientific method is an essential tool in research.

A method of research in which a problem is identified, relevant data is gathers, hypothesis is formulated from the data and testable explanation is found for the hypothesis.
Scientific method is characterized by systematic observation, measurement experimentation, formulation and testing of hypothesis and its modification.

Definitions of Scientific Method :

According to **George A. Lundberg** : "Social scientists are committed to the belief that the problems which confront them are to be solved, if at all by judicious and systematic observation, verification, classification, and interpretation of social phenomena. This is a approach in its most rigorous and successful from is broadly designated as the scientific method."

According to R.N. Thouless : "Scientific method is a system of techniques (different in many respects in different sciences, although retaining the same general character) for attaining the end of discovering general laws."

Characteristics of scientific Method :

According to Martindale and Monachies : "Science too is a mode of thought, and like all thinking it arises in response to problems. It differs from the other modes of thought primarily in its method. Among the methods characteristic of the science are
(1) the emphasis it places upon the observation
(2) the attempt to test its ideas in practice
(3) the development of experiment, of model situations that may serve to test its ideas
(4) the invention of new instruments that permit more precise observation and more exact measurement
(5) the rigorous exclusion of the scientists evaluations from the study, and the concentration on the problem of how thing actually happen rather than on why they happen or what ought to happen".

Some Characteristics of Scientific Method are :

(1) Verifiable evidence : i.e., factual observation which other observers can see and check.

(**2) Accuracy** : It means truth or correctness of a statement or describing things exactly as they are and avoiding jumping to unwarranted conclusion either by exaggeration or fantasising.

(3) Systematic Observation : Strictly speaking the scientific method is systematic that is, it relies on care carefully planned studies rather than on random or haphazard observation. Nevertheless, Science can begin from some random observation.

(4) Objective Approach : The scientific method is objective. It relies on facts and on the world as it is, rather than on beliefs, wishes or desires. Scientists attempt (wtih varying degrees of success) to remove their biases when making observations.

(5) Precision : i.e., making it as exact as necessary, or giving exact number or measurement. Instead of saying "I interviewed a large number of people", one says, "I interviewed 493 persons".
Instead of saying, most of the people were against family planning, one says, seventy two percent people were against family planning." Thus, in scientific precision, one avoids colourfull literature and vague meanings.

(6) Logical: Logic is defined as the discourse of argument. Analytically, logic is separable from any science, it constitutes a field of inquiry itself. However science is not independent of the logic supporting it, at some point in his inquire, the researcher reaches a conclusion regarding the acceptability of some proposition.

(**7) Training investigators**: Imparting necessary knowledge to investigators to make them understand what to look for, how to interpret it and avoid inaccurate data collection.

(8) Predictive: Science is concerned with relating the present to the future. In fact, scientists strive to develop theories because, among other reasons, they are useful in predicting behaviour. A theory's adequacy lies in its ability to predict a phenomenon or event successfully.
According to Henry Jhonson Characteristics of Scientific Research

- It is empirical
- It is theoretical

- It is cummulative
- It is non – ethical

All above characteristics of scientific method point out that any generalisation based on this type of investigation is true. A systematically collected body of scientific evidence is rarely challenged.

Basic Research:

Basic (aka fundamental or pure) research is driven by a scientist's curiosity or interest in a scientific question. The main motivation is to expand man's knowledge, not to create or invent something. There is no obvious commercial value to the discoveries that result from basic research.

For example, basic science investigations probe for answers to questions such as:

- How did the universe begin?
- What are protons, neutrons, and electrons composed of?
- How do slime molds reproduce?
- What is the specific genetic code of the fruit fly?

Most scientists believe that a basic, fundamental understanding of all branches of science is needed in order for progress to take place. In other words, basic research lays down the foundation for the applied science that follows. If basic work is done first, then applied spin-offs often eventually result from this research. As Dr. George Smoot of LBNL says, "People cannot foresee the future well enough to predict what's going to develop from basic research. If we only did applied research, we would still be making better spears."

Applied Research:

Applied research is designed to solve practical problems of the modern world, rather than to acquire knowledge for knowledge's sake. One might say that the goal of the applied scientist is to improve the human condition.

For example, applied researchers may investigate ways to:

- improve agricultural crop production
- treat or cure a specific disease
- improve the energy efficiency of homes, offices, or modes of transportation

Some scientists feel that the time has come for a shift in emphasis away from purely basic research and toward applied science. This trend, they feel, is necessitated by the problems resulting from global overpopulation, pollution, and the overuse of the earth's natural resources.

Action research

Action research is focused on solving a problem or informing individual and community-based knowledge in a way that impacts teaching, learning, and other related processes. It is less focused on contributing theoretical input, instead producing actionable input.

Action research is a research method that aims to simultaneously investigate and solve an issue. In other words, as its name suggests, action research conducts research and takes action at the same time. It was first coined as a term in 1944 by MIT professor Kurt Lewin.A highly interactive method, action research is often used in the social sciences, particularly in educational settings. Particularly popular with educators as a form of systematic inquiry, it prioritizes reflection and bridges the gap between theory and practice. Due to the nature of the research, it is also sometimes called a cycle of action or a cycle of inquiry.

Type of Research

Participatory action research emphasizes that participants should be members of the community being studied, empowering those directly affected by outcomes of said research. In this method, participants are effectively co-researchers, with their lived experiences considered formative to the research process.

Practical action research focuses more on how research is conducted and is designed to address and solve specific issues.

Both types of action research are more focused on increasing the capacity and ability of future practitioners than contributing to a theoretical body of knowledge.

Action research models

Action research is often reflected in 3 action research models: operational (sometimes called technical), collaboration, and critical reflection.

Operational (or technical) action research is usually visualized like a spiral following a series of steps, such as “planning → acting → observing → reflecting.”

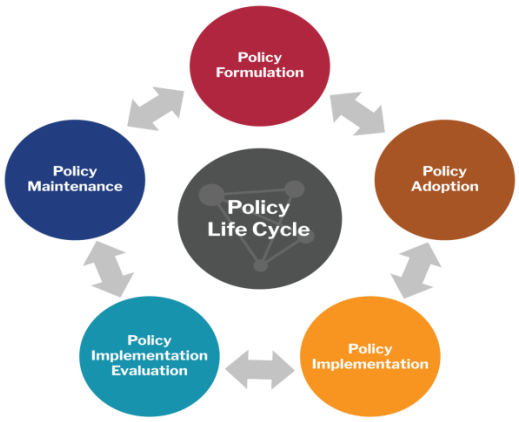
Collaboration action research is more community-based, focused on building a network of similar individuals (e.g., college professors in a given geographic area) and compiling learnings from iterated feedback cycles.

Critical reflection action research serves to contextualize systemic processes that are already ongoing (e.g., working retroactively to analyze existing school systems by questioning why certain practices were put into place and developed the way they did).

Policy Research

Research is an organised and systematic collection, analysis, and presentation of information in order to establish facts and generate knowledge by reaching a new understanding. In public policy, research is a scientific enquiry that seeks to investigate a concept and/or a problem situation in order to gain a deeper understanding and reaching effective solution through systematic collection, analysis and interpretation of data. The process entails a careful and detailed investigation into a specific problem, concern, and/or issue employing an appropriate research strategy (or method).

Policy research is a type of research that aims to provide answers and evidence which can contribute to the improvement of policy and policy-making processes. Policy-oriented research is not only limited to finding solutions to policy problems but is also concerned to improve better practices and interventions by informing organisations, policymakers and decision-makers with pragmatic, action-oriented useful recommendations (see Becker, Bryman & Ferguson, 2012). Similarly, policy-oriented research entails informing and/or understanding one or more aspects of the public policy process (Becker & Bryman, 2011). As presented in figure 2, there are two types of policy research.



A SIMPLIFIED VIEW OF THE POLICY PROCESS

Research for policy is concerned to inform actors involved in managing various stages of the policy process (from the policy formation stage to the policy implementation stage). This attempts to explain the policy-making process and its execution. This type of research is primarily concerned with generating policy – suggesting possible solutions to deal with a particular problem. For instance, policy measures for the Pandemic (COVID-19) from 2019 onwards.

Research of policy is concerned with how the problem was defined, the agenda was set, a policy was formulated, decisions were made, and how the policy/intervention was implemented, evaluated and changed. This attempts to review the whole (or a particular stage of) policy process and suggest revisions, if required. For instance, the evaluation the of whole programme or particular policy stages involved in the Benazir Income Support Programme (BISP).

It is to realise that research has a key role in policy and practice. Decisions made on perceptions and observations are bound to fail as compared to decisions based on data and evidence. It is therefore the shared responsibility of researchers and policymakers/practitioners to realise the effective value of R&D and its utility in managing policy decisions.

Theory and research

A social theory is defined as a system of interconnected ideas that compresses and organises knowledge about the social world (Neuman, 2007).

The basic elements of building a theory are: 1) concepts 2) variables 3) statements, and 4) formats. Although there are diverse claims about what makes a theory these four elements are common to all of them.

Concepts

Theories are build from concepts. Concepts denotes phenomena. Concepts helps in isolating the feature of the world that are considered important at that instance. Concepts are structured form definitions. Definitions allows us to visualise the phenomenon that is denoted by the concept. It enables the researcher to see the same thing and to understand what it is that is being studied. Therefore, concepts used in building a theory tries to communicate the same meaning to all those who use them. In sociology, unlike in sciences, special symbols cannot be used to denote a concept, therefore the concept is defined as precisely as possible so that it communicates the same meaning to all. Concepts of theory reveal Theory and Research abstractness.

b) Variables

The concept of scientific theory should denote the variable features of the world. To understand events requires that we visualise how variation in one phenomenon is related to variation in another. In the physical sciences,variables are the characteristics of thing which are physically manipulated. In social sciences it refers to attributes which are fixed for each thing but which are observed to be at different levels, amount or strength across samples and other aggregate groups. Variable measures a social construct like age, class etc. in a way which renders it amenable to numerical analysis. The important feature of a variable is that it is capable of reflecting variations within population and is not a constant.

Statement and Formats

The concepts of a theory must be connected to each other and this connection between concepts is makes theoretical statement. These statements specify the way in which events represented by concepts are interrelated and at the same time, they provide an interpretation of how and why events should be connected to each other. When these theoretical statements are grouped together they constitute the theoretical formats.

Inductive Method

Inductive research is a research approach that involves gathering and analyzing data to develop a theory or hypothesis. In this approach, researchers begin with specific observations and data and then work toward more general theories and conclusions. This research is often used when little is known about a topic or when there is no existing theory to explain the observations being made. The goal of inductive research is to develop a theory grounded in data and use it to explain patterns or relationships in the data.

Process of Inductive Research

Data collection: The first step in inductive research is to collect data. This can be done through a variety of methods, including interviews, observations, surveys, and document analysis.

Data analysis: Once the data has been collected, the next step is to analyze it. This involves identifying patterns and themes within the data. Inductive research relies heavily on qualitative data analysis methods, such as coding and thematic analysis.

Identification of themes: After analyzing the data, the researcher will begin to identify themes that emerge from the data. These themes represent patterns or commonalities within the data.

Development of theories: Once themes have been identified, the researcher will begin to develop theories or explanations for these patterns. Theories are grounded in the data and are used to explain the phenomena that have been observed.

Reporting of findings: The final step in the inductive research process is to report the findings. This can be done through a variety of formats, including academic papers, presentations, and reports. The reporting of findings should be grounded in the data and should clearly explain the theories that have been developed.

Deductive Research

Deductive research is a form of research that begins with a theory or hypothesis and seeks to test its validity through the collection and analysis of data. The researcher starts with a general theory or idea and then develops specific hypotheses based on that theory. These hypotheses are then tested through the collection of data, which is analyzed to determine whether it supports or refutes the initial theory or hypotheses. Deductive research is often used in quantitative research, where data is collected through structured methods such as surveys, experiments, or statistical analysis.

Process of Deductive Research

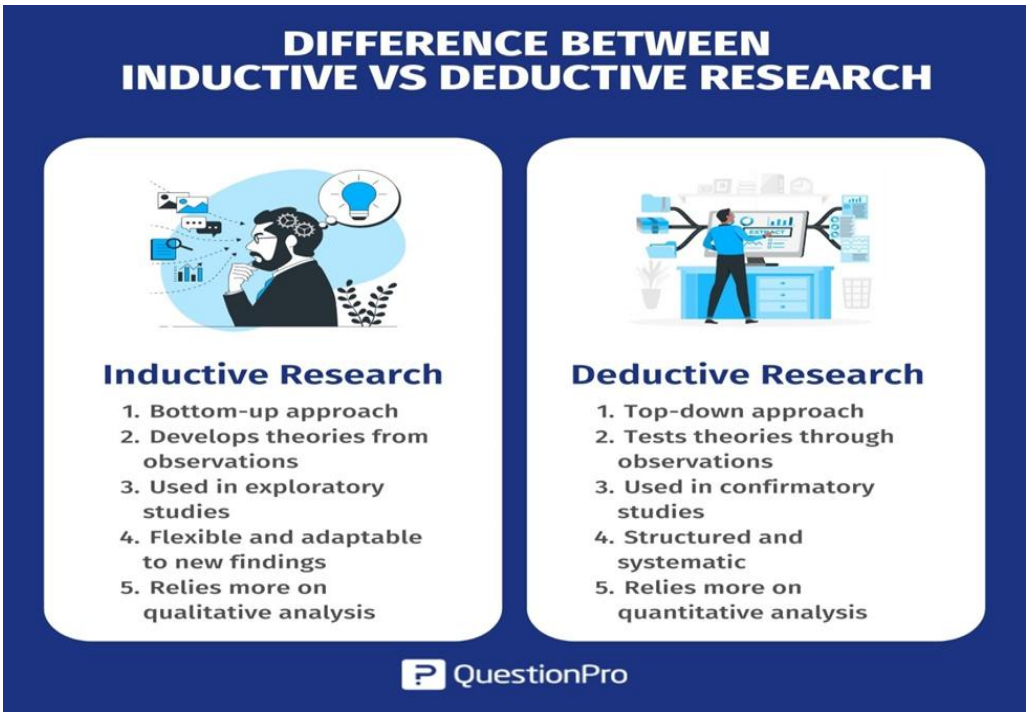
Formulation of a research question or hypothesis: This step involves the identification of a research question or hypothesis based on existing theory or knowledge.

Development of a research design: Once the research question or hypothesis has been formulated, the next step is to develop a research design that outlines the methods and procedures that will be used to test the hypothesis.

Data collection: This step involves the collection of data using methods that are appropriate for the research design. For example, if the research design involves a survey, then data will be collected through the use of questionnaires.

Data analysis: Once the data has been collected, the next step is to analyze it in order to test the hypothesis. This involves the use of statistical techniques and other methods of analysis to determine whether the data supports or refutes the hypothesis.

Interpretation of results: The final step in the process of deductive research involves the interpretation of the results. This involves drawing conclusions based on the analysis of the data and determining whether the hypothesis has been supported or refuted.



LET US SUM UP

The unit Introduction to Research provides a foundational understanding of what research entails, particularly within the realm of scientific inquiry. It begins by defining research as a systematic and objective process of collecting, analyzing, and interpreting information to answer questions or solve problems. Scientific research is distinguished by its reliance on empirical evidence and logical reasoning, grounded in the core characteristics of science—objectivity, reliability, verifiability, and ethical neutrality. The scientific method serves as the backbone of research, characterized by features such as systematic observation, formulation of hypotheses, experimentation, and logical analysis. Its primary purpose is to discover new knowledge, validate existing knowledge, and apply findings for practical use. The assumptions of the scientific method include a belief in causality, uniformity in nature, and the value of empirical evidence. The steps in the scientific method typically involve identifying a problem, reviewing literature, forming a hypothesis, collecting and analyzing data, and drawing conclusions. The chapter also elaborates on various types of social research, including pure/basic/fundamental research which seeks to expand theoretical understanding; applied research, aimed at solving practical problems; action research, which involves active participation to bring change; and policy research, which supports informed policy-making. A vital section discusses the interrelationship between theory and research, where theory guides research and research refines theory. Finally, the chapter explains inductive and deductive reasoning as two essential approaches: induction involves deriving general principles from specific observations, while deduction starts with a theory or hypothesis and tests it through specific observations. This comprehensive introduction lays the groundwork for understanding how scientific research contributes to knowledge development in the social sciences.

GLOSSARY

Research.

Scientific Method

Empirical

Hypothesis

Theory

Pure Research

CHECK YOUR PROGRESS

1. The word ‘Research’ is comprised of two words: _____.
2. Research is only conducted by highly gifted individuals and cannot be done by average persons.
3. Scientific research is considered to be a continuous search for knowledge and understanding of reality carried out through the scientific method.

ANSWERS TO CHECK YOUR PROGRESS

Re + Search

False

True

MODEL QUESTIONS

Define research and mention two important definitions.

List any four characteristics of the scientific method.

What do you mean by action research?

SUGGESTED READINGS

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UNIT - II: REVIEW OF LITERATURE

Scope and Purpose of literature review, Processes and sources of reviewing the literature. Hypothesis: Functions, Conditions for a Valid Hypothesis, Formulation of Hypothesis, Forms of Hypothesis, Hypothesis Testing.

Overview

This unit offers a comprehensive understanding of two key components of the research process—literature review and hypothesis. The review of literature serves as a critical foundation for any research work, highlighting its scope and purpose in establishing the context, identifying research gaps, and refining research questions. The process of reviewing literature involves systematically gathering, analyzing, and synthesizing information from various primary and secondary sources, such as academic journals, books, reports, and online databases. Understanding this process enables the researcher to frame the study within existing knowledge and justify the research need. The unit also delves into the concept of hypothesis, which is a tentative explanation or prediction that guides the research investigation. It explains the functions of a hypothesis in directing the study, the conditions for a valid hypothesis, and how hypotheses are formulated based on theoretical frameworks and existing evidence. Further, it categorizes the forms of hypothesis—null, alternative, directional, and non-directional—and outlines the process of hypothesis testing as a method to verify assumptions using empirical data. Together, the review of literature and hypothesis formulation are presented as essential elements in building a scientific and logical research framework.

Learning objectives

- Gain insights into the significance of reviewing existing literature in research, its role in identifying research gaps, refining research questions, and avoiding duplication.
- Identify systematic methods of conducting a literature review, including searching, selecting, organizing, and synthesizing scholarly.
- Understand what a hypothesis is and its role in guiding scientific inquiry and providing a basis for data collection and interpretation.
- Learn about the essential characteristics of a scientifically valid hypothesis.
- Learn the basic steps of hypothesis testing including stating hypotheses, selecting the appropriate test, setting significance level, analyzing data, and interpreting results**.**

Introduction

A literature review is a comprehensive summary of previous research on a topic. ...The review should enumerate, describe, summarize, objectively evaluate and clarify this previous research. It should give a theoretical base for the research and help you (the author) determine the nature of your research.

A literature review discusses published information in a particular subject area, and sometimes information in a particular subject area within a certain time period. A literature review can be just a simple summary of the sources, but it usually has an organizational pattern and combines both summary and synthesis.

The literature review is a written overview of major writings and other sources on a selected topic. Sources covered in the review may include scholarly journal articles, books, government reports, Web sites, etc. The literature review provides a description, summary and evaluation of each source.

The purpose of a literature review is to:

- Provide foundation of knowledge on topic

- Identify areas of prior scholarship to prevent duplication and give credit to other researchers
- Identify inconstancies: gaps in research, conflicts in previous studies, open questions left from other research
- Identify need for additional research (justifying your research)
- Identify the relationship of works in context of its contribution to the topic and to other works
- Place your own research within the context of existing literature making a case for why further study is needed.

Categories:

1. Simple - A simple literature review is a brief overview of the topic not necessarily purely academic in scope and often uses popular sources (although popular sources are noted so their weight and value can be judged) this review is often just the start of the research process.

2. Applied - Used mostly in business, government and other professional environments applied literature reviews are more fact finding exorcizes. Used to look at marketability and profitability they look at change and value objectivity and accuracy in similar projects and programs.

3. Academic - Whether stand alone or part of a paper, study, or project the Academic Literature Review requires accuracy, quality resources , objectivity thoroughness and quality analysis but unlike the other two styles the Academic Review requires a depth the others do not. Academic sources not popular should be used and a summery and synthesis of sources usually within a conceptual framework.

Importance of literature review in research:

The importance of literature review in scientific manuscripts can be condensed into an analytical feature to enable the multifold reach of its significance. It adds value to the legitimacy of the research in many ways:

1. Provides the interpretation of existing literature in light of updated developments in the field to help in establishing the consistency in knowledge and relevancy of existing materials.

2. It helps in calculating the impact of the latest information in the field by mapping their progress of knowledge.

3. It brings out the dialects of contradictions between various thoughts within the field to establish facts.

4. The research gaps scrutinized initially are further explored to establish the latest facts of theories to add value to the field.

5. Indicates the current research place in the schema of a particular field.

6. Provides information for relevancy and coherency to check the research.

7. Apart from elucidating the continuance of knowledge, it also points out areas that require further investigation and thus aid as a starting point of any future research.

8. Justifies the research and sets up the research question.

9. Sets up a theoretical framework comprising the concepts and theories of the research upon which its success can be judged

10. Helps to adopt a more appropriate methodology for the research by examining the strengths and weaknesses of existing research in the same field

11. Increases the significance of the results by comparing it with the existing literature

12. Provides a point of reference by writing the findings in the scientific manuscript

13. Helps to get the due credit from the audience for having done the fact-finding and fact checking mission in the scientific manuscripts

14. The more the reference of relevant sources of it could increase more of its trustworthiness with the readers

15. Helps to prevent plagiarism by tailoring and uniquely tweaking the scientific manuscript not to repeat other's original idea

16. By preventing plagiarism, it saves the scientific manuscript from rejection and thus also saves a lot of time and money

17. Helps to evaluate, condense and synthesize gist in the author's own words to sharpen the research focus

18. Helps to compare and contrast to show the originality and uniqueness of the research than that of the existing other researches

19. Rationalizes the need for conducting the particular research in a specified field

20. Helps to collect data accurately for allowing any new methodology of research than the existing ones.

Hypothesis

A hypothesis is a tentative statement about the relationship between two or more variables. It is a specific, testable prediction about what you expect to happen in a study. It is a preliminary answer to your question that helps guide the research process.

Consider a study designed to examine the relationship between sleep deprivation and test performance. The hypothesis might be: "This study is designed to assess the hypothesis that sleep-deprived people will perform worse on a test than individuals who are not sleep-deprived."

The word hypothesis consists of two words:

Hypo + thesis = Hypothesis

'Hypo' means tentative or subject to the verification and 'Thesis' means statement about solution of a problem.

The world meaning of the term hypothesis is a tentative statement about the solution of the problem. Hypothesis offers a solution of the problem that is to be verified empirically and based on some rationale.

Examples of Hypothesis based on their types-

Simple hypothesis- Consumption of coke every day leads to obesity.

Null hypothesis- All flower lilies have the same number of petals.

Directional hypothesis- A person gets 7 hours of sleeps, will make him feel less tiredness than if he sleeps less.

Definition

"A hypothesis is a tentative generalisation the validity of which remains to be tested. In its most elementary stage, the hypothesis may be any hunch, guess, imaginative idea which becomes the basis for further investigation." - Lungberg

➢ "It is a tentative supposition or provisional guess which seems to explain the situation under observation." - James E. Greighton

Characteristics of a Workable Hypothesis

It is said that man's mind, like his body, is often active without any immediate goal. A number of interesting hypothesis may emanate from man's mind but all of them may not necessarily be empirically verifiable.

1. Hypothesis Should Be Conceptually Clear

The concepts used in the hypothesis should be clearly defined, not only formally but also, if possibly, operationally. Formal definition of the concepts will clarify what a particular concept stands for, while the operational definition will leave no ambiguity about what would constitute the empirical evidence or indicator of the concept on the plane of reality. Obviously, an undefined or ill-defined concept makes it difficult or

rather impossible for the researcher to test his hypothesis as there will not be any standard basis for him to know the observable facts.

However, a researcher, while defining concepts, should use, as far as possible, the terms that are communicable or definitions that are commonly accepted. It should be stated as far as possible in most simple terms so that it can be easily understandable to all concerned. He should not create 'a private world of words.'

2. Hypothesis Should Be Specific

A hypothesis should be couched in specific terms. No vague or value-judgmental terms should be used in formulation of a hypothesis. It should specifically state the posited relationship between the variables. It should include a clear statement of all the predictions and operations indicated therein and they should be precisely spelled out. Specific formulation of a hypothesis assures that research is practicably significant. It helps to increase the validity of results because the more specific the statement or prediction, the smaller the probability that it will actually be borne out as a result of mere accident or chance. A researcher, therefore, must remember that narrower hypothesis is generally more testable and he should develop such a hypothesis.

3. Hypothesis Should Be Empirically Testable

A hypothesis, as, stated earlier, should be formulated in such a way that it should possibly be to empirically verifiable. It should have empirical referents so that it will be possible to deduce certain logical deductions and inferences about it. Such statements as 'pigs are well named because they are so dirty' can hardly be usable hypothesis as they do not have any empirical referents for testing their validity.

4. Hypothesis Should Be Related to Available Techniques

A hypothesis needs to be empirically tested. This requirement obviously makes it necessary that a hypothesis should be related to available techniques of data collection. A researcher who does not know what techniques are available to him to

test his hypothesis cannot test his hypothesis. His ignorance of the available techniques, makes him weak in formulating a workable hypothesis.

5. Hypothesis Should Be Related to a Body of Theory or Theoretical Orientation

It is needless to re-emphasize here that a researcher, through testing his hypothesis, intends to contribute to the existing fact, theory or science. While formulating his hypothesis, he has to take a serious pause to see the possible theoretical gains of testing the hypothesis. A hypothesis, if tested, helps to qualify, support, correct or refute an existing theory, only if it is related to some theory or has some theoretical orientation.

FUNCTIONS

The following are the main functions of hypothesis in the research process suggested by H.H.

Mc Ashan:

1. It is a temporary solution of a problem concerning with some truth, which enables an investigator to start his research work.

2. It offers a basis in establishing the specifics what to study for and may provide possible solutions to the problem.

3. Each hypothesis may lead to formulate another hypothesis.

4. A preliminary hypothesis may take the shape of final hypothesis.

5. Each hypothesis provides the investigator with definite statement which may be objectively tested and accepted or rejected and leads for interpreting results and drawing conclusions that is related to original purpose.

The functions of a hypothesis may be condensed into three. The following are the threefold functions of a hypothesis:

a) To delimit the field of the investigation.

b) To sensitize the researcher so that he should work selectively, and have very realistic approach to the problem.

c) To offer the simple means for collecting evidences to the verification.

TYPES

Hypothesis may broadly be classified as working hypothesis, research hypothesis, null hypothesis, statistical hypothesis, alternative hypothesis and scientific hypothesis.

1. Working Hypothesis

Working hypothesis is a preliminary assumption of the researcher about the research topic, particularly when sufficient information is not available to establish a hypothesis, and as a step towards formulating the final research hypothesis. Working hypotheses are used to design the final research plan, to place the research problem in its right context and to reduce the research topic to an acceptable size.

For example, in the field of business administration, a researcher can formulate a working hypothesis that “assuring bonus increases the sale of a commodity”. Later on, by collecting some preliminary data, he modifies this hypothesis and takes a research hypothesis that “assuring lucrative bonus increases the sale of a commodity.”

2. Scientific Hypothesis

Scientific hypothesis contains statement based on or derived from sufficient theoretical and empirical data.

3. Alternative Hypothesis

Alternative hypothesis is a set of two hypothesis (research and null) which states the opposite of the null hypothesis. In statistical tests of null hypothesis, acceptance of

Ho (null hypothesis) means rejection of the alternative hypothesis; and rejection of Ho means similarly acceptance of the alternative hypothesis.

4. Research Hypothesis

Research hypothesis is a researcher's proposition about some social fact without reference to its particular attributes. Researcher believes that it is true and wants that it should be disproved, e.g., Muslims have more children than Hindus, or drug abuse is found among upper-class students living in hostels or rented rooms. Research hypothesis may be derived from theories or may result in developing of theories.

5. Null Hypothesis

Null hypothesis is reverse of research hypothesis. It is a hypothesis of no relationship. Null hypothesis does not exist in reality but are used to test research hypothesis. Why is research hypothesis changed in null hypothesis for verification? The main reasons according to Black and Champion are:

(1) It is easier to prove something false than to prove it true.

(2) When one tries to prove something, it indicates his firm belief and commitment to the idea but when he wants to disprove it, it indicates his objectivity.

(3) It is based on probability theory, i.e., it can either be true or false. It cannot be both.

(4) It is a convention in social research to use null hypothesis.

6. Statistical Hypothesis

Statistical hypothesis, according to Winter, is a statement/observation about statistical populations that one seeks to support or refute. The things are reduced to numerical quantities and decisions are made about these quantities, e.g., income difference between two groups:

Group A is richer than group B. Null hypothesis will be: group A is not richer than group B.

Here, variables are reduced to measurable quantities.

For the purpose of testing statistical significance, hypotheses are concisely classified into two types:

1. Null Hypothesis

A null hypothesis is a statement that there is no actual relationship between variables. (Ho or HN). The final conclusion of the investigator will either retain a null hypothesis or reject a null hypothesis in favor of an alternative hypothesis. Not rejecting Ho does not really mean that Ho s true. There might not be enough evidence against Ho. Once the null hypothesis has been stated, it is easy to construct the alternative hypothesis. It is essentially the statement that the null hypothesis is false. Example can be “There is no significant difference in the anxiety level of children of High IQ and those of low IQ.

2. Alternate Hypothesis

An alternative hypothesis is a statement that suggests a potential outcome that the researcher may expect. (H1 or HA). It is established only when a null hypothesis is rejected. Often an alternative Hypothesis is the desired conclusion of the investigator. The two types of alternative hypothesis are: (a)

i. Directional Hypothesis and

ii. Non-directional Hypothesis.

Directional Hypothesis is a type of alternative hypothesis that specifies the direction of expected findings. Sometimes directional hypotheses are created to examine the relationship among variables rather than to compare groups. Directional hypothesis may read, “…is more than..”, “…will be lesser..” Example can be “Children with high IQ will exhibit more anxiety than children with low IQ”

Non-directional Hypothesis is a type of alternative hypothesis in which no definite direction of the expected findings is specified. The researcher may not know what can be predicted from the past literature. It may read, "...there is a difference between.." Example can be "There is a difference in the anxiety level of the children of high IQ and those of low IQ."

Goode and Hatt have given the following three types of hypotheses on the basis of level of abstractness:

1. Hypothesis which presents proposition in common sense terms or, about which some common-sense observations already exist or, which seeks to test common sense statements.

For example: bad parents produce bad children, or committed managers always give profits, or rich students drink more alcohol.

2. Hypothesis which are somewhat complex, i.e., which give statement of a little complex relationship.

For example: Communal riots are caused by religious polarization, Crime is caused by differential associations, Juvenile delinquency is related to residence in slums, or Deviant behaviour is caused by mental disorders.

3. Hypothesis which are very complex, i.e., which describe relationship between two variables in more complex terms, e.g., high fertility exists more in low income, conservatives, and rural people than in high income, modern, and urban people. Here dependent variable is 'fertility' while independent variables are income, values, education, and residence, etc. The other example is: Muslims have high fertility rate than Hindus. We have to keep number of variables constant to test this hypothesis. This is abstract way to handle the problem.xxx

FORMULATION

Hypothesis can pertain to virtually anything. For example, urbanization and urban life style boost suicide rate, broken homes tend to lead juvenile delinquency, modernization and education among women lead to increase in divorces, poverty causes criminality, and unemployment among youths leads to violent crimes. There can be no restrictions whatsoever about what can be hypothesized. However, hypothesis needs to be empirically tested. In fact, a researcher needs to put a great deal of thought into formulation of his hypothesis.

Formulation of Hypothesis differs with the method of research conducted such as:

1. Qualitative Method

The researcher uses questions, not objectives or hypothesis. He poses a central question, which is being examined in the study in the most general form- “the broadest question that can be asked in a study.” Several sub-questions are raised related to the central question to narrow the focus of study but to leave the questioning at an open end. They are under continual review and restructuring along the course of research. Questions begin with “what”, “how”. They focus on a single concept. The questions use non-directional terminology.

2. Quantitative Method

The researcher uses questions and hypothesis to compose and focus the purpose of study.

Hypothesis or research questions used to compare, relate and describe variables. The research follows from a test of theory and the question and the hypothesis or the research questions are included in the theory. Independent and dependent variables are measured separately. It is not a combination of both either a research question or a hypothesis. Hypothesis needs to be structured before the data-gathering and interpretation phase of the research. A well-grounded hypothesis indicates that the

researcher has sufficient knowledge in the area to undertake the investigation. The hypothesis gives direction to the collection and interpretation of data.

Consider the example of a simple association between two variables, Y and X.

i. Y and X are associated (or, there is an association between Y and X).

ii. Y is related to X (or, Y is dependent on X).

iii. As X increases, Y decreases (or, increases in values of X appear to effect reduction in values of Y).

The first hypothesis provides a simple statement of association between Y and X. Nothing is indicated about the association that would allow the researcher to determine which variable, Y or X, would tend to cause the other variable to change in value.

The second hypothesis is also a simple statement of association between Y and X, but this time it may be inferred that values of Y are in some way contingent upon the condition of the X variable.

The third hypothesis is the most specific of the three. Not only does it say that Y and X are related and that Y is dependent on X for its value, but it also reveals something more about the nature of the association between the two variables.

DEDUCTIVE AND INDUCTIVE APPROACHES

There are two broad methods of reasoning such as deductive and inductive approaches. The main difference between inductive and deductive approaches to research is that whilst a deductive approach is aimed and testing theory, an inductive approach is concerned with the generation of new theory emerging from the data.

Deductive Approach:

Deductive reasoning works from the more general to the more specific. Sometimes this is informally called a “top-down” or “waterfall” approach. Researcher might begin

with thinking up a theory about his topic of interest. He then narrows that down into more specific hypothesis that he can test. Researcher narrows down even further when he collects observations to address the hypothesis. This ultimately leads the researcher to be able to test the hypothesis with specific data -- a confirmation (or not) of our original theories.

THEORY

HYPOTHESIS

OBSERVATION

CONFIRMATION

Inductive Approach:

Inductive reasoning works the other way, moving from specific observations to broader generalizations and theories. Informally, sometimes this is called as a “bottom up” or “hill climbing” approach. In inductive reasoning, researcher begins with specific observations and measures, begins to detect patterns and regularities, formulate some tentative hypothesis that he can explore, and finally end up developing some general conclusions or theories.

THEORY

TENTATIVE HYPOTHESIS

PATTERN

OBSERVATION

IMPORTANCE

The importance of hypothesis can be described in the following ways:

1. It Focuses Research: Without it, research is unfocussed research and remains like a random empirical wandering. It serves as necessary link between theory and the investigation.

2. It Places Clear and Specific Goals: A well thought of hypothesis places clear and specific goals before the research worker and provides him with a basis for selecting sample and research procedure to meet these goals.

3. It Prevents Blind Research: "The use of hypothesis prevents a blind search and indiscriminate gathering of masses of data which may later prove irrelevant to the problem under study."– P. V. Young

George J. Mouley thinks that a good Hypothesis serves the following purposes:

a) Gives help in deciding the direction in which he has to proceed.

b) It helps in selecting pertinent fact.

c) It helps in drawing conclusions.

DIFFERENCE BETWEEN HYPOTHESIS, ASSUMPTIONS AND POSTULATES

Hypothesis, assumptions and postulates are generally confused with one another. However, following are the major differences between them.

S. No	**HYPOTHESIS**	**ASSUMPTIONS**	**POSTULATES**
1	Hypothesis are tentative statements or a proposed explanation of any observable phenomenon.	Assumptions are statements of what the researcher believes to be facts but cannot verify.	Postulates are propositions which are accepted as true. Postulates are fundamental propositions used to prove other statements.

2	The experiment will either prove the hypothesis right or wrong.	Assumptions are basically hunches or anything that is taken for granted.	Postulates are not proven; they are simply accepted at their face values.
3	Hypothesis provides enough evidence to be regarded as a valid theory.	Assumption can be used as premise of a particular argument but may not be otherwise accepted	Postulates provides basis for legal reasoning

Hypothesis is important for a study. Hypothesis is important for bringing clarity, specificity and focus to a research study. A hypothesis is a speculative statement that is subjected to verification through a research study. In formulating, a hypothesis it is important to ensure that it is simple, specific conceptually clear, able to be verified, rooted in a body of knowledge and able to be operationalized. The study of hypothesis for logical consistency is a phase of thinking. It consists of checking the logical character of reasoning by which the consequences of hypothesis are deduced for verification. In the second place, the study of hypothesis for logical consistency involves checking if for the agreement with the already known laws of nature. It must not conflict with the highest and simplest laws of good thinking and it must not disagree with those principles of science which are considered valid beyond reasonable doubt. The suggested inferences are tested in thought, for logical coherence, before they are tested in action. A Hypothesis is never proved; it is merely sustained or rejected. If it fails to meet the test of its validity, it must be modified or rejected. A hypothesis can be useful even it is partially incorrect. The negative instances which occur require only clarification and refinement of the hypothesis rather than its outright rejection. It has a significant role in the formulation of theory, principles and laws. It is also known as tentative theory, after verification it takes the shape of final theory. A theory embers new hypothesis, these are subjected to verification, after the verification it becomes a new theory in field studies. In building up the theories, this cyclic process continues.

"A hypothesis serves as a powerful beacon that lights the way for the research worker." -Van Dalen

SUM UP

The review of literature and hypothesis formulation are foundational elements of the research process. A literature review serves multiple purposes: it provides a comprehensive overview of existing knowledge, identifies gaps and inconsistencies in prior studies, and establishes a theoretical framework for new research. The scope of a literature review encompasses scholarly articles, books, reports, and other academic sources relevant to the topic, while the process includes searching, selecting, analyzing, and synthesizing these materials to gain insight and contextual understanding. Reviewing the literature ensures the researcher builds upon previous findings, avoids duplication, and justifies the need for the current study.

Hypothesis, on the other hand, is a tentative statement predicting the relationship between variables. It performs several functions: it provides direction to the research, aids in data collection, and serves as a basis for drawing conclusions. For a hypothesis to be valid, it must be conceptually clear, specific, empirically testable, and logically connected to a theoretical framework. The formulation of a hypothesis requires a thorough understanding of the subject and often stems from literature reviews or theoretical considerations. Hypotheses can take various forms such as null, alternative, directional, and non-directional types. Hypothesis testing involves collecting and analyzing data to accept or reject the proposed statements, thus confirming or refining existing theories. Together, literature review and hypothesis formulation lay the groundwork for a meaningful and structured research study.

Glossary

Literature Review: A comprehensive summary and critical analysis of previous research on a specific topic, aiming to establish a theoretical foundation and identify research gaps.

Hypothesis: A tentative, testable statement predicting the relationship between two or more variables in a research study.

Null Hypothesis (Ho): A type of hypothesis that proposes no significant relationship or difference between variables, serving as a benchmark for testing the research hypothesis.

Deductive Approach: A logical process where the researcher begins with a theory and tests it through hypothesis formulation and data collection.

Check Your Progress

A _____ is a tentative, testable statement about the relationship between two or more variables, guiding the direction of research.

A literature review must always use only popular sources such as newspapers and blogs.

A directional hypothesis predicts not only that a relationship exists but also the direction of the effect.

Answers to Check Your Progress

Hypothesis

False

True

Model Questions

Differentiate between Simple, Applied, and Academic literature reviews.

How does a literature review help in identifying research gaps?

How does the literature review support the choice of research methodology?

Define a hypothesis. What are its key characteristics?

What are the criteria for formulating a good research hypothesis?

Explain the types of hypotheses used in social science research.

Discuss the functions of hypothesis in the research process.

For Further Reading

Booth, W. C., Colomb, G. G., & Williams, J. M. – "The Craft of Research"

Hart, Chris – "Doing a Literature Review: Releasing the Social Science Research Imagination"

Machi, L. A., & McEvoy, B. T. – "The Literature Review: Six Steps to Success"

Galvan, J. L. – "Writing Literature Reviews"

Ridley, D. – "The Literature Review: A Step-by-Step Guide for Students"

Goode, W. J., & Hatt, P. K. – "Methods in Social Research"

Kothari, C. R. – "Research Methodology: Methods and Techniques"

Neuman, W. Lawrence – "Social Research Methods: Qualitative and Quantitative Approaches"

P. V. Young – "Scientific Social Surveys and Research"

Babbie, Earl – "The Practice of Social Research"

UNIT - III

Research Process and Sampling:

Research Process: Research Design: Need for Research Design, Features. Types: Exploratory, Descriptive, Explanatory, Experimental and Evaluative. Quantitative Methods and Survey Research - Nature, scope & limitations of quantitative research methods-Sampling: Probability and nonprobability methods. Understanding Qualitative Research -Field and researcher in qualitative research- Doing qualitative Research- Conducting Interview and Doing Ethnography, Mixed Method Research Design – Triangulation Method.

Research Process According to Clifford Woody research comprises defining and redefining problems, formulating hypothesis or suggested solutions; collecting, organizing and evaluating data; making deductions and reaching conclusions; and at last carefully testing the conclusions to determine whether they fit the formulating hypothesis.

LEARNING OBJECTIVES

After studying this unit, you will be able to:

Understand the concept and purpose of research as defined by Clifford Woody.

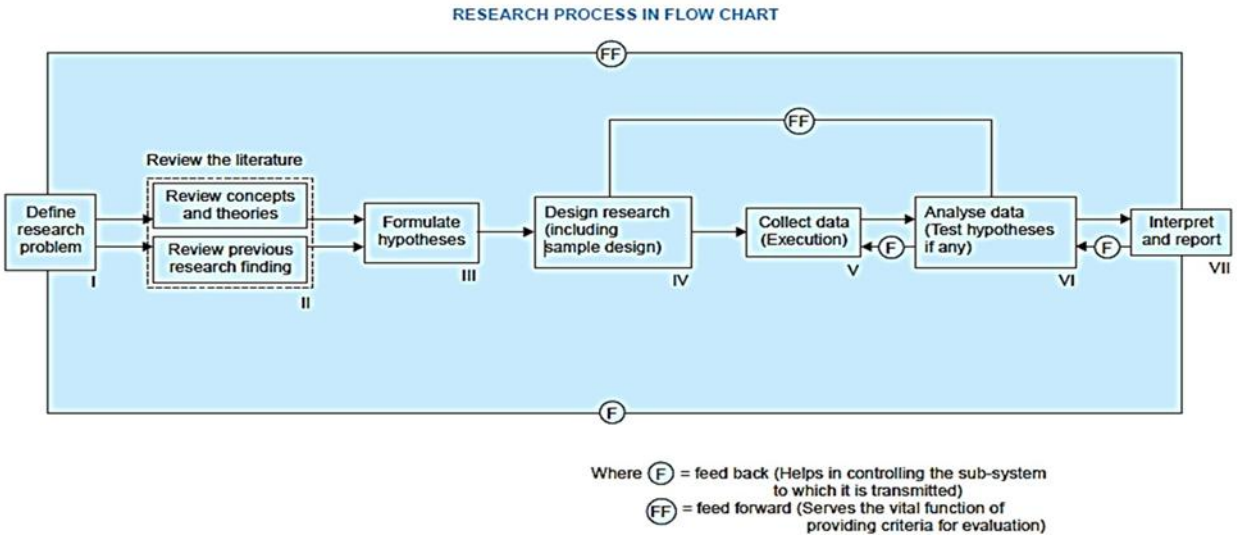
Identify and describe the major steps involved in the research process.

Explain the logical sequence of actions necessary to conduct effective research.

Comprehend the role of hypothesis formulation and data evaluation in the research cycle.

Recognize the importance of testing conclusions in validating a research hypothesis

Before embarking on the details of research methodology and techniques, it seems appropriate to present a brief overview of the research process. Research process consists of series of actions or steps necessary to effectively carry out research and the desired sequencing of these steps. The chart shown in Figure 1 well illustrates a research process.



The chart indicates that the research process consists of a number of closely related activities, as shown through I to VII. But such activities overlap continuously rather than following a strictly prescribed sequence. At times, the first step determines the nature of the last step to be undertaken. If subsequent procedures have not been taken into account in the early stages, serious difficulties may arise which may even prevent the completion of the study. One should remember that the various steps involved in a research process are not mutually exclusive; nor they are separate and distinct. They do not necessarily follow each other in any specific order and the researcher has to be constantly anticipating at each step in the research process the requirements of the subsequent steps. However, the following order concerning various steps provides a useful procedural guideline regarding the research process: (1) formulating the research problem; (2) extensive literature survey; (3) developing the hypothesis; (4) preparing the research design; (5) determining sample design; (6) collecting the data; (7) execution of the project; (8) analysis of data; (9) hypothesis testing; (10) generalisations and

interpretation, and (11) preparation of the report or presentation of the results, i.e., formal write-up of conclusions reached.

1. Formulating the research problem:

There are two types of research problems, viz., those which relate to states of nature and those which relate to relationships between variables. At the very outset the researcher must single out the problem he wants to study, i.e., he must decide the general area of interest or aspect of a subject-matter that he would like to inquire into. Initially the problem may be stated in a broad general way and then the ambiguities, if any, relating to the problem be resolved. Then, the feasibility of a particular solution has to be considered before a working formulation of the problem can be set up. The formulation of a general topic into a specific research problem, thus, constitutes the first step in a scientific enquiry. Essentially two steps are involved in formulating the research problem, viz., understanding the problem thoroughly, and rephrasing the same into meaningful terms from an analytical point of view.

The best way of understanding the problem is to discuss it with one's own colleagues or with those having some expertise in the matter. In an academic institution the researcher can seek the help from a guide who is usually an experienced man and has several research problems in mind. Often, the guide puts forth the problem in general terms and it is up to the researcher to narrow it down and phrase the problem in operational terms. In private business units or in governmental organisations, the problem is usually earmarked by the administrative agencies with whom the researcher can discuss as to how the problem originally came about and what considerations are involved in its possible solutions.

The researcher must at the same time examine all available literature to get himself acquainted with the selected problem. He may review two types of literature—the conceptual literature concerning the concepts and theories, and the empirical literature consisting of studies made earlier which are similar to the one proposed. The basic outcome of this review will be the knowledge as to what data and other materials are

available for operational purposes which will enable the researcher to specify his own research problem in a meaningful context. After this the researcher rephrases the problem into analytical or operational terms i.e., to put the problem in as specific terms as possible. This task of formulating, or defining, a research problem is a step of greatest importance in the entire research process. The problem to be investigated must be defined unambiguously for that will help discriminating relevant data from irrelevant ones. Care must, however, be taken to verify the objectivity and validity of the background facts concerning the problem. Professor W.A. Neiswanger correctly states that the statement of the objective is of basic importance because it determines the data which are to be collected, the characteristics of the data which are relevant, relations which are to be explored, the choice of techniques to be used in these explorations and the form of the final report. If there are certain pertinent terms, the same should be clearly defined along with the task of formulating the problem. In fact, formulation of the problem often follows a sequential pattern where a number of formulations are set up, each formulation more specific than the preceeding one, each one phrased in more analytical terms, and each more realistic in terms of the available data and resources.

2. Extensive literature survey:

Once the problem is formulated, a brief summary of it should be written down. It is compulsory for a research worker writing a thesis for a Ph.D. degree to write a synopsis of the topic and submit it to the necessary Committee or the Research Board for approval. At this juncture the researcher should undertake extensive literature survey connected with the problem. For this purpose, the abstracting and indexing journals and published or unpublished bibliographies are the first place to go to. Academic journals, conference proceedings, government reports, books etc., must be tapped depending on the nature of the problem. In this process, it should be remembered that one source will lead to another. The earlier studies, if any, which are similar to the study in hand should be carefully studied. A good library will be a great help to the researcher at this stage.

3. Development of working hypotheses:

After extensive literature survey, researcher should state in clear terms the working hypothesis or hypotheses. Working hypothesis is tentative assumption made in order to draw out and test its logical or empirical consequences. As such the manner in which research hypotheses are developed is particularly important since they provide the focal point for research. They also affect the manner in which tests must be conducted in the analysis of data and indirectly the quality of data which is required for the analysis. In most types of research, the development of working hypothesis plays an important role. Hypothesis should be very specific and limited to the piece of research in hand because it has to be tested. The role of the hypothesis is to guide the researcher by delimiting the area of research and to keep him on the right track. It sharpens his thinking and focuses attention on the more important facets of the problem. It also indicates the type of data required and the type of methods of data analysis to be used.

How does one go about developing working hypotheses? The answer is by using the following approach:

(a) Discussions with colleagues and experts about the problem, its origin and the objectives in seeking a solution;

(b) Examination of data and records, if available, concerning the problem for possible trends, peculiarities and other clues;

(c) Review of similar studies in the area or of the studies on similar problems; and

(d) Exploratory

Personal investigation which involves original field interviews on a limited scale with interested parties and individuals with a view to secure greater insight into the practical aspects of the problem.

Thus, working hypotheses arise as a result of a-priori thinking about the subject, examination of the available data and material including related studies and the counsel

of experts and interested parties. Working hypotheses are more useful when stated in precise and clearly defined terms. It may as well be remembered that occasionally we may encounter a problem where we do not need working hypotheses, specially in the case of exploratory or formulative researches which do not aim at testing the hypothesis. But as a general rule, specification of working hypotheses in another basic step of the research process in most research problems.

4. Preparing the research design:

The research problem having been formulated in clear cut terms, the researcher will be required to prepare a research design, i.e., he will have to state the conceptual structure within which research would be conducted. The preparation of such a design facilitates research to be as efficient as possible yielding maximal information. In other words, the function of research design is to provide for the collection of relevant evidence with minimal expenditure of effort, time and money.

But how all these can be achieved depends mainly on the research purpose. Research purposes may be grouped into four categories, viz., (i) Exploration, (ii) Description, (iii) Diagnosis, and (iv) Experimentation. A flexible research design which provides opportunity for considering many different aspects of a problem is considered appropriate if the purpose of the research study is that of exploration. But when the purpose happens to be an accurate description of a situation or of an association between variables, the suitable design will be one that minimizes bias and maximises the reliability of the data collected and analysed.

There are several research designs, such as, experimental and non-experimental hypothesis testing. Experimental designs can be either informal designs (such as before-and-after without control, after-only with control, before-and-after with control) or formal designs (such as completely randomized design, randomized block design, Latin square design, simple and complex factorial designs), out of which the researcher must select one for his own project.

The preparation of the research design, appropriate for a particular research problem, involves usually the consideration of the following:

(i) the means of obtaining the information;

(ii) the availability and skills of the researcher and his staff (if any);

(iii) explanation of the way in which selected means of obtaining information will be organised and the reasoning leading to the selection;

(iv) the time available for research; and

(v) the cost factor relating to research, i.e., the finance available for the purpose.

5. Determining sample design:

All the items under consideration in any field of inquiry constitute a 'universe' or 'population'. A complete enumeration of all the items in the 'population' is known as a census inquiry. It can be presumed that in such an inquiry when all the items are covered no element of chance is left and highest accuracy is obtained. But in practice this may not be true. Even the slightest element of bias in such an inquiry will get larger and larger as the number of observations increases.

Moreover, there is no way of checking the element of bias or its extent except through a resurvey or use of sample checks. Besides, this type of inquiry involves a great deal of time, money and energy. Not only this, census inquiry is not possible in practice under many circumstances. For instance, blood testing is done only on sample basis. Hence, quite often we select only a few items from the universe for our study purposes. The items so selected constitute what is technically called a sample.

The researcher must decide the way of selecting a sample or what is popularly known as the sample design. In other words, a sample design is a definite plan determined before any data are actually collected for obtaining a sample from a given population. Thus, the plan to select 12 of a city's 200 drugstores in a certain way constitutes a sample design.

Samples can be either probability samples or non-probability samples. With probability samples each element has a known probability of being included in the sample but the non-probability samples do not allow the researcher to determine this probability. Probability samples are those based on simple random sampling, systematic sampling, stratified sampling, cluster/area sampling whereas nonprobability samples are those based on convenience sampling, judgement sampling and quota sampling techniques.

In practice, several of the methods of sampling may well be used in the same study in which case it can be called mixed sampling. It may be pointed out here that normally one should resort to random sampling so that bias can be eliminated and sampling error can be estimated. But purposive sampling is considered desirable when the universe happens to be small and a known characteristic of it is to be studied intensively. Also, there are conditions under which sample designs other than random sampling may be considered better for reasons like convenience and low costs. The sample design to be used must be decided by the researcher taking into consideration the nature of the inquiry and other related factors.

6. Collecting the data:

In dealing with any real life problem it is often found that data at hand are inadequate, and hence, it becomes necessary to collect data that are appropriate. There are several ways of collecting the appropriate data which differ considerably in context of money costs, time and other resources at the disposal of the researcher. Primary data can be collected either through experiment or through survey. If the researcher conducts an experiment, he observes some quantitative measurements, or the data, with the help of which he examines the truth contained in his hypothesis. But in the case of a survey, data can be collected by any one or more of the following ways: (i) By observation; (ii) Through personal interview; (iii) Through telephone interviews; (iv) By mailing of questionnaires; (v) Through schedules.

The researcher should select one of these methods of collecting the data taking into consideration the nature of investigation, objective and scope of the inquiry, finanical

resources, available time and the desired degree of accuracy. Though he should pay attention to all these factors but much depends upon the ability and experience of the researcher. In this context Dr A.L. Bowley very aptly remarks that in collection of statistical data commonsense is the chief requisite and experience of the chief teacher.

7. Execution of the project:

Execution of the project is a very important step in the research process. If the execution of the project proceeds on correct lines, the data to be collected would be adequate and dependable.

The researcher should see that the project is executed in a systematic manner and in time. If the survey is to be conducted by means of structured questionnaires, data can be readily machine processed. In such a situation, questions as well as the possible answers may be coded. If the data are to be collected through interviewers, arrangements should be made for proper selection and training of the interviewers. The training may be given with the help of instruction manuals which explain clearly the job of the interviewers at each step. Occasional field checks should be made to ensure that the interviewers are doing their assigned job sincerely and efficiently. A careful watch should be kept for unanticipated factors in order to keep the survey as much realistic as possible.

This, in other words, means that steps should be taken to ensure that the survey is under statistical control so that the collected information is in accordance with the pre-defined standard of accuracy. If some of the respondents do not cooperate, some suitable methods should be designed to tackle this problem. One method of dealing with the non-response problem is to make a list of the non-respondents and take a small sub-sample of them, and then with the help of experts vigorous efforts can be made for securing response.

8. Analysis of data:

After the data have been collected, the researcher turns to the task of analysing them. The analysis of data requires a number of closely related operations such as establishment of categories, the application of these categories to raw data through coding, tabulation and then drawing statistical inferences. The unwieldy data should necessarily be condensed into a few manageable groups and tables for further analysis. Thus, researcher should classify the raw data into some purposeful and usable categories. Coding operation is usually done at this stage through which the categories of data are transformed into symbols that may be tabulated and counted. Editing is the procedure that improves the quality of the data for coding. With coding the stage is ready for tabulation. Tabulation is a part of the technical procedure wherein the classified data are put in the form of tables. The mechanical devices can be made use of at this juncture. A great deal of data, especially in large inquiries, is tabulated by computers. Computers not only save time but also make it possible to study large number of variables affecting a problem simultaneously.

Analysis work after tabulation is generally based on the computation of various percentages, coefficients, etc., by applying various well defined statistical formulae. In the process of analysis, relationships or differences supporting or conflicting with original or new hypotheses should be subjected to tests of significance to determine with what validity data can be said to indicate any conclusion(s). For instance, if there are two samples of weekly wages, each sample being drawn from factories in different parts of the same city, giving two different mean values, then our problem may be whether the two mean values are significantly different or the difference is just a matter of chance. Through the use of statistical tests we can establish whether such a difference is a real one or is the result of random fluctuations. If the difference happens to be real, the inference will be that the two samples come from different universes and if the difference is due to chance, the conclusion would be that the two samples belong to the same universe. Similarly, the technique of analysis of variance can help us in analysing whether three or more varieties of seeds grown on certain fields yield

significantly different results or not. In brief, the researcher can analyse the collected data with the help of various statistical measures.

9. Hypothesis-testing:

After analysing the data as stated above, the researcher is in a position to test the hypotheses, if any, he had formulated earlier. Do the facts support the hypotheses or they happen to be contrary? This is the usual question which should be answered while testing hypotheses. Various tests, such as Chi square test, t-test, F-test, have been developed by statisticians for the purpose.

The hypotheses may be tested through the use of one or more of such tests, depending upon the nature and object of research inquiry. Hypothesis-testing will result in either accepting the hypothesis or in rejecting it. If the researcher had no hypotheses to start with, generalisations established on the basis of data may be stated as hypotheses to be tested by subsequent researches in times to come.

10. Generalisations and interpretation:

If a hypothesis is tested and upheld several times, it may be possible for the researcher to arrive at generalisation, i.e., to build a theory. As a matter of fact, the real value of research lies in its ability to arrive at certain generalisations. If the researcher had no hypothesis to start with, he might seek to explain his findings on the basis of some theory. It is known as interpretation. The process of interpretation may quite often trigger off new questions which in turn may lead to further researches.

11. Preparation of the report or the thesis:

Finally, the researcher has to prepare the report of what has been done by him. Writing of report must be done with great care keeping in view the following:

1. The layout of the report should be as follows: (i) the preliminary pages; (ii) the main text, and (iii) the end matter.

2. Report should be written in a concise and objective style in simple language avoiding vague expressions such as 'it seems,' 'there may be', and the like.

3. Charts and illustrations in the main report should be used only if they present the information more clearly and forcibly.

4. Calculated 'confidence limits' must be mentioned and the various constraints experienced in conducting research operations may as well be stated.

Research Design

A research design can be defined as the preparation of conditions, for the collection and analysis of data in such a manner, which aims at combining relevance to the research purpose with economy in procedure. In other words, the design arrangement of a research project is commonly known as the "research design". Besides, the decisions like what, where, when, how, etc., in regard to a research study, creates a research design. In fact, the research design is the conceptual structure within which a research is conducted. Moreover, it comprises the outline for the collection, measurement and analysis of data. Hence, the design carries a blueprint of what the researcher will do, from composing the hypothesis and its operational implications to the final analysis of data. Overtly, the design decisions happen to be in respect of:

1) What is the research?

2) Where and why will the research be conducted?

3) What data is required for the research?

4) Where can be the data found?

5) What will be the time period of the research?

6) What will be the sample design?

7) What methods will be used for data collection?

8) How will be the data analysed?

9) In which style will be the research report prepared?

Based on the above mentioned design decisions, the complete research design may be divided into the following parts:

(a) Sample design: this deals with the technique of selecting items and thus requires careful observation for the given research study.

(b) Observational design: this relates to the conditions under which the experiments are to be conducted.

(c) Statistical design: this concerns the question of how many items are to be observed, and how are the collected data and information going to be analysed.

(d) Operational design: this deals with the methods by which the procedures specified in the sample, observational and statistical designs can be conducted.

The essential characteristics of a research design are as the following:

(a) It is a plan, which specifies the sources and types of data relevant to the research problem.

(b) It is a strategy, which decides the approach that will be used to collect and analyse the data.

(c) Since most of the research studies are conducted under these two controls, it also includes the time and cost budgets.

In short, the research design must contain the following:

(i) A clear and concise statement of the research problem,

(ii) The population to be studied, and

(iii) The various procedures, methods, and techniques to be used for collecting

and analyzing the data.

Need for Research Design:

Research design has a significant impact on the reliability of the results obtained. It thus acts as a firm foundation for the entire research. It is needed because it facilitates the smooth functioning of the various research operations. It makes the research as efficient as possible by giving maximum information with minimal expenditure of effort, time and money. For construction of a house, we need to have a proper blueprint prepared by an expert architect. Similarly, we need a proper research design or plan prior to data collection and analysis of our research project. Preparation of research design should be done carefully as even a minute error might ruin the purpose of the entire project. The design helps the researcher to organize his ideas, which helps to identify and correct his flaws, if any. In a good research design, all the components with each other or go together with each other in a coherent manner. The theoretical and conceptual framework must with the research goals and purposes. Likewise, the data collection strategy must fit with the research purposes, conceptual and theoretical framework and approach to data analysis.

The need for research design is as follows:

∑ It reduces inaccuracy;

∑ Helps to get maximum efficiency and reliability;

∑ Eliminates bias and marginal errors;

∑ Minimizes wastage of time;

∑ Helpful for collecting research materials;

∑ Helpful for testing of hypothesis;

∑ Gives an idea regarding the type of resources required in terms of money,

manpower, time, and efforts;

∑ Provides an overview to other experts;

∑ Guides the research in the right direction.

Features of a Good Research Design:

When a researcher has formulated a research problem, he/she has to focus on developing a good design for solving the problem. A good design is one that minimizes bias and maximizes the reliability of the data. It also yields maximum information, gives minimum experimental error, and provides different aspects of a single problem. A research design depends on the purpose and nature of the research problem. Thus, one single design cannot be used to solve all types of research problem, i.e., a particular design is suitable for a particular problem.

A research design usually consists of the following factors:

(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; and

(v) The availability of time and money for the research work.

If a research study is an exploratory or formulative one, i.e., it focuses on discovery of ideas and insights, the research design should be flexible enough to consider different aspects of the study. Similarly, if the study focuses on accurate description or association between variables, the design should be accurate with minimum bias and maximum reliability. However, in practice, it is difficult to categorize a particular study

into a particular group. A study can be categorized only on the basis of its primary function and accordingly, its design can be developed. Moreover, the above mentioned factors must be given due weight age while working on the details of the research design.

Research Design: Important Concepts

In order to facilitate a clear and better understanding of the different research designs, it is initially necessary to define all the various important concepts of research design itself.

1) Dependent and independent variables: A variable is a concept that can take on different quantitative values. E.g., weight, height, income, etc. A dependent variable can be defined as the variable, which depends upon or is a consequence of the other variable. On the other hand, an independent variable can be defined as the variable that is antecedent to the dependent variable. E.g., if height depends upon age, then height is a dependent variable, while age is an independent variable.

2) Extraneous variable: Although, the independent variables are unrelated to the study purpose, they might however affect the dependent variables, known as extraneous variables. E.g., When a researcher investigates the hypothesis of the relationship between children's gains in moral studies achievement and their self concepts. The self-concept denotes an independent variable, whereas the moral studies achievement denotes a dependent variable. However, intelligence may also affect the moral studies achievement, but as it is unrelated to the study purpose, it will thus be called an extraneous variable.

3) Control: The most significant quality of a good research design is to reduce the influence/effect of extraneous variables. Control is a technical term, which is used while designing the study, by reducing the effects of extraneous independent variables. Besides, in experimental studies, the term control refers to the restraining of experimental conditions.

4) Confounded relationship: In case the dependent variable is bound by the influence of extraneous variable, the relationship between the dependent and independent variables is known to be confused by extraneous variables.

5) Research hypothesis: This can be defined as the prediction or a hypothesized relationship that needs to be tested by scientific methods. Besides, it is a predictive statement, which connects an independent variable to a dependent variable.

Moreover, a research hypothesis needs to contain, at least, one independent and one dependent variable.

6) Experimental and non-experimental hypothesis-testing research: When a research aims at investigating a research hypothesis, it is known as the hypothesis testing research. However, it can be of the experimental or the non-experimental design. On the other hand, a research in which the independent variable is manipulated is known as the experimental hypothesis-testing research, while the research in which an independent variable is not manipulated is known as the nonexperimental hypothesis-testing research.

7) Experimental and control groups: When any group is exposed to the usual conditions of an experimental hypothesis-testing research, it is known as a control group. Whereas, when the group is exposed to some other special condition, it is known as an experimental group.

8) Treatments: This can be defined as the different types of conditions under which the experimental and control groups are put. E.g., In order to determine the comparative impact of three varieties of fertilizers on a crop yield, the three different varieties of fertilizers will be treated as three different treatments.

9) Experiment: This can be defined as the process of examining the truth of a statistical hypothesis, relating to some research problem. E.g., An experiment conducted in order to research the usefulness of a newly developed medicine.

i. Absolute experiment the determination of the impact of a fertilizer on a crop yield is an example of absolute experiment.

ii. Comparative experiment the determination of the impact of one fertilizer, in comparison to another fertilizer, is an example of comparative experiment.

10) Experimental units: These represent the pre-determined plots or blocks, where different types of treatments are used. Moreover, such type of experimental units must be selected, as well as defined, very cautiously and thoroughly.

Characteristics of Research Design

The features of a research design have been explained in detail below.

Focused: The research question and goals are specific and clear. Narrow the scope to what can be studied. For example, instead of asking, "How do students learn?" ask, "How does peer tutoring affect chemistry learning for first-year undergraduate students?"

Logical: The steps of the design follow each other in a reasonable order. Each step prepares for or builds on the next in an orderly manner. For example, surveys are given after interviews to clarify and quantify initial findings.

Reflective: Researchers consider how their views, knowledge, and blind spots can shape data collection, analysis, and interpretation. Subjectivity is acknowledged. For example, recognizing personal bias toward a given theory to avoid favoring confirming evidence.

Accountable: Strategies increase validity, reliability, and transparency to minimize biases and errors. For example, using multiple coders for thematic analysis to reduce subjective interpretation of qualitative data.

Thorough: Enough depth and detail are included to answer the research question, not. For example, adequate sample size to detect effects of interest with sufficient statistical power.

Pragmatic: The design is realistic, given constraints. For example, limiting the number of interviews to what can be transcribed and analyzed within the study timeframe.

Systematic: Procedures follow a logical, ordered system to reduce errors and increase consistency. For example, all interviews follow the same script and are recorded/transcribed using a standard format.

Adaptable: Some flexibility is built to deal with unexpected issues or opportunities. For example, being open to modifying participant recruitment strategies if not yielding the needed sample.

Ethical: Protocols ensure participants are treated and. For example, obtaining informed consent and transparency about the study's risks/benefits.

Transparent: The design is described in sufficient detail so others can critique and reproduce the research. For example, stating data analysis procedures in the methodology section.

Valid: Measures what it intends to measure. There are no systematic errors that distort the results. For example, using a validated questionnaire that has been shown to assess the underlying construct of interest.

Reliable: Can produce consistent results over multiple studies. For example, pilot testing protocols to identify and resolve sources of measurement error.

Controlled: Extraneous variables that could influence outcomes are controlled or accounted for. For example, random assignment to conditions controls for confounding variables.

Replicable: Methods and procedures are described in enough detail so others can reproduce the study. For example, providing transcripts of open-ended interview questions alongside a detailed coding scheme.

Generalizable: Results can be extended to the broader population from which the sample was drawn. For example, using a selected, representative sample of the target population.

Objective: Methods are chosen to minimize researcher subjectivity and bias. For example, using structured questionnaires instead of open-ended interviews.

Feasible: Can be implemented within available resources and constraints. For example, collecting existing data rather than conducting large-scale primary data collection.

Limited: Does not attempt more questions/analyses than can be done well within the scope. For example, limiting the number of variables investigated to only those most relevant to the research question.

Acknowledges limitations: Recognizes imperfections and biases that still exist in the design. For example, discuss how self-reported measures may suffer from social desirability bias.

Uses triangulation: Employs multiple methods to confirm research findings. For example, comparing themes from interviews to those from an open-ended survey**.**

Types of research design

Exploratory research

-Exploratory research is preliminary study of an unfamiliar problem about which the researcher has little or no knowledge. It is similar to a doctor's initial investigation of a patient suffering from an unfamiliar malady for getting some clues for identifying it. It is ill structured and much less focused on predetermined objectives. It usually takes the form of a pilot study.

Exploratory research is characterized by its flexibility. When a problem is broad and not specifically defined, the researchers use exploratory research as a beginning step.

Exploratory studies are a valuable means of understanding what is happening; to seek new insights; to ask questions and to assess phenomenon in a new light (Yin, 1994).

Exploratory research has the goal of formulating problems more precisely, clarifying concepts, gathering explanations, gaining insight, eliminating impractical ideas and forming hypotheses. Literature research, survey, focus group and case studies are usually used to carry out exploratory research. An exploratory research may develop hypotheses, but it does not seek to test them.

Though it is a separate type of research, it is appropriate to consider it as the first stage of a three-stage process of exploration, description and experimentation. The purpose of an exploratory study may be:

1. To generate new ideas or

2. To increase the researcher's familiarity with the problem or

3. To make a precise formulation of the problem or

4. To gather information for clarifying concepts or

5. To determine whether it is feasible to attempt the study.

Sometimes, a scientist may find, after spending a tremendous amount of energy and time on a research project, that it is not possible to secure the required data. A preliminary exploration could help avoiding such dismay. For example, a research student of the author wanted to study the pattern of marketing strategies of large manufacturing enterprises. A critical pre-requisite to this study was to know whether marketing executives would divulge adequate information about their marketing strategies. An exploration determined that they would not. An exploratory study does not aim at testing hypothesis.

According to Daniel Katz(1953), it just attempts "to see what is there rather than to predict the relationships that will be founded. But it should be so designed as to provide

as definite information as possible for a set of research objectives." Levels of Exploratory Studies:-Daniel Katz (1953) conceptualizes two levels of exploratory studies. "At the first level is the discovery of the significant variables in the situation; at the second, the discovery of relationship between variables." It is necessary to delimit the area to be studied even at the first level. Katz warns that it is a mistake to believe that one study is going to be able to account for all the variance in complex social phenomena. He advises that "It is much more effective to take one central set of variables and investigate them as thoroughly as possible as to try to study the universe in one piece of research."

The Need for Exploratory Studies:-A strong rationale for choosing an exploratory research design is that exploratory social science has the potential to be more insightful than confirmatory research by applying dialectical thinking. Dialectics, explains Theodor W. Adorno (1973), means to achieve something positive by means of negation(Adorno, 1973).

Social sciences are relatively young. Researches in them are scarce. Many of them inevitably have to be exploratory ones. Few welltrodden paths exist to follow for the investigators of social life. Most existing theories in social sciences are either too general or too specific to provide clear guidance for empirical research. Hence, exploratory research is necessary to get initial insight into the problems for the purpose of formulating them for more precise investigation. Hence, it is also known as formulative research.

Process of Exploratory Research:-About the steps in exploration, Selltiz and others (1959) have suggested the following three steps/ methods for the exploratory study:

a) A review of pertinent literature

b) An experience survey

c) An analysis of "insight stimulating" cases

Analysis of insight-stimulating cases: In an unexplored area of study, an intensive study of some selected cases can yield stimulating insight.

For example, the extraordinary theoretical insights of Sigmund Freud on human psyche were the result of his intensive study of patients. Profound insights into the relationships between the individual and society have been brought out by anthropological case studies of primitive cultures.

The types of people who provide “insight-stimulating” information could include the following:

1. New comers related to research.

2. Marginal or peripheral individuals who are placed on the margin between contending groups. For example, in an organizational hierarchy, foremen are neither managers nor workers but something in between.

3. Individuals in transition, e.g., recently promoted or transferred employees.

4. Deviants and isolates in a group who hold a different view from the majority.

5. “Pure” cases or cases that should be extreme examples of the conditions under study, e.g., the most dissatisfied beneficiary of a rural development scheme.

6. Those who fit well and those who do not both.

7. Those that represent different categories in the system. The end of an exploratory study comes when the researcher finds that further research is not presently possible on the problem or succeeds in identifying the major dimensions of the problem. In the latter case, he has to plan the formal research design.

Descriptive Research:

Descriptive research is defined as a research method that describes the characteristics of the population or phenomenon that is being studied. This methodology focuses more on the "what" of the research subject rather than the "why" of the research subject.

In other words, descriptive research primarily focuses on describing the nature of a demographic segment, without focusing on "why" a certain phenomenon occurs. In other words, it "describes" the subject of the research, without covering "why" it happens.

For example, an apparel brand that wants to understand the fashion purchasing trends among New York buyers will conduct a demographic survey of this region, gather population data and then conduct descriptive research on this demographic segment. The research will then uncover details on "what is the purchasing pattern of New York buyers", but not cover any investigative details on "why" the patterns exits. Because for the apparel brand trying to break into this market, understanding the nature of their market is the objective of the study.

Characteristics of Descriptive Research

The term descriptive research then, refers to research questions, design of the research and data analysis that would be conducted on that topic. It is called an observational research method because none of the variables that are part of the research study are influenced in any capacity.

Quantitative research: Descriptive research is a quantitative research method that attempts to collect quantifiable information to be used for statistical analysis of the population sample. It is an popular market research tool that allows to collect and describe the nature of the demographic segment.

2. Uncontrolled variables: In descriptive research, none of the variables are influenced in any way. This uses observational methods to conduct the research. Hence, the nature of the variables or their behavior is not in the hands of the researcher.

3. Cross-sectional studies: Descriptive research is generally a cross-sectional study where different sections belonging to the same group are studied.

4. Basis for further research: The data collected and analyzed from descriptive research can then be further researched using different research techniques. The data also can help point towards the types of research methods are to be used for the subsequent research.

Applications of Descriptive Research with Examples

Descriptive research can be used in multiple ways and for multiple reasons. Before getting into any kind of survey though, the survey goals and survey design is very important. Despite following these steps though, there is no way to know if the research outcome will be met. To understand the end objective of research goals, below are some ways organizations currently use descriptive research today:

• Define respondent characteristics: The aim of using close-ended questions is to draw concrete conclusions about the respondents. This could be the need to derive patterns, traits and behaviors of the respondents. It could also be to understand from a respondent, their attitude or opinion about the phenomenon in question. For example, understanding from millenials the hours per week they spend on browsing the internet. All this information helps the organization conducting the research make informed business decisions.

• Measure data trends: Data trends can be measured over time with statistical capabilities provided by descriptive research. Consider if an apparel company conducts research between different demographics like age groups from 24-35 and 36-45 on a new range launch of autumn wear. If one of those groups doesn't take too well to the new launch, this provides an insight into what clothes are like and what are not and the ones that are not, are dropped.

• Conduct comparisons: Organizations also use descriptive research to understand how different groups respond to a certain product or service. For example, an apparel brand

creates a survey asking general questions that measure the brands image. The same survey also asks demographic questions like age, income, gender, geographical location etc. This consumer research helps the organization understand what aspects of the brand appeal to the population and what aspects do not. It also helps in making product or marketing fixes or in some cases even create a new product line just to cater to a high growth potential, group.

- Validate existing conditions: Descriptive research is widely used to help ascertain the prevailing conditions and underlying patterns of the research object. Due to the non invasive method of research and the use of quantitative observation and some aspects of qualitative observation, each variable is observed and an in-depth analysis can be concluded. It is also used to validate any existing conditions that maybe prevalent in a population.

- Conduct research at different times: To ascertain if there are any similarities or differences, the research can be conducted at different periods of times. This also allows any number of variables to be evaluated. For the purpose of verification, studies on prevailing conditions can also be repeated to draw trends.

Descriptive Research Methods

There are 3 distinctive methods to conduct descriptive research. They are:

- Observational Method

The observational method is the most effective method to conduct descriptive research and both quantitative observation and qualitative observation are used in this research method.

Quantitative observation is the objective collection of data which is primarily focused on numbers and values – it suggests “associated to, of or depicted in terms of a quantity”. Results of quantitative observation are derived using statistical and numerical analysis methods. It implies observation of any entity that can be associated with a numeric

value such as age, shape, weight, volume, scale etc. For example, the researcher can track if current customers will refer the brand by using a simple Net Promoter Score question.

Qualitative observation doesn't involve measurements or numbers but instead just monitoring characteristics. In this case the researcher observes the respondents from a distance. Since the respondents are in a comfortable environment, the characteristics observed are natural and effective. In descriptive research, the researcher can chose to be either a complete observer, an observer as a participant, a participant as an observer or a complete participant. For example, in a supermarket, a researcher can from afar monitor and track the selection and purchasing trends of the customers. This offers a deeper insight into the purchasing experience of the customer.

Case Study Method

Case studies involve in-depth research and study of individuals or groups. Case studies lead to a hypothesis and widen a further scope of studying a phenomenon. However, case studies should not be used to determine cause and effect as they don't have the capacity to make accurate predictions because there could be a bias on the part of the researcher. The other reason why case studies are not an accurate way of conducting descriptive research is because there could be an atypical respondent in the research and describing them leads to poor generalizations and move away from external validity.

Survey Research

In survey research, respondents answer through surveys or questionnaires, or polls. They are a popular market research tool to collect feedback from respondents. In order for a survey to gather good quality data, it should have good survey questions, which should be a balanced mix of open ended questions and close ended-questions. The survey method can be conducting online or offline which is makes it the go-to option for descriptive research where the sample size is very large.

Advantages of Descriptive Research

Some of the major advantages of descriptive research are:

- Data collection: Descriptive research can be conducted by using specific methods like observational method, case study method and survey method. Between these, all major methods of data collection are covered which provides a lot of information. This can be used for future research or even developing hypothesis of your research object.
- Varied: Since the data collected is both qualitative and quantitative, it gives a holistic understanding of a research topic. This causes data that was not planned to be collected gets tracked and the data is varied, diverse and thorough.
- Natural environment: Descriptive research allows for the research to be conducted in the natural environment of the respondent and this ensures that high-quality and honest data is collected.
- Quick to conduct and cheap: As the sample size is generally large in descriptive research, the data collection is quick to conduct and is cheap.
- Forms basis for decision-making: As the data collected in descriptive research represents a larger population and is robust, it is easy to make decisions on the basis of the statistical analysis of that data.

Disadvantages of Descriptive Research

Some of the major disadvantages of descriptive research are:

- Confidentiality: Respondents aren't always truthful if questions are too personal or they feel that they are being "watched". This may negate the validity of the data.
- Halo effect: If the research observer has a potential bias towards the research topic or some

respondents in the research, the observations then maybe considered as invalid or untrue.

• Sample isn't representative: Due to the randomness of the sample, it is very tough to validate that the sample is an accurate representation of the whole population.

• No scope to learn cause: Since descriptive research only focuses on the "what" of an objective or phenomenon, it does not delve into the "why or how" and that is a limitation in learning specific causes.

Explanatory research design

Explanatory research is a method developed to investigate a phenomenon that has not been studied or explained properly. Its main intention is to provide details about where to find a small amount of information.

With this method, the researcher gets a general idea and uses research as a tool to guide them quicker to the issues that we might address in the future. Its goal is to find the why and what of an object of study.

Explanatory research is responsible for finding the why of the events by establishing cause-effect relationships. Its results and conclusions constitute the deepest level of knowledge, according to author Fidias G. Arias. In this sense, explanatory studies can deal with the determination of causes (post-facto research) and effects (experimental research) through hypothesis testing.

Characteristics of Explanatory Research

It allows for an increased understanding of a specific topic. Although it does not offer conclusive results, the researcher can find out why a phenomenon occurs.

It uses secondary research as a source of information, such as literature or published articles, that are carefully chosen to have a broad and balanced understanding of the topic.

It allows the researcher to have a broad understanding of the topic and refine subsequent research questions to augment the study's conclusions.

Researchers can distinguish the causes why phenomena arising during the research design process and anticipate changes.

Explanatory research allows them to replicate studies to give them greater depth and gain new insights into the phenomenon.

Types of Explanatory Research

Literature research: It is one of the fastest and least expensive means of determining the hypothesis of the phenomenon and collecting information. It involves searching for literature on the internet and in libraries. It can, of course, be in magazines, newspapers, commercial and academic articles.

In-depth interview: The process involves talking to a knowledgeable person about the topic under investigation. The in-depth interview is used to take advantage of the information offered by people and their experience, whether they are professionals within or outside the organization.

Focus groups: Focus groups consist of bringing together 8 to 12 people who have information about the phenomenon under study and organizing sessions to obtain from these people various data that will help the research.

Case studies: This method allows researchers to deal with carefully selected cases. Case analysis allows the organization to observe companies that have faced the same issue and deal with it more efficiently.

Importance of explanatory research

Explanatory research is conducted to help researchers study the research problem in greater depth and understand the phenomenon efficiently.

The primary use for explanatory research is problem-solving by finding the overlooked data that we had never investigated before. At the same time, it might not bring out conclusive data; it will allow us to understand the issue more efficiently.

In carrying out the research process, it is necessary to adapt to new findings and knowledge about the subject. Although it is impossible to conclude, it is possible to explore the variables with a high level of depth.

Explanatory research allows the researcher to become familiar with the topic to be examined and design theories to test them.

Experimental research design

Experimental research is a study conducted with a scientific approach using two sets of variables. The first set acts as a constant, which researcher use to measure the differences of the second set. Quantitative research methods, for example, are experimental.

If researcher don't have enough data to support your decisions, researcher must first determine the facts. This research gathers the data necessary to help you make better decisions.

Researcher can conduct experimental research in the following situations:

Time is a vital factor in establishing a relationship between cause and effect.

Invariable behavior between cause and effect.

researcher wish to understand the importance of cause and effect.

Experimental Research Design Types

The classic experimental design definition is: "The methods used to collect data in experimental studies."

There are three primary types of experimental design:

• Pre-experimental research design

• True experimental research design

• Quasi-experimental research design

The way researcher classify research subjects based on conditions or groups determines the type of research design you should use.

Pre-Experimental Design

A group, or various groups, are kept under observation after implementing cause and effect factors. Researcher will conduct this research to understand whether further investigation is necessary for these particular groups.

Researcher can break down pre-experimental research further into three types:

One-shot Case Study Research Design

One-group Pretest-posttest Research Design

Static-group Comparison

True Experimental Design

It relies on statistical analysis to prove or disprove a hypothesis, making it the most accurate form of research. Of the types of experimental design, only true design can establish a cause-effect relationship within a group. In a true experiment, three factors need to be satisfied:

There is a Control Group, which won't be subject to changes, and an Experimental Group, which will experience the changed variables.

A variable that can be manipulated by the researcher

Random distribution

This experimental research method commonly occurs in the physical sciences.

Quasi-Experimental Design

The word “Quasi” indicates similarity. A quasi-experimental design is similar to an experimental one, but it is not the same. The difference between the two is the assignment of a control group. In this research, an independent variable is manipulated, but the participants of a group are not randomly assigned. Quasi-research is used in field settings where random assignment is either irrelevant or not required.

Importance of Experimental Design

Experimental research is a powerful tool for understanding cause-and-effect relationships. It allows us to manipulate variables and observe the effects, which is crucial for understanding how different factors influence the outcome of a study.

But the importance of experimental research goes beyond that. It’s a critical method for many scientific and academic studies. It allows us to test theories, develop new products, and make groundbreaking discoveries.

For example, this research is essential for developing new drugs and medical treatments. Researchers can understand how a new drug works by manipulating dosage and administration variables and identifying potential side effects.

Similarly, experimental research is used in the field of psychology to test theories and understand human behavior. By manipulating variables such as stimuli, researchers can gain insights into how the brain works and identify new treatment options for mental health disorders.

It is also widely used in the field of education. It allows educators to test new teaching methods and identify what works best. By manipulating variables such as class size,

teaching style, and curriculum, researchers can understand how students learn and identify new ways to improve educational outcomes.

In addition, experimental research is a powerful tool for businesses and organizations. By manipulating variables such as marketing strategies, product design, and customer service, companies can understand what works best and identify new opportunities for growth.

Advantages of Experimental Research

When talking about this research, we can think of human life. Babies do their own rudimentary experiments (such as putting objects in their mouths) to learn about the world around them, while older children and teens do experiments at school to learn more about science.

Ancient scientists used this research to prove that their hypotheses were correct. For example, Galileo Galilei and Antoine Lavoisier conducted various experiments to discover key concepts in physics and chemistry. The same is true of modern experts, who use this scientific method to see if new drugs are effective, discover treatments for diseases, and create new electronic devices (among others).

It's vital to test new ideas or theories. Why put time, effort, and funding into something that may not work?

This research allows you to test your idea in a controlled environment before marketing. It also provides the best method to test your theory thanks to the following advantages:

Advantages of experimental research

Researchers have a stronger hold over variables to obtain desired results.

The subject or industry does not impact the effectiveness of experimental research. Any industry can implement it for research purposes.

The results are specific.

After analyzing the results, you can apply your findings to similar ideas or situations.

You can identify the cause and effect of a hypothesis. Researchers can further analyze this relationship to determine more in-depth ideas.

Experimental research makes an ideal starting point. The data you collect is a foundation for building more ideas and conducting more action research.

Whether you want to know how the public will react to a new product or if a certain food increases the chance of disease, experimental research is the best place to start. Begin your research by finding subjects using QuestionPro Audience and other tools today.

Evaluation research design

Evaluation research, also known as program evaluation, refers to research purpose instead of a specific method. Evaluation research is the systematic assessment of the worth or merit of time, money, effort and resources spent in order to achieve a goal.

Evaluation research is closely related to but slightly different from more conventional social research. It uses many of the same methods used in traditional social research, but because it takes place within an organizational context, it requires team skills, interpersonal skills, management skills, political smartness, and other research skills that social research does not need much. Evaluation research also requires one to keep in mind the interests of the stakeholders.

Evaluation research is a type of applied research, and so it is intended to have some real-world effect. Many methods like surveys and experiments can be used to do evaluation research. The process of evaluation research consisting of data analysis and reporting is a rigorous, systematic process that involves collecting data about organizations, processes, projects, services, and/or resources. Evaluation research enhances knowledge and decision-making, and leads to practical applications.

Why do evaluation research?

The common goal of most evaluations is to extract meaningful information from the audience and provide valuable insights to evaluators such as sponsors, donors, client-groups, administrators, staff, and other relevant constituencies. Most often, feedback is perceived value as useful if it helps in decision-making. However, evaluation research does not always create an impact that can be applied anywhere else, sometimes they fail to influence short-term decisions. It is also equally true that initially, it might seem to not have any influence, but can have a delayed impact when the situation is more favorable. In spite of this, there is a general agreement that the major goal of evaluation research should be to improve decision-making through the systematic utilization of measurable feedback.

Characteristics of Evaluation Research

Research Environment: Evaluation research is conducted in the real world; that is, within the context of an organization.

Research Focus: Evaluation research is primarily concerned with measuring the outcomes of a process rather than the process itself.

Research Outcome: Evaluation research is employed for strategic decision making in organizations.

Research Goal: The goal of program evaluation is to determine whether a process has yielded the desired result(s).

This type of research protects the interests of stakeholders in the organization.

It often represents a middle-ground between pure and applied research.

Evaluation research is both detailed and continuous. It pays attention to performative processes rather than descriptions.

Research Process: This research design utilizes qualitative and quantitative research methods to gather relevant data about a product or action-based strategy. These methods include observation, tests, and surveys.

Types of Evaluation Research

The Encyclopedia of Evaluation (Mathison, 2004) treats forty-two different evaluation approaches and models ranging from “appreciative inquiry” to “connoisseurship” to “transformative evaluation”. Common types of evaluation research include the following:

Formative Evaluation

Formative evaluation or baseline survey is a type of evaluation research that involves assessing the needs of the users or target market before embarking on a project. Formative evaluation is the starting point of evaluation research because it sets the tone of the organization’s project and provides useful insights for other types of evaluation.

Mid-term Evaluation

Mid-term evaluation entails assessing how far a project has come and determining if it is in line with the set goals and objectives. Mid-term reviews allow the organization to determine if a change or modification of the implementation strategy is necessary, and it also serves for tracking the project.

Summative Evaluation

This type of evaluation is also known as end-term evaluation of project-completion evaluation and it is conducted immediately after the completion of a project. Here, the researcher examines the value and outputs of the program within the context of the projected results.

Summative evaluation allows the organization to measure the degree of success of a project. Such results can be shared with stakeholders, target markets, and prospective investors.

Outcome Evaluation

Outcome evaluation is primarily target-audience oriented because it measures the effects of the project, program, or product on the users. This type of evaluation views the outcomes of the project through the lens of the target audience and it often measures changes such as knowledge-improvement, skill acquisition, and increased job efficiency.

Appreciative Enquiry

Appreciative inquiry is a type of evaluation research that pays attention to result-producing approaches. It is predicated on the belief that an organization will grow in whatever direction its stakeholders pay primary attention to such that if all the attention is focused on problems, identifying them would be easy.

In carrying out appreciative inquiry, the research identifies the factors directly responsible for the positive results realized in the course of a project, analyses the reasons for these results, and intensifies the utilization of these factors.

Evaluation Research Methodology

There are four major evaluation research methods, namely; output measurement, input measurement, impact assessment and service quality

Output/Performance Measurement

Output measurement is a method employed in evaluative research that shows the results of an activity undertaking by an organization. In other words, performance measurement pays attention to the results achieved by the resources invested in a specific activity or organizational process.

More than investing resources in a project, organizations must be able to track the extent to which these resources have yielded results, and this is where performance

measurement comes in. Output measurement allows organizations to pay attention to the effectiveness and impact of a process rather than just the process itself.

Other key indicators of performance measurement include user-satisfaction, organizational capacity, market penetration, and facility utilization. In carrying out performance measurement, organizations must identify the parameters that are relevant to the process in question, their industry, and the target markets.

Performance Evaluation Research Questions Examples

What is the cost-effectiveness of this project?

What is the overall reach of this project?

How would you rate the market penetration of this project?

How accessible is the project?

Is this project time-efficient?

performance-evaluation-survey

Input Measurement

In evaluation research, input measurement entails assessing the number of resources committed to a project or goal in any organization. This is one of the most common indicators in evaluation research because it allows organizations to track their investments.

The most common indicator of inputs measurement is the budget which allows organizations to evaluate and limit expenditure for a project. It is also important to measure non-monetary investments like human capital; that is the number of persons needed for successful project execution and production capital.

Input Evaluation Research Questions Examples

What is the budget for this project?

What is the timeline of this process?

How many employees have been assigned to this project?

Do we need to purchase new machinery for this project?

How many third-parties are collaborators in this project?

Impact/Outcomes Assessment

In impact assessment, the evaluation researcher focuses on how the product or project affects target markets, both directly and indirectly. Outcomes assessment is somewhat challenging because many times, it is difficult to measure the real-time value and benefits of a project for the users.

In assessing the impact of a process, the evaluation researcher must pay attention to the improvement recorded by the users as a result of the process or project in question. Hence, it makes sense to focus on cognitive and affective changes, expectation-satisfaction, and similar accomplishments of the users.

Impact Evaluation Research Questions Examples

How has this project affected you?

Has this process affected you positively or negatively?

What role did this project play in improving your earning power?

On a scale of 1-10, how excited are you about this project?

How has this project improved your mental health?

Service Quality

Service quality is the evaluation research method that accounts for any differences between the expectations of the target markets and their impression of the undertaken project. Hence, it pays attention to the overall service quality assessment carried out by the users.

It is not uncommon for organizations to build the expectations of target markets as they embark on specific projects. Service quality evaluation allows these organizations to track the extent to which the actual product or service delivery fulfils the expectations.

Service Quality Evaluation Questions

On a scale of 1-10, how satisfied are you with the product?

How helpful was our customer service representative?

How satisfied are you with the quality of service?

How long did it take to resolve the issue at hand?

How likely are you to recommend us to your network?

Uses of Evaluation Research

Evaluation research is used by organizations to measure the effectiveness of activities and identify areas needing improvement. Findings from evaluation research are key to project and product advancements and are very influential in helping organizations realize their goals efficiently.

The findings arrived at from evaluation research serve as evidence of the impact of the project embarked on by an organization. This information can be presented to stakeholders, customers, and can also help your organization secure investments for future projects.

Evaluation research helps organizations to justify their use of limited resources and choose the best alternatives.

It is also useful in pragmatic goal setting and realization.

Evaluation research provides detailed insights into projects embarked on by an organization. Essentially, it allows all stakeholders to understand multiple dimensions of a process, and to determine strengths and weaknesses.

Evaluation research also plays a major role in helping organizations to improve their overall practice and service delivery. This research design allows organizations to weigh existing processes through feedback provided by stakeholders, and this informs better decision making.

Evaluation research is also instrumental to sustainable capacity building. It helps you to analyze demand patterns and determine whether your organization requires more funds, upskilling or improved operations.

Data Collection Techniques Used in Evaluation Research

In gathering useful data for evaluation research, the researcher often combines quantitative and qualitative research methods. Qualitative research methods allow the researcher to gather information relating to intangible values such as market satisfaction and perception.

On the other hand, quantitative methods are used by the evaluation researcher to assess numerical patterns, that is, quantifiable data. These methods help you measure impact and results; although they may not serve for understanding the context of the process.

Quantitative Methods for Evaluation Research

Surveys

A survey is a quantitative method that allows you to gather information about a project from a specific group of people. Surveys are largely context-based and limited to target groups who are asked a set of structured questions in line with the predetermined context.

Surveys usually consist of close-ended questions that allow the evaluative researcher to gain insight into several variables including market coverage and customer preferences. Surveys can be carried out physically using paper forms or online through data-gathering platforms like Formplus.

Questionnaires

A questionnaire is a common quantitative research instrument deployed in evaluation research. Typically, it is an aggregation of different types of questions or prompts which help the researcher to obtain valuable information from respondents.

Polls

A poll is a common method of opinion-sampling that allows you to weigh the perception of the public about issues that affect them. The best way to achieve accuracy in polling is by conducting them online using platforms like Formplus.

Polls are often structured as Likert questions and the options provided always account for neutrality or indecision. Conducting a poll allows the evaluation researcher to understand the extent to which the product or service satisfies the needs of the users.

Qualitative Methods for Evaluation Research

One-on-One Interview

An interview is a structured conversation involving two participants; usually the researcher and the user or a member of the target market. One-on-One interviews can be conducted physically, via the telephone and through video conferencing apps like Zoom and Google Meet.

Focus Groups

A focus group is a research method that involves interacting with a limited number of persons within your target market, who can provide insights on market perceptions and new products.

Qualitative Observation

Qualitative observation is a research method that allows the evaluation researcher to gather useful information from the target audience through a variety of subjective approaches. This method is more extensive than quantitative observation because it deals with a smaller sample size, and it also utilizes inductive analysis.

Case Studies

A case study is a research method that helps the researcher to gain a better understanding of a subject or process. Case studies involve in-depth research into a given subject, to understand its functionalities and successes.

Quantitative Method

The quantitative method is a research approach that emphasizes using numerical measurements and statistical analysis to understand phenomena. This method involves collecting data that can be quantified and subjecting it to various statistical techniques to test hypotheses or explore relationships between variables. It is widely used in science, economics, psychology, and social sciences, where researchers aim to produce objective results that can be generalized across populations. The process typically involves designing experiments or surveys, gathering measurable data, and analyzing this data using mathematical models to draw conclusions or make predictions. Quantitative methods are valued for their precision and the ability to handle large volumes of data, making them crucial for making informed decisions and validating theories.

Survey Research

Survey research a research method involving the use of standardized questionnaires or interviews to collect data about people and their preferences, thoughts, and behaviors in a systematic manner. Although census surveys were conducted as early as Ancient Egypt, survey as a formal research method was pioneered in the 1930-40s by

sociologist Paul Lazarsfeld to examine the effects of the radio on political opinion formation of the United States. This method has since become a very popular method for quantitative research in the social sciences.

The survey method can be used for descriptive, exploratory, or explanatory research. This method is best suited for studies that have individual people as the unit of analysis. Although other units of analysis, such as groups, organizations or dyads (pairs of organizations, such as buyers and sellers), are also studied using surveys, such studies often use a specific person from each unit as a “key informant” or a “proxy” for that unit, and such surveys may be subject to respondent bias if the informant chosen does not have adequate knowledge or has a biased opinion about the phenomenon of interest. For instance, Chief Executive Officers may not adequately know employee’s perceptions or teamwork in their own companies, and may therefore be the wrong informant for studies of team dynamics or employee self-esteem.

Survey research has several inherent strengths compared to other research methods. First, surveys are an excellent vehicle for measuring a wide variety of unobservable data, such as people’s preferences (e.g., political orientation), traits (e.g., self-esteem), attitudes (e.g., toward immigrants), beliefs (e.g., about a new law), behaviors (e.g., smoking or drinking behavior), or factual information (e.g., income). Second, survey research is also ideally suited for remotely collecting data about a population that is too large to observe directly. A large area, such as an entire country, can be covered using mail-in, electronic mail, or telephone surveys using meticulous sampling to ensure that the population is adequately represented in a small sample. Third, due to their unobtrusive nature and the ability to respond at one’s convenience, questionnaire surveys are preferred by some respondents. Fourth, interviews may be the only way of reaching certain population groups such as the homeless or illegal immigrants for which there is no sampling frame available. Fifth, large sample surveys may allow detection of small effects even while analyzing multiple variables, and depending on the survey design, may also allow comparative analysis of population subgroups (i.e., within-group and between-group analysis). Sixth, survey research is economical in terms of

researcher time, effort and cost than most other methods such as experimental research and case research. At the same time, survey research also has some unique disadvantages. It is subject to a large number of biases such as non-response bias, sampling bias, social desirability bias, and recall bias, as discussed in the last section of this chapter.

Depending on how the data is collected, survey research can be divided into two broad categories: questionnaire surveys (which may be mail-in, group-administered, or online surveys), and interview surveys (which may be personal, telephone, or focus group interviews). Questionnaires are instruments that are completed in writing by respondents, while interviews are completed by the interviewer based on verbal responses provided by respondents. As discussed below, each type has its own strengths and weaknesses, in terms of their costs, coverage of the target population, and researcher's flexibility in asking questions.

Questionnaire Surveys

Invented by Sir Francis Galton, a questionnaire is a research instrument consisting of a set of questions (items) intended to capture responses from respondents in a standardized manner. Questions may be unstructured or structured. Unstructured questions ask respondents to provide a response in their own words, while structured questions ask respondents to select an answer from a given set of choices. Subjects' responses to individual questions (items) on a structured questionnaire may be aggregated into a composite scale or index for statistical analysis. Questions should be designed such that respondents are able to read, understand, and respond to them in a meaningful way, and hence the survey method may not be appropriate or practical for certain demographic groups such as children or the illiterate.

Most questionnaire surveys tend to be self-administered mail surveys, where the same questionnaire is mailed to a large number of people, and willing respondents can complete the survey at their convenience and return it in postage-prepaid envelopes. Mail surveys are advantageous in that they are unobtrusive, and they are inexpensive to

administer, since bulk postage is cheap in most countries. However, response rates from mail surveys tend to be quite low since most people tend to ignore survey requests. There may also be long delays (several months) in respondents' completing and returning the survey (or they may simply lose it). Hence, the researcher must continuously monitor responses as they are being returned, track and send reminders to non-respondents repeated reminders (two or three reminders at intervals of one to 1.5 months is ideal). Questionnaire surveys are also not well-suited for issues that require clarification on the part of the respondent or those that require detailed written responses. Longitudinal designs can be used to survey the same set of respondents at different times, but response rates tend to fall precipitously from one survey to the next.

A second type of survey is group-administered questionnaire. A sample of respondents is brought together at a common place and time, and each respondent is asked to complete the survey questionnaire while in that room. Respondents enter their responses independently without interacting with each other. This format is convenient for the researcher, and high response rate is assured. If respondents do not understand any specific question, they can ask for clarification. In many organizations, it is relatively easy to assemble a group of employees in a conference room or lunch room, especially if the survey is approved by corporate executives.

A more recent type of questionnaire survey is an online or web survey. These surveys are administered over the Internet using interactive forms. Respondents may receive an electronic mail request for participation in the survey with a link to an online website where the survey may be completed. Alternatively, the survey may be embedded into an e-mail, and can be completed and returned via e-mail. These surveys are very inexpensive to administer, results are instantly recorded in an online database, and the survey can be easily modified if needed. However, if the survey website is not password-protected or designed to prevent multiple submissions, the responses can be easily compromised. Furthermore, sampling bias may be a significant issue since the survey cannot reach people that do not have computer or Internet access, such as many of the poor, senior, and minority groups, and the respondent sample is skewed

toward an younger demographic who are online much of the time and have the time and ability to complete such surveys. Computing the response rate may be problematic, if the survey link is posted on listservs or bulletin boards instead of being e-mailed directly to targeted respondents. For these reasons, many researchers prefer dual-media surveys (e.g., mail survey and online survey), allowing respondents to select their preferred method of response.

Constructing a survey questionnaire is an art. Numerous decisions must be made about the content of questions, their wording, format, and sequencing, all of which can have important consequences for the survey responses.

Response formats. Survey questions may be structured or unstructured. Responses to structured questions are captured using one of the following response formats:

Dichotomous response, where respondents are asked to select one of two possible choices, such as true/false, yes/no, or agree/disagree. An example of such a question is: Do you think that the death penalty is justified under some circumstances (circle one): yes / no.

Nominal response, where respondents are presented with more than two unordered options, such as: What is your industry of employment: manufacturing / consumer services / retail / education / healthcare / tourism & hospitality / other.

Ordinal response, where respondents have more than two ordered options, such as: what is your highest level of education: high school / college degree / graduate studies.

Interval-level response, where respondents are presented with a 5-point or 7-point Likert scale, semantic differential scale, or Guttman scale. Each of these scale types were discussed in a previous chapter.

Continuous response, where respondents enter a continuous (ratio-scaled) value with a meaningful zero point, such as their age or tenure in a firm. These responses generally tend to be of the fill-in-the blanks type.

Question content and wording. Responses obtained in survey research are very sensitive to the types of questions asked. Poorly framed or ambiguous questions will likely result in meaningless responses with very little value. Dillman (1978) recommends several rules for creating good survey questions. Every single question in a survey should be carefully scrutinized for the following issues:

Is the question clear and understandable: Survey questions should be stated in a very simple language, preferably in active voice, and without complicated words or jargon that may not be understood by a typical respondent. All questions in the questionnaire should be worded in a similar manner to make it easy for respondents to read and understand them. The only exception is if your survey is targeted at a specialized group of respondents, such as doctors, lawyers and researchers, who use such jargon in their everyday environment.

Is the question worded in a negative manner: Negatively worded questions, such as should your local government not raise taxes, tend to confuse many responses and lead to inaccurate responses. Such questions should be avoided, and in all cases, avoid double-negatives.

Is the question ambiguous: Survey questions should not words or expressions that may be interpreted differently by different respondents (e.g., words like “any” or “just”). For instance, if you ask a respondent, what is your annual income, it is unclear whether you referring to salary/wages, or also dividend, rental, and other income, whether you referring to personal income, family income (including spouse’s wages), or personal and business income? Different interpretation by different respondents will lead to incomparable responses that cannot be interpreted correctly.

Does the question have biased or value-laden words: Bias refers to any property of a question that encourages subjects to answer in a certain way. Kenneth Rasinky (1989) examined several studies on people’s attitude toward government spending, and observed that respondents tend to indicate stronger support for “assistance to the poor” and less for “welfare”, even though both terms had the same meaning. In this study,

more support was also observed for “halting rising crime rate” (and less for “law enforcement”), “solving problems of big cities” (and less for “assistance to big cities”), and “dealing with drug addiction” (and less for “drug rehabilitation”). A biased language or tone tends to skew observed responses. It is often difficult to anticipate in advance the biasing wording, but to the greatest extent possible, survey questions should be carefully scrutinized to avoid biased language.

Is the question double-barreled: Double-barreled questions are those that can have multiple answers. For example, are you satisfied with the hardware and software provided for your work? In this example, how should a respondent answer if he/she is satisfied with the hardware but not with the software or vice versa? It is always advisable to separate double-barreled questions into separate questions: (1) are you satisfied with the hardware provided for your work, and (2) are you satisfied with the software provided for your work. Another example: does your family favor public television? Some people may favor public TV for themselves, but favor certain cable TV programs such as Sesame Street for their children.

Is the question too general: Sometimes, questions that are too general may not accurately convey respondents’ perceptions. If you asked someone how they liked a certain book and provide a response scale ranging from “not at all” to “extremely well”, if that person selected “extremely well”, what does he/she mean? Instead, ask more specific behavioral questions, such as will you recommend this book to others, or do you plan to read other books by the same author? Likewise, instead of asking how big is your firm (which may be interpreted differently by respondents), ask how many people work for your firm, and/or what is the annual revenues of your firm, which are both measures of firm size.

Is the question too detailed: Avoid unnecessarily detailed questions that serve no specific research purpose. For instance, do you need the age of each child in a household or is just the number of children in the household acceptable? However, if unsure, it is better to err on the side of details than generality.

Is the question presumptuous: If you ask, what do you see are the benefits of a tax cut, you are presuming that the respondent sees the tax cut as beneficial. But many people may not view tax cuts as being beneficial, because tax cuts generally lead to lesser funding for public schools, larger class sizes, and fewer public services such as police, ambulance, and fire service. Avoid questions with built-in presumptions.

Is the question imaginary: A popular question in many television game shows is “if you won a million dollars on this show, how will you plan to spend it?” Most respondents have never been faced with such an amount of money and have never thought about it (most don’t even know that after taxes, they will get only about $640,000 or so in the United States, and in many cases, that amount is spread over a 20-year period, so that their net present value is even less), and so their answers tend to be quite random, such as take a tour around the world, buy a restaurant or bar, spend on education, save for retirement, help parents or children, or have a lavish wedding. Imaginary questions have imaginary answers, which cannot be used for making scientific inferences.

Do respondents have the information needed to correctly answer the question: Often times, we assume that subjects have the necessary information to answer a question, when in reality, they do not. Even if a response is obtained, in such case, the responses tend to be inaccurate, given their lack of knowledge about the question being asked. For instance, we should not ask the CEO of a company about day-to-day operational details that they may not be aware of, or asking teachers about how much their students are learning, or asking high-schoolers “Do you think the US Government acted appropriately in the Bay of Pigs crisis?”

Question sequencing. In general, questions should flow logically from one to the next. To achieve the best response rates, questions should flow from the least sensitive to the most sensitive, from the factual and behavioral to the attitudinal, and from the more general to the more specific. Some general rules for question sequencing:

Start with easy non-threatening questions that can be easily recalled. Good options are demographics (age, gender, education level) for individual-level surveys and firmographics (employee count, annual revenues, industry) for firm-level surveys.

Never start with an open ended question.

If following an historical sequence of events, follow a chronological order from earliest to latest.

Ask about one topic at a time. When switching topics, use a transition, such as “The next section examines your opinions about …”

Use filter or contingency questions as needed, such as: “If you answered “yes” to question 5, please proceed to Section 2. If you answered “no” go to Section 3.”

Other golden rules . Do unto your respondents what you would have them do unto you. Be attentive and appreciative of respondents’ time, attention, trust, and confidentiality of personal information. Always practice the following strategies for all survey research:

People’s time is valuable. Be respectful of their time. Keep your survey as short as possible and limit it to what is absolutely necessary. Respondents do not like spending more than 10-15 minutes on any survey, no matter how important it is. Longer surveys tend to dramatically lower response rates.

Always assure respondents about the confidentiality of their responses, and how you will use their data (e.g., for academic research) and how the results will be reported (usually, in the aggregate).

For organizational surveys, assure respondents that you will send them a copy of the final results, and make sure that you follow up with your promise.

Thank your respondents for their participation in your study.

Finally, always pretest your questionnaire, at least using a convenience sample, before administering it to respondents in a field setting. Such pretesting may uncover

ambiguity, lack of clarity, or biases in question wording, which should be eliminated before administering to the intended sample.

Interview Survey

Interviews are a more personalized form of data collection method than questionnaires, and are conducted by trained interviewers using the same research protocol as questionnaire surveys (i.e., a standardized set of questions). However, unlike a questionnaire, the interview script may contain special instructions for the interviewer that is not seen by respondents, and may include space for the interviewer to record personal observations and comments. In addition, unlike mail surveys, the interviewer has the opportunity to clarify any issues raised by the respondent or ask probing or follow-up questions. However, interviews are time-consuming and resource-intensive. Special interviewing skills are needed on part of the interviewer. The interviewer is also considered to be part of the measurement instrument, and must proactively strive not to artificially bias the observed responses.

The most typical form of interview is personal or face-to-face interview, where the interviewer works directly with the respondent to ask questions and record their responses.

Personal interviews may be conducted at the respondent's home or office location. This approach may even be favored by some respondents, while others may feel uncomfortable in allowing a stranger in their homes. However, skilled interviewers can persuade respondents to cooperate, dramatically improving response rates.

A variation of the personal interview is a group interview, also called focus group. In this technique, a small group of respondents (usually 6-10 respondents) are interviewed together in a common location. The interviewer is essentially a facilitator whose job is to lead the discussion, and ensure that every person has an opportunity to respond. Focus groups allow deeper examination of complex issues than other forms of survey research, because when people hear others talk, it often triggers responses or ideas

that they did not think about before. However, focus group discussion may be dominated by a dominant personality, and some individuals may be reluctant to voice their opinions in front of their peers or superiors, especially while dealing with a sensitive issue such as employee underperformance or office politics. Because of their small sample size, focus groups are usually used for exploratory research rather than descriptive or explanatory research.

A third type of interview survey is telephone interviews. In this technique, interviewers contact potential respondents over the phone, typically based on a random selection of people from a telephone directory, to ask a standard set of survey questions. A more recent and technologically advanced approach is computer-assisted telephone interviewing (CATI), increasing being used by academic, government, and commercial survey researchers, where the interviewer is a telephone operator, who is guided through the interview process by a computer program displaying instructions and questions to be asked on a computer screen. The system also selects respondents randomly using a random digit dialing technique, and records responses using voice capture technology. Once respondents are on the phone, higher response rates can be obtained. This technique is not ideal for rural areas where telephone density is low, and also cannot be used for communicating non-audio information such as graphics or product demonstrations.

Role of interviewer. The interviewer has a complex and multi-faceted role in the interview process, which includes the following tasks:

Prepare for the interview: Since the interviewer is in the forefront of the data collection effort, the quality of data collected depends heavily on how well the interviewer is trained to do the job. The interviewer must be trained in the interview process and the survey method, and also be familiar with the purpose of the study, how responses will be stored and used, and sources of interviewer bias. He/she should also rehearse and time the interview prior to the formal study.

Locate and enlist the cooperation of respondents: Particularly in personal, in-home surveys, the interviewer must locate specific addresses, and work around respondents' schedule sometimes at undesirable times such as during weekends. They should also be like a salesperson, selling the idea of participating in the study.

Motivate respondents: Respondents often feed off the motivation of the interviewer. If the interviewer is disinterested or inattentive, respondents won't be motivated to provide useful or informative responses either. The interviewer must demonstrate enthusiasm about the study, communicate the importance of the research to respondents, and be attentive to respondents' needs throughout the interview.

Clarify any confusion or concerns: Interviewers must be able to think on their feet and address unanticipated concerns or objections raised by respondents to the respondents' satisfaction. Additionally, they should ask probing questions as necessary even if such questions are not in the script.

Observe quality of response: The interviewer is in the best position to judge the quality of information collected, and may supplement responses obtained using personal observations of gestures or body language as appropriate.

Conducting the interview. Before the interview, the interviewer should prepare a kit to carry to the interview session, consisting of a cover letter from the principal investigator or sponsor, adequate copies of the survey instrument, photo identification, and a telephone number for respondents to call to verify the interviewer's authenticity. The interviewer should also try to call respondents ahead of time to set up an appointment if possible. To start the interview, he/she should speak in an imperative and confident tone, such as "I'd like to take a few minutes of your time to interview you for a very important study," instead of "May I come in to do an interview?" He/she should introduce himself/herself, present personal credentials, explain the purpose of the study in 1-2 sentences, and assure confidentiality of respondents' comments and voluntariness of their participation, all in less than a minute. No big words or jargon should be used, and no details should be provided unless specifically requested. If the interviewer wishes to

tape-record the interview, he/she should ask for respondent's explicit permission before doing so. Even if the interview is recorded, the interview must take notes on key issues, probes, or verbatim phrases.

During the interview, the interviewer should follow the questionnaire script and ask questions exactly as written, and not change the words to make the question sound friendlier. They should also not change the order of questions or skip any question that may have been answered earlier. Any issues with the questions should be discussed during rehearsal prior to the actual interview sessions. The interviewer should not finish the respondent's sentences. If the respondent gives a brief cursory answer, the interviewer should probe the respondent to elicit a more thoughtful, thorough response. Some useful probing techniques are:

The silent probe: Just pausing and waiting (without going into the next question) may suggest to respondents that the interviewer is waiting for more detailed response.

Overt encouragement: Occasional "uh-huh" or "okay" may encourage the respondent to go into greater details. However, the interviewer must not express approval or disapproval of what was said by the respondent.

Ask for elaboration: Such as "can you elaborate on that?" or "A minute ago, you were talking about an experience you had in high school. Can you tell me more about that?"

Reflection: The interviewer can try the psychotherapist's trick of repeating what the respondent said. For instance, "What I'm hearing is that you found that experience very traumatic" and then pause and wait for the respondent to elaborate.

After the interview in completed, the interviewer should thank respondents for their time, tell them when to expect the results, and not leave hastily. Immediately after leaving, they should write down any notes or key observations that may help interpret the respondent's comments better.

Biases in Survey Research

Despite all of its strengths and advantages, survey research is often tainted with systematic biases that may invalidate some of the inferences derived from such surveys. Five such biases are the non-response bias, sampling bias, social desirability bias, recall bias, and common method bias.

Non-response bias. Survey research is generally notorious for its low response rates. A response rate of 15-20% is typical in a mail survey, even after two or three reminders. If the majority of the targeted respondents fail to respond to a survey, then a legitimate concern is whether non-respondents are not responding due to a systematic reason, which may raise questions about the validity of the study's results. For instance, dissatisfied customers tend to be more vocal about their experience than satisfied customers, and are therefore more likely to respond to questionnaire surveys or interview requests than satisfied customers. Hence, any respondent sample is likely to have a higher proportion of dissatisfied customers than the underlying population from which it is drawn. In this instance, not only will the results lack generalizability, but the observed outcomes may also be an artifact of the biased sample. Several strategies may be employed to improve response rates:

Advance notification: A short letter sent in advance to the targeted respondents soliciting their participation in an upcoming survey can prepare them in advance and improve their propensity to respond. The letter should state the purpose and importance of the study, mode of data collection (e.g., via a phone call, a survey form in the mail, etc.), and appreciation for their cooperation. A variation of this technique may request the respondent to return a postage-paid postcard indicating whether or not they are willing to participate in the study.

Relevance of content: If a survey examines issues of relevance or importance to respondents, then they are more likely to respond than to surveys that don't matter to them.

Respondent-friendly questionnaire: Shorter survey questionnaires tend to elicit higher response rates than longer questionnaires. Furthermore, questions that are clear, non-offensive, and easy to respond tend to attract higher response rates.

Endorsement: For organizational surveys, it helps to gain endorsement from a senior executive attesting to the importance of the study to the organization. Such endorsement can be in the form of a cover letter or a letter of introduction, which can improve the researcher's credibility in the eyes of the respondents.

Follow-up requests: Multiple follow-up requests may coax some non-respondents to respond, even if their responses are late.

Interviewer training: Response rates for interviews can be improved with skilled interviewers trained on how to request interviews, use computerized dialing techniques to identify potential respondents, and schedule callbacks for respondents who could not be reached.

Incentives : Response rates, at least with certain populations, may increase with the use of incentives in the form of cash or gift cards, giveaways such as pens or stress balls, entry into a lottery, draw or contest, discount coupons, promise of contribution to charity, and so forth.

Non-monetary incentives: Businesses, in particular, are more prone to respond to non-monetary incentives than financial incentives. An example of such a non-monetary incentive is a benchmarking report comparing the business's individual response against the aggregate of all responses to a survey.

Confidentiality and privacy: Finally, assurances that respondents' private data or responses will not fall into the hands of any third party, may help improve response rates.

Sampling bias. Telephone surveys conducted by calling a random sample of publicly available telephone numbers will systematically exclude people with unlisted telephone

numbers, mobile phone numbers, and people who are unable to answer the phone (for instance, they are at work) when the survey is being conducted, and will include a disproportionate number of respondents who have land-line telephone service with listed phone numbers and people who stay home during much of the day, such as the unemployed, the disabled, and the elderly. Likewise, online surveys tend to include a disproportionate number of students and younger people who are constantly on the Internet, and systematically exclude people with limited or no access to computers or the Internet, such as the poor and the elderly. Similarly, questionnaire surveys tend to exclude children and the illiterate, who are unable to read, understand, or meaningfully respond to the questionnaire. A different kind of sampling bias relate to sampling the wrong population, such as asking teachers (or parents) about academic learning of their students (or children), or asking CEOs about operational details in their company. Such biases make the respondent sample unrepresentative of the intended population and hurt generalizability claims about inferences drawn from the biased sample.

Social desirability bias. Many respondents tend to avoid negative opinions or embarrassing comments about themselves, their employers, family, or friends. With negative questions such as do you think that your project team is dysfunctional, is there a lot of office politics in your workplace, or have you ever illegally downloaded music files from the Internet, the researcher may not get truthful responses. This tendency among respondents to “spin the truth” in order to portray themselves in a socially desirable manner is called the “social desirability bias”, which hurts the validity of response obtained from survey research. There is practically no way of overcoming the social desirability bias in a questionnaire survey, but in an interview setting, an astute interviewer may be able to spot inconsistent answers and ask probing questions or use personal observations to supplement respondents’ comments.

Recall bias. Responses to survey questions often depend on subjects’ motivation, memory, and ability to respond. Particularly when dealing with events that happened in the distant past, respondents may not adequately remember their own motivations or behaviors or perhaps their memory of such events may have evolved with time and no

longer retrievable. For instance, if a respondent to asked to describe his/her utilization of computer technology one year ago or even memorable childhood events like birthdays, their response may not be accurate due to difficulties with recall. One possible way of overcoming the recall bias is by anchoring respondent's memory in specific events as they happened, rather than asking them to recall their perceptions and motivations from memory.

Common method bias. Common method bias refers to the amount of spurious covariance shared between independent and dependent variables that are measured at the same point in time, such as in a cross-sectional survey, using the same instrument, such as a questionnaire. In such cases, the phenomenon under investigation may not be adequately separated from measurement artifacts. Standard statistical tests are available to test for common method bias, such as Harmon's single-factor test (Podsakoff et al. 2003), Lindell and Whitney's (2001) market variable technique, and so forth. This bias can be potentially avoided if the independent and dependent variables are measured at different points in time, using a longitudinal survey design, of if these variables are measured using different methods, such as computerized recording of **dependent variable versus questionnaire-based self-rating of independent variables.**

QUANTITATIVE RESEARCH METHOD

Decision Science is the application that uses scientific approach and solves the management problems. It also helps managers to make best decisions.

Decision science includes a large number of mathematically oriented techniques. These techniques can be either developed within field of decision science or taken from other disciplines. Decision science is a recognised and established discipline in business. Decision science is a technique which is mainly used within business for increasing their efficiency and productivity.

In various surveys of businesses, many indicate that they use decision science techniques, and most rate the results to be very good.

Decision science is also known as operations research, quantitative techniques, quantitative analysis and management sciences. It is largely used in daily routine of most programs of business organisation.

Meaning and Definition of Quantitative Techniques :

The term Decision Science / Quantitative Techniques (QT) /Operations Research (OR) describes the discipline that is focused on the application of Information Technology (IT) for well-versed decision-making.

Quantitative techniques are those statistical and programming techniques: which support the decision making process especially related to industry and business. QT takes into consideration the elements of qualities such as use of numbers, symbols and other mathematical expressions.

QT is basically helpful enhancement to judgment and intuition. Quantitative techniques assess planning factors and alternatives as and when they arise rather than suggest courses of action.

Quantitative, techniques may be defined as those techniques which provide the decision maker with a systematic and powerful means of analysis and help, based on quantifiable data, in exploring policies for achieving pre-determined goals. "Quantitative techniques are mainly appropriate to problems of complex business enterprises".

QT can be considered as the scientific approach to managerial decision making. This approach starts from raw data and after manipulation or processing, information is produced which is valuable for making decision.

The main aim of quantitative analysis is the processing and manipulating of raw data into meaningful information. For increasing the use of quantitative analysis, computer can be used as an instrument.

According to C.R. Kothari :

"Quantitative Techniques may be defined as those technique which provide the decision maker with a systematic and powerful means of analysis and help, based on quantitative in exploring policies for achieving per-determined goals".

Quantitative Techniques are the devices developed on the basis of mathematical and statistical models.

Role of Quantitative Techniques in Decision Making :

The major roles of quantitative technique are as follows :

It provides a tool for scientific analysis.

It offers solutions for various business problems.

It enables proper deployment of resources.

It supports in minimising waiting and servicing costs.

It helps the management to decide when to buy and what is the procedure of buying.

It helps in reducing the total processing time necessary for performing a set of jobs.

Characteristics of Quantitative Techniques :

Decision-Making :

Decision-making or problem solving constitutes the major working of operations research: Managerial decision-making is considered to be a general systematic process of operations research (OR).

Scientific Approach :

Like any other research, operations research also emphasises on the overall approach and takes into account all the significant effects of the system. It understands and

evaluates them as a whole. It takes a scientific approach towards reasoning. It involves the methods defining the problem, its formulation, testing and analysing of the results obtained.

Objective-Oriented Approach :

Operations Research not only takes the overall view of the problem, but also endeavours to arrive at the best possible (say optimal) solution to the problem in hand. It takes an objective-oriented approach. To achieve this, it is necessary to have a defined measure of effectiveness which is based on the goals of the organisation. This measure is then used to make a comparison between alternative solutions to the problem and adopt the best one.

Inter-Disciplinary Approach :

No approach can be effective, if taken singly. OR is also inter-disciplinary in nature. Problems are multi-dimensional and approach needs a team work. For example, managerial problems are affected by economic, sociological, biological, psychological, physical and engineering aspect. A team that plans to arrive at a solution, to such a problem, needs people who are specialists in areas such as mathematics, engineering, economics, statistics, management, etc.

Industry:

Industrial management deals with a series of problems, starting right from the purchase of raw materials till the dispatch of final products. The management is ultimately interested in overall understanding of the methods, of optimising profits. Therefore, to take decision on scientific basis, operations research team has to think about various alternative methods, to produce goods and obtaining returns in each case.

Not only this, the operations research study should also suggest possible changes in the overall structure like installation of a new machine or introduction to automation, etc., for optimising the results. Many industries have gained immensely by applying operations

research in various tasks. For example, operations research can be used in the fields of manufacturing and production, blending and product mix, inventory management, for forecasting demand, sale and purchase, for repair and maintenance jobs, for scheduling and sequencing planning, and also for scheduling and control of projects.

Developing Economies :

OR is applicable to both developing and developed economies. But a lot of scope exists in developing economies, for building up an operations research approach towards planning. The basic idea is to orient the planning, to achieve maximum growth per capital income in minimum time; considering the goals and restrictions of the country. Poverty and hunger are the core problems faced by many countries of Asia and Africa. Therefore, people like statisticians, economists, technicians, administrators, politicians and agriculture experts can work in conjunction, to solve this problem with an operations research approach.

Agriculture Industry :

Operations research approach has a huge scope in agriculture sector Population explosion has led to scarcity of food. Optimum allocation of land for various crops in accordance with climatic conditions is a challenge for many countries. Also, each developing country is facing the problem of optimal distribution of water from several water bodies. These areas of concern hold a great scope for scientific research.

Organisation :

Organisation, big or small, can adopt operations research approach effectively. Operational productivity of organisations have improved by using quantitative techniques. Techniques of operations research, can be applied to minimise cost, and maximise benefit for decisions. For example, a departmental store faces problem like, employing additional sales girls, or purchasing an additional van, etc.

Business and Society :

Businesses and society can directly be benefited from operations research. For example, hospitals, clinics etc. Operations research methods can be applied directly to solve administrative problems such as minimising the waiting time of outdoor patients.

Similarly, the business of transport can also be benefited by applying simulation methods. Such methods, can help to regulate train arrivals and their running timings. Queuing theory, can be applied to minimise congestion and passengers waiting time.

These methods are increasingly being applied in L.I.C. workplaces. It helps in deciding the premium rates of various policies. Industries such as petroleum, paper, chemical, metal processing, aircraft, rubber, mining and textile have been extremely benefited by its use.

Nature of Quantitative Techniques :

Quality of Solution :

Quantitative techniques helps in improving the quality of solution but may not necessarily result in a perfect solution. It helps to find the best possible solution to the problem under consideration.

Goal-Oriented Optimum Solution :

Quantitative techniques is sensitive about the optimization theory. It aims at identify the best possible course of action or solution under given constraints.

Use of Models :

Quantitative techniques uses models built by quantitative measurement, It also derives a solution from the model using one or more of the diversified mathematical techniques. A decision can be arrived, either by conducting experiments on it or by mathematical analysis. The objective is to assess the organisation to determine its policy, and actions scientifically and optimise its results.

Require Willing Executives :

Quantitative techniques needs a group of individuals having diverse backgrounds and skills to evaluate and analyse the costs, pros and cons of the alternative solutions of the problem. Willingness to participate in such experimental process is must for the executives. This will empower the decision-makers, to be objective in selecting the best possible solution.

Reduces Complexity :

Quantitative techniques attempts to minimise the complexity of business operation by helping managers to correct a difficult function or process. It also attempts to innovate easy solutions of costly and complicated functions, compared to actual experimental practice.

Importance of Decision Science / Quantitative Techniques :

Better Control:

For large organisations, it is practically impossible to continuously supervise every routine work. A QT approach comes handy and gives an analytical and quantitative basis to identify the problem area. QT approach is most frequently adopted with production scheduling and inventory replenishment.

Better Systems:

For example, Problems identifying the best location for factories or decision on whether to open a new warehouse, etc., are often been studied and analysed by QT approach. This approach helps to improve the existing system such as, selecting economical means of transportation, production scheduling, job sequencing, or replacing old machinery.

Better Decisions:

QT models help in improved decision-making and thereby reduce the risk of wrong decisions. QT approach gives the executive an improved insight into the problem and thereby improve decision-making.

Better Co-ordination:

QT models help in co-ordination of different or various divisions of an organisation.

Limitations of Quantitative Techniques:

Dependence on an Electronic Computer:

QT approach is mathematical in nature. QT techniques try to find out an optimal solution to a problem, by taking all the factors into consideration. The need of computers become unavoidable because these factors are enormous (huge), it requires huge calculations to express them in quantity and to establish relationships among them.

Non-Quantifiable Factors:

One of the drawbacks of QT techniques is that they provide a solution only when all the elements related to a problem are quantified. Since all relevant variables may not be quantified, they do not find a place in QT models.

Wrong Estimation:

Certain assumptions and estimates are made for assigning quantitative values to factors involved in QT, so that a quantitative analysis can be done. If such estimates are wrong. The result can be misleading.

Involves Time and Cost :

Operations research is a costly affair. An organisation needs to invest time, money and effort into QT to make it effective. Professionals need to be hired to conduct constant

research. For better research outcomes, these professionals must constantly review the rapidly changing business scenarios.

Implementation :

The complexities of human relations and behavior must be taken into account while implementing QT decisions, as it is a very delicate task.

Applications of Quantitative Techniques:

Uses, scope and applications of quantitative techniques in managerial decision-making are as follows:

Finance, Budgeting and Investment:

Long range capital requirements, cash flow analysis, investment portfolios and dividend policies.

Credit policies, credit risks and procedures for delinquent account.

Procedures to deal with complaints and claim.

Marketing :

Selection of product, its timing and competitive actions.

Cost and time-based decision for advertising media.

Rate of calling an account and requirement of number of salesmen, etc.

Market research effectiveness.

Physical Distribution :

Size of warehouses, distribution centre, retail outlets, etc., and their location.

Policy for distribution.

Purchasing, Procurement and Exploration :

Buying rules.

Determining purchase timing and its quantity.

Policies for bidding and analysis of vendor.

Replacement policies of equipment.

Personnel :

Manpower requirement forecasting, recruitment policies and assignment of job.

Suitable personnel selection considering age and skills, etc.

For each service centre determining the optimum number of persons.

Production :

Proper allocation of machines for scheduling and sequencing the production.

Optimum product mix calculation.

Selecting production plant sites along with its location and design.

Research and Development :

Alternative designs evaluation and its reliability.

Developed projects control.

Multiple research projects co-ordination.

Required determination of time and cost

SAMPLING

Sampling is itself a short cut method of studying people, groups, communities, and all other areas. Sampling can be defined as the method or the technique consisting of selection for the study of the so called part or the portion or the sample, with a view to draw conclusions or solutions about the universe or the population.

According to Mildred Parton, “Sampling method is the process or the method of drawing a definite number of individuals, cases or observations from a particular universe, selecting part of a total group for investigation.”

Therefore, the definition of sampling can be divided as so:

- Sampling is the process of selecting a representative group from the population under study.
- The target population is the total group of individuals from which the sample might be drawn.
- A sample is a group of people who take part in the investigation. The people who take part are referred to as “participants”.
- Generalisability refers to the extent to which we can apply the findings of our research to the target population we are interested in.

In order to answer the research questions, it is doubtful that the researcher should be able to collect data from all cases. Thus, there is a need to select a sample. The entire set of cases from which researcher sample is drawn in called the population. Since, researchers have neither the time nor the resources to analyze the entire population so they apply sampling technique to reduce the number of cases.

Basic Principles of Sampling

Theory of sampling is based on the following laws-

Law of Statistical Regularity :

This law comes from the mathematical theory of probability. According to King," Law of Statistical Regularity says that a moderately large number of the items chosen at random from the large group are almost sure on the average to possess the features of the large group."

According to this law the units of the sample must be selected at random.

Law of Inertia of Large Numbers :

According to this law, other things being equal – the larger the size of the sample; the more accurate the results are likely to be.

The Purpose of Sampling:

In some types of research the target population might be as broad as all humans, but in other types of research the target population might be a smaller group such as teenagers, preschool children or people who misuse drugs.

It is more or less impossible to study every single person in a target population so psychologists select a sample or sub-group of the population that is likely to be representative of the target population we are interested in.

This is important because we want to generalize from the sample to target the population. The more representative the sample, the more confident the researcher can be that the results can be generalized to the target population.

One of the problems that can occur when selecting a sample from a target population is sampling bias. Sampling bias refers to situations where the sample does not reflect the characteristics of the target population.

Characteristics of the sampling technique:

- Much cheaper.

- Saves time.
- Much reliable.
- Very suitable for carrying out different surveys.
- Scientific in nature.

Advantages of sampling:

- Very accurate.
- Economical in nature.
- Very reliable.
- High suitability ratio towards the different surveys.
- Takes less time.
- In cases, when the universe is very large, then the sampling method is the only practical method for collecting the data.

Disadvantages of sampling:

- Inadequacy of the samples.
- Chances for bias.
- Problems of accuracy.
- Difficulty of getting the representative sample.
- Untrained manpower.
- Absence of the informants.

● Chances of com10mitting the errors in sampling.

IMPORTANT TERMS

Universe or Population:

Population, compilation, or set of things, items, or quantities (grouped together on the basis of common or defining descriptions or characteristics) from which a representative sample is drawn for relationship, comparison or measurement. The population or universe embodies the entire group of units which is the centre of the study. Thus, the population could consist of all the persons in the country, or those in a particular topographical position, or a special cultural or economic group, depending on the rationale and exposure of the study.

Thus, it is a total set of elements (persons or objects) that share some common features defined by the sampling criterion established by the researcher. Population is Comprised of two groups - target population & accessible population.

Target Population:

Target population is the total group of population units from which the sample is to be drawn. A sample is the group of units who took part in research. Generalisability refers to the degree to which we can correlate the findings of our research to the target population we are concerned.

Accessible Population:

Accessible population is the population in research to which the researchers can correlate their conclusions. This population is a split or subset of the target population and is also known as the study population. It is from the accessible population that researchers draw their samples. Sample Group or Sampling.

● Sampling Units:

Each entity or person or thing which forms the entire universe is called a sampling unit. It is the most bias thing in the universe from which data is to be collected. For example, in a study proposed for assessing the violation of human rights among hand-rickshaw pullers in the city of Kolkata, each of the rickshaw puller is a sampling unit. Herein, the universe will be the entire body of rickshaw pullers in Kolkata.

In some studies more than one sample is drawn out of the universe for making a sound research. In such cases, each body of unit is called as 'unit' and the entities and person from whom the data is collected are called 'sampling elements'.

Sample Size:

Deciding the size of the sample is a major concern of the researcher. Size of the sample is the total number of sampling units that the researcher will include in the sample. The size of the sample should not be vast as the purpose of studying the sample and not the universe will be lost. Similarly, the sample size cannot be too small either for it will not adequately represent the universe.

Biased Sample:

Despite the care taken by the researcher, it is possible that some samples collected by him can represent some characteristics of the universe more than others. Such a sample is called a biased sample. It is pertinent for the researcher to be aware and make sure that his samples are not biased, to avoid error in sampling.

A. Probability Sampling

Probability sampling means that every item in the population has an equal chance of being included in the sample. One way to undertake random sampling would be if researcher was to construct a sampling frame first and then used a random number generation computer program to pick a sample from the sampling frame. Probability or

random sampling has the greatest freedom from bias but may represent the most costly sample in terms of time and energy for a given level of sampling error.

Simple random sampling :

The simple random sample means that every case of the population has an equal probability of inclusion in the sample.

Disadvantages associated with simple random sampling include: A complete frame (a list of all units in the whole population) is needed; in some studies, such as surveys by personal interviews, the costs of obtaining the sample can be high if the units are geographically widely scattered; The standard errors of estimators can be high.

Systematic sampling :

Systematic sampling is where every 10nth case after a random start is selected. For example, if surveying a sample of consumers, every fifth consumer may be selected from your sample. The advantage of this sampling technique is its simplicity.

Stratified random sampling

Stratified sampling is where the population is divided into strata (or subgroups) and a sample is taken from each subgroup. A subgroup is a natural set of items. Subgroups might be based on company size, gender or occupation (to name but a few). Stratified sampling is often used where there is a great deal of variation within a population. Its purpose is to ensure that every stratum is adequately represented.

Cluster sampling

Cluster sampling is where the whole population is divided into clusters or groups. Subsequently, a random sample is taken from these clusters, all of which are used in the final sample. Cluster sampling is advantageous for those researchers whose subjects are fragmented over large geographical areas as it saves time and money.

The stages to cluster sampling can be summarized as follows:

➢ Choose cluster grouping for sampling frame, such as type of company or geographical region.

➢ Number each of the clusters.

➢ Select sample using random sampling

Multi-stage sampling :

Multi-stage sampling is a process of moving from a broad to a narrow sample, using a step by step process.

If, for example, a Malaysian publisher of an automobile magazine were to conduct a survey, it could simply take a random sample of automobile owners within the entire Malaysian population. Obviously, this is both expensive and time consuming. A cheaper alternative would be to use multi-stage sampling. In essence, this would involve dividing Malaysia into a number of geographical regions. Subsequently, some of these regions are chosen at random, and then subdivisions are made, perhaps based on local authority areas.

Next, some of these are again chosen at random and then divided into smaller areas, such as towns or cities.

The main purpose of multi-stage sampling is to select samples which are concentrated in a few geographical regions. Once again, this saves time and money.

B. Non probability Sampling

Non probability sampling is often associated with case study research design and qualitative research. With regards to the latter, case studies tend to focus on small samples and are intended to examine a real life phenomenon, not to make statistical inferences in relation to the wider population. A sample of participants or cases does not

need to be representative, or random, but a clear rationale is needed for the inclusion of some cases or individuals rather than others.

Quota sampling :

Quota sampling is a non-random sampling technique in which participants are chosen on the basis of predetermined characteristics so that the total sample will have the same distribution of characteristics as the wider population.

Snowball sampling :

Snowball sampling is a non random sampling method that uses a few cases to help encourage other cases to take part in the study, thereby increasing sample size. This approach is most applicable in small populations that are difficult to access due to their closed nature, e.g. secret societies and inaccessible professions

Convenience sampling :

Convenience sampling is selecting participants because they are often readily and easily available. Typically, convenience sampling tends to be a favored sampling technique among students as it is inexpensive and an easy option compared to other sampling techniques. Convenience sampling often helps to overcome many of the limitations associated with research. For example, using friends or family as part sample is easier than targeting unknown individuals.

Purposive or judgmental sampling

Purposive or judgmental sampling is a strategy in which particular settings persons or events are selected deliberately in order to provide important information that cannot be obtained from other choices. It is where the researcher includes cases or **participants in the sample because they believe that they warrant inclusion.**

Filed and researcher in qualitative research

Field research is defined as a qualitative method of data collection that aims to observe, interact and understand people while they are in a natural environment. For example, nature conservationists observe behavior of animals in their natural surroundings and the way they react to certain scenarios. In the same way, social scientists conducting field research may conduct interviews or observe people from a distance to understand how they behave in a social environment and how they react to situations around them.

Field research encompasses a diverse range of social research methods including direct observation, limited participation, analysis of documents and other information, informal interviews, surveys etc. Although field research is generally characterized as qualitative research, it often involves multiple aspects of quantitative research in it.

Field research typically begins in a specific setting although the end objective of the study is to observe and analyze the specific behavior of a subject in that setting. The cause and effect of a certain behavior, though, is tough to analyze due to presence of multiple variables in a natural environment. Most of the data collection is based not entirely on cause and effect but mostly on correlation. While field research looks for correlation, the small sample size makes it difficult to establish a causal relationship between two or more variables.

Methods of Field Research

Direct Observation

In this method, the data is collected via an observational method or subjects in a natural environment. In this method, the behavior or outcome of situation is not interfered in any way by the researcher. The advantage of direct observation is that it offers contextual data on people management, situations, interactions and the surroundings. This method of field research is widely used in a public setting or environment but not in a private environment as it raises an ethical dilemma.

Participant Observation

In this method of field research, the researcher is deeply involved in the research process, not just purely as an observer, but also as a participant. This method too is conducted in a natural environment but the only difference is the researcher gets involved in the discussions and can mould the direction of the discussions. In this method, researchers live in a comfortable environment with the participants of the research design, to make them comfortable and open up to in-depth discussions.

Ethnography

Ethnography is an expanded observation of social research and social perspective and the cultural values of an entire social setting. In ethnography, entire communities are observed objectively. For example, if a researcher would like to understand how an Amazon tribe lives their life and operates, he/she may chose to observe them or live amongst them and silently observe their day-to-day behavior.

Qualitative Interviews

Qualitative interviews are close-ended questions that are asked directly to the research subjects. The qualitative interviews could be either informal and conversational, semi-structured, standardized and open-ended or a mix of all the above three. This provides a wealth of data to the researcher that they can sort through. This also helps collect relational data. This method of field research can use a mix of one-on-one interviews, focus groups and text analysis.

Case Study

A case study research is an in-depth analysis of a person, situation or event. This method may look difficult to operate, however, it is one of the simplest ways of conducting research as it involves a deep dive and thorough understanding the data collection methods and inferring the data.

Doing qualitative research

Qualitative research How to situate naturalistic inquiry in the field of qualitative research and of social research in general? Broadly speaking, qualitative research in social science aims to describe, interpret, and explain social reality through the medium of language (as opposed to quantitative research, which aims to do so through the medium of mathematics). Qualitative research thus is a generic approach in social research covering ethnography, anthropological fieldwork, qualitative sociology, organizational fieldwork, interpretive research, oral history, narrative research, and so on (see Figure 2). Although each of these has its own tradition, usually linked with the history of a particular social-scientific discipline (anthropology, sociology, organizational and administrative science, social history, linguistics), we feel that they all belong to the same family. As we emphasize in the figure, they are branches of the same tree of qualitative research. Naturalistic research is qualitative research by ordinary means into everyday situations, aiming to disturb these situations as little as possible. It strives to blend in, respecting people in their everyday lives, taking their actions and experiences seriously, and building on these carefully. As a craft, naturalistic inquiry may be considered the artisanal core of qualitative research and hence of ethnography and all the other varieties of qualitative research.

Qualitative Interview

A qualitative Interview is a research approach used in a qualitative study where more personal interaction is required and detailed in depth information is gathered from the participant. Qualitative interviews usually involve follow-up questions and are conducted in a conversation or discussion format.

A qualitative interview is a more personal form of research agenda compared to general questionnaires or focused group studies. Such formats often include open-ended and follow-up questions.

How to conduct a Qualitative Interview?

Conducting a qualitative interview requires careful planning and implementation to ensure that you gather meaningful and rich data. Here are some steps to consider when conducting a qualitative research interview:

Define your research methods & objectives:

Clearly define the purpose of your qualitative interview and the specific research method questions you want to address. It will help you design appropriate research interview questions and interview guides for your data analysis.

Recruit participants:

Identify the target population or specific individuals who can provide valuable insights related to your research questions. Consider criteria such as demographics, expertise, or experiences that align with your research methods and objectives. Use appropriate methods, such as purposive sampling of data collection, to recruit participants who can offer diverse perspectives.

Obtain informed consent:

Before conducting the interview, ensure that participants understand the purpose, procedures, and potential risks or benefits of their involvement. Obtain their informed consent, clearly explaining their rights as participants, including confidentiality and their ability to withdraw from the study at any time.

Develop an interview guideline:

Prepare a flexible in depth interviews guide that includes a set of open-ended interview questions for an interview participant. The guide should be designed to elicit participants' perspectives, experiences, and insights related to your research objectives

for conducting interviews. Consider using probing techniques to encourage participants to elaborate on their responses and explore different dimensions of the topic.

Comfortable environment:

Select a suitable location for the in depth interviews that is comfortable, private, and free from distractions for an interview participant. Create a relaxed and welcoming atmosphere to help participants feel at ease and encourage open communication for qualitative interviewing. Establish rapport and build trust with participants by introducing yourself, explaining the purpose of conducting interviews, and actively listening to their responses.

Conduct the interview:

Start by asking introductory questions to establish a rapport with the participant. Follow the qualitative interview guide, but remain flexible and responsive to participants' responses. Allow participants to speak freely and provide detailed answers, using probing techniques to delve deeper into their experiences, emotions, and perspectives. Take notes or record the interview (with participants' consent) to capture accurate and detailed information.

Respect participants' perspectives:

Show respect for their experiences and perspectives, even if they differ from yours. Avoid making judgments or imposing your own beliefs during the interview. Create a non-judgmental and inclusive environment that encourages

Transcribe and analyze the data:

Transcribe the interview recordings or review your notes promptly after each interview while the details remain fresh. Analyze the qualitative data using appropriate methods, such as thematic data analysis, to identify patterns, themes, and insights. Ensure that the data is anonymized and handled following ethical guidelines.

By following these steps, you can conduct a qualitative research interview that facilitates rich and meaningful discussions, resulting in valuable data analysis for your research process.

Types of Qualitative Interviews

The interview itself can be conducted over multiple formats. Qualitative researchers can employ several types of qualitative interviews based on their research objectives and the nature of the study. Here are some popular types of qualitative interviews:

Types Of Qualitative Interviews

Structured Interviews:

Structured interviews involve a predetermined set of questions that are asked in the same order and manner to each participant. The questions of structured interviews are typically closed-ended or have limited response options. This type of interview is proper when researchers aim to collect specific information in a standardized way, allowing for easier comparison and analysis of responses across participants.

Semi-Structured Interviews:

Semi-structured interviews combine predetermined questions with flexibility for additional probing and follow-up questions. Researchers have a set of core questions to guide the interview but can adapt the interview data collection process based on participants' responses. This type of approach allows for a deeper exploration of participants' experiences, thoughts, and perspectives while maintaining some standardization level.

Unstructured Interviews:

Unstructured interviews involve open-ended questions and a free-flowing conversation between the interviewer and the participant. The interviewer may have a general topic or area of interest but allows the conversation to evolve naturally. Unstructured

interviews provide a high degree of flexibility and allow participants to express themselves more freely, often leading to rich and nuanced data.

Each qualitative interview type has its strengths and is suited for different research purposes. Researchers or a research team should carefully select the appropriate type of research interview that aligns with their research objectives, the nature of the phenomenon under investigation, and the population being studied.

Ethnographic research method?

Ethnography is a qualitative research method in which a researcher—an ethnographer—studies a particular social/cultural group with the aim to better understand it. ... Ethnography is the systematic study of people and their cultures. It refers both to the process that is used to study people as well as the outcome of this process. The term “ethnography” comes from the Greek words “ethnos” (which means “people” or “nation) and “grapho” (which means “I write”).

Ethnography is a type of qualitative research that gathers observations, interviews and documentary data to produce detailed and comprehensive accounts of different social phenomena. ... It is also aimed at those interested in considering the use of ethnographic methods in their own research work.

Definitions

Arnal, Del Rincón and LatorreAccording to Arnal, Del Rincón and Latorre,"ethnographic research is the most popular method to analyze and emphasize the descriptive and interpretative questions of a specific sociocultural environment. It has been widely used in studies of social anthropology and education, so much so that it can be considered one of the most relevant research methods in humanistic-interpretative research."

Rodríguez Gómez According to Rodríguez Gómez is the "research method by which you learn the way of life of a specific social unit, which can be a family, a class, a faculty or a school."

The concept of ethnography of Giddens goes deeper into the development of this science, since it affirms that it is "the direct study of people and groups during a certain period, using participant observation or interviews to know their social behavior".

Key Characteristics of Ethnographic Studies

- They frequently involve working with previously unstudied phenomena
- They place an emphasis on exploring social phenomena rather than testing predetermined hypotheses
- They concentrate on describing the culture of a group in a very detailed and complex manner
- The professional must be involved in the group to study to get their acceptance and trust.
- They involve extensive fieldwork where data collection is primarily through interviews, symbols, artifacts, observations, and many other sources
- Ethnographic procedures tend to overlap and occur simultaneously. The data collected and its explanations work to collect more and more new information.
- The experience and the exploration are the tools to know a social scenario at first hand through the participant observation. From this strategy, information is obtained that generates conceptual categories.

Stages of Collection

- Informal stage: Collection of data; insights used to modify data collection and refine research questions
- Formal stage: sorting, organizing, and reducing the volume of the data

• “Thick Description”: identifying patterns, interpreting causes, consequences, and relationships to understand and provide explanation

• Description should be sufficiently realistic for others to see the implications

Assumptions in Ethnography :

i) Ethnographic research assumes that the main objective of research depends upon and is affected by the interpretation of community cultural understandings.

ii) It also assumes that it is very important as well as difficult to identify the target community that requires to be studied by the researcher.

iii) Ethnography further assumes that that the researcher is an expert and is thorough with the norm and mores of the culture.

iv) The researcher is also assumed to be an expert in the language spoken in the community. The underlying assumption in ethnography’ s commitment to being there is an assumption that certain types of information are only obtainable through firsthand research. A researcher can obtain a great deal of information about a particular place or group of people without engaging in ethnography.

Ethnographic method

In this type of research you should use inductive and deductive methods.

They are two opposed approaches: the first part of the observed facts to formulate theories, and the second one studies the theses to deduce phenomena.

In short, the inductive method goes from the particular to the general, and the deductive is absolutely the opposite, part of the general to reach the peculiarity of each case.

- The participant observation.

- Making maps. Within a group there are specific places to carry out each activity. The professional must do a mapping of the place, indicating the public, private, religious areas, among others.

- Kinship maps. It refers to establishing power figures, genealogical trees and elements that help to understand the relationship of individuals in certain groups.

- Carry out informal / formal interviews

- Organize discussion groups

- Collect life stories: autobiographies, personality interviews.

- Document stories. There are communities where myths and legends are fundamental. In addition, they provide data on the culture, beliefs and values of the society analyzed.

- Take photos and, if possible, videos.

- Consult censuses. There are cases in which this data is not available. If possible, the investigation can make its own census.

- Sort and archive the data.

Steps Of Ethnographic Method

1) Selection: The ethnographic method begins with selection of a culture. The researcher selects the culture/ community or population according to his or her interest.

2) Review of Literature: Then the researcher reviews the literature pertaining to the culture to get a brief idea and historical sketch of the culture selected for study.

3) Identification of variables: The researcher then identifies variables which interests him or her as well as the members of the culture and needs to be explored.

4) Entry: The ethnographer then tries to enter the culture and gain the acceptance of the members of the culture.

5) Cultural Immersion: Ethnographers live in the culture for months or even years which they have chosen to study. The middle stages of the ethnographic method involve gaining informants, using them to gain yet more informants in a chaining process.

6) Data Collection: After gaining the confidence of the respondents, the researcher collects information in form of observational transcripts and interview recordings and tapings.

7) Development of theory: After analysing the data, the researcher formulates theory on the basis of interpretation of the results and reports achieved. However, the ethnographic researcher tries best to avoid theoretical preconceptions and formulates theory on the basis of the perspectives of the members of the culture and from observation. The researcher may seek validation of induced theories by going back to members of the culture for their reaction.

Advantages of Ethnography

1. It helps people know more about other cultures.

2. It helps businesses learn more about their target market.

3. It helps increase scientists' understanding of human behavior.

4. It can easily evolve and discover new things

Limitations of Ethnography:

1. It can be difficult to choose a representative sample.

2. It takes a lot of time.

3. It depends on the ethnographer's relationship with his subjects.

4. It depends on people's openness and honesty.

5. It can lead to cultural bias.

6. Issues of data sample size can also arise with ethnographic research

Mixed method

Mixed methods research is a popular method for researching today, allowing for a deeper exploration of a research question by utilizing a blend of qualitative and quantitative data.

By blending both quantitative and qualitative data, mixed methods research allows for a more thorough exploration of a research question. It can answer complex research queries that cannot be solved with either qualitative or quantitative research.

Analyze your mixed methods research

Dovetail streamlines analysis to help you uncover and share actionable insights Analyze with Dovetail

What is mixed methods research?

Mixed methods research combines the elements of two types of research: quantitative and qualitative.

Quantitative data is collected through the use of surveys and experiments, for example, containing numerical measures such as ages, scores, and percentages.

Qualitative data involves non-numerical measures like beliefs, motivations, attitudes, and experiences, often derived through interviews and focus group research to gain a deeper understanding of a research question or phenomenon.

Mixed methods research is often used in the behavioral, health, and social sciences, as it allows for the collection of numerical and non-numerical data.

When to use mixed methods research

Mixed methods research is a great choice when quantitative or qualitative data alone will not sufficiently answer a research question. By collecting and analyzing both quantitative and qualitative data in the same study, you can draw more meaningful conclusions.

There are several reasons why mixed methods research can be beneficial, including generalizability, contextualization, and credibility.

For example, let's say you are conducting a survey about consumer preferences for a certain product. You could collect only quantitative data, such as how many people prefer each product and their demographics. Or you could supplement your quantitative data with qualitative data, such as interviews and focus groups, to get a better sense of why people prefer one product over another.

It is important to note that mixed methods research does not only mean collecting both types of data. Rather, it also requires carefully considering the relationship between the two and method flexibility.

You may find differing or even conflicting results by combining quantitative and qualitative data. It is up to the researcher to then carefully analyze the results and consider them in the context of the research question to draw meaningful conclusions.

When designing a mixed methods study, it is important to consider your research approach, research questions, and available data. Think about how you can use different techniques to integrate the data to provide an answer to your research question.

Mixed methods research design

A mixed methods research design is an approach to collecting and analyzing both qualitative and quantitative data in a single study.

Mixed methods designs allow for method flexibility and can provide differing and even conflicting results. Examples of mixed methods research designs include convergent parallel, explanatory sequential, and exploratory sequential.

By integrating data from both quantitative and qualitative sources, researchers can gain valuable insights into their research topic. For example, a study looking into the impact of technology on learning could use surveys to measure quantitative data on students' use of technology in the classroom. At the same time, interviews or focus groups can provide qualitative data on students' experiences and opinions.

Types of mixed method research designs

Researchers often struggle to put mixed methods research into practice, as it is challenging and can lead to research bias. Although mixed methods research can reveal differences or conflicting results between studies, it can also offer method flexibility.

Designing a mixed methods study can be broken down into four types: convergent parallel, embedded, explanatory sequential, and exploratory sequential.

Convergent parallel

The convergent parallel design is when data collection and analysis of both quantitative and qualitative data occur simultaneously and are analyzed separately. This design aims to create mutually exclusive sets of data that inform each other.

For example, you might interview people who live in a certain neighborhood while also conducting a survey of the same people to determine their satisfaction with the area.

Embedded design

The embedded design is when the quantitative and qualitative data are collected simultaneously, but the qualitative data is embedded within the quantitative data. This

design is best used when you want to focus on the quantitative data but still need to understand how the qualitative data further explains it.

For instance, you may survey students about their opinions of an online learning platform and conduct individual interviews to gain further insight into their responses.

Explanatory sequential design

In an explanatory sequential design, quantitative data is collected first, followed by qualitative data. This design is used when you want to further explain a set of quantitative data with additional qualitative information.

An example of this would be if you surveyed employees at a company about their satisfaction with their job and then conducted interviews to gain more information about why they responded the way they did.

Exploratory sequential design

The exploratory sequential design collects qualitative data first, followed by quantitative data. This type of mixed methods research is used when the goal is to explore a topic before collecting any quantitative data.

An example of this could be studying how parents interact with their children by conducting interviews and then using a survey to further explore and measure these interactions.

Integrating data in mixed methods studies can be challenging, but it can be done successfully with careful planning.

No matter which type of design you choose, understanding and applying these principles can help you draw meaningful conclusions from your research.

Strengths of mixed methods research

Mixed methods research designs combine the strengths of qualitative and quantitative data, deepening and enriching qualitative results with quantitative data and validating quantitative findings with qualitative data. This method offers more flexibility in designing research, combining theory generation and hypothesis testing, and being less tied to disciplines and established research paradigms.

Take the example of a study examining the impact of exercise on mental health. Mixed methods research would allow for a comprehensive look at the issue from different angles.

Researchers could begin by collecting quantitative data through surveys to get an overall view of the participants' levels of physical activity and mental health. Qualitative interviews would follow this to explore the underlying dynamics of participants' experiences of exercise, physical activity, and mental health in greater detail.

Through a mixed methods approach, researchers could more easily compare and contrast their results to better understand the phenomenon as a whole.

Additionally, mixed methods research is useful when there are conflicting or differing results in different studies. By combining both quantitative and qualitative data, mixed methods research can offer insights into why those differences exist.

For example, if a quantitative survey yields one result while a qualitative interview yields another, mixed methods research can help identify what factors influence these differences by integrating data from both sources.

Overall, mixed methods research designs offer a range of advantages for studying complex phenomena. They can provide insight into different elements of a phenomenon in ways that are not possible with either qualitative or quantitative data alone. Additionally, they allow researchers to integrate data from multiple sources to gain a deeper understanding of the phenomenon in question.

Challenges of mixed methods research

Mixed methods research is labor-intensive and often requires interdisciplinary teams of researchers to collaborate. It also has the potential to cost more than conducting a stand alone qualitative or quantitative study.

Interpreting the results of mixed methods research can be tricky, as it can involve conflicting or differing results. Researchers must find ways to systematically compare the results from different sources and methods to avoid bias.

For example, imagine a situation where a team of researchers has employed an explanatory sequential design for their mixed methods study. After collecting data from both the quantitative and qualitative stages, the team finds that the two sets of data provide differing results. This could be challenging for the team, as they must now decide how to effectively integrate the two types of data in order to reach meaningful conclusions. The team would need to identify method flexibility and be strategic when integrating data in order to draw meaningful conclusions from the conflicting results.

Advanced frameworks in mixed methods research

Mixed methods research offers powerful tools for investigating complex processes and systems, such as in health and healthcare.

Besides the three basic mixed method designs—exploratory sequential, explanatory sequential, and convergent parallel—you can use one of the four advanced frameworks to extend mixed methods research designs. These include multistage, intervention, case study, and participatory.

Multistage

This framework mixes qualitative and quantitative data collection methods in stages to gather a more nuanced view of the research question. An example of this is a study that first has an online survey to collect initial data and is followed by in-depth interviews to gain further insights.

Intervention

This design involves collecting quantitative data and then taking action, usually in the form of an intervention or intervention program. An example of this could be a research team who collects data from a group of participants, evaluates it, and then implements an intervention program based on their findings.

Case study

This utilizes both qualitative and quantitative research methods to analyze a single case. The researcher will examine the specific case in detail to understand the factors influencing it. An example of this could be a study of a specific business organization to understand the organizational dynamics and culture within the organization.

Participatory

This type of research focuses on the involvement of participants in the research process. It involves the active participation of participants in formulating and developing research questions, data collection, and analysis.

An example of this could be a study that involves forming focus groups with participants who actively develop the research questions and then provide feedback during the data collection and analysis stages.

The flexibility of mixed methods research designs means that researchers can choose any combination of the four frameworks outlined above and other methodologies, such as convergent parallel, explanatory sequential, and exploratory sequential, to suit their particular needs.

Through this method's flexibility, researchers can gain multiple perspectives and uncover differing or even conflicting results when integrating data.

When it comes to integration at the methods level, there are four approaches.

Connecting involves collecting both qualitative and quantitative data during different phases of the research.

Building involves the collection of both quantitative and qualitative data within a single phase.

Merging involves the concurrent collection of both qualitative and quantitative data.

Embedding involves including qualitative data within a quantitative study or vice versa.

Techniques for integrating data in mixed method studies

Integrating data is an important step in mixed methods research designs. It allows researchers to gain further understanding from their research and gives credibility to the integration process. There are three main techniques for integrating data in mixed methods studies: triangulation protocol, following a thread, and the mixed methods matrix.

Triangulation protocol

This integration method combines different methods with differing or conflicting results to generate one unified answer.

For example, if a researcher wanted to know what type of music teenagers enjoy listening to, they might employ a survey of 1,000 teenagers as well as five focus group interviews to investigate this. The results might differ; the survey may find that rap is the most popular genre, whereas the focus groups may suggest rock music is more widely listened to.

The researcher can then use the triangulation protocol to come up with a unified answer—such as that both rap and rock music are popular genres for teenage listeners.

Following a thread

This is another method of integration where the researcher follows the same theme or idea from one method of data collection to the next.

A research design that follows a thread starts by collecting quantitative data on a specific issue, followed by collecting qualitative data to explain the results. This allows whoever is conducting the research to detect any conflicting information and further look into the conflicting information to understand what is really going on.

For example, a researcher who used this research method might collect quantitative data about how satisfied employees are with their jobs at a certain company, followed by qualitative interviews to investigate why job satisfaction levels are low. They could then use the results to explore any conflicting or differing results, allowing them to gain a deeper understanding of job satisfaction at the company.

By following a thread, the researcher can explore various research topics related to the original issue and gain a more comprehensive view of the issue.

Mixed methods matrix

This technique is a visual representation of the different types of mixed methods research designs and the order in which they should be implemented. It enables researchers to quickly assess their research design and adjust it as needed.

The matrix consists of four boxes with four different types of mixed methods research designs: convergent parallel, explanatory sequential, exploratory sequential, and method flexibility.

For example, imagine a researcher who wanted to understand why people don't exercise regularly. To answer this question, they could use a convergent parallel design, collecting both quantitative (e.g., survey responses) and qualitative (e.g., interviews) data simultaneously.

If the researcher found conflicting results, they could switch to an explanatory sequential design and collect quantitative data first, then follow up with qualitative data if needed. This way, the researcher can make adjustments based on their findings and integrate their data more effectively.

Mixed methods research is a powerful tool for understanding complex research topics. Using qualitative and quantitative data in one study allows researchers to understand their subject more deeply.

Mixed methods research designs such as convergent parallel, explanatory sequential, and exploratory sequential provide method flexibility, enabling researchers to collect both types of data while avoiding the limitations of either approach alone.

However, it's important to remember that mixed methods research can produce differing or even conflicting results, so it's important to be aware of the potential pitfalls and take steps to ensure that data is being correctly integrated. If used effectively, mixed methods research can offer valuable insight into topics that would otherwise remain largely unexplored.

Triangulation in Qualitative Research

Triangulation in qualitative research is defined as the process of using multiple sources, methods, data, or perspectives to enhance the credibility and validity of research findings.

The term “triangulation” originates from navigation, where multiple landmarks are used to precisely pinpoint a location. In the context of qualitative research, triangulation involves the convergence of evidence from different angles to corroborate and validate research interpretations, reducing the potential for bias and strengthening the overall rigor of the study.

Researchers employ triangulation as a strategy to reduce the potential for bias and to increase the robustness of their interpretations.

By integrating various data collection techniques, such as interviews, observations, and document analysis, as well as seeking input from diverse participants or researchers, triangulation aims to provide a more comprehensive and nuanced understanding of the research phenomenon.

The first aspect of triangulation is the use of multiple data sources or methods to investigate the same phenomenon. By integrating diverse types of information, such as interviews, observations, and document analysis, researchers can gain a more comprehensive understanding of the research topic. This approach helps overcome the limitations of relying on a single data source and enriches the depth of the study's insights.

Secondly, triangulation can involve investigator triangulation, where multiple researchers independently analyze and interpret the data. This collaborative effort adds an additional layer of reliability as different perspectives are considered, reducing the risk of individual biases influencing the study outcomes. The inclusion of multiple researchers enhances the trustworthiness of the research findings through collective scrutiny.

Furthermore, theoretical triangulation encourages researchers to draw on multiple theoretical frameworks or perspectives when interpreting the data. This enriches the analysis by considering different lenses through which the research phenomenon can be understood. By integrating various theoretical perspectives, researchers can provide a more nuanced and holistic understanding of the complex dynamics inherent in qualitative research.

We will cover all the various types of triangulations used with examples. But first, let us deep-dive into the key characteristics of triangulation in qualitative research.

Key Characteristics of Triangulation in Qualitative Research

Diversity of Sources or Methods:

Triangulation involves using multiple sources of data, methods, or perspectives to study the same phenomenon. This diversity helps ensure a comprehensive and well-rounded understanding of the research topic.

Validation and Corroboration:

The primary purpose of triangulation is to validate and corroborate research findings. By cross-verifying information from different sources or methods, researchers aim to enhance the credibility and reliability of their interpretations.

Reduction of Bias:

Triangulation helps mitigate individual bias and subjectivity by incorporating varied viewpoints. Different researchers, data sources, or methods contribute to a more objective and balanced analysis, minimizing the impact of personal biases.

Increased Reliability:

The use of triangulation is associated with increased reliability in qualitative research. When findings are consistent across different sources or methods, researchers have greater confidence in the robustness and dependability of their results.

Comprehensive Understanding:

Triangulation aims to provide a more comprehensive understanding of the research phenomenon. By integrating diverse perspectives and types of data, researchers can capture the complexity and richness of the subject under investigation.

Enhanced Validity:

The application of triangulation contributes to the validity of qualitative research. Validity is strengthened when researchers can demonstrate that their interpretations are grounded in a convergence of evidence from multiple sources or methods.

Holistic Approach:

Triangulation encourages researchers to adopt a holistic approach to their study. Instead of relying on a single method or perspective, researchers consider various facets of the research question, leading to a more nuanced and thorough exploration.

Flexible Application:

Triangulation is a flexible approach that can be applied at different stages of the research process. Researchers can use it in the design phase, during data collection, or in the analysis and interpretation of findings, tailoring its application to the specific needs of the study.

Transparent Documentation:

Transparency is a key characteristic of triangulation. Researchers are expected to document their decisions regarding the selection of sources, methods, and perspectives. This documentation allows others to assess the rigor and appropriateness of the triangulation approach.

Continuous Reflection and Adjustment:

Researchers employing triangulation should engage in continuous reflection on their choices and methods. If needed, adjustments can be made during the research process to ensure that the triangulation strategy aligns with the evolving understanding of the research phenomenon.

These characteristics collectively contribute to the strength and rigor of qualitative research, making triangulation a valuable methodological approach in the pursuit of comprehensive and reliable findings.

Importance of Triangulation in Qualitative Research

Triangulation plays a crucial role in qualitative research for several reasons, contributing to the credibility, reliability, and depth of the study. The importance of triangulation can be understood through the following key aspects:

Enhancing Credibility:

Triangulation helps establish the credibility of qualitative research by cross-verifying findings through multiple data sources, methods, or perspectives. This approach reduces the likelihood of drawing inaccurate conclusions based on a single source of information. Researchers can have greater confidence in the robustness of their results when multiple data points converge on similar themes or patterns.

Reducing Bias and Subjectivity:

By employing different data sources, methods, or investigators, triangulation helps mitigate individual biases and subjectivity inherent in qualitative research. Researchers may have different perspectives or interpret data in diverse ways, and triangulation provides a means to account for these variations. This collective approach fosters a more objective and comprehensive understanding of the research phenomenon.

Ensuring Trustworthiness:

Triangulation is a key strategy for ensuring the trustworthiness of qualitative research. When findings are supported by evidence from various angles, it adds to the overall trustworthiness of the study. Trustworthiness is a critical criterion in evaluating the quality of qualitative research and encompasses aspects such as credibility, transferability, dependability, and confirmability.

Comprehensive Understanding:

Qualitative research often seeks to explore complex phenomena in-depth. Triangulation facilitates a more comprehensive understanding by incorporating multiple dimensions, perspectives, and contextual factors. Researchers can capture the richness and complexity of the research topic, leading to findings that are more nuanced and reflective of the intricacies involved.

Validation of Results:

The convergence of findings from different data sources or methods serves as a form of validation. When various sources of evidence consistently point to similar conclusions, it reinforces the validity of the results. This validation is particularly important in qualitative research, where the interpretative nature of data analysis requires rigorous efforts to establish the trustworthiness of the findings.

Addressing Research Limitations:

No research method is without limitations, and triangulation is a strategy to address and overcome some of these limitations. By acknowledging and addressing potential weaknesses in the research design, data collection, or analysis, researchers can strengthen the overall quality of the study. Triangulation helps compensate for the shortcomings of individual components by drawing on the strengths of others.

Facilitating a Holistic Approach:

Triangulation encourages researchers to adopt a holistic approach to their study. By considering multiple facets of the research question, incorporating various data types, and involving different perspectives, researchers can develop a more nuanced and holistic understanding of the phenomena under investigation. This holistic perspective contributes to the richness and depth of qualitative research.

The triangulation is essential in qualitative research for bolstering the validity and reliability of study findings, reducing bias, and providing a more comprehensive

understanding of complex phenomena. It is a methodological approach that enhances the overall rigor and trustworthiness of qualitative research endeavors.

Types of Triangulation in Qualitative Research

Triangulation in qualitative research involves the use of multiple sources, methods, or perspectives to enhance the credibility and validity of study findings. Here are several types of triangulation, each defined with examples:

1, Data Triangulation:

Data triangulation involves the use of multiple and varied data sources or types to validate or corroborate research findings. By collecting information from different angles, researchers aim to enhance the comprehensiveness and reliability of their interpretations.

Example: In a study on youth perceptions of climate change, data triangulation might include conducting interviews with young individuals, analyzing social media posts related to climate change discussions among this demographic, and reviewing school curricula to understand the educational aspects of their environmental awareness.

2. Methodological Triangulation:

Methodological triangulation refers to the use of different research methods, tools, or approaches to explore the same research question. This approach helps researchers capitalize on the strengths of various methods and obtain a more nuanced understanding of the phenomenon.

Example: In a study investigating the impact of a new teaching method on student engagement, methodological triangulation might involve administering surveys to students, conducting classroom observations, and analyzing test scores to gather a comprehensive view of the teaching method’s effectiveness.

3. Investigator Triangulation:

Investigator triangulation involves employing multiple researchers or evaluators to independently analyze and interpret the data. This collaborative approach helps mitigate individual biases and increases the reliability of study findings.

Example: In a qualitative study exploring the experiences of cancer survivors, investigator triangulation could involve two researchers independently coding and analyzing interview transcripts. Any discrepancies or different interpretations would be discussed and resolved through consensus.

4. Theoretical Triangulation:

Theoretical triangulation entails using multiple theoretical frameworks or perspectives to interpret the data. By drawing on diverse theories, researchers aim to enrich their understanding of the research phenomenon and provide a more holistic analysis.

Example: In a study on the social impact of urban development, theoretical triangulation might involve analyzing the data through both ecological systems theory and social capital theory. This dual theoretical approach enables researchers to explore how environmental changes affect social relationships and community dynamics.

5. Time Triangulation:

Time triangulation involves studying the same phenomenon at different points in time to understand temporal changes, patterns, or developments. This type of triangulation is particularly useful for exploring the evolution of a subject over a specific duration.

Example: In a longitudinal study on the impact of a public health intervention, time triangulation might involve collecting data through surveys and interviews at the beginning, middle, and end of the intervention period. This approach allows researchers to assess changes in participants' behaviors and perceptions over time.

6. Space or Location Triangulation:

Space or location triangulation involves conducting research in different physical settings or locations. This type of triangulation helps researchers account for contextual variations and assess the generalizability of findings across different environments.

Example: In a cultural anthropology study on family dynamics, space triangulation might involve comparing data collected from urban and rural households. Exploring variations in family structures and practices across different locations can provide a more comprehensive understanding of cultural influences.

Best Practices for Triangulation in Qualitative Research

Implementing triangulation in qualitative research requires careful planning and execution to ensure the reliability and validity of the study findings. Here are some best practices to consider when applying triangulation:

Define Research Questions and Objectives:

Clearly articulate the research questions and objectives that you aim to address through your qualitative study. This initial step provides a foundation for determining the types of triangulation that will be most beneficial in answering your research questions.

Select Triangulation Components:

Identify the specific components of triangulation that align with your research design. This could include data triangulation (using multiple data sources), methodological triangulation (employing different research methods), investigator triangulation (involving multiple researchers), theoretical triangulation (drawing on multiple theoretical frameworks), and other relevant types such as time or location triangulation.

Develop a Research Design:

Create a comprehensive research design that outlines the overall structure of your study, including the sampling strategy, data collection methods, and data analysis procedures.

Ensure that the chosen triangulation components are integrated into the design, specifying how they will be applied to address the research questions.

Select and Implement Data Collection Methods:

Based on your research design, select appropriate data collection methods. This could involve qualitative interviews, observations, document analysis, surveys, or a combination of these. Apply the chosen methods to collect data from diverse sources or using diverse approaches, ensuring that each method contributes unique insights to the research.

Maintain Consistency Across Data Sources:

While using multiple data sources, maintain consistency in terms of the research focus and objectives. Ensure that each data source aligns with the overall research questions and contributes complementary information. This consistency enhances the coherence of the triangulated findings.

Conduct Data Analysis:

Analyze the data collected through the various methods. This involves coding, categorizing, and interpreting the information. Use an approach that allows for integration and comparison of findings from different sources. Identify patterns, themes, or discrepancies that emerge across the triangulated data.

Compare and Contrast Findings:

Compare and contrast the findings from different data sources or methods. Look for convergence or divergence in the results. Assess whether the various perspectives or sources provide a coherent and comprehensive understanding of the research phenomenon. Consider how the triangulation process contributes to the validation of your results.

Ensure Transparency and Reflexivity:

Throughout the research process, maintain transparency in your decision-making and data analysis. Clearly document the rationale behind your choices, including the selection of triangulation components, methods, and sources. Practice reflexivity by acknowledging and addressing potential biases or preconceptions that may influence the research.

Interpret and Synthesize Findings:

Synthesize the triangulated findings to provide a comprehensive interpretation of the research phenomenon. Discuss how the integration of multiple perspectives enhances the depth and validity of your conclusions. Consider the implications of the triangulated results for theory, practice, or further research.

Write the Research Report:

Present your findings in a comprehensive research report. Clearly articulate how triangulation was applied and its impact on the study. Discuss the strengths and limitations of your approach, and reflect on the overall contribution of triangulation to the quality and rigor of your qualitative research.

LET US SUM UP

The unit on “Collection of Data” provides a comprehensive overview of the various stages and techniques involved in gathering information for research. It begins by distinguishing between primary and secondary data, where primary data is collected firsthand by the researcher, and secondary data is derived from existing sources such as reports, publications, and records. The unit also discusses the importance of conducting a pilot study and pre-test to refine research instruments and ensure the reliability and validity of data collection tools. Various methods of data collection are explored, including interviews, focused group discussions (FGDs), observations, sociometry, case studies, and content analysis—each suited to different research

contexts and objectives. The section on tools of data collection highlights the importance of constructing effective questionnaires and schedules to elicit accurate responses. Furthermore, the unit introduces measurement and scaling techniques, emphasizing the meaning and significance of scales in quantifying qualitative attributes. It outlines the need for scales in research, discusses common problems encountered in scaling, and presents various methods for scale construction. Altogether, this unit equips researchers with foundational knowledge and practical skills necessary for systematic and scientific data collection in social research.

GLOSSARY

Research Process: A series of steps undertaken to conduct systematic investigation, including identifying a problem, reviewing literature, designing the study, collecting and analyzing data, and reporting findings.

Research Design: A blueprint or framework for conducting research that specifies the methods and procedures for collecting and analyzing data.

Exploratory Research: Preliminary research to clarify the nature of a problem; often unstructured and qualitative.

Descriptive Research: Research used to describe characteristics of a population or phenomenon.

Explanatory Research: Aims to explain the cause-and-effect relationship between variables.

Experimental Research: A scientific approach involving manipulation of variables to observe effects under controlled conditions.

Evaluative Research: Used to assess the effectiveness of programs, practices, or policies.

Sampling: The process of selecting a subset of the population for participation in the study.

Probability Sampling: Sampling techniques where every member of the population has a known and equal chance of being selected.

Non-Probability Sampling: Sampling methods where some members have no chance or an unknown chance of being selected.

Qualitative Research: Explores social phenomena using non-numerical data like interviews, observations, and text.

Ethnography: A qualitative method involving the immersive study of people and cultures.

CHECK YOUR PROGRESS

_____ sampling gives each member of the population an equal chance of being selected, making it a probability sampling method.

The research design that aims to explore new insights and generate ideas rather than test hypotheses is known as _____ research.

In qualitative research, the role of the researcher is often passive and detached.T/F

Triangulation in mixed method research involves using multiple methods or data sources to enhance the validity of the results.T/F

ANSWERS TO CHECK YOUR PROGRESS

Random

Exploratory

False

True

MODEL QUESTIONS

Define sampling and explain any two types.

What is a research design? Why is it important?

Write a short note on descriptive research.

What is the role of a field researcher in qualitative research?

SUGGESTED READINGS

Kothari, C. R. – "Research Methodology: Methods and Techniques"

Creswell, John W. – Research Design: Qualitative, Quantitative, and Mixed Methods Approaches. SAGE Publications.

Denzin, Norman K. & Lincoln, Yvonna S. – Handbook of Qualitative Research.

Silverman, David – Doing Qualitative Research. SAGE Publications.

Patton, Michael Q. – Qualitative Research & Evaluation Methods.

Bryman, Alan – Social Research Methods. Oxford University Press.

UNIT – IV - Collection of Data

Sources of Secondary Data: Primary and Secondary Data, Pilot study and pre-test. Methods of Data Collection: Interview, Focused Group Discussion, Observation, Sociometry, Case Study, Content Analysis. Tools of data collection. Construction of Questionnaire and Schedule, Measurement and Scaling Techniques. Meaning, Need for Scales, Problems of Scaling, Methods of Scale Construction

OVERVIEW

An essential phase in social science research is data collection, which involves gathering relevant information to analyze and interpret social phenomena. The data used in research can be broadly classified into primary and secondary data. Primary data refers to information collected firsthand by the researcher through methods such as interviews, surveys, and experiments specifically for the study at hand. In contrast, secondary data is obtained from existing sources such as government reports, books, articles, websites, and previous research studies, offering a cost-effective and time-saving alternative but with limitations in relevance and specificity.

Before the main research, a pilot study and pre-test are often conducted to refine research tools and methodology. A pilot study is a small-scale version of the main study, helping to test the feasibility, identify logistical issues, and improve research design. A pre-test involves testing the data collection instruments such as questionnaires or interview schedules on a small sample to identify and rectify ambiguities or inconsistencies.

Various methods of data collection are employed depending on the research objectives. The interview method involves direct, face-to-face or telephonic interaction between the

researcher and respondent, enabling detailed and in-depth information. Focus Group Discussion (FGD) brings together a small group of participants to discuss a specific topic under a moderator's guidance, useful for exploring community perceptions and group norms. Observation, whether participant or non-participant, allows the researcher to gather data by systematically watching people in their natural settings. Sociometry is used to measure social relationships and dynamics within a group, identifying patterns of interaction and popularity. Case Study involves an in-depth investigation of a single case or a few selected units, offering rich, contextual data. Content Analysis is a systematic technique for analyzing textual, visual, or audio content to identify patterns, themes, or biases.

Tools of data collection include questionnaires, schedules, interview guides, and observation checklists. Questionnaires and schedules are structured sets of questions designed to elicit responses from respondents. While a questionnaire is generally self-administered, a schedule is filled by the researcher during face-to-face interviews. Constructing a good questionnaire or schedule requires clarity, relevance, logical sequencing, and neutrality to avoid bias.

Measurement and scaling techniques are used to quantify abstract concepts like attitudes, opinions, and behaviors. Scaling is vital for ensuring that variables can be measured consistently and comparably. The need for scales arises from the requirement to reduce subjectivity in measurement and to enable statistical analysis. However, scaling presents problems such as defining the unit of measurement, ensuring reliability and validity, and dealing with respondent biases. Methods of scale construction include the Likert scale, Thurstone scale, Guttman scale, and semantic differential scale. Each has its own approach to capturing and quantifying subjective data, making them indispensable in empirical social research. Through careful construction and use of data collection methods and tools, researchers can ensure the credibility and robustness of their study findings.

LEARNING OBJECTIVES

After studying this unit, you will be able to:

- Understand the distinction between primary and secondary data and identify appropriate sources of secondary data for research.
- Comprehend the purpose and procedure of conducting a pilot study and pre-test in the research process.
- Explore various methods of data collection such as interview, focused group discussion, observation, sociometry, case study, and content analysis, and understand their relevance in different research contexts.
- Identify and apply appropriate tools for data collection in social research.
- Gain knowledge on the construction and design of questionnaires and schedules for effective data gathering.
- Understand the meaning, purpose, and types of measurement and scaling techniques used in social science research.
- Recognize the importance of scaling in research, common challenges encountered in the process, and different methods for constructing reliable and valid scales.

Introduction

Various methods of collecting data are employed by social scientists, researcher, investigators, philosopher, and thinkers. Here we will discuss the varied dimensions relevant to:

*Data generation ,

*Responses and setting for data collection.

The task of data collection begins after a research problem has been defined and research design /plan chalked out. Researcher would have to decide which sort of data

he/she would be using for his study & what method of data collection to be most suitable.

Meaning of data

A statistical investigation deals with large mass of inter-related facts in the form of numerical figures. These information in the form of numerical figures is generally termed as data. Whereas sometimes data can be in the form of general description or elaboration too. or

Data are special type of information, generally obtained through observation, surveys, enquiries, or are generated as a result of human activity for the purpose of research.

The Primary data are original data which are collected for the first time for a specific purpose. Such data are published by authorities who themselves are responsible for their collection.

Use and advantage of primary data

Original and independent collection increased the authenticity of data.

Directly Collection enhance the reliability of data.

Used in both quantitative and qualitative research methods.

Hidden information can be collected through primary data.

After analyzed primary data can be used as secondary data.

Disadvantage of primary data

Reliability depend on respondents information accuracy.

Information can be bias.

Expensive and time consuming in nature.

Lack of experience among researcher.

Requires field work.

Secondary Data: Those data which have been collected by someone else and which have already been passed through the statistical process or analyzed by someone else are known as Secondary data. It is the data which may be published or unpublished, but has been collected and is used for some other purpose earlier.

(Or)

The Secondary data on the other hand, are those which have already been collected by some other agency and which have already been processed. Secondary data may be available in the form of published or unpublished sources.

Advantage

- These data can be quickly manageable.
- Time and cost balance remains maintained.
- Information available is already analyzed by experts.
- Used to update data or reinterpret existing ones.
- Helpful for philosopher, thinker or authors for developing new concept.
- Field work is less.

Disadvantage

No standard measurement of validity.

Need expertise.

Accuracy and reliability is always lesser than primary data.

Pilot Study

In social science research, the term pilot study is used in two different ways. It can refer to so-called feasibility studies which are "small scale version[s], or trial run[s], done in preparation for the major study" (Polit et. al. 2001: 467). A pilot study can also be the pre-testing or 'trying out' of a particular research instrument (Baker 1994: 182-3). Thus, a pilot study is a small-scale implementation of a larger study or a part of a larger study. Pilot studies last for shorter period of time and usually involve a smaller number of participants, sites or organisations. Pilot studies can be used in any methodological setting, especially when attempting to collect data in a new format or location or to simply examine potential roadblocks before full implementation. A pilot study may also be viewed as a feasibility study. A feasibility study is completed to determine if the full study can be accomplished. Feasibility studies are practical when there is concern that a full-scale study may not be possible due to concerns about cost, procedures, personnel and other issues. Pilot studies are not simply exploratory in nature. They are designed with a clear purpose of developing some conclusions and pushing an area of research (Schreiber 2008). It resembles the main study in many respects, including an assessment of the primary outcome. In some cases, this will be the first phase of the substantive study and data from pilot phase may contribute to the final analysis. This can be referred to as an internal pilot. Or at the end of the pilot study, the data may be analysed and set aside, a so called external pilot (http://www.nets.nihr.ac.uk/glossary). Pilot studies range from relatively informal trying out procedures on a handful of participants, to efficacy studies, or to small scale clinical trial interventions (Hertzog 2008).

Why is it Essential?

Conducting a pilot study is important in social research. It serves many purposes:

It often provides the researcher with ideas, approaches, clues the researcher may not have foreseen before conducting the study. Such ideas and clues increase the chances of getting clearer findings in the main study.

It permits a thorough check of the planned statistical and analytical procedures, giving the researcher a chance to evaluate their usefulness to the data. The researcher may then be able to make needed alterations in the data collecting methods and therefore analyse data in the main study more efficiently.

It can greatly reduce the number of unanticipated problems because the researcher has all opportunity to redesign parts of his/her study to overcome difficulties that the pilot study reveals.

It may save lot of time and money. The pilot study almost always provides enough data for the researcher to decide whether to go ahead with the main study.

In the pilot study, the researcher may try out a number of alternative measures and then select those that produce the clearest result for the main study.

Pilot study is especially beneficial for students. The less research experience the student has, the more s/he likely to benefit from a pilot study. Because of that possibility the student should attempt a pilot study whenever possible.

A pilot study also helps in answering methodological questions.

Benefits of pilot study

Feasibility: A pilot study can help determine if the study's design and methods are feasible.

Research question: A pilot study can help refine the research question.

Data collection: A pilot study can help refine data collection procedures and instruments.

Budget: A pilot study can help determine the cost of the larger study.

Sample size: A pilot study can help determine the sample size for the larger study.

Risk identification: A pilot study can help identify potential risks or issues.

Pre-test

The objective of this section is to understand the importance of pre-testing. Pre-test is an important part in social research. Despite their widely recognized importance in survey research, pre-tests have received little methodological attention (Hunt et.al.1982). Whether a study is to employ questionnaires, interviews, observation or available data, a pre-test is vital. As has been mentioned earlier, pre-tests are preliminary tests of the measures used on a small sample of the population to be studied. No matter how carefully one designs a measure for questionnaire, interviews, or observations it is still advisable to give it an actual try. A pre-test of a questionnaire may demonstrate that some of the questions are unintelligible to respondents. In a questionnaire with open–ended questions, the researcher might find that the respondents are giving inadequate answers, suggesting a need to reword the question. An interviewer undertaking a pre-test might find that the respondents do not feel that that the interview is legitimate and may refuse to be questioned, signaling the need to reword the introductory remarks. Very often pre-testing of questionnaire is done in a hurried, non systematic fashion. Lehmann (1979) has pointed out that the pre-testing stage in the research process is one “most likely to be squeezed out due to cost and time pressures”. Similarly reports on pre-testing are almost absent in the literature on social sciences.

Fundamental Issues in Pre-testing

Let us examine some of the fundamental issues pertaining to pre-testing process. According to Hunt et. al. (1982), there are five fundamental issues with respect to pre-testing. These are:

What specific item should be pre-tested?

What method should be used to conduct pre-test?

Who should do the pre-testing?

Who should be the subjects in the pre-test?

How large a sample is needed for the pre-test? Let us examine each issue in detail.

a) Items that should be pre-tested:

This can be separated into three categories:

Items about the questionnaire itself

Items about specific questions

Items about data analysis.

The items about questionnaire which has to be pre-tested include: length, layout, the format for the questions used, and the number of lines to leave for replies and the sequencing of questions. The pre-test can also be used as a device to estimate response rate for the questionnaire.

Second, we need to pre-test individual questions. The interviewer who is doing the pre-test should carefully observe the respondent as s/he is filling out the questionnaire/Interview schedule. If a respondent hesitates at a particular question, the question may be ambiguous or confusing, or may contain terminology unfamiliar to the respondent. The interviewer should probe the respondent after each question and /or at the end of the questionnaire to ascertain how the respondent interpreted each question and whether the respondent had problems with any questions.

Third, the pre-testing process can and should be used to pre-test data analysis procedures and the complete research design. Coding and tabulating the procedures should be pre-tested with dummy tables prepared to facilitate this process. The results of the open-ended questions on the preliminary questionnaire may be used to suggest new research hypothesis that could be tested. In short, the pre-testing of the questionnaire should be considered a “dry run” of the entire research project.

Methods of Data collection:

What is data?

Data can be any piece of information. Data can take the form of numbers, text, graphics (charts, tables, pictures, maps, etc.), verbal exchanges (e.g., conversations), etc. In essence, data can be any piece of information that can be conveyed to and understood by someone else. Data Collection is a systematic, logical method to collect raw information that accurately and reliably represents the variable(s) or field(s) under study.

Interview

The term interview can be dissected into two terms as, 'inter' and 'view'. The essence of interview is that one mind tries to read the other. Interview is meant to record people's opinions, experiences, beliefs and ideas through face to face interaction between researcher and respondents.

In an interview all formalities are laid down and the gate is opened for delivering into the intellectuals, emotional and subconscious mind of the respondents.

Definition

P.V. Young

The interview may be regarded as a systematic method by which a person enters more or less imaginatively into the inner life of a comparative stranger.

Goode & Hatt: Interviewing is fundamentally a process of social interaction.

Types of Interview

Interview has been classified in different ways. One way of classification of interviews is based on their functions, such as diagnostic interviews often used for clinical purposes. The other way of classification of interviews is the number of persons participating in the interview process, for example, individual interview or group interviews. Yet another

basis of classifying interviews is the format used for interview, for example, structured and non-structured.

Any one of the bases can be relied on to classify the various types of interviews just mentioned above. Most probably, the easiest and most convenient way to classify them is the degree to which they are structured.

The Structured Interviews

As the name suggests, structured interviews maintain some control over the respondents. Nevertheless, considerable flexibility is permitted in deciding the extent to which interviews should be structured. First and foremost area, through which an interview is structured, is the questions and its responses.

The questions in an interview are regulated to get appropriate responses. In so far as responses are concerned they are regulated and controlled by giving multiple choices to the interviewee. To achieve this, first the questions have to be in order and focused to get reliable and appropriate responses; if is beneficTa1 to ask questions in same order from one interview to another interview.

Semi-structured interviews: Semi-structured interviews also contain a core set of questions, but allow the interviewer to ask supplementary questions, or change the order in which questions are asked.

Unstructured Interviews

In unstructured interviews. Questions are not ordered in a particular way. The order of questions is not fixed. In other words the order of questions followed in one interview may not be followed in the next interview. Even the questions asked are not worded in the same way. In sum, the interview is free of I regulation and control.

Group Interview

In an interview we call for questioning each individual separately. Where as in group interviews, we interview more than one individual at a time. In a group interview as many as eight to ten people may discuss the subject matter of an investigation under the direction of an interviewer. However, such interviews are more satisfactory as a source of hypotheses or as a way of gathering information about the group, they do not ordinarily yield systematic information from every individual in the group on each point covered in a personal interview.

Telephone Interviews

Telephone interviews are conducted in cases where individuals are likely to have telephones, but who are scattered in a large geographical area. Telephone interviews typically combine the advantages and disadvantages of both mailed questionnaire and personal interviews. Low cost and rapid completion with relatively high response rates are the major advantages of telephone interview.

It is possible to conduct large scale surveys through telephone interviews within a few hours of the occurrence of a traumatic event in order to illicit immediate reactions. The major reservation about telephone interviewing has been that those people who have telephones are not representative of the general population.

Observation

Observation is the basic method of obtaining information about social phenomena under investigation. All of us are constantly engaged in observation. However, all such observations are not scientific observations. Observations become a method of data collection when it is planned in accordance with the purpose of research and recorded systematically keeping in mind the validity and reliability of observed data.

There are numerous situations where this method of observation is considered as most appropriate. Say for example, a researcher who is interested in understanding the

behaviour of children who cannot speak, necessarily, has to depend on thi's method of observation. Many aspects of our behavior are so much a part of life that it becomes difficult to translate it into words.

Many a time, a researcher faces resistance from respondents being studied. Sometimes, people do not cooperate with the researcher and show their unwillingness to respond to the questions of the researcher. Although observations cannot always overcome such resistance, it is relatively the most appropriate method of data collection in such situations.

The method of observations serves variety of research objectives. Exploratory objectives are worth mentioning here. A researcher can explore some aspects of his main research question or can gain insight into the research problem and develop the basis for his hypothesis. It may also be used to collect supplementary information that would help interpret findings obtained by other methods.

Type of Observations

There are several types of observations varying from completely unstructured to structured, pre-coded, formal procedures to suit the needs of researchers and the overall objectives of the research problems. One way of differentiating among various types of observations is to draw distinction on the basis of degree of structuredness. Accordingly, we get two observational procedures:

(1) unstructured and (2) structured. The other way of classifications is in terms of the role played by the researcher. On this basis observation procedures may be classified as (I) participant observation and (2) non-participant observation.

Structured Observations

Structured observations take into consideration a clear and specific definition of the units to be observed and data to be recorded. This is possible only when the problem is well formulated. However, in exploratory studies the researcher does not know in

advance which dimension of the problem will be relevant. Structured observations are mostly used in studies designed to describe a problem or to test causal hypothesis. The use of structured observation procedures presupposes that the researcher knows what aspects of the problem.

Unstructured Observations

In a practical situation it is often not possible to plan out the 'observation' process in advance. Particularly in case of exploratory studies, the researcher does not have enough clues to structure his observations, which may call for changes in what he observes. Such changes are characteristics of unstructured observation. Since the unstructured observations are flexible it allows for changes in the focus from time to time if and when reasonable clues warrant such changes.

Participant Observations

Participant observation involves sharing the life of the group under study by the researcher. In other words, participant observation is an attempt to put both the observer and the observed on the same side by making the observer a member of the group so that he can experience what they experience and work within their frame of reference. In particular, the researcher becomes a member of the community being observed by him.

Non-participant Observations

On the contrary, non-participant observation is characterised by a lack of participation by the observer in the life of the group that a researcher is observing. In other words, in non-participant observations the observer has detached role and records without any attempt on his part to participate in the interaction process with the group being observed.

Focus Group Discussion

A focus group discussion involves gathering people from similar backgrounds or experiences together to discuss a specific topic of interest. It is a form of qualitative research where questions are asked about their perceptions attitudes, beliefs, opinion or ideas. In focus group discussion participants are free to talk with other group members; unlike other research methods it encourages discussions with other participants. It generally involves group interviewing in which a small group of usually 8 to 12 people. It is led by a moderator (interviewer) in a loosely structured discussion of various topics of interest.

The group's composition and the group discussion should be carefully planned to create a non-intimidating environment, so that participants feel free to talk openly and give honest opinions. Since participants are actively encouraged to not only express their own opinions, but also respond to other members and questions posed by the leader, focus groups offer a depth, nuance, and variety to the discussion that would not be available through surveys.

Additionally, as FGDs are structured and directed, but also expressive, they can yield a lot of information in a relatively short time.

Therefore, FGDs are a good way to gather in-depth information about a community's thoughts and opinions on a topic. The course of the discussion is usually planned in advance and most moderators rely on an outline, or guide, to ensure that all topics of interest are covered.

Key Features of FGDs

• Involves organized discussion with a selected group of individuals to gain information about their views and experiences of a topic

• Particularly suited for obtaining several perspectives about the same topic

• Helps in gaining insights into people's shared understanding of everyday life and the ways in which individuals are influenced by others in a group situation

• The role of the moderator is very significant, as good levels of group leadership and interpersonal skill are required to moderate a group successfully.

The advantages of using focus group discussion are as follows:

• Free and open discussion among the respondents results in generation of new ideas that can be very useful for decision-making.

• A focus group is not static. The moderator can bring any changes in order to better facilitate the discussion during the group discussion. This dynamism allows better results in terms of information derived by a focus group.

• Expressions other than those in verbal form such as gestures and stimulated activities can provide researcher with useful insights.

The disadvantages of using focus group discussion are as follows:

• Though moderator can control the discussion, the extent to which he/she can control the discussion depends on his/her experience. Inexperienced moderator may face problems in controlling some participants who try to dominate the group.

• Respondents may be reluctant to share some sensitive ideas and concerns publicly.

• Due to small sample size and heterogeneity of individuals, the findings may not be adequate to make projections or the composite picture of the situation.

• An FGD can be a very artificial set-up that influences the respondents to express and act unnaturally. The findings may be far from the actual.

Case study

A case study refers to specific unit of analysis for the study. The unit may be a person, family, a social group, a social institution or committees. A case study involves intensive study of a relative small number of situations. It views a social unit as a whole. It places more emphasis on the full analysis of limited number of events or conditions another behavior. It is a longitudinal approach so in development over a period of time the case study processes deeply and analyses interactions between the factors that explain present status or that influences change or growth. The purpose is to understand life cycle or an important part of life cycle of the unit.

Case study is the method of exploring and analyzing the life of social unit, be that unit a person, a family, institution, culture, group or even entire community.

Characteristics of Case Study

Case studies are in depth investigations of a given social unit resulting in a complete well organized picture of that unit.

It is a study of a unit as a whole. The unit may be a person, a family, a social group, an institution, a committee or situation.

It is quantitative analysis not based on scientific analysis.

It follows on typicalness rather than uniqueness.

It examines a small number of units across a large number of variables and conditions.

A generalization drawn from a single case cannot be applied to case in given population.

It is a longitudinal approach. It shows a development over a period of time.

It deals with both what and why of the subject. It describes the complex behavior pattern of a unit.

It identifies three factors:

Features which are common to all cases in a general group.

Features which are not common to all cases but are common to certain subgroups.

Features which are unique to specific cases.

Steps/phases in case study

State the objectives. What is the unit or study and what characteristics and process will direct the investigation?

Design the approach. How will the unit be selected?

- What sources of data are available? What data collection method is used?
- Collect the data.
- Organize the information to form a coherent, well- integrated reconstruction of unit of study.
- Report the result and discuss their significance.
- Strength/merits of case study
- Inferences are obtained from study of an entire situation.
- A case study is description of a real event or situation where as a statistical study involves abstraction form real situation. Example: an average may be typical of a large group, but not descriptive of a single unit in the group.
- More accurate data are obtained.
- Case study is particularly useful as background information for planning major investigations in the social sciences.
- It is source of important hypothesis.
- The researcher gains many new insights into human behavior and becomes emotionally mature.

Limitations of case study

Since case study gives detailed description of complete situations, it is difficult to develop formal method of observation and recording. Informal method tends to become subjective rather than objective.

Lack of objectivity carries out into the analysis case data. This may lead to unwanted conclusions.

In analyzing cases, investigators are inclined to generalize although the case study method does not lend itself to generalization. Case studies are limited in their representatives because of their narrow focus on a few units.

It is highly expensive and time taking.

It lacks sample method.

Interview schedule

An interview schedule is a structured guide with predetermined questions designed to gather specific information on a topic or issue. During the interview, the interviewer refers to this schedule to ensure all relevant questions are addressed.

In essence, an interview schedule is a tool used by designated enumerators to conduct interviews. It comprises questions aimed at testing hypotheses or collecting targeted information, posed to the interviewee in a face-to-face setting by the interviewer.

An interview is a direct exchange between an interviewer and interviewee, intended to delve into the interviewee's behavior, obstacles, and future goals. Its main aim is to help the interviewee gain self-awareness and a clearer understanding of their environment, empowering them to overcome challenges and refine their plans. Crafting an interview schedule, which involves planning and structuring the questions asked during the interview, requires both creativity and careful preparation.

Developing an effective interview schedule requires extensive prior research and practice due to various factors. One significant challenge arises from the inherent ambiguity and diverse interpretations of language, which can obscure the intended focus on the issues and hypotheses being examined. Additionally, there might be a lack of acknowledgment regarding the interview schedule's role as a precise measurement tool, as well as insufficient background knowledge and experience in its creation.

2. Structured Interview Schedule: This specific interview format often draws comparisons to the structure found in survey forms.

Formation of Interview Schedule

Crafting an interview schedule doesn't adhere to a one-size-fits-all approach. It's commonly customized to suit the unique nature and purpose of the interview, as well as the targeted audience or participants.

Measurement and scaling techniques

A) Measurement: Measurement is the process of observing and recording the observations that are collected as part of research. The recording of the observations may be in terms of numbers or other symbols to characteristics of objects according to certain prescribed rules. The respondent's, characteristics are feelings, attitudes, opinions etc. The most important aspect of measurement is the specification of rules for assigning numbers to characteristics. The rules for assigning numbers should be standardized and applied uniformly. This must not change over time or objects.

B) Scaling: Scaling is the assignment of objects to numbers or semantics according to a rule. In scaling, the objects are text statements, usually statements of attitude, opinion, or feeling. Issues in attitude measurement When a researcher is interested in measuring the attitudes, feelings or opinions of respondents he/she should be clear about the following:

a) What is to be measured?

b) Who is to be measured?

c) The choices available in data collection techniques

Level of Measurement Levels of Measurements

There are four different scales of measurement. The data can be defined as being one of the four scales. The four types of scales are:

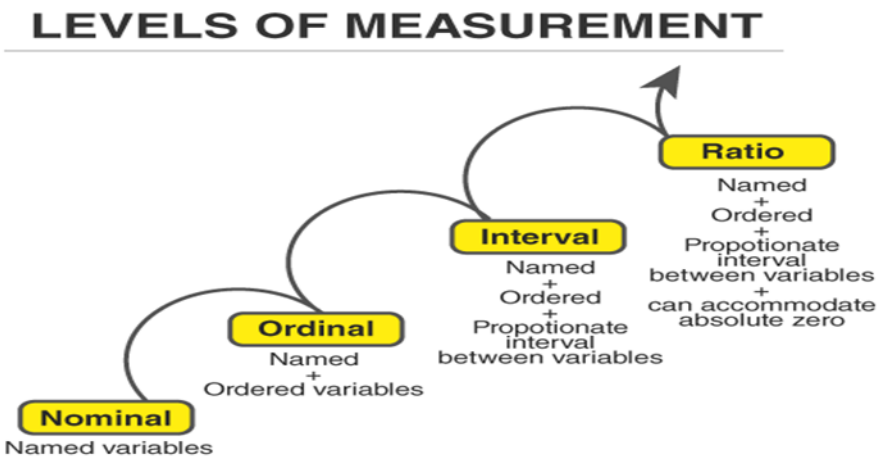
Nominal Scale

Ordinal Scale

Interval Scale

Ratio Scale

Scales of Measurement



Nominal Scale

A nominal scale is the 1st level of measurement scale in which the numbers serve as “tags” or “labels” to classify or identify the objects. A nominal scale usually deals with the non-numeric variables or the numbers that do not have any value.

Characteristics of Nominal Scale

A nominal scale variable is classified into two or more categories. In this measurement mechanism, the answer should fall into either of the classes.

It is qualitative. The numbers are used here to identify the objects.

The numbers don't define the object characteristics. The only permissible aspect of numbers in the nominal scale is "counting."

Example:

An example of a nominal scale measurement is given below:

What is your gender?

M- Male

F- Female

Here, the variables are used as tags, and the answer to this question should be either M or F.

Ordinal Scale

The ordinal scale is the 2nd level of measurement that reports the ordering and ranking of data without establishing the degree of variation between them. Ordinal represents the "order." Ordinal data is known as qualitative data or categorical data. It can be grouped, named and also ranked.

Characteristics of the Ordinal Scale

The ordinal scale shows the relative ranking of the variables

It identifies and describes the magnitude of a variable

Along with the information provided by the nominal scale, ordinal scales give the rankings of those variables

The interval properties are not known

The surveyors can quickly analyse the degree of agreement concerning the identified order of variables

Example:

Ranking of school students – 1st, 2nd, 3rd, etc.

Ratings in restaurants

Evaluating the frequency of occurrences

Very often

Often

Not often

Not at all

Assessing the degree of agreement

Totally agree

Agree

Neutral

Disagree

Totally disagree

Interval Scale

The interval scale is the 3rd level of measurement scale. It is defined as a quantitative measurement scale in which the difference between the two variables is meaningful. In other words, the variables are measured in an exact manner, not as in a relative way in which the presence of zero is arbitrary.

Characteristics of Interval Scale:

The interval scale is quantitative as it can quantify the difference between the values

It allows calculating the mean and median of the variables

To understand the difference between the variables, you can subtract the values between the variables

The interval scale is the preferred scale in Statistics as it helps to assign any numerical values to arbitrary assessment such as feelings, calendar types, etc.

Example:

Likert Scale

Net Promoter Score (NPS)

Bipolar Matrix Table

Ratio Scale

The ratio scale is the 4th level of measurement scale, which is quantitative. It is a type of variable measurement scale. It allows researchers to compare the differences or intervals. The ratio scale has a unique feature. It possesses the character of the origin or zero points.

Characteristics of Ratio Scale:

Ratio scale has a feature of absolute zero

It doesn't have negative numbers, because of its zero-point feature

It affords unique opportunities for statistical analysis. The variables can be orderly added, subtracted, multiplied, divided. Mean, median, and mode can be calculated using the ratio scale.

Ratio scale has unique and useful properties. One such feature is that it allows unit conversions like kilogram – calories, gram – calories, etc.

Example:

An example of a ratio scale is:

What is your weight in Kgs?

Less than 55 kgs

55 – 75 kgs

76 – 85 kgs

86 – 95 kgs

More than 95 kgs

Meaning of Scaling

The process of arriving at a set of statements to measure attitude, opinion or perception is known as scaling. Scaling may be defined as the 'arrangement of objects to numbers according to a rule'. Here the objects refer to textual statements concerning attitudes or opinion.

Scaling

Scaling is the branch of measurement that involves the construction of an instrument that associates qualitative constructs with quantitative metric units. Scaling evolved out of efforts in psychology and education to measure “unmeasurable” constructs like authoritarianism and self-esteem. In many ways, scaling remains one of the most arcane and misunderstood aspects of social research measurement. And, it attempts to do one of the most difficult of research tasks – measure abstract concepts.

Most people don’t even understand what scaling is. The basic idea of scaling is described in General Issues in Scaling, including the important distinction between a scale and a response format. Scales are generally divided into two broad categories: unidimensional and multidimensional. The unidimensional scaling methods were developed in the first half of the twentieth century and are generally named after their inventor. We’ll look at three types of unidimensional scaling methods here:

Thurstone or Equal-Appearing Interval Scaling

Likert or “Summative” Scaling

Guttmann or “Cumulative” Scaling

In the late 1950s and early 1960s, measurement theorists developed more advanced techniques for creating multidimensional scales. Although these techniques are not considered here, you may want to look at the method of concept mapping that relies on that approach to see the power of these multivariate methods.

Thurston scale

A Thurston has numbers of agree or disagree statements. It is unidimensional scale to measure attitudes towards people. Developing the scale is time consuming and relatively complex compared to other scales (like Likert scale).

Although there are technically three scales, when people refer to the “Thurston scale” they are usually talking about the method of equal appearing intervals’. It’s called equal appearing intervals’ because when you choose the items for your test (see steps 6 below) you are picking item equally.

The method to successive interval: this method is more challenging to implement than equal-appearing intervals’.

The method of paired compression: require twice judgments than the equal-appearing intervals’ method can quickly become very consuming.

The three methods differ in their construction, but still result in the same Agree/Disagree quiz given to respondents.

Method of equal appearing intervals’

Step 1: develop a large number of agree/disagree statements for a topic. For Example, if you wanted to find out people’s attitudes towards immigrants, your statements might include:

Immigrants drain social services.

Immigrants take jobs away from regular people.

Immigrants perform low wage, unpopular task.

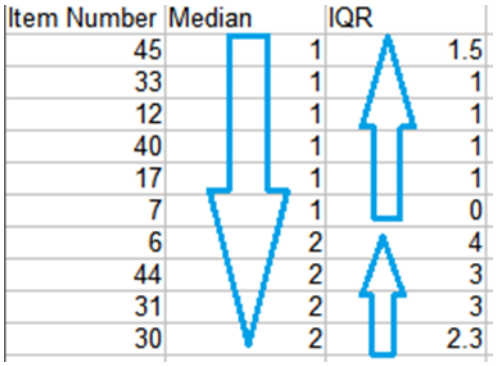
Step 2: have appeal of judges rate the items on a scale of 1 to 11 for how favorable each item is towards the topic (in this case, immigration). The lowest score (1) should indicate an extremely unfavorable attitude and the highest score(11) should indicate an extremely favorable attitude. Note that you do not want the judges to agree or disagree with the statements- you want them to rate statements on how effective they would be at uncovering attitude.

Step 3: find median score and interquartile range (IQR) for each items, you should have 50 median scores and 50 IQRs.

Step 4: sort the table in ascending order (smallest to largest) by median. In other words, the 1st should be at the top of the table and the 11s should be at the bottom.

Step 5: for each set of median (i.e. 1s,2s,3s) sort the IQRs by descending order(Largest to smallest).

The figure below shows a partial table with the data sorted according to ascending medians with their respective descending IQRs.



Item Number	Median	IQR
45	1	1.5
33	1	1
12	1	1
40	1	1
17	1	1
7	1	0
6	2	4
44	2	3
31	2	3
30	2	2.3

Step 6:select your finl scale items using the table you created in step 4 and 5. For example, you might choose one item from each median value.

You want to statement with the most agreement between judges. For each median value, this is the item which the lowest want interquartile range. This is a “Rule of thumb”: you don’t have to choose this item. If you decide it’s poorly worded or ambiguous, choose the item above it (with nest lowest IQR).

Likert scale:

Various kinds of ratting scales have been developed to measure attitudes directly (i.e. the person knows their attitude is being studied). The most widely used is the Likert Scale.

Likert (1932) developed the principle of measuring attitudes by asking people to respond to a series of statements about a topic, in terms of extent to which they agree with them, and so tapping into cognitive and affective components of attitudes.

Likert- type or frequency scales use fixed choice response format and are designed to measure attitudes or opinions. These ordinal scales measure level of agreement/ disagreement.

Likert –type scale assumes that the strength/ intensity of experience is linear, i.e. on continuum from strongly agree to strongly disagree, and makes the assumption that attitudes can be measured. Respondents may be offered a choice of five to seven or even nine pre-coded responses with the neutral point being neither agree nor disagree.

GLOSSARY

Data: Facts and statistics collected together for reference or analysis. Primary Data: Original data collected firsthand by the researcher for a specific purpose.

Secondary Data: Data that has already been collected and published by others, such as census reports, books, and articles.

Pilot Study: A small-scale preliminary study conducted before the main research to refine the methodology.

Pre-test: A trial run of the research instrument (such as a questionnaire) to identify issues before final administration.

interview: A data collection method where information is gathered through direct questioning.

Focused Group Discussion (FGD): A qualitative method involving a guided discussion among a small group to gain diverse perspectives. Observation: A systematic method of collecting data by watching behavior or events as they occur.

Sociometry: A quantitative method for measuring social relationships. Case Study: An in-depth, contextual analysis of a single case or a few cases. Content Analysis: A technique for systematically analyzing textual, visual, or audio **content.**

Questionnaire: A research instrument with a series of questions used to gather information from

CHECK YOUR PROGRESS

_____ data is collected directly by the researcher through tools like interviews, observations, and surveys.

A _____ study is a small-scale version of the main research conducted to test the feasibility and design of the full study.

Secondary data is always more accurate than primary data.T/F

Content analysis is a technique used to interpret and analyze the content of textual, visual, or audio materials.T/F

ANSWERS TO CHECK YOUR PROGRESS

Primary

Pilot

False

True

MODEL QUESTIONS

Define and differentiate between primary and secondary data.

What is a pilot study? Explain its importance in research.

Discuss the different methods of data collection used in sociological research.

Write short notes on: (a) Sociometry, (b) Case Study, (c) Content Analysis.

How are questionnaires constructed? What are the key features of a good questionnaire?

What is scaling? Explain the various methods of scale construction used in social science research.

Highlight the problems associated with measurement and scaling in empirical research.

SUGGESTED READINGS

Kothari, C. R. – "Research Methodology: Methods and Techniques"

Babbie, Earl – "The Practice of Social Research"

Neuman, W. Lawrence – "Social Research Methods: Qualitative and Quantitative Approaches"

Bailey, Kenneth D. – "Methods of Social Research"

Oppenheim, A. N. – "Questionnaire Design, Interviewing and Attitude Measurement"

Black, Thomas R. – "Doing Quantitative Research in the Social Sciences"

Unit – V - Processing of data and report writing

Editing, Coding, Classification, Tabulation and interpretation of data, Diagrammatic and Graphic Representation, Interpretation, Footnotes, Bibliography and Report Writing.

OVERVIEW

The chapter "Processing of Data and Report Writing" provides a comprehensive overview of the essential steps involved in organizing and presenting research findings systematically. It begins with editing, which involves reviewing collected data for accuracy, consistency, and completeness, followed by coding—assigning numerical or symbolic codes to responses to facilitate analysis. Classification is the logical grouping of data into meaningful categories, and tabulation refers to arranging data into tables for easy comparison and analysis. The chapter also emphasizes the importance of diagrammatic and graphic representation, using charts, graphs, and diagrams to visualize data effectively. Interpretation is the analytical phase where the researcher draws inferences and meaningful conclusions from the processed data. Furthermore, the chapter highlights the importance of properly citing sources through footnotes and compiling a comprehensive bibliography. Finally, it culminates with the structure and principles of report writing, which involves presenting the entire research process and findings clearly, logically, and coherently to the intended audience.

LEARNING OBJECTIVES

After studying this unit, you will be able to:

- To understand the key techniques of data processing including editing, coding, classification, and tabulation for accurate and meaningful research output.
- To gain proficiency in interpreting quantitative and qualitative data through systematic analysis and representation.
- To develop the ability to present research findings effectively using diagrammatic and graphic tools for visual clarity.
- To acquire skills in scholarly documentation through the proper use of footnotes, citations, and bibliography according to academic standards.
- To learn the structure, format, and components of comprehensive research report writing for effective academic and professional communication.

INTORDUCTION

After collecting data, the method of converting raw data into meaningful statement; includes data processing, data analysis, and data interpretation and presentation. Data reduction or processing mainly involves various manipulations necessary for preparing the data for analysis. The process (of manipulation) could be manual or electronic. It involves editing, categorizing the open-ended questions, coding, computerization and preparation of tables and diagrams. Data processing is concerned with editing, coding, classifying, tabulating and charting and diagramming research data.

The essence of data processing in research is data reduction.

Data reduction involves winnowing out the irrelevant from the relevant data and establishing order from chaos and giving shape to a mass of data. Data processing in research consists of five important steps

1. Editing of data
2. Coding of data
3. Classification of data
4. Tabulation of data
5. Data diagrams

Data Collection, Processing and Analysis

Acquiring data: Acquisition involves collecting or adding to the data holdings.

There are several methods of acquiring data:

1. collecting new data
2. using your own previously collected data
3. reusing someone others data
4. purchasing data
5. acquired from Internet (texts, social media, photos)

Data processing: A series of actions or steps performed on data to verify, organize, transform, integrate, and extract data in an appropriate output form for subsequent use. Methods of processing must be rigorously documented to ensure the utility and integrity of the data.

Data Analysis involves actions and methods performed on data that help describe facts, detect patterns, develop explanations and test hypotheses. This includes data quality assurance, statistical data analysis, modeling, and interpretation of results.

Results: The results of above mentioned actions are published as a research paper. In case the research data is made accessible, one has to prepare the data set for opening up.

METHODS OF DATA PROCESSING IN RESEARCH

Data processing is that procedure in which research frame collected data through editing, coding, classifying, tabulating, charting, and diagramming. The purpose of data processing in research is data reduction or minimization. This processing transforms irrelevant data to relevant. Basically it works with 5 steps that is given below.

Validation - Covers five areas:

1. Fraud

2. Screening
3. Procedure
4. Completeness
5. Courtesy

EDITING OF DATA - Editing is the first step of data processing. Editing is the process of examine the data collected through questionnaire or any other method. It starts after all data collection to check it or reform into useful data.

1. Raw data is checked for mistakes made by either the interviewer or the respondent
2. By reviewing completed interviews from primary research, the researcher can check several areas of concern:
3. Asking the proper questions
4. Accurate recording of answers
5. Correct screening of respondents
6. Complete and accurate recording of open-ended questions

Mildred B. Parten in his book points out that the editor is responsible for seeing that the data are;

1. Accurate as possible,
2. Consistent with other facts secured,
3. Uniformly entered,
4. As complete as possible,
5. Acceptable for tabulation and arranged to facilitate coding tabulation.

There are different types of editing. They are:

1. Editing for quality asks the following questions: are the data forms complete, are the data free of bias, are the recordings free of errors, are the inconsistencies in responses within limits, are there evidences to show dishonesty of enumerators or interviewers and are there any wanton manipulation of data.
2. Editing for tabulation does certain accepted modification to data or even rejecting certain pieces of data in order to facilitate tabulation. or instance, extremely high or low value data item may be ignored or bracketed with suitable class interval.

Field Editing is done by the enumerator. The schedule filled up by the enumerator or the respondent might have some abbreviated writings, illegible writings and the like. These are rectified by the enumerator. This should be done soon after the enumeration or interview before the loss of memory. The field editing should not extend to giving some guess data to fill up omissions.

4. Central Editing is done by the researcher after getting all schedules or questionnaires or forms from the enumerators or respondents. Obvious errors can be corrected. For missed data or information, the editor may substitute data or information by reviewing information provided by likely placed other respondents. A definite inappropriate answer is removed and “no answer” is entered when reasonable attempts to get the appropriate answer fail to produce results.

Editors must keep in view the following points while performing their work:

1. They should be familiar with instructions given to the interviewers and coders as well as with the editing instructions supplied to them for the purpose,
2. While crossing out an original entry for one reason or another, they should just draw a single line on it so that the same may remain legible,
3. They must make entries (if any) on the form in some distinctive color and that too in a standardized form,
4. They should initial all answers which they change or supply,
5. Editor’s initials and the data of editing should be placed on each completed form or schedule.

CODING OF DATA - Coding is the process of categories data according to research subject or topic and the design of research. In coding process researcher set a code for a particular things like male - M, Female- F that indicate the gender in questionnaire without writing full spelling same as researcher can be use colors to highlight something or numbers like 1+, 1-. this type of coding makes easy to calculate or evaluate result in tabulation.

1. Grouping and assigning values to various responses from the survey instrument
2. Codes are numerical
3. Can be tedious if certain issues are not addressed prior to collecting the data

Four-step process to develop codes for responses:

1. Generate a list of as many potential responses as possible
2. Consolidate responses
3. Assign a numerical value as a code
4. Assign a coded value to each response

CLASSIFICATION OF DATA - Classification or categorization is the process of grouping the statistical data under various understandable homogeneous groups for the purpose of convenient interpretation. A uniformity of attributes is the basic criterion for classification; and the grouping of data is made according to similarity. Classification becomes necessary when there is a diversity in the data collected for meaningless for meaningful presentation and analysis. However, it is meaningless in respect of homogeneous data. A good classification should have the characteristics of clarity, homogeneity, equality of scale, purposefulness and accuracy.

Objectives of Classification are below:

1. The complex scattered and haphazard data is organized into concise, logical and intelligible form.
2. It is possible to make the characteristics of similarities and dis – similarities clear.
3. Comparative studies are possible.
4. Understanding of the significance is made easier and thereby good deal of human energy is saved.
5. Underlying unity amongst different items is made clear and expressed.
6. Data is so arranged that analysis and generalization becomes possible.

TABULATION OF DATA - Tabulation is the process of summarizing raw data and displaying it in compact form for further analysis. Therefore, preparing tables is a very important step. Researcher can be tabulation by hand or in digital mode. The choice is made largely on the basis of the size and type of study, alternative costs, time pressures, and the availability of computers, and computer programmes. If the number of questionnaire is small, and their length short, hand tabulation is quite satisfactory. The counting the number of observations (cases) that are classified into certain categories

1. One-way tabulation: Categorization of single variables existing in a study

2. Cross-tabulation: Simultaneously treating two or more variables in the study

3. Categorizing the number of respondents who have answered two or more questions consecutively

Table may be divided into: (i) Frequency tables, (ii) Response tables, (iii) Contingency tables, (iv) Uni-variate tables, (v) Bi-variate tables, (vi) Statistical table and (vii) Time series tables.

Generally a research table has the following parts:

(a) table number,

(b) title of the table,

(c) caption

(d) stub (row heading),

(e) body,

(f) head note,

(g) foot note.

As a general rule the following steps are necessary in the preparation of table:

Title of table: The table should be first given a brief, simple and clear title which may express the basis of classification.

Columns and rows: Each table should be prepared in just adequate number of columns and rows.

Captions and stubs: The columns and rows should be given simple and clear captions and stubs.

Ruling: Columns and rows should be divided by means of thin or thick rulings.

Arrangement of items; Comparable figures should be arranged side by side.

Deviations: These should be arranged in the column near the original data so that their presence may easily be noted.

Size of columns: This should be according to the requirement.

Arrangements of items: This should be according to the problem.

Special emphasis: This can be done by writing important data in bold or special letters.

Unit of measurement: The unit should be noted below the lines.

Approximation: This should also be noted below the title.

Foot – notes: These may be given below the table.

Total: Totals of each column and grand total should be in one line.

Source : Source of data must be given. For primary data, write primary data.

DATA DIAGRAMS - Diagrams are charts and graphs used to present data. These facilitate getting the attention of the reader more. These help presenting data more effectively. Creative presentation of data is possible. The data diagrams classified into:

1. Charts: A chart is a diagrammatic form of data presentation. Bar charts, rectangles, squares and circles can be used to present data. Bar charts are uni-dimensional, while rectangular, squares and circles are two-dimensional.

2. Graphs: The method of presenting numerical data in visual form is called graph, A graph gives relationship between two variables by means of either a curve or a straight line. Graphs may be divided into two categories. (1) Graphs of Time Series and (2) Graphs of Frequency Distribution. In graphs of time series one of the factors is time and other or others is / are the study factors. Graphs on frequency show the distribution of by income, age, etc. of executives and so on.

Problems in Processing of data:

The problem concerning “Don’t know” (or DK) responses: While processing the data, the researcher often comes across some responses that are difficult to handle. One category of such responses may be ‘Don’t Know Response’ or simply DK response. When the DK response group is small, it is of little significance. But when it is relatively big, it becomes a matter of major concern in which case the question arises: Is the question which elicited DK response useless? The answer depends on two points viz., the respondent actually may not know the answer or the researcher may fail in obtaining the appropriate information. In the first case the concerned question is said to be alright and DK response is taken as legitimate DK response. But in the second case, DK response is more likely to be a failure of the questioning process.

How DK responses are to be dealt with by researchers? The best way is to design better type of questions. Good rapport of interviewers with respondents will result in minimizing DK responses. But what about the DK responses that have already taken

place? One way to tackle this issue is to estimate the allocation of DK answers from other data in the questionnaire. The other way is to keep DK responses as a separate category in tabulation where we can consider it as a separate reply category if DK responses happen to be legitimate, otherwise we should let the reader make his own decision. Yet another way is to assume that DK responses occur more or less randomly and as such we may distribute them among the other answers in the ratio in which the latter have occurred. Similar results will be achieved if all DK replies are excluded from tabulation and that too without inflating the actual number of other responses.

INTERPRETATION OF DATA

Data interpretation refers to the implementation of processes through which data is reviewed for the purpose of arriving at an informed conclusion. The interpretation of data assigns a meaning to the information analyzed and determines its signification and implications.

Meaning of Interpretation

Interpretation refers to the task of drawing inferences from the collected facts after an analytical and /or experimental study. In fact, it is a search for broader meaning of research findings.

The task of interpretation has two major aspects viz.,

1. The effort to establish continuity in research through linking the results of a given study with those of another, and

2. The establishment of some explanatory concepts. “In one sense, interpretation is concerned with relationships within the collected data, partially overlapping analysis.

3. Interpretation also extends beyond the data of the study to include the results of other research, theory and hypotheses.

Thus, interpretation is the device through which the factors that seem to explain what has been observed by researcher in the course of the study can be better understood and it also provides a theoretical conception which can serve as a guide for further researches.

The importance of data interpretation is evident and this is why it needs to be done properly. Data is very likely to arrive from multiple sources and has a tendency to enter

the analysis process with haphazard ordering. Data analysis tends to be extremely subjective. That is to say, the nature and goal of interpretation will vary from business to business, likely correlating to the type of data being analyzed. While there are several different types of processes that are implemented based on individual data nature, the two broadest and most common categories are “quantitative analysis” and “qualitative analysis”.

Yet, before any serious data interpretation inquiry can begin, it should be understood that visual presentations of data findings are irrelevant unless a sound decision is made regarding scales of measurement. Before any serious data analysis can begin, the scale of measurement must be decided for the data as this will have a long-term impact on data interpretation ROI. The varying scales include:

Nominal Scale: non-numeric categories that cannot be ranked or compared quantitatively.

Variables are exclusive and exhaustive.

Ordinal Scale: exclusive categories that are exclusive and exhaustive but with a logical order. Quality ratings and agreement ratings are examples of ordinal scales (i.e., good, very good, fair, etc., OR agree, strongly agree, disagree, etc.).

Interval: a measurement scale where data is grouped into categories with orderly and equal distances between the categories. There is always an arbitrary zero point.

Ratio: contains features of all three. For a more in-depth review of scales of measurement, read our article on data analysis questions.

Once scales of measurement have been selected, it is time to select which of the two broad interpretation processes will best suit your data needs. Let’s take a closer look at those specific data interpretation methods and possible data interpretation problems.

How to Interpret Data?

Illustration of data interpretation on blackboard when interpreting data, an analyst must try to discern the differences between correlation, causation and coincidences, as well as many other biases – but he also has to consider all the factors involved that may have led to a result. There are various data interpretation methods one can use.

The interpretation of data is designed to help people make sense of numerical data that has been collected, analyzed and presented. Having a baseline method (or methods) for interpreting data will provide your analyst teams a structure and consistent foundation. Indeed, if several departments have different approaches to interpret the same data, while sharing the same goals, some mismatched objectives can result. Disparate methods will lead to duplicated efforts, inconsistent solutions, wasted energy and inevitably – time and money. In this part, we will look at the two main methods of interpretation of data: with a qualitative and a quantitative analysis.

Qualitative Data Interpretation

Qualitative data analysis can be summed up in one word – categorical. With qualitative analysis, data is not described through numerical values or patterns, but through the use of descriptive context (i.e., text). Typically, narrative data is gathered by employing a wide variety of person-to-person techniques. These techniques include:

Observations: detailing behavioral patterns that occur within an observation group. These patterns could be the amount of time spent in an activity, the type of activity and the method of communication employed.

Documents: much like how patterns of behavior can be observed, different types of documentation resources can be coded and divided based on the type of material they contain.

Interviews: one of the best collection methods for narrative data. Enquiry responses can be grouped by theme, topic or category. The interview approach allows for highly-focused data segmentation.

A key difference between qualitative and quantitative analysis is clearly noticeable in the interpretation stage. Qualitative data, as it is widely open to interpretation, must be “coded” so as to facilitate the grouping and labeling of data into identifiable themes. As person-to-person data collection techniques can often result in disputes pertaining to proper analysis, qualitative data analysis is often summarized through three basic principles: notice things, collect things, think about things.

Quantitative Data Interpretation

If quantitative data interpretation could be summed up in one word (and it really can't) that word would be "numerical." There are few certainties when it comes to data analysis, but you can be sure that if the research you are engaging in has no numbers involved, it is not quantitative research.

Quantitative analysis refers to a set of processes by which numerical data is analyzed. More often than not, it involves the use of statistical modeling such as standard deviation, mean and median. Let's quickly review the most common statistical terms:

Mean: a mean represents a numerical average for a set of responses. When dealing with a data set (or multiple data sets), a mean will represent a central value of a specific set of numbers. It is the sum of the values divided by the number of values within the data set. Other terms that can be used to describe the concept are arithmetic mean, average and mathematical expectation.

Standard deviation: this is another statistical term commonly appearing in quantitative analysis. Standard deviation reveals the distribution of the responses around the mean. It describes the degree of consistency within the responses; together with the mean, it provides insight into data sets.

Frequency distribution: this is a measurement gauging the rate of a response appearance within a data set. When using a survey, for example, frequency distribution has the capability of determining the number of times a specific ordinal scale response appears (i.e., agree, strongly agree, disagree, etc.). Frequency distribution is extremely keen in determining the degree of consensus among data points.

Typically, quantitative data is measured by visually presenting correlation tests between two or more variables of significance. Different processes can be used together or separately, and comparisons can be made to ultimately arrive at a conclusion. Other signature interpretation processes of quantitative data include:

Regression analysis

Cohort analysis

Predictive and prescriptive analysis

Now that we have seen how to interpret data, let's move on and ask ourselves some questions: what are some data interpretation benefits? Why do all industries engage in

data research and analysis? These are basic questions, but that often don't receive adequate attention.

Why Data Interpretation Is Important

Illustrating quantitative data interpretation with charts & graphs

The purpose of collection and interpretation is to acquire useful and usable information and to make the most informed decisions possible. From businesses, to newlyweds researching their first home, data collection and interpretation provides limitless benefits for a wide range of institutions and individuals.

Data analysis and interpretation, regardless of method and qualitative/quantitative status, may include the following characteristics:

1. Data identification and explanation
2. Comparing and contrasting of data
3. Identification of data outliers
4. Future predictions

Data analysis and interpretation, in the end, helps improve processes and identify problems. It is difficult to grow and make dependable improvements without, at the very least, minimal data collection and interpretation. What is the key word? Dependable. Vague ideas regarding performance enhancement exist within all institutions and industries. Yet, without proper research and analysis, anidea is likely to remain in a stagnant state forever (i.e., minimal growth). So… what are a few of the business benefits of digital age data analysis and interpretation? Let's take a look!

1) Informed decision-making: A decision is only as good as the knowledge that formed it.

Informed data decision making has the potential to set industry leaders apart from the rest of the market pack. Studies have shown that companies in the top third of their industries are, on average, 5% more productive and 6% more profitable when implementing informed data decision-making processes. Most decisive actions will arise only after a problem has been identified or a goal defined.

Data analysis should include identification, thesis development and data collection followed by data communication.

If institutions only follow that simple order, one that we should all be familiar with from grade school science fairs, then they will be able to solve issues as they emerge in real time. Informed decision making has a tendency to be cyclical. This means there is really no end, and eventually, new questions and conditions arise within the process that need to be studied further. The monitoring of data results will inevitably return the process to the start with new data and sights.

2) Anticipating needs with trends identification: data insights provide knowledge, and knowledge is power. The insights obtained from market and consumer data analyses have the ability to set trends for peers within similar market segments. A perfect example of how data analysis can impact trend prediction can be evidenced in the music identification application, Shazam. The application allows users to upload an audio clip of a song they like, but can't seem to identify. Users make 15 million song identifications a day. With this data, Shazam has been instrumental in predicting future popular artists.

When industry trends are identified, they can then serve a greater industry purpose. For example, the insights from Shazam's monitoring benefits not only Shazam in understanding how to meet consumer needs, but it grants music executives and record label companies an insight into the popculture scene of the day. Data gathering and interpretation processes can allow for industry-wide climate prediction and result in greater revenue streams across the market. For this reason, all institutions should follow the basic data cycle of collection, interpretation, decision making and monitoring.

3) Cost efficiency: Proper implementation of data analysis processes can provide businesses with profound cost advantages within their industries. A recent data study performed by Deloitte vividly demonstrates this in finding that data analysis ROI is driven by efficient cost reductions. Often, this benefit is overlooked because making money is typically viewed as "sexier" than saving money. Yet, sound data analyses have the ability to alert management to cost-reduction opportunities without any significant exertion of effort on the part of human capital.

4) Clear foresight: companies that collect and analyze their data gain better knowledge about themselves, their processes and performance. They can identify performance

challenges when they arise and take action to overcome them. Data interpretation through visual representations lets them process their findings faster and make better-informed decisions on the future of the company.

Types of Data Interpretation

Bar Graphs – by using bar graphs we can interpret the relationship between the variables in the form of rectangular bars. These rectangular bars could be drawn either horizontally or vertically. The different categories of data are represented by bars and the length of each bar represents its value. Some types of bar graphs include grouped graphs, segmented graphs, stacked graphs etc.

Pie Chart – the circular graph used to represent the percentage of a variable is called a pie chart. The pie charts represent numbers as proportions or percentages. Some types of pie charts are simple pie charts, doughnut pie charts, and 3D pie charts.

Tables – statistical data are represented by tables. The data are placed in rows and columns. Types of tables include simple tables and complex tables.

Line Graph – the charts or graphs that show information in a series of points are included in the line graphs. Line charts are very good to visualise continuous data or sequence of values. Some of the types of line graphs are simple line graphs, stacked line graphs etc.

Data Interpretation Problems

The oft-repeated mantra of those who fear data advancements in the digital age is “big data equals big trouble.” While that statement is not accurate, it is safe to say that certain data interpretation problems or “pitfalls” exist and can occur when analyzing data, especially at the speed of thought.

Let’s identify three of the most common data misinterpretation risks and shed some light on how they can be avoided:

1) Correlation mistaken for causation: our first misinterpretation of data refers to the tendency of data analysts to mix the cause of a phenomenon with correlation. It is the assumption that because two actions occurred together, one caused the other. This is not accurate as actions can occur together absent a cause and effect relationship.

Digital age example: assuming that increased revenue is the result of increased social media followers… there might a definitive correlation between the two, especially with today's multichannel purchasing experiences. But, that does not mean an increase in followers is the direct cause of increased revenue. There could be either a common cause or an indirect causality.

Remedy: attempt to eliminate the variable you believe to be causing the phenomenon.

2) Confirmation bias: our second data interpretation problem occurs when you have a theory or hypothesis in mind, but are intent on only discovering data patterns that provide support, while rejecting those that do not.

Digital age example: your boss asks you to analyze the success of a recent multi-platform social media marketing campaign. While analyzing the potential data variables from the campaign (one that you ran and believe performed well), you see that the share rate for Facebook posts were great, while the share rate for Twitter Tweets were not. Using only the Facebook posts to prove your hypothesis that the campaign was successful would be a perfect manifestation of confirmation bias.

Remedy: as this pitfall is often based on subjective desires, one remedy would be to analyze data with a team of objective individuals. If this is not possible, another solution is to resist the urge to make a conclusion before data exploration has been completed. Remember to always try to disprove a hypothesis, not prove it.

3) Irrelevant data: the third and final data misinterpretation pitfall is especially important in the digital age. As large data is no longer centrally stored, and as it continues to be analyzed at the speed of thought, it is inevitable that analysts will focus on data that is irrelevant to the problem they are trying to correct.

Digital age example: in attempting to gauge the success of an email lead generation campaign, you notice that the number of homepage views directly resulting from the campaign increased, but the number of monthly newsletter subscribers did not. Based on the number of homepage views, you decide the campaign was a success when really it generated zero leads.

Remedy: proactively and clearly frame any data analysis variables and KPIs prior to engaging in a data review. If the metric you are using to measure the success of a lead

generation campaign is newsletter subscribers, there is no need to review the number of homepage visits. Be sure to focus on the data variable that answers your question or solves your problem and not on irrelevant data.

Interpretation of Data: The Use of Dashboards Bridging the Gap As we have seen, quantitative and qualitative methods are distinct types of data analyses. Both offer a varying degree of return on investment (ROI) regarding data investigation, testing and decision-making. Because of their differences, it is important to understand how dashboards can be implemented to bridge the quantitative and qualitative information gap. How are digital data dashboard solutions playing a key role in merging the data disconnect? Here are a few of the ways:

1) Connecting and blending data. With today's pace of innovation, it is no longer feasible (nor desirable) to have bulk data centrally located. As businesses continue to globalize and borders continue to dissolve, it will become increasingly important for businesses to possess the capability to run diverse data analyses absent the limitations of location. Data dashboards decentralize data without compromising on the necessary speed of thought while blending both quantitative and qualitative data.

Whether you want to measure customer trends or organizational performance, you now have the capability to do both without the need for a singular selection.

2) Mobile Data. Related to the notion of "connected and blended data" is that of mobile data. In today's digital world, employees are spending less time at their desks and simultaneously increasing production. This is made possible by the fact that mobile solutions for analytical tools are no longer standalone. Today, mobile analysis applications seamlessly integrate with everyday business tools. In turn, both quantitative and qualitative data are now available on demand where they're needed, when they're needed and how they're needed.

3) Visualization. Data dashboards are merging the data gap between qualitative and quantitative methods of interpretation of data, through the science of visualization. Dashboard solutions come "out of the box" well-equipped to create easy-to-understand data demonstrations. Modern online data visualization tools provide a variety of color and filter patterns, encourage user interaction and are engineered to help enhance

future trend predictability. All of these visual characteristics make for an easy transition among data methods – you only need to find the right types of data visualization to tell your data story the best way possible.

To give you an idea of how a market research dashboard fulfils the need of bridging quantitative and qualitative analysis, and helps in understanding how to interpret data in research thanks to visualization, have a look at the following one. It brings together both qualitative and quantitative data knowledgeably analyzed and visualizes it in a meaningful way that everyone can understand, thus empowering any viewer to interpret it:

To see more data analysis and interpretation examples, visit our library of business dashboards. Now that we have an understanding of how business intelligence dashboards can help bridge the gap between traditional quantitative and qualitative data methods, let's have a little summary of the data interpretation methods mentioned all along this article.

Data Interpretation Methods Summary List & Tips

Data analysis and interpretation are critical to develop sound conclusions and make better informed decisions. As we have seen all along this article, there is an art and science to the interpretation of data. Hereafter is a list-summary of how to interpret data and some tips:

1. Collect your data and make it as clean as possible.
2. Choose the type of analysis to perform: qualitative or quantitative, and apply the methods respectively to each.
3. Qualitative analysis: observe, document and interview notice, collect and think about things.
4. Quantitative analysis: you lead a research with a lot of numerical data to be analyzed through various statistical methods – mean, standard deviation or frequency distribution for instance.
5. Take a step back: and think about your data from various perspectives, and what it means for various participants or actors of the project.

6. Reflect on your own thinking and reasoning: and be aware of the many pitfalls data analysis and interpretation carries. Correlation versus causation, subjective bias, false information and inaccurate data, etc.

FOOT NOTES

Footnotes are notes placed at the bottom of the page in a piece of academic writing and indicated in the text with superscript numbers (or sometimes letters or other symbols). They are used to provide additional information or citations that would disrupt the flow of the main text if included within it.

Example: Citation

In the main text:

The theory of relativity was first proposed by Albert Einstein in 1905.[1]

At the bottom of the page:

1. Albert Einstein, "On the Electrodynamics of Moving Bodies," Annalen der Physik 17 (1905): 891-921.

Bibliography

A bibliography is a list of all the sources you have used in the process of researching your work. It is typically placed at the end of an academic paper or research.

APA (American Psychological Association) Style

In-text citation: (Author, Year)

Reference list entry: Author, A. A. (Year). Title of article. Title of Journal, Volume (Issue), page numbers.

Example:

In-text: (Smith, 2023)

Reference list: Smith, J. (2023). The impact of climate change on global health. Journal of Environmental Science, 15(2), 123-145.

MLA (Modern Language Association) Style

In-text citation: (Author's Last Name Page Number)

Works Cited entry: Author's Last Name, First Name. Title of Work. Publisher, Year.

Example:

In-text: (Smith 25)

Works Cited: Smith, John. Climate Change and Human Health. Oxford University Press, 2023.

Chicago (Chicago Manual of Style) Style

In-text citation: Footnote or endnote with author, title, and page number

Bibliography entry: Author's Last Name, First Name. Title of Work. Place of Publication: Publisher, Year.

Example:

Footnote/endnote:

John Smith, Climate Change and Human Health (Oxford: Oxford University Press, 2023), 25.

Bibliography: Smith, John. Climate Change and Human Health. Oxford: Oxford University Press, 2023.

Book:

MLA: Smith, John. The History of Cats. New York: Penguin, 2023.

APA: Smith, J. (2023). The history of cats. New York: Penguin.

Journal Article:

MLA: Johnson, Sarah. "The Impact of Cats on Human Happiness." Feline Journal 15, no. 2 (2022): 35-42.

APA: Johnson, S. (2022). The impact of cats on human happiness. Feline Journal, 15(2), 35-42.

Website:

MLA: "Cat Facts." American Cat Association. Accessed April 2, 2024. [invalid URL removed]

APA: American Cat Association. (2024). Cat facts. Retrieved April 2, 2024, from [invalid URL removed]

Report writing

Title page. ...

Abstract (or Executive Summary in business reports) ...

Table of contents. ...

Introduction. ...

Methodology. ...

Discussion. ...

Conclusion/recommendations. ...

Appendices.

Title page

The title page needs to be informative and descriptive, concisely stating the topic of the report.

Abstract (or Executive Summary of reports)

The abstract is a brief summary of the context, methods, findings and conclusions of the report. It is intended to give the reader an overview of the report before they continue reading, so it is a good idea to write this section last.

An executive summary should outline the key problem and objectives, and then cover the main findings and key recommendations.

Table of contents

Readers will use this table of contents to identify which sections are most relevant to them. You must make sure your contents page correctly represents the structure of your report.

Take a look at this sample contents page.

Introduction

In your introduction you should include information about the background to your research, and what its aims and objectives are. You can also refer to the literature in this section; reporting what is already known about your question/topic, and if there are any gaps. Some reports are also expected to include a section called ‘Terms of references’, where you identify who asked for the report, what is covers, and what its limitations are.

Methodology

If your report involved research activity, you should state what that was, for example you may have interviewed clients, organised some focus groups, or done a literature

review. The methodology section should provide an accurate description of the material and procedures used so that others could replicate the experiment you conducted.

Results/findings

The results/findings section should be an objective summary of your findings, which can use tables, graphs, or figures to describe the most important results and trends. You do not need to attempt to provide reasons for your results (this will happen in the discussion section).

Discussion

In the discussion you are expected to critically evaluate your findings. You may need to re-state what your report was aiming to prove and whether this has been achieved. You should also assess the accuracy and significance of your findings, and show how it fits in the context of previous research.

Conclusion/recommendations

Your conclusion should summarise the outcomes of your report and make suggestions for further research or action to be taken. You may also need to include a list of specific recommendations as a result of your study.

References

The references are a list of any sources you have used in your report. Your report should use the standard referencing style preferred by your school or department eg Harvard, Numeric, OSCOLA etc.

Appendices

You should use appendices to expand on points referred to in the main body of the report. If you only have one item it is an appendix, if you have more than one they are called appendices. You can use appendices to provide backup information, usually data or statistics, but it is important that the information contained is directly relevant to the content of the report.

Appendices can be given alphabetical or numerical headings, for example Appendix A, or Appendix 1. The order they appear at the back of your report is determined by the order that they are mentioned in the body of your report. You should refer to your

appendices within the text of your report, for example ‘see Appendix B for a breakdown of the questionnaire results’. Don’t forget to list the appendices in your contents page.

LET US SUM UP

"Processing of Data and Report Writing" focuses on the systematic organization and presentation of research findings. It begins with editing, which ensures accuracy and consistency in the collected data, followed by coding, where responses are transformed into symbols or numbers for analysis. Classification groups the data into meaningful categories, while tabulation arranges it into tables for easy interpretation. Diagrammatic and graphic representations like charts and graphs visually convey patterns and trends. Interpretation involves drawing conclusions and explaining the significance of the data in the context of the research. The chapter also covers the use of footnotes for referencing, compiling a bibliography of sources used, and the final stage of report writing, which involves presenting the research process and findings in a structured and coherent format.

GLOSSARY

Editing: The process of checking and correcting data for accuracy, consistency, and completeness after collection.

Coding: Assigning symbols (usually numbers or letters) to responses so that data can be tabulated and analyzed efficiently.

Classification: Organizing data into categories or classes based on shared characteristics for better interpretation.

Tabulation: Systematic arrangement of data in rows and columns for easy understanding and analysis.

Diagrammatic Representation: Presentation of statistical data through diagrams like bar charts, pie charts, and histograms.

Graphic Representation: Use of line graphs, scatter plots, and curves to depict data trends over time or between variables.

Interpretation of Data: Drawing meaningful conclusions and inferences from analyzed data.

Footnotes: Notes at the bottom of the page providing citations or explanations of particular terms used in the text.

Bibliography: A list of sources, such as books, articles, and documents, consulted or cited in a research work.

CHECK YOUR PROGRESS

1. Social control is essential for maintaining _____ in society.
2. Family is considered a formal agency of social control. (True/False)
3. Social change is always progressive. (True/False)
4. According to Marx, the primary driver of social change is _____.
5. The concept of social evolution implies movement from _____ to _____ forms of social organization.

ANSWERS TO CHECK YOUR PROGRESS

Social order/stability

False

False

Class conflict

Simple, complex

MODEL QUESTIONS

Discuss the different types of diagrammatic and graphical representations used in data analysis.

How are footnotes and bibliography useful in academic report writing?

Describe the components and structure of a well-organized research report.

What is the significance of coding in quantitative data analysis?

Explain the relationship between data processing and effective report writing.

SUGGESTED FOR READINGS

Kothari, C. R. – “Research Methodology: Methods and Techniques”

Krishnaswami, O. R., & Ranganathan, M. – “Methodology of Research in Social Sciences”

Babbie, Earl – “The Practice of Social Research”

Bajpai, S. R. – “Methods of Social Survey and Research”

Ghosh, B. N. – “Scientific Method and Social Research”

Young, P. V. – “Scientific Social Surveys and Research”

Wilkinson & Bhandarkar – “Methodology and Techniques of Social Research”

Blalock, H. M. – “Social Statistics”

Nachmias, D., & Nachmias, C. – “Research Methods in the Social Sciences”

Bryman, Alan – “Social Research Methods”