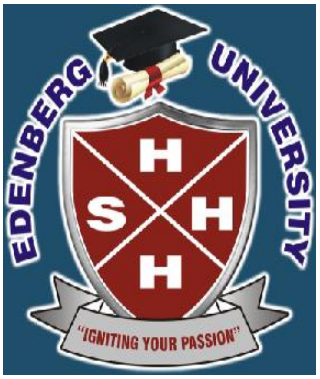

UNIVERSITY OF EDENBERG

APPLIED RESEARCH IN SOCIAL SCIENCE

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PREFACE

Research is an indispensable and influential apparatus in accompanying man towards progress in various facets of life. Without systematic research there would have been very little progress. Since creation, mankind has been engaged in research, we are all involved in research in our day to day lives; we owe our civilization and triumph in technology to research. In simple terms research can described as seeking answers and solutions to questions and problems.

Despite, the significance of research in various disciplines, most students at undergraduate and postgraduate levels confess that they find research to be complicated. Many books have been written on research and methodologies, but still there appears to be a discrepancy between theorem and the actual process of research experienced by research students. Students fail to understand the books written on Research because generally they are written in technical language, they are not familiar with its vocabulary, methodology and course contents. This book seeks to answer the call for a more simplified and practical approach to conducting research.

Every consideration has been made to write this book in a very non-technical language. It is believed that students who try to understand the research methodology through self-learning may also find it easy. The chapters are written with that approach. Even those students who intend to attain high level of knowledge of the research methodology in social sciences will find this book very helpful in understanding the basic concepts before they read any book on research.

There are many approaches to research and different writing styles and research layout, but in this book the author has avoided congesting the book with various writing styles. It has been confined to the writing style adopted by the University of Edenberg. At the time of writing, this book was intended to be used as reference book for students and researchers affiliated to University of Edenberg. Students and researchers in other institutions may find this book very helpful and relevant to academic discourse in social sciences.

CHAPTER ONE

RESEARCH

Introduction

Research is at the core of development in various spheres of life. It is a vehicle that has transported mankind from the Stone Age to current scientific age where technology has triumphed. Scientific research leads to progress in some field of life. New products, new facts, new concepts and new ways of doing things are being found due to ever-increasing significant research in the physical, the biological, the social and the psychological fields. Research today is no longer confined to the science laboratory (Best, 1986).

Word 'Research' is comprises of two words = Re and 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

'Research' is a term loosely used in everyday speech to describe a multitude of activities, such as collecting masses of information, delving into esoteric theories, and producing wonderful new products. It is important that a student or practitioner embarking on a programme of academic or practical research has a clear idea of what the word 'research' really means, and clears away any misconceptions which might exist owing to its common use in other fields. Research may be defined as a method of studying problems whose solutions are to be derived partly or wholly from facts.

According to Best (1986), research is considered to be the more formal, systematic and intensive process of carrying out 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.

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 formulated hypothesis (Woody, 2015).

Social research may be defined as a scientific undertaking which by means of logical and systematized techniques aims to discover new facts or verify and test old facts, analyze their sequences, inter-relationships and casual explanation which were derived within an appropriate theoretical frame of reference, develop new scientific tools, concepts and theories which would facilitate reliable and valid study of human behavior (Younge, 2007).

Research is a procedure by which we attempt to find systematically, and with the support of demonstrable fact, the answer to a question or the resolution of a problem (Leedy, 1989).

You could go on finding definitions of research, which would, as in the above examples, differ in emphasis and scope. What is certain is that there are many different opinions about and approaches to research.

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 are:

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 in Research

According to Cohen and Manion (1994, pp. 12–16) there are five major assumptions underlying research.

The first major assumption is the belief that there is some kind of ***order*** in the universe, and that it is possible for us to gain some understanding of this order. This is linked with the idea of determinism, the assumption that events have causes, and that the links between events and causes can be revealed. This regularity enables some predictions to be made about future events (e.g. if gravity causes apples to fall today, it will also cause them to fall tomorrow). Scientists do admit, however, that owing to imperfect knowledge, predictions of varying levels of probability often result.

The second assumption is that, in order to enable us to gain this understanding of the world, there must be an agreement between people that ***external reality*** exists, and that people recognize the same reality, a public or shared reality. It is hardly necessary to point out that much philosophic debate has been devoted to the nature of reality. Nevertheless, scientific enquiry relies on the acceptance of the reliability of knowledge gained by experience to provide empirical evidence (evidence which is verifiable by observation) to support or refute its theories.

The third assumption is the ***reliability*** of human perception and intellect. Despite the many ways in which our senses can be tricked, researchers depend on their senses to record and measure their work reliably. Reasoning is an important method of organizing data and ideas, and is regarded, if used correctly, as a dependable tool of research. Human memory also plays a major role in research. To avoid questioning at every single stage, some credence must be given to the power of memory to provide reliable knowledge.

The fourth assumption is the principle of ***parsimony***. Phenomena should be explained in as economic a manner as possible. Needless complexity is abhorred, and scientists aim to achieve the most elegant and simple theories.

The fifth assumption is that of ***generality***. This is the assumption that there can be valid relationships between the particular cases investigated by the researcher and the general situation in the world at large. It is accepted that these relationships can be relatively unproblematic in some sciences (e.g. chemistry and physics) but that in others, with a larger number of unknown factors (e.g. sociology); there is a weaker chance of generality.

Characteristics of Research

It is generated by a question: We are surrounded by unanswered questions, unresolved problems, with conjecture and unproven beliefs. A questioning mind is the precondition for research. Why, how, when do things happen? What do events mean? What caused them? All these are questions which can generate research activity. Such a question is often referred to as the research problem.

It necessitates clarification of a goal: Without a clear statement of the objectives and what is intended to be done, the research cannot be successful.

It entails a specific programme of work: Research needs to be carefully planned in order to achieve its objectives and reach conclusions.

It is aimed at increasing understanding by interpreting facts or ideas and reaching some conclusions about their meaning: The significance of facts or ideas depends on the way in which the intellect can extract meaning from them.

It requires reasoned argument to support conclusions: In order to communicate an ordered sequence of ideas, a clear logical argument is required.

It is reiterative in its activities: Advances in knowledge and interpretations of facts are based on previous knowledge, which, in turn, is expanded by the advances. Then resolution of research problems often gives rise to further problems which need resolving.

Types of Research:

There are varieties of ways through which we may classify it into different categories

1. **On the basis of nature of information:**

   On the basis of nature of information we can classify the research into two types;

   a. *Qualitative Research:* when information is in the form of qualitative data.
   b. *Quantitative Research:* when information is in the form of quantitative data.

2. **On the basis of nature of subject matter of research:**

   On the basis of these criteria we can categorize the research into two categories.

   a. Basic/ Fundamental /pure or Theoretical Research: Its utility is universal.
   b. Experimental or Applied Research: Its utility is limited.

3. **On the basis of approach of research:**

   We may classify research into two different categories.

   a. Longitudinal Research: Examples of this category are historical, Case study and Genetic research.
   b. Cross-Sectional Research: Examples of this category are Experimental and Survey Research.

4. **On the basis of method of research :**

   On the basis of research method we may classify a research into five different categories:

   i. **Philosophical Research:** It is purely qualitative in nature and we are focusing on the vision of others on the content of research.

ii. **Historical Research:** It is both qualitative as well as quantitative in nature and deals with past events.
iii. **Survey Research:** It deals with present events and is quantitative in nature. It may further be sub-divided into; discretional, correlational and exploratory type of research.
iv. **Experimental Research:** This is purely quantitative in nature and deals with future events.
v. **Case-Study Research:** It deals with unusual events. It may be qualitative as well as quantitative in nature depending upon the content.

CHAPTER TWO

RESEARCH PROCESS

The Research Problem

The problems lie everywhere around us. They even lie at our door step and in our backyards. Human nature is so complicated, that a problem solved for one individual may still exist for another individual, a problem solved for one class/ school/teacher/ situation/ system/time etc., still remains a problem for another class/ school/ teacher/ situation/system/time or a problem solved for the time being may reappear with a lapse of time. We become habitual of living in the age of problems i.e. we are so much surrounded by the problem that we suffers from ,"problem blindness". But in order to solve the problem or making research we need to delimit the problem.

Selection of problem is not the first step in research but identification of the problem is the first step in research. Selection of problem is governed by reflective thinking. It is wrong to think that identification of a problem means to select a topic of a research or statement of the problem.

A topic or statement of the problem and research problem are not the synonyms but they are inclusive. The problem concerns with the functioning of the broader area of field studied, whereas a topic or title or statement of the problem is the verbal statement of the problem. The topic is the definition of the problem which delimits or pin points the task of a researcher.

It is the usual practice of the researcher that they select the topic of the study from different sources especially from research abstracts. They do not identify the problem, but a problem is made on the basis of the topic. It results that they have no active involvement in their research activities, whatever, they do, do mechanically.

At the very outset, the researcher must decide the general area of interest or aspect of a subject matter that he would like to inquire into and then research problem should be formulated.

Definitions of the Problem:

The obstacles which hinder our path are regarded as problem. Different definitions of the problem are given below;

Problem is the obstacle in the path of satisfying our needs (John Geoffrey)

Problem is a question which is to be solved (Tornsand)

To define a problem means to put a fence around it, to separate it by careful distinctions from like questions found in related situations of need (Whitney)

A problem is a question proposed for a solution generally speaking a problem exists when there is a no available answer to same question (Townsend)

A problem is an interrogative sentence or statement that asks: What relation exists between two or more variables (Kerlinger)

To define a problem means to specify it in detail and with precision each question and subordinate question to be answered is to be specified, the limits of the investigation must be determined. Frequently, it is necessary to review previous studies in order to determine just what is to be done. Sometimes it is necessary to formulate the point of view or educational theory on which the investigation is to be based. If certain assumptions are made, they must be explicitly noted (Monero and Engelhart)

Problems for research are everywhere. Take a good look around you. You might be frustrated waiting for a lecturer that never shows up on time and you wish somebody can come out with a better system that prioritizes punctuality, imagine a system that allows you to have lecturers through video-conferencing and Skype. These are examples of problems which need to be relooked and researched. That is why we say that the heart of every research is the problem. Research problem is paramount to the success of a research effort.

The formulation of a research problem is the first and most important step of the research process. This is more like identifying a destination prior to beginning a journey. A research problem is like the foundation of a building. The type and architecture of the building depends on the foundations. If the foundation is well designed and strong, you can expect the building to be strong as well. You must have a clear idea with regard to what it is that you want to find out but not what you think you must find.

A research problem can begin with something simple to something very complex, depending on the nature of the research theme.

The Sources of the Problem:

- ☞ The classroom, school, home, community and other agencies of education are obvious sources.
- ☞ Social developments and technological changes are constantly bringing forth new problems and opportunities for research.
- ☞ Record of previous research such specialized sources as the encyclopedias of educational, research abstracts, research bulletins, research reports, journals of researches, dissertations and many similar publications are rich sources of research problems.
- ☞ Text book assignments, special assignments, reports and term papers will suggest additional areas of needed research.
- ☞ Discussions-Classroom discussions, seminars and exchange of ideas with faculty members and fellow scholars and students will suggest many stimulating

problems to be solved, close professional relationships, academic discussions and constructive academic climate are especially advantageous opportunities.

- ☞ Questioning attitude: A questioning attitude towards prevailing practices and research oriented academic experience will effectively promote problem awareness.
- ☞ The most practical source of problem is to consult supervisor, experts of the field and most experienced persons of the field. They may suggest most significant problems of the area. He can discuss certain issues of the area to emerge a problem.

Although research problems should not be assigned or they should not be proposed and allotted by a guide but consultation with the more experienced faculty member or research worker is a desirable practice.

Statement of Problem:

Kerlinger has identified following three criteria of good problem statements;

a. A problem should be concerned with relation between two or more variables.
b. It should be stated 'clearly and unambiguously in question form'.
c. It should be amenable to empirical testing.

Meeting these criteria in his problem statement will result, in a clear and concise idea of what the researcher wants to do. This sets the state for further planning.

Objectives of Assumptions about the Problem:

- ✍ To make the research work feasible.
- ✍ To delimit the scope of the problem.
- ✍ To establish the proper frame of reference.

Aspects of Delimiting a Problem:

- ☞ Delimited to certain variables that should be mentioned clearly in the problem.
- ☞ Delimited to the area or level as primary level, secondary level, and college or university level.
- ☞ Delimited to size of sample, considering the time, energy and money.
- ☞ Delimited to the best method only.
- ☞ Delimited to the best available tool for measuring the variable.
- ☞ Delimited to the most appropriate techniques.
- ☞ Other delimitations particular to a problem.

As the above delimitations help the researcher for conducting the study, the findings of studies also confine to these delimitations.

Evaluation of the Problem:

When considering a problem a researcher is required to ask himself a series of questions about it. These are helpful in the evaluation of the problem on the basis of personal suitability of the researcher and social value of the problem.

Following questions must be answered affirmatively before the study is under Taken:

- Is the Problem Researchable?
- Is the Problem New?
- Is the Problem Significant?
- Is the Problem Feasible for the Particular Researcher?

In order to be feasible, a problem should agree with the following:

- Research competencies of the Researcher
- Interest and enthusiasm of the Researcher
- Financial consideration in the Project
- Time requirement for the Project
- Administrative considerations in the Project.

One of the most important functions of the research guide is to help the student clarify his thinking, achieve a sense of focus and develop a manageable problem from one that may be vague and too complex.

Activity

- Describe why a research problem is the heart of the research process.
- Research on the Internet: Find at least two problems graduate students face when they are doing their thesis.
- Formulate a research problem in your area of study interest.

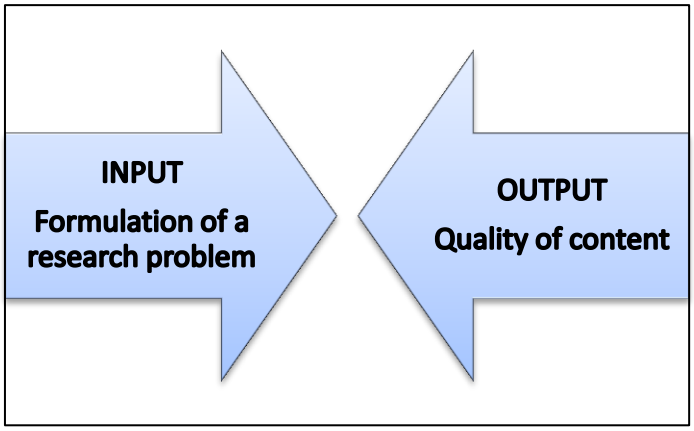

Figure 2.1: Relationship between research problem and quality of content

The formulation of a research problem is like the input for a research work and the output refers to quality of contents of the research report and the validity associated is entirely dependent upon it, as illustrated in Figure 2.1 above. As a student, you

must remember that formulating research problem is the most crucial step. So take time in formulating your research problem because a clearer research problem means clearer research output and progress.

2.2 Considerations in Selecting a Research Problem

When selecting a research problem for your study, there are a few factors which you need to consider. These factors will ensure that your research process is more manageable and you will remain motivated. Table 2.1 below shows the factors to consider in selecting a research problem.

Table 2.2: Selecting a Research Problem

Consideration Factor	Description
1. interest	▪ The most important criterion in selecting a research problem. ▪ The whole research process is normally time-consuming and a lot of hard work is needed. If you choose a topic which does not greatly interest you, it would become difficult to keep up the motivation to write.
2. Expertise	▪ Before selecting a research problem, you need to ensure that you met certain level of expertise in the area you are proposing. ▪ Make use of the facts you learned during the study and of course your research supervisors will lend a hand as well. ▪ *Remember, you need to do most of the work yourself.*
3. Data availability	▪ If your research title needs collection of information (journal, reports, proceedings) before finalizing the title, you need to make sure you have these materials available and in the relevant format.
4. Relevance	▪ Always choose a topic that suits your interest and profession. Ensure that your study adds to the existing body of knowledge. Of course, this will help you to sustain interest throughout the research period.
5. Ethics	▪ In formulating the research problem, you should consider some ethical issues as well. ▪ Sometimes, during the research period, the study population might be adversely affected by some questions. Therefore, it is always good for you to identify ethics related issues during the research problem formulation itself.

Self-Check 2.1

1. Define the importance of a research problem.
2. Explain three considerations when selecting a research problem.

STEPS IN RESEARCH PROBLEM FORMULATION

In any research task, the formulation of a research problem is the most important part of the research process. The process of formulating a research problem consists of a number of steps.

Step 1: Identification of Subject Area

Ask yourself what you like to do after your graduation or what field you would like to specialize in. This will help you to find an interesting topic. For example, if you are a computer networking student, inclined to work in the area of fiber optics network troubleshooting, information security, system administration or quality of services, you can carry out research in these areas. just like a student of degree in Secondary Education may take keen interest in the area of curriculum and education quality, the use of computer aided learning, and the perception of pupils towards use of indigenous language in schools.

Figure 2.3: Identifying the area of interest

Step2: Problem Definition and Identification

A problem should be identified in the respective field of study that is close to your interest or related to your specialization. A student should develop vast knowledge in his/her area of interest that is designed for a long-term accumulative process.

For example, design and development on knowledge management framework for best practice of your organisation, qualitative analysis of customer and company's role in e-commerce, implementation of service-oriented architecture in supply chain management and so forth.

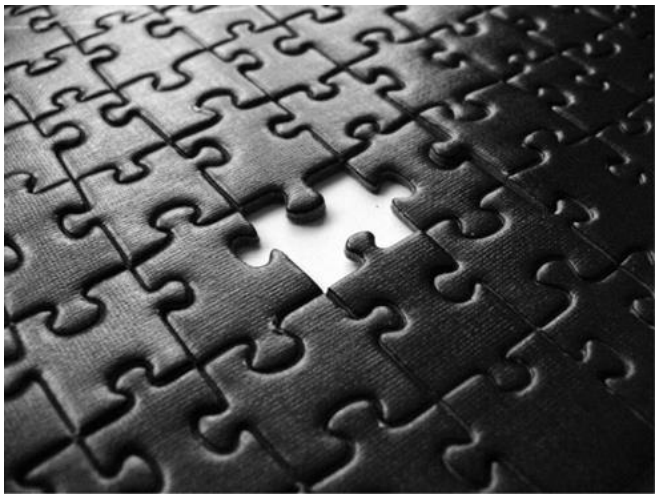

Figure 4.4: Identify problem in the area of interest

Step 3: Literature Review

Once the problem is formulated 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.

It is important to have proper literature review in the area of study. Literature review can reveal similar investigations and suggest approaches in dealing with similar problems. For example, if you are interested in exploring web-based database management for specific application, you could start with textbooks in that area or books that are related to databases and web-based services. Textbooks could provide fundamental knowledge to start with a particular area. However, journals and theses could provide critical information as they review related literature.

Journals and theses can reveal sources of data never known to you. It could also introduce you to significant research personalities whose research and writings are not known to you.

Generally, students tend to refer to other popular sources such as magazines and newspapers compared to journals and theses. Journals are presumed to be original investigation into unexplored areas of study in different disciplines. Thus, the challenge is to extract new ideas and methods that never occurred to you prior to starting your research.

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. It's very important or it provides the focal point for research.

Step 4: Selection of Research Design, Subjects and Data Collection Technique(s)

After framing hypothesis we have to prepare a research design i.e. we 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 optimum effort, time and expenditure. But how all these can be achieved depends mainly on the research purpose.

Upon deciding the research problem and having a clear idea of the related literature, the next step is to select and plan the research design, subjects as well as identify data collection techniques. Research design is crucial as it provides overall structure for the research procedure, the data that a researcher collects and the data analysis that the researcher conducts. It is planning that would ensure the success of your research by identifying resources, procedures and data always with the goal from the very beginning.

A sample design is a definite plan determined before any data is actually collected for obtaining a sample from a given population.in census inquiry we involve a great deal of time, money and energy so it not possible in practice under many circumstances. Sample designs can be either probability or non-probability. With probability samples each element has a known probability of being included in the sample but the non-probability samples do not allow the researchers to determine this probability.

Step 5: Collecting the Data

There are several ways of collecting the appropriate data which differ considerably in context of cost, time and other resources at the disposal of the researcher. Primary data can be collected either through experiment or through survey. In case of survey, data can be collected by any one or more of the following ways;

i. By observation,
ii. Through personal interview,
iii. Through telephonic interviews,
iv. By mailing of questionnaires or
v. Through schedules.

Step 6: Data Processing and Analysis

Typically, in any field's research methodology, the data collected need to be analyzed and computed to provide us inferential and interpretation on the problem.

If the research question involves quantitative approach, statistical methods are used to analyze. The analyzed data will be presented in tables and graphs. A researcher interprets the data in relation to the research questions based on the analysis performed. For the qualitative approach, information is coded, justified and presented with valid reasoning.

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 inference. 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 of differences supporting or conflicting with original or new hypothesis should be subjected to tests of significance to determine with what validity data can be said to indicate any conclusions.

After analyzing the data, the researcher is in a position to test the hypothesis, if any, he had formulated earlier. Do the facts support the hypothesis or they happen to be contrary? This is the usual question which is to be answered by applying various tests like 't' test, 'F' test etc. F test have been developed by statisticians for the purpose. Hypothesis testing will result in either accepting the hypothesis or in rejecting it. If the researcher had no hypothesis to start with, generalizations established on the basis of data may be stated.

If a hypothesis is tested and upheld several times, it may be possible for the researcher to arrive at generalization i.e. to build a theory. As a matter of fact, the real value of research lies in its ability to arrive at certain generalizations. 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.

Step 7: Implications, Conclusions and Recommendations

Implications and conclusion are important justifications that every researcher should take note as part of the research process. The novelty of the work and contribution of new knowledge are seen in the implications and conclusion part of the entire research. Recommendations normally highlight a few potential research questions derived at the end of the research process and to foster new research continuation based on the findings. Now, we can see clearly that research is said to be helical or cyclical because research begets more research and one comes across additional problems that need resolving after a conclusion is reached.

Step 8: Publish and Communicate Results

Once the findings of the research are obtained, it is important for you to communicate with other fellow researchers and practitioners. The results should be published in journals and conference proceedings as these are platforms for interested parties to communicate and discuss on the findings. If you are a graduate student, you will most probably be communicating your findings in the form of a

thesis or dissertation. This is an established format for presenting the findings of your research to the academic world.

The researcher has to prepare the report of what has been done by him. The layout of the report should be as follows; the preliminary pages, the main text and end matter. The preliminary pages carry title, acknowledgements and forward and then index. The main text of the report should have introduction, review of literature and methodology.

Criteria of Good Research:

One expects scientific research to satisfy the following criteria:

- The purpose of the research should be clearly defined and common concepts be used.
- The research procedure used should be described in sufficient detail to permit another researcher to repeat the researcher for further advancement, keeping the continuity of what has already been attained.
- The procedural design of the research should be carefully planned to yield results that are as objective as possible.
- The researcher should report with complete frankness, flaws in procedural design and estimate their effects upon the findings.
- The analysis of data should be sufficiently adequate to reveal its significance and the methods of analysis used should be appropriate. The validity and reliability of the data should be checked carefully.
- Conclusions should be confined to those justified by the data of the research and limited to those for which the data provide an adequate basis.
- Greater confidence in research is warranted if the researcher is experienced, has a good reputation in research and is a person of integrity.

Tips: Remember the first responsibility is to formulate a problem that is carefully phrased and represents the single goal of the total research effort.

SUB-PROBLEMS IN RESEARCH

While constructing your research problem, you might come across several sub-problems.

Sub-problems are sub-parts of the main research problem you designed. As a student, you must be able to distinguish sub-problems that are an integral part of the main problem from things that look like problems but are nothing more than procedural issues. The latter is actually pseudo-sub-problems which involve decisions the researcher must make before he/she can resolve the research problem and its sub-problems.

Students must remember clearly that pseudo-sub-problems are not researchable problems.

There are four key characteristics of sub-problems:

1. Each sub problem should be a Completely Researchable Unit
   - A sub-problem should constitute a logical sub-area of the larger research undertaking.
   - Each sub-problem might be researched as a separate subproject within the larger research goal.
   - The solutions to the sub-problems, taken together, combine to resolve the main problem.
   - It is essential that each sub-problem be stated clearly and succinctly (expressed briefly and clearly).
   - Often, a sub-problem is stated in the form of a question because it tends to focus the researcher's attention more directly on the research target of the sub-problem than does a declarative statement.
   - After all, an interrogative attitude is what marks a true researcher.
2. Each Sub-problem must be Clearly Tied to the Interpretation of the Data
   - At some point in the statement of the sub-problem-as within the main problem-the fact that data will be interpreted must be clearly evident
   - This fact may be expressed as a part of each sub-problem statement, or it may occupy an entirely separate sub-problem.
3. The Sub-problems Must Add Up to the Totality of the Problem
   - After the sub-problems have been stated, check them against the statement of the main problem to see that nothing in excess of the coverage of the main problem is included.
4. Sub problems Should be Small in Number
   - If the main problem is carefully stated and properly limited to a feasible research effort, the researcher will find that it usually contains two to six sub-problems.
   - Sometimes, the inexperienced researcher will come up with as many as 10, 15 or 20 sub-problems.

SELF-CHECK

- What are the steps of research problem formulation?
- Differentiate between research problem and sub-problems.

DISCUSSION

- Do you agree that formulating research problem should be the first thing to do in undertaking a research project? Discuss.
- Discuss some research problems related to your field of study that you are interested in pursuing. Construct a statement of research problem at the end of your discussion.
- List any manageable sub problems of research based on your designed research problem.

CHAPTER THREE

VARIABLES AND THEIR TYPES

Introduction

Variable is a concept which can take on different quantitative values. For example; height, weight, income, age etc. The main focus of the scientific study is to analyze the functional relationship of the variables. A variable is a quantity which can vary from one individual to another, the quantity which can vary from person to person. Variable is a property that taken on different value (Kerlinger).

It is any feature or aspect of an event, function or process that, by its presence and nature, affects some other event or process, which is being studied

- Continuous Variable:

  It is that which can assume any numerical value within a specific range.

- Discrete Variable:

  A variable for which the individual values fall on the scale only with distinct gaps is called a discrete variable.

- Dependent Variable or Criterion variable:

  If one variable depends or is a consequence of other, it is termed as dependent variable. Criterion variable is the basis on which the effectiveness of the experimental variable is studied.

- Independent Variable or Experimental Variable:

  The variable that is antecedent to the dependent variable is termed as an independent variable. The variable whose effect is going to be known is known as experimental variable.

- Controlled Variable:

  The effectiveness of an experimental variable is examined by comparing with other variable, known as controlled variable.

- Confounding Variable:

Those aspects of study or sample, that might influence the dependent variable (outcome measures), and whose effect may be confused with the effects of the independent variable. They are of two types; Intervening and extraneous variable.

- Intervening Variable:

  There are a number of abstract variables in educational/social experiments, which intervene the effect of experimental or criterion variable. For controlling intervening variable appropriate research design should be used. Intervening variables are hard if not impossible, to observe because they usually have to do with an individual's feelings like boredom, stress, fatigue, excitement etc. Extraneous variable on the other hand, are more readily observed or measured and thus are more easily controlled.

- Extraneous Variable:

  Independent variables that are not related to the purpose of the study, but may affect the dependent variable are termed as extraneous variables. Suppose the researcher wants to test the hypothesis that there is a relationship between children's gain in social studies achievement and their self-concept. Here self-concept is independent variable and achievement in social study is dependent variable. Intelligence may as well affect the social studies achievement; but since it is not related to the purpose of the study undertaken by the researcher, it will be termed as extraneous variable. Whatever effect is noticed on dependent variable as a result of extraneous variable(s) is technically described as an 'experimental error.'

A study must always be so designed that the effect upon the dependent variable is attributed entirely to the independent variables and not to some extraneous variable(s).When the dependent variable is not free from the influence of extraneous variable(s), the relationship between the dependent and independent variable is said to be confounded by an extraneous variable(s).

Extraneous variable can be controlled by removing the variable causing distraction. It may be eliminated by selecting cases with uniform characteristics and through randomization.

- Organismic Variable:

There are some variables which cannot be manipulated. They are accepted by the researcher as they are. They are levels of intelligence, sex, class levels, and the like. The researcher can classify the subjects by sex but he cannot modify to suit his research condition. If a researcher attempts to compare boys and girls on some learning task, any differences might be attributed to sex differences but not necessarily so. The differences between boys and girls could be due to differences in intelligence, training, motivation or a myriad of other conditions present in all human beings and not necessarily to biological differences between sexes. Those variables which cannot be manipulated and cannot themselves point out causal relations are called organismic variables.

CHAPTER FOUR

FORMULATION OF HYPOTHESIS

Introduction

The word hypothesis consists of two words: Hypo + Thesis. 'Hypo' means tentative or subject to the verification. 'Thesis' means statement about solution of the problem. Thus the literal 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.

Again, 'hypo' means the composition of two or more variables which are to be verified and 'thesis' means position of these variables in the specific frame of reference.

Definitions of Hypothesis:

Any supposition which we make in order to endeavor to deduce conclusions in accordance with facts which are known to be real under the idea that if the conclusions to which the hypothesis leads are known truths, the hypothesis itself either must be or at least likely to be true (Mill).

A hypothesis is a tentative generalization the validity of which remains to be tested. In its most elementary stage the hypothesis may be any hunch, guess, imaginative idea which becomes basis for further investigation (Lundberg).

It is a shrewd guess or inference that is formulated and provisionally adopted to explain observed facts or conditions and to guide in further investigation (John W. Best).

A hypothesis is a statement temporarily accepted as true in the light of what is, at the time, known about a phenomenon, and it is employed as a basis for action in the search for new, truth, when the hypothesis is fully established, it may take the form of facts, principles and theories (Barr and Scates).

Hypothesis is an assumption whose testability is to be tested on the basis of the compatibility of its implications with empirical evidence and previous knowledge (Gorge J. Mouly).

Nature of Hypothesis:

- ☞ Conceptual: Some kind of conceptual elements in the framework are involved in a hypothesis.
- ☞ Verbal statement in a declarative form: It is a verbal expression of ideas and concepts. It is not merely mental idea but in the verbal form, the idea is ready enough for empirical verification.
- ☞ It represents the tentative relationship between two or more variables.
- ☞ Forward or future oriented: A hypothesis is future-oriented. It relates to the future verification not the past facts and information.
- ☞ Pivot of a scientific research: All research activities are designed for verification of hypothesis.

Functions of Hypothesis:

H.H. Mc Ashan has mentioned the following functions of hypothesis;

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

- ☞ It offers a basis in establishing the specifics what to study for and may provide possible solutions to the problem.
- ☞ It may lead to formulate another hypothesis.
- ☞ A preliminary hypothesis may take the shape of final hypothesis.
- ☞ 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.
- ☞ It delimits field of the investigation.
- ☞ It sensitizes the researcher so that he should work selectively, and have very realistic approach to the problem.
- ☞ It offers the simple means for collecting evidences for verification.

Importance of a Hypothesis:

a. Investigator's eyes: by guiding the investigator in further investigation hypothesis serves as the investigator's eyes in seeking answers to tentatively adopted generalization.

b. Focuses research: Without hypothesis, a research is unfocussed research and remains like a random empirical wandering. Hypothesis serves as necessary link between theory and the investigation.

c. Clear and specific goals: A well thought out set 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.

d. Links together: It serves the important function of linking together related facts and information and organizing them into wholes.

e. Prevents blind research: In the words of P.V. Young, "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."

f. Guiding Light:" A hypothesis serves as powerful beacon those lights the way for the research work."

g. It provides direction to research and prevent the review of irrelevant literature and the collection of useful or excess data.

h. It sensitizes the investigator certain aspects of situation which are irrelevant from the standpoint of problem at hand.

i. It enables the investigator to understand with greater clarity his problem and its ramification.

j. It is an indispensible research instrument, for it builds a bridge between the problem and the location of empirical evidence that may solve the problem.

k. It provides the investigator with the most efficient instrument for exploring and explaining the unknown facts.

l. It provides a frame work for drawing conclusion.

m. It stimulates the investigator for further research.

Forms of Hypothesis:

According to Tuckman following are the forms of hypothesis;

☞ *Question form:*

A hypothesis stated as a question represents the simplest level of empirical observation. It fails to fit most definitions of hypothesis. It frequently appears in the list. There are cases of simple investigation which can be adequately implemented by raising a question, rather than dichotomizing the hypothesis forms into acceptable / rejectable categories.

☞ *Declarative Statement :*

A hypothesis developed as a declarative statement provides an anticipated relationship or difference between variables. Such a hypothesis developer has examined existing evidence which led him to believe that a difference may be anticipated as additional evidence. It is merely a declaration of the independent variables effect on the criterion variable.

☞ *Directional Hypothesis :*

A directional hypothesis connotes an expected direction in the relationship or difference between variables. This type of hypothesis developer appears more certain of anticipated evidence. If seeking a tenable hypothesis is the general interest of the researcher, this hypothesis is less safe than the others because it reveals two possible conditions. First that the problem of seeking relationship between variables is so obvious that additional evidence is scarcely needed. Secondly, researcher has examined the variables very thoroughly and the available evidence supports the statement of a particular anticipated outcome.

☞ *Non –Directional Hypothesis or Null Hypothesis:*

This hypothesis is stated in the null form which is an assertion that no relationship or no difference exists between or among the variables. Null hypothesis is a statistical hypothesis testable within the framework of probability theory. It is a non-directional form of hypothesis.

There is a trend to employ or develop null hypothesis in research in most of the disciplines. A null hypothesis tentatively states that on the basis of evidence tested there is no difference. If the null hypothesis is rejected, there is a difference but we do not know the alternative or the differences. In this the researcher has not to anticipate or give the rational for the declaration or directional form. It does not make researcher biased or prejudiced. He may be objective about the expected outcomes of the research or findings.

Actually this is a statistical hypothesis which is self- explanatory. Null hypothesis means zero hypotheses. A researcher has nothing to do in developing it, while research hypothesis is second step in the process of reflective thinking.

A null hypothesis in an appropriate form is order to accommodate the object of inquiry for extracting this information. It does not necessarily reflect the expectations of the researcher so much as the utility of the null form as the best fitted to the logic of chance in statistical knowledge or science.

There is no difference or relationship between or among variables under certain conditions. Statistical tests of significance are used to accept and reject the null hypothesis. If it is rejected, the general hypothesis is accepted.

Non-directional hypothesis is known as null hypothesis because it 'nullifies' the positive argument of the findings or non-directional statement of the generalization. It is also termed as statistical or zero hypothesis because it denies the existence of any systematic principles apart from the effect of chance. It assumes that none or zero difference exists between the two population means or the treatments.

Formulation of Testable Hypothesis:

A hypothesis is a tentative assumption drawn from knowledge and theory. It is used as a guide in the investigation of other facts and theory that are as yet unknown. Its formulation is one of the most difficult and most crucial steps in the entire scientific process. A poorly chosen or poorly worded hypothesis can prevent the following:

- The obtaining of enough pertinent data,
- The drawing of conclusions and generalizations ,and
- The application of certain statistical measures in the analysis of the result.

Hypothesis is the central core of study that directs the selection of the data to be gathered, the experimental design, the statistical analysis and the conclusions drawn from the study.

A study may be devoted to the testing of one major hypothesis, a number of subsidiary hypothesis, or both major and subsidiary hypotheses. When several hypotheses are used, each should be stated separately in order to anticipate the type of analysis required and in order to definitely accept or reject each hypothesis on its own merit. Irrespective of number or type used each hypothesis should be testable and based upon a logical foundation.

Fundamental Basis of Hypothesis:

The researcher deals with reality on two levels;

i. The Operational Level:

On the operational level researcher must define events in observable terms in order to operate with the reality necessary to do researches.

ii. The Conceptual Level:

On the conceptual level the researcher must define events in terms of underlying communality with other events. Defining at a conceptual level, the researcher can abstract from single specific to general instance and begin to understand how phenomena operate and variables interrelate. The formulation of a hypothesis very frequently requires going from an operational or concrete level to the conceptual or abstract level. This movement to the conceptual level enables the result to be generalized beyond the specific conditions of a particular study and thus to be of wider applicability.

Research requires the ability to move from the operational to the conceptual level and vice–versa. This ability is required not only in constructing experiments but in applying their findings as well. The process of making conceptual contrasts between operational programme is called conceptualization or dimensionalization.

Difficulties in the Formulation of Useful Hypothesis:

Moving from the operational to the conceptual level and vice –versa is a critical ingredient of the research to demonstration process. The following are the difficulties in the formulation of hypothesis:

- Absence of knowledge of a clear theoretical framework.
- Lack of ability to make use of the theoretical framework logically.
- Lack of acquaintance with available research technique resulting in failure to be able to phrase the hypothesis properly.

CHAPTER FIVE

RESEARCH DESIGN

Introduction

A research design is simply the framework or plan for a study that is used as a guide in collecting and analyzing the data. It is a blueprint that is followed in completing a study. Research design is the blue print for collection measurement and analysis of data. Actually it is a map that is usually developed to guide the research.

Definitions of Research Design

Research design is a master plan specifying the methods and procedures for collection and analyzing the needed information (William Zikmund)

Research design is the plan, structure and strategy of investigation conceived so as to obtain answers to research questions and to control variance (Kerlinger)

Thus we can say that a research design is the arrangement of condition for collection and analysis of data in a manner that aims to generalize the findings of the sample on the population.

Purpose of a Research Design:

Research designs are used for the following purposes;

a. To minimize the expenditure:

   Research design carries an important influence on the reliability of the results attained .It therefore provides a solid base for the whole research. This makes the research as effective as possible by providing maximum information with minimum spending of effort, money and time by preparing the advance plan of all about the research.

b. To facilitate the smooth scaling:

   Research design is needed because it facilitates the smooth scaling of the various research operations, thereby making research as efficient as possible yielding maximal information with minimal expenditure of effort, time and money.

c. To collect the relevant data and technique:

   Research design stands for advance planning of the methods to be adopted for collecting the relevant data and the techniques to be used in their analysis, keeping in view the objective of the research and the availability of staff time and money. Poor preparation of research design upset the entire project.

d. To provide blue print for plans:

Research design is needed due to the fact that it allows for the smooth working of many research operations. It is like blue print which we need in advance to plan the methods to be adopted for collecting the relevant data and techniques to be used in its analysis for preparation of research project. Just as for better economical and attractive construction of a house need a blue print and a map of that, similarly we needs a blue print or a design for the smooth flow of operation of research.

e. To provide an overview to other experts:

A research design provides an overview of all the research process and with the help of the design we can take the help and views of experts of that field. The design helps the investigator to organize his ideas, which helps to recognize and fix his faults.

f. To provide a direction:

A research design provides a proper or particular direction to the other executives and others who are helping us into the process. The researcher studies available, literature and learns about new (alternative approaches.

Characteristics of Good Research Design:

Generally a good research design minimizes bias and maximizes the reliability of the data collected and analyzed. The design which gives the smallest experimental error is reported to be the best design in scientific investigation. Similarly, a design which yields maximum information and provides an opportunity for considering different aspects of a problem is considered to be the most appropriate and efficient design. A good research design possesses the following characteristics;

- **Objectivity:**

  It refers to the findings related to the method of data collection and scoring of the responses. The research design should permit the measuring instruments which are fairly objective in which every observer or judge scoring the performance must precisely give the same report. In other words, the objectivity of the procedure may be judged by the degree of agreement between the final scores assigned to different individuals by more than one independent observer. This ensures the objectivity of the collected data which shall be capable of analysis and interpretation.

- **Reliability:**

  It refers to consistency throughout a series of measurements. For example, if a respondent gives out a response to a particular item, he is expected to give the same response to that item even if he is asked repeatedly. If he is changing his response to the same item, the consistency will be lost. So the researcher should frame the items in a questionnaire in such a way that it provides consistency or reliability.

- **Validity:**

Any measuring device or instrument is said to be valid when it measures what it is expected to measure. For example, an intelligence test conducted for measuring the IQ should measure only the intelligence and nothing else and the questionnaire shall be framed accordingly.

- **Generalizability:**

It means how best the data collected from the samples can be utilized for drawing certain generalizations applicable to a large group from which sample is drawn. Thus a research design helps an investigator to generalize his findings provided he has taken due care in defining the population, selecting the sample, deriving appropriate statistical analysis etc. while preparing the research design. Thus a good research design is one which is methodologically prepared and should ensure that generalization is possible. For ensuring the generalization we should confirm that our research problem has the following characteristics;

a. The problem is clearly formulated.
b. The population is clearly defined.
c. Most appropriate techniques of sample selection are used to form an appropriate sample.
d. Appropriate statistical analysis has been carried out.
e. The findings of the study are capable of generalizations.

- **Adequate Information:**

The most important requirement of good research design is that it should provide adequate information so that the research problem can be analyzed on a wide perspective. An ideal design should take into account important factors like;

a. Identifying the exact research problem to be studied
b. The objective of the research
c. The process of obtaining information
d. The availability of adequate and skilled manpower and
e. The availability of adequate financial resources for carrying research.
f. Some other important features of a good research design are flexibility, adaptability, efficiency, being economic and so on. A good research design should minimize bias and maximize reliability and generalization.

CHAPTER SIX

SAMPLING

Introduction

A survey may be conducted by either of two methods: Census Method or Parametric method and; Sampling method or Non-parametric method.

- **Census method:** It deals with the investigation of the entire population. Here the data are collected for each and every unit of the universe. This method provides more accurate and exact information as no unit is left out.
- **Sampling method:** Here a small group is selected as representative of the whole universe. It works with the objective to obtain accurate and reliable information about the universe with minimum of cost, time and energy and to set out the limits of accuracy of such estimates. It makes exhaustive and intensive study possible with much less time, money and material. It's more popular in research work.

Population or universe means, the entire mass of observations, which is the parent group from which a sample is to be formed. The term population or universe conveys a different meaning than a traditional one. In census survey, the count of individuals (men, women and children) is known as population.

But in Research Methodology population means characteristics of a specific group. For example secondary school teachers of, who have some specific features like teaching experience, teaching attitudes etc.

Sampling means selecting a given number of subjects from a defined population as representative of that population.

One type of population distinguished by educational researchers is called the target population. By target population distinguished by educational researchers is called the target population. By target population, also called universe, we mean all the members of a real or hypothetical set of people, events or objects to which we wish to generalize the results of our research.

The first step in sampling is to define the target population.

Research work is guided by inductive thinking. The researcher proceeds from specificity to generality. The sample observation is the specific situation, which is applied to the population, it is the general situation.

The measures of a sample are known as statistics and measures of a population are termed as parameter. Mean, S.D., coefficient of Correlation of sample observation known as Statistics and Mean, S.D., coefficient of correlation of population are known as parameters. Generally parameters are estimated on the basis of sample statistics.

Sampling is indispensable technique in behavioral research and not so common in physical sciences. It is fundamental to all statistical methodology of behavioral and social research. It makes research findings economical and accurate. Sampling means selection of individuals from the population in such a way that every individual has equal chance to be taken into the sample. Term sample should be reserved for a set of units or portion of an aggregate of material which has been selected in the belief that it will be representative of the whole aggregate. *Sample is set of units of an aggregate.*

Assumptions of Sampling:

1. Homogeneity amidst complexity:

Social phenomenon is very complex in nature and every unit appears to be different from another. But at the same time they also possess similarities in many respects. It is, therefore, assumed that there is the possibility of such representative types in the whole population that makes sampling possible.

2. Possibility of Representative Selection:

Sampling has its origin in the mathematical theory of probability and law of statistical regularity. The law of statistical regularity lays down that a group of objects chosen at random from a large group tend to possess the characteristics of that large group (universe) (Conner).

3. Absolute accuracy not essential but relative or significant accuracy i.e. needed in case of large scale observations; because it is practically impossible to achieve as a result of errors in measurement, collection of data, its analysis and interpretation.

Definition:

A statistical sample is a miniature picture or cross –section of the entire group or aggregate from which the sample is taken (Young)

A sample is a small proportion of a population selected for observation and analysis .It is a collection consisting of a part or sub-set of the objects or individuals of population which is selected for the express purpose of representing the population.

By observing the characteristics of the sample, one can make certain inferences about characteristics of the population from which it is drawn.

Sampling is the process of selecting a sample from the population. For this purpose, the population is divided into a number of parts called sampling units.

Sampling designs means the joint procedure of selection and estimation. Sampling is a part of the strategy of research. Sampling should be such that the error of estimation is minimum.

A sample as the name implies, is a smaller representation of a larger whole (Good and Hatt).

In every branch of science we lack the resources, to study more than a fragment of the phenomenon that might advance our knowledge." i.e. fragment is sample and phenomenon is population. The sample observations are applied to the phenomenon i.e. generalization (Cocharn,).

In the social sciences, it is not possible to collect data from every respondent relevant to our study but only from some fractional part of the respondents. The process of selecting the fractional part is called sampling.

Need of Sampling:

- Economy of time.
- Economy of money.
- True detailed knowledge.
- Utility in experimental study.
- It has reliability because it is based on probability theory.

Advantages of Sampling:

1. It has a greater adaptability.
2. It is an economical technique.
3. It has high speed for generalization.
4. It has greater precision and accuracy in the observation.
5. This technique has great accuracy.
6. It has a greater speed in conducting a research work.
7. It has a greater scope in the field of research.
8. It reduces the cost of observation or data collection.

Disadvantages or Limitation of Sampling:

1. Scope of biasness (Less accuracy)
2. Problem of representative sample-Difficulty in selecting a truly representative sample.
3. Need of eligible researchers.
4. Instability of sample subjects or changeability of units i.e. in heterogeneous population.
5. There are certain situations where sampling is possible.

Essentials of an Ideal Sample:

- **Homogeneity:** The units included in sample must be as likeness with other units.
- **Adequacy:** A sample having 10% of the whole data is adequate.
- **Independence**: Every unit should be free to be included in the sample.
- **Representativeness;** An ideal sample must be such that it represents the whole data adequately. In the number of units included in a sample should be sufficient to enable derivation of conclusions applicable to the whole data.
- **Economical** in terms of time and money.
- **High level of reliability.**

Characteristics of a Good Sample:

1. A good sample is the true representative of the population corresponding to its properties.
2. The population is known as aggregate of certain properties and sample is called sub-aggregate of the universe.

3. A good sample is free from bias; the sample does not permit prejudices, the learning and pre-conception, imaginations of the investigator to influence its choice.
4. A good sample is an objective one; it refers objectivity in selecting procedure or absence of subjective elements from the situation.
5. A good sample maintains accuracy .It yields an accurate estimates or statistics and does not involve errors.
6. A good sample is comprehensive in nature. Comprehensiveness is a quality of a sample which is controlled by specific purpose of the investigation. A sample may be comprehensive in traits but may not be a good representative of the population.
7. A good sample has the practicability for research.

Type of sampling Methods

A Probability Sampling
A 1 Random Sampling
A-2 Systematic Sampling
A-3 Stratified Sampling
A-4 Multistage Sampling
A-5 Purposive Sampling
A-6 Cluster Sampling
A-7 Multiple Sampling

B Non-Probability Sampling
B-1 Incidental/Accidental Sampling
B-2 Judgment Sampling
B- 3 Purposive Sampling
B-4 Quota Sampling

Difference between Probability and Non-

No.	Probability Sampling	Non- Probability Sampling
1.	It is a method of sampling which gives the probability that a sample is representative of population.	In the absence of any idea of probability the method of sampling is known as non-probability sampling.
2.	Probability sampling is generally used in fundamental research in which the purpose is to generalize the results.	It is generally used in action researches in which one studies a class without any generalization purpose.
3.	It refers from the sample as well as the population.	There is no idea of population.
4.	Every individual of the population has equal probability to be taken into the sample.	There is no probability of selecting any individual.
5.	It may be representative of the population.	It has free distribution.
6.	Its observations (data) are used for the inferential purpose.	The observations are not used for generalization purpose.

7.	Inferential or parametric statistics are used	Non-inferential or non-parametric statistics are used
8.	There is a risk of drawing conclusion.	There is no risk for drawing conclusions.
9.	It is based on Law of probability sampling i.e. Law of Statistical Regularity and Law of Inertia of the Large Sample.	It is not based on law of probability sampling.

Probability Sampling:

According to Halmstadter, a probability sample is one that has been used selected in such a way that every element chosen has a known probability of being included.

Probability sampling is of different types:

A. *Simple Random Sampling:* It is one in which each element of the population has an equal and independent chance of being included in the sample i.e. a sample selected by randomization method is known as simple random sample and this technique is simple randomizing.

Randomization is done by using the following techniques:

- Tossing a coin (b) Throwing a dice
- Lottery method (d) Blind folded method
- Tippett's table method

Merits of Randomization:

- It requires the minimum knowledge of population.
- It is free from subjectivity and free from personal error.
- It provides appropriate data for one's purpose.
- The observations of the sample can be used for inferential purpose.

Demerits of Randomization:

- It cannot ensure the representativeness of a sample.
- It does not use the knowledge about the population.
- Its inferential accuracy depends upon the size of the sample.

B. *Systematic Sampling:* is an improvement over the simple random sampling. This method requires the complete information about the population. There should be a list of information of all the individuals of the population in any systematic way.

Now we decide the size of the sample:

Let the size of sample is = n and population size is = N

Now we select each N/n individual from the list and thus we have the desired size of sample which is known as systematic sample. Thus for this technique of sampling population should be arranged in any systematic way.

Merits:

1. This is a simple method of selecting a sample.
2. It reduces the field cost.
3. Inferential statistics may be used.
4. Sample may be comprehensive and representative of population.
5. Observations of the sample may be used for drawing conclusions and generalizations.

Demerits:

1. This is not free from error, since there is subjectivity due to different ways of systematic list by different individuals.
2. Knowledge of population is essential.
3. Information of each individual is essential.
4. This method can't ensure the representativeness.
5. There is a risk in drawing conclusions from the observations of the sample.

C. *Stratified Sampling:* It is an improvement over the earlier methods. When we employ this technique, the researcher divides his population into strata on the basis of some characteristics and from each of these smaller homogenous groups (strata) draws at random a predetermined number of units. Researcher should choose that characteristic as criterion which seems to be more relevant in his research work.

Stratified sampling may be of three types;

1. Disproportionate:

Means that the size of the sample in each unit is not proportionate to the size of the unit but depends upon considerations involving personal judgment and convenience. This method of sampling is more effective for comparing strata which have different error possibilities. It is less efficient for determining population characteristics.

2. Proportionate:

It refers to the selection from each sampling unit of a sample that is proportionate to the size of the unit. Advantages of this procedure includes representativeness with respect to variables used as the basis of classifying categories and increased chances of being able to make comparisons between strata. Lack of information on proportion of the population in each category and faulty classification may be listed as disadvantages of this method.

3. Optimum allocation:

Stratified sampling is representative as well as comprehensive than other stratified samples. It refers to selecting units from each stratum. Each stratum should be in proportion to the corresponding stratum the population. Thus sample obtained is known as optimum allocation sample.

Merits:

- ☞ It is a good representative of the population.
- ☞ It is an improvement over the earlier technique of sampling.
- ☞ It is an objective method of sampling.
- ☞ Observations can be used for inferential purpose.

Demerits:

- ☞ Serious disadvantage of this method is that it is difficult for the researcher to decide the relevant criterion for stratification.
- ☞ Only one criterion can be used for stratification, but generally it seems more than one criterion relevant for stratification.
- ☞ It is costly and time consuming method.

- ☞ Selected samples may be representative with reference to the used criterion but not for the other.
- ☞ There is a risk of generalization.

D. Multiple or Double Repetitive Sampling:

Generally this is not a new method but only a new application of the samplings. This is most frequently used for establishing the reliability of a sample. When employing a mailed questionnaire, double sampling is sometimes used to obtain a more representative sample. This is done because some randomly selected subjects who are sent questionnaires may not return them.

Obviously, the missing data will bias the result of the study, if the people who fail to reply the query differ in some fundamental way from the others in respect to the phenomenon being studied. To eliminate this bias, a selected sample may be drawn at random from the non-respondents and the people interviewed to obtain the desired information. Thus this technique is also known as repeated or multiple sampling.

This double sampling technique enables one to check on the reliability of the information obtained from first sample. Thus, double sampling, where in one sample is analyzed and information obtained is used to draw the next sample to examine the problem further.

Merits:

- ☞ Thus sampling procedure leads to the inferences of free determine precision based on a number of observations.
- ☞ This technique of sampling reduces the error.
- ☞ This method maintains the procedure of the finding evaluate the reliability of the sample.

Demerits:

- ☞ This technique of sampling cannot be used for a large sample. It is applicable only for small sample.
- ☞ This technique is time consuming and costly.
- ☞ It's planning and administration is more complicated.

E. Multi Stage Sampling:

This sample is more comprehensive and representative of the population. In this type of sampling primary sample units are inclusive groups and secondary units are sub-groups within these ultimate units to be selected which belong to one and only one group.

Stages of a population are usually available within a group or population, whenever stratification is done by the researcher. The individuals are selected from different stages for constituting the multi stage sampling.

Merits:

- ☞ It is a good representative of the population.
- ☞ Multistage sampling is an improvement over the earlier methods.
- ☞ It is an objective procedure of sampling.
- ☞ The observations from multi stage sample may be used for inferential purpose.

Demerits:

- ☞ It is a difficult and complex method of sampling.
- ☞ It involves errors when we consider the primary stages.
- ☞ It is again a subjective technique of sampling.

F. Cluster Sampling:

To select the intact group as a whole is known as a cluster sampling. In cluster sampling the sample units contain groups of element (cluster) instead of individual members or items in the population. Rather than listing all elementary school children in a given city and randomly selecting 15 % of these students for the sample, a researcher lists all of the elementary schools in the city, selects at random 15 % of these clusters of units, and uses all of the children in the selected schools as the sample.

Merits:

- ☞ It may be a good representative of the population.
- ☞ It is an easy method.
- ☞ It is an economical method.
- ☞ It is practicable and highly applicable in education.
- ☞ Observations can be used for inferential purpose.

Demerits:

- Cluster sampling is not free from errors.
- It is not comprehensive.

Non-Probability Sampling Method:

Samples which are selected through non-random methods are called non-probability samples. Depending upon the technique used it may be;

A. Incidental or Accidental Sampling:

The term incidental or accidental applied to those samples that are taken because they are most frequently available i.e. this refers to the groups which are used as samples of a population because they are readily available or because the researcher is unable to employ more acceptable sampling methods.

Merits:

- It is very easy method of sampling.
- It is frequently used method in behavioral sciences.
- It reduces the time, money and energy i.e. it is an economical method.

Demerits:

- It is not representative of the population.
- It is not free from errors.
- Parametric statistics cannot be used.

B. Judgment Sampling:

This involves the selection of a group from the population on the basis of available information assuming as if they are representative of the entire population. Here group may also be selected on the basis of intuition or on the basis of the criterion deemed to be self-evident. Generally investigator should take the judgment sample so this sampling is highly risky.

Merits:

- Knowledge of investigator can be best used in this technique of sampling.
- This method of sampling is economical.

Demerits:

- This technique is objective.
- It is not free from errors.
- It includes uncontrolled variation.
- Inferential statistics cannot be used for the observation of this sampling, so generalization is not possible.

C. Purposive Sampling:

The purposive sampling is selected by some arbitrary method because it is known to be representative of the total population, or it is known that it will produce well matched groups. The idea is to pick out the sample in relation to criterion which is considered important for the particular study. This method is appropriate when the study places special emphasis upon the control of certain specific variables.

Merits:

- Use the best available knowledge concerning the sample subjects.
- Better control of significant variables.
- Sample groups data can be easily matched.
- Homogeneity of subjects used in the sample.

Demerits:

- Reliability of the criterion is questionable.
- Knowledge of population is essential.
- Errors in classifying sampling subjects.
- Inability to utilize the inferential parametric statistics.
- Inability to make generalization concerning total population.

D. Quota Sampling:

This combines both judgment sampling and probability sampling: on the basis of judgment or assumption or the previous knowledge, the proportion of population falling into each category is decided. Thereafter a quota of cases to be drawn is fixed and the observer is allowed to sample as he likes. Quota sampling is very arbitrary and likely to figure in municipal surveys.

Merits:

- ☞ It is an improvement over the judgment sampling.
- ☞ It is an easy sampling technique.
- ☞ It is not frequently used in social surveys.

Demerits:

- ☞ It is not a representative sample.
- ☞ It is not free from errors.
- ☞ It has the influence of regional, geographical and social factors.

E. Snowball Sampling:

The term; snow ball sampling' has been used to describe a sampling procedure in which the sample goes on becoming bigger and bigger as the observation or study proceeds. The term snowball stems from the analogy of a snowball sample which would allow computation of estimates of sampling error and use of statistical test of significance.

For example, an opinion survey is to be conducted on smokers of a particular brand of cigarette. At the first stage, we may pick up a few people who are known to us or can be identified to be the smokers of that brand. At the time of interviewing them, we may obtain the names of other persons known to the first stage subjects. Thus the subjects go on serving an informant for the identification of more subjects and the sample goes on increasing.

Merit:

Snowball sampling which is generally considered to be non-probabilistic can be converted into probabilistic by selecting subjects randomly within each stage.

Demerits:

Sampling errors may creep in.

F. Purposive or Expert Choice Sampling:

Samples are sometimes expressly chosen because, in the light of available information, these mirror some larger group with reference to one or more given characteristics. The controls in such samples are usually identified as representative areas (city, country, state, and district), representative characteristics of individuals (age, sex, marital status, socio-economic status, and race) or types of groups (administrator, counselors, teachers etc.).

These controls may be further sub-divided by specified categories within classes such as amount of training, years of experience or attitudes towards a specific phenomenon. Up-to this stage, these controls are somewhat similar to those used in satisfaction. Purposive sampling differs from stratified random sampling in that the actual selection of the units to be included in the sample in each group is done purposively rather than by random method.

CHAPTER SEVEN

TOOLS OF DATA COLLECTION

Introduction

A researcher requires many data – gathering tools or techniques. Tests are the tools of measurement and it guides the researcher in data collection and also in evaluation. Tools may vary in complexity, interpretation, design and administration. Each tool is suitable for the collection of certain type of information.

One has to select from the available tools those which will provide data he seeks for testing hypothesis. It may happen that existing research tools do not suit the purpose in some situation, so researcher should modify them or construct his own.

Different tools used for data collection may be;

1. Questionnaires
2. Interviews
3. Schedules
4. Observation Techniques
5. Rating Scales

1. Questionnaire:

It is list of questions related to one topic. It may be defined as;

A questionnaire is a systematic compilation of questions that are submitted to a sampling of population from which information is desired (Barr, Davis & Johnson).

In general, the word questionnaire refers to a device for securing answers to questions by using a form which the respondent fills in himself (W. J. Goode & K. Hall). The questionnaire is probably most used and most abused of the data gathering devices .It is easy to prepare and to administer.

The questionnaire is a form prepared and distributed to secure responses to certain questions. It is a device for securing answers to questions by using a form which the respondent will fill by himself. It is a systematic compilation of questions. It is an important instrument being used to gather information from widely scattered sources. Normally used where one cannot see personally all of the people from

whom he desires responses or where there is no particular reason to see them personally.

Characteristics of a Good Questionnaire:

- ☞ It deals with an important or significant topic.
- ☞ Its significance is carefully stated on the questionnaire itself or on its covering letter.
- ☞ It seeks only that data which cannot be obtained from the resources like books, reports and records.
- ☞ It is as short as possible, only long enough to get the essential data.
- ☞ It is attractive in appearance, nearly arranged and clearly duplicated or printed.
- ☞ Directions are clear and complete, important terms are clarified.
- ☞ The questions are objective, with no clues, hints or suggestions.
- ☞ Questions are presented in an order from simple to complex.
- ☞ Double negatives, adverbs and descriptive adjectives are avoided.
- ☞ Double barreled questions or putting two questions in one question are also avoided.
- ☞ The questions carry adequate number of alternatives.
- ☞ It is easy to tabulate, summarize and interpret.

Merits of Questionnaire Method:

1. it's very economical.
2. It's a time saving process.
3. It covers the research in wide area.
4. It's very suitable for special type of responses.
5. It is most reliable in special cases.

Demerits of Questionnaire Method:

1. Through this we get only limited responses.
2. Lack of personal contact.
3. Greater possibility of wrong answers.
4. Chances of receiving incomplete response are more.
5. Sometimes answers may be illegible.
6. It may be useless in many problems.

2. The Interview:

Interview is a two way method which permits an exchange of ideas and information.

Interviewing is fundamentally a process of social interaction (W. J. Goode & P.K. Hatt).

The interview constitutes a social situation between two persons, the psychological process involved requiring both individuals mutually respond though the social research purpose of the interview call for a varied response from the two parties concerned (Vivien Palmar).

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 (P.V. Young).

In an interview a rapport is established between the interviewer and the interviewee. Not only is physical distance between them annihilated, the social and cultural barrier is also removed; and a free mutual flow of ideas to and fro takes place. Both create their respective impression upon each other.

The interview brings them both on the same level and an emotional attachment supervenes between them.

In an interview all formalities are laid down and the gate is opened for delivering into the intellectuals, emotional and subconscious stirrings of the interviewee. Thus here the 'depth' of subject (man) is gone to the very bottom of his emotional pool and may check his truthfulness of responses.

Difference between Interview and Questionnaire

Questionnaire Method	Interview Method
1. Data is gathered indirectly.	1. Data is gathered directly.
2. No face to face contact between two.	2. There is face to face contact between interviewer and interviewee.
3. Interviewer should have the general knowledge of the topic.	3. Skillful interviewer is needed.
4. The Interviewee will hesitate to write it.	4. Some confidential information can also be obtained.
5. We get written information only	5. We get written and oral both type of information.

Characteristics of an Interview:

- The interviewer can probe into casual factors, determine attitudes, and discover the origin of problem.
- It's appropriate to deal with young children and illiterates person.
- It can make cross questioning possible.
- It helps the investigator to gain an impression of the person concerned.
- It can deal with delicate, confidential and even intimate topics.
- It has flexibility.
- Sincerity, frankness, truthfulness and insight of the interviewee can be better judged through cross questioning.
- It gives no chance for respondent to modify his earlier answer.
- It is applicable in survey method, but it is also applicable in historical, experimental, case studies and clinical studies.

Merits of Interview:

- Direct research.
- Deep research
- Knowledge of past and future.
- Knowledge of special features.
- Mutual encouragement is possible.
- Supra-observation is possible.
- Knowledge of historical and emotional causes.
- Examination of known data.

Disadvantage of Interview:

- May provides misleading information.
- Defects due to interviewee(low level of intelligence or may be emotionally unbalanced)
- Result may be affected due to prejudices of interviewer.
- Result may be affected due to the difference in the mental outlook of interviewee and interviewer.
- One sided and incomplete research.

G. Schedule:

When a researcher is using a set of questionnaires for interview purpose it is known as schedule.

Schedule is the name usually applied to set of questions, which are asked and filled by an interviewer in a face to face situation with another (W.J. Goode & P. K. Hatt).

By a schedule we cannot, however, obtain information about many things at once. It is best suited to the study of a single item thoroughly.

According to Thomas Carson Macormie, The schedule is nothing more than a list of questions which, it seems necessary to test the hypothesis.

Thus, schedule is a list of questions formulated and presented with the specific purpose of testing an assumption or hypothesis. In schedule method interview occupies a central and plays a vital role.

As a matter of fact success in the use of schedule is largely determined by the ability and tact of the interviewer rather than by the quality of the questions posed.

Because the interviewer himself poses the questions and notes down the answers all by himself, the quality of questions has not any great significance.

Important Features of Schedule:

1. The schedule is presented by the interviewer. The questions are asked and the answers are noted down by him.
2. The list of questions is a mere formal document, it need not be attractive.
3. The schedule can be used in a very narrow sphere of social research.
4. It aids to delimit the scope of the study and to concentrate on the circumscribed elements essential to the analysis.
5. It aims at delimiting the subject.
6. In the schedule the list of questions is preplanned and noted down formally and the interviewer is always armed with the formal document detailing the questions.

Points to be kept in mind while designing schedule;

1. The Interviewer should not frame long, complex, defective questions.
2. Unrelated and unnecessary questions should not be asked.
3. Schedule should not contain personal and upsetting questions.

4. Its questions should be simple, clear and relevant to topic.
5. Questions should be suitable to respondent's intelligence level.
6. Impersonal, indirect and unambiguous questions should be included in schedule.

Merits of Schedule:

1. Higher percentage of responses.
2. Possible to observe personality factors.
3. Through interview personal contact is possible.
4. It is possible to give human touch to schedule.
5. Removal of doubts is possible because face to face interaction is there.
6. It is possible to know about the defects of the interviewee.

H. Observation Technique:

This is most commonly used technique of evaluation research. It is used for evaluating cognitive and non-cognitive aspects of a person. It is used in evaluation performance, interests, attitudes, values towards their life problems and situations. It is most useful technique for evaluating the behaviors of children.

It is technique of evaluation in which behavior are observed in a natural situations.

It is thorough study based on visual observation. Under this technique group behaviors and social institutions problems are evaluated (Younge,).

Observation employs relatively more visual and senses than audio and vocal organs (C.A. Morse,).

The cause- effect relationship and study of events in original form, is known as observation.

Observation seeks to ascertain what people think and do by watching them in action as they express themselves in various situations and activities.

Observation is recognized as the most direct means of studying people when one is interested in their overt behavior.

In questionnaires and interview people may write answer as they think, they do but this is often different from what they actually do. These restrictions are missing in observation so observation is a more natural way of gathering data. Artificiality and

formality of questionnaires and interview is replaced by reality and informality in observation. Data obtained through observation are more real and true than the data collected by any other method. It also plays a particular part in survey procedure.

Characteristics of Observation Schedule:

According to Jahoda it has many characteristics;

1. It serves a formulated research purpose.
2. It is planned systematically rather than occurring haphazardly.
3. It is systematically recorded and related to more general propositions.
4. It is subjected to checks and controls with respect to validity, reliability and precision.
5. It is a direct technique to study an object, an event or a problem.
6. It is based mainly on visual –audio scene.
7. It employs own experiences.
8. It establishes cause-effect relationship.
9. It is an objective technique of data collection.
10. It is both objective and subjective evaluation technique.
11. It is formal as well as informal technique.
12. It is quantitative as well as qualitative technique for data collection.

Advantages:

- ☞ It is reliable and valid technique of collecting data and information.
- ☞ We get first hand data through this method.
- ☞ Record of observation is also available immediately.
- ☞ It is simple, broad and comprehensive method.
- ☞ It is an oldest technique of data collection and getting direct information.

Limitations:

- ☞ It has a limited scope for its use because all the events cannot be observed directly.
- ☞ It is subjective method.
- ☞ It is very time consuming process.
- ☞ Costly so energy consuming also.

- Presence of observer influences the behavior of the person i.e. subject becomes conscious.
- In case covert behavior, which can't be observed, it is not useful.
- Observer should be trained and experienced.

Rating Scale:

Ratting is term applied to express opinion or judgment regarding some situation, object or character. Opinions are usually expressed on a scale of values; rating techniques are devices by which such judgments may be quantified.

Rating is an essence and direct observation (Ruth Strong).

A rating scale ascertains the degree, intensity and frequency of a variable (Von Dalen,).

Rating techniques are more commonly used in scaling traits and attributes. A rating method is a method by which one systematizes, the expression of opinion concerning a trait. The rating is done by parents, teachers, a board of interviewers and judges and even by the self as well.

The special feature of rating scale is that the attitudes are evaluated not on the basis of the opinions of the subjects but on the basis of the opinions and judgments of the experimenter himself.

In rating scale data are collected by; Verbal behavior, facial expression, personal documents, clinical type interview, projective techniques and immediate experiences as emotions, thoughts and perceptions.

Advantages:

- Writing reports to parents.
- Filling out admission blanks for colleges.
- Finding out students' needs.
- Making recommendations to employers.
- Supplementing other sources of under taking about child.
- Stimulating effect upon the rates.

Limitations:

- Difference in rating abilities.
- Difference in reliability as subjects for rating.
- Agreement among raters of one type of contact only.
- Average superior than single.
- Impact of emotions.
- Limits of self-rating.
- Over rating.
- Limits of rating of specific qualities.
- Limits of justifications.

Activities Involved in Data Collection:

Data must be collected and recorded in a form suitable for the intended analysis. The collection of data requires time and substantial effort for acquiring skills and making the necessary arrangements for collection and to ensure adequate quality.

Access to Data:

Generally it is a problem for researcher to get access to data because the institutions or the persons who generally control the data are not willing to provide him data for one or the other reason or excuse. Some necessary steps are required to motivate such institutions or persons to provide necessary data willingly. Some educational problems are of such nature that the subjects specially girls are not willing to disclose correct information. Similarly a researcher of any board or university may not have access to confidential data.

Adequate Standard:

The researcher should demonstrate that his data were properly collected. It is possible if the following conditions are fulfilled.

i. It should be ensured that the supplied data met e requirement of validity. In other words the data should, ensure what they claimed to measure.
ii. Proper attention should be paid to measurement error.

The following types of error are possible in data collection;

- Errors due to malfunctioning of measuring equipment/ instrument.
- Error of bias.

- ☞ Deliberate falsehood.
- ☞ Distortion of facts.
- ☞ Random errors.

iii. It should be ensured that a suitable sample was drawn out of the population so that proper generalization could be made.

iv. It should also be checked that the data were properly recorded. The conditions under which the data were gathered should be properly noted and suitable data recording method should be used. The efforts should be made to detect and eliminate errors arising during recording. The data are generally recorded in the following forms;

- ☞ notes of the researcher
- ☞ Log books and journals are used by a researcher doing the experiment or conducting a field study
- ☞ Interview notes
- ☞ Responses to questionnaires
- ☞ Recording on tape recorder.
- ☞ Video cameras
- ☞ Transcribing data for computer input

Data Organization:

Whatever method is used for collection of data it will be necessary that an extensive set of supplementary notes should be made for the following;

i. Sources of data
ii. Conditions under which data were gathered.

There should be stored in such a way as offer some reasonable prospects of retrieval when required.

Collecting Primary Data and Secondary Data:

The primary data can be collected through laboratory measurement, field observation, questionnaires, interviews, opinionnaires, schedules etc.

The secondary data can be collected from technical publications such as manuals, handbooks, data sheets, and standards, books and journals, official publications of

the Central government, state governments, local bodies, private data services and computer data base.

General Rules:

There are some general rules that apply to all types of data collection. They are as follows;

- ☞ Do not collect more information than is required for the research problem.
- ☞ Make sure the wording of the data collection instrument is clear and unambiguous.
- ☞ Use clear and explicit instructions in data collection instruments.
- ☞ Design the response options as carefully as the items stems themselves.
- ☞ Make responding to the measuring instrument as alternative as possible.
- ☞ Make sure that the final products look professional.

CHAPTER EIGHT

DATA ANALYSIS

Introduction

Data analysis embraces a whole range of activities of both the qualitative and quantitative type. It is usual tendency in behavioral research that much use of quantative analysis is made and statistical methods and techniques are employed. The statistical methods and techniques are employed. The statistical methods and techniques have got a special position in research because they provide answers to the problems.

Kaul defines data analysis as, studying the organized material in order to discover inherent facts. The data are studied from as many angles as possible to explore the new facts.

Purpose:

The following are the main purposes of data analysis:

- **Description:**

  It involves a set of activities that are as essential first step in the development of most fields. A researcher must be able to identify a topic about which much was not known; he must be able to convince others about its importance and must be able to collect data.

- **Construction of Measurement Scale:**

  The researcher should construct a measurement scale. All numbers generated by measuring instruments can be placed into one of four categories:

  I. **Nominal:** The number serves as nothing more than labels. For example no 1 was not less than no 2 .Similarly no 2 was neither more than no 1 and nor less than no 3.
  II. **Ordinal:** Such numbers are used to designate an ordering along some dimensions such as from less to more, from small to large, from sooner to later.
  III. **Interval:** The interval provides more précised information than ordinal one. By this type of measurement the researcher can make exact and meaningful

decisions. For example if A,B and C are of 150 cm, 145cm and 140 cm height, the researcher can say that A is 5 cm taller than B and B is 5 cm taller than C.

IV. **Ratio Scale:** It has two unique characteristics. The intervals between points can be demonstrated to be precisely the same and the scale has a conceptually meaningful zero point.

☞ **Generating empirical relationships:**

Another purpose of analysis of data is identification of regularities and relationships among data. The researcher has no clear idea about the relationship which will be found from the collected data. If the data were available in details it will be easier to determine the relationship. The researcher can develop theories if he is able to recognize pattern and order of data. The pattern may be showing association among variables, which may be done by calculating correlation among variables or showing order, precedence or priority. The derivation of empirical laws may be made in the form of simple equations relating one interval or ratio scaled variable to a few others through graph methods.

☞ **Explanation and prediction:**

Generally knowledge and research are equated with the identification of causal relationships and all research activities are directed to it. But in many fields the research has not been developed to the level where causal explanation is possible or valid predictions can be made. In such a situation explanation and prediction is construct as enabling the values of one set of variables to be derived given the values of another.

Functions:

The following are the main functions of data analysis:

☞ The researcher should analyze the available data for examining the statement of the problem.

☞ The researcher should analyze the available data for examining each hypothesis of the problem.

☞ The researcher should study the original records of the data before data analysis.

☞ The researcher should analyze the data for thinking about the research problem in lay man's term.

- ☞ The researcher should analyze the data by attacking it through statistical calculations.
- ☞ The researcher should think in terms of significant tables that the available data permits for the analysis of data.

Statistical Calculations:

The researcher will have to use either descriptive statistics or inferential statistics for the purpose of the analysis.

1. The descriptive statistics may be on any of the following forms:

☞ *Measures of Central Tendency:*

These measures are mean, median, mode geometric mean and harmonic mean. In behavioral statistics the last two measures are not used. Which of the first three will be used in social statistics depends upon the nature of the problem.

☞ *Measures of Variability:*

These measures are range, mean deviation, quartile deviation and standard deviation. In social statistics the first two measures are rarely used. The use of standard deviation is very frequently made for the purpose of analysis.

☞ *Measures of Relative Position:*

These measures are standard scores (Z or T scores), percentiles and percentile ranks .All of them are used in educational statistics for data analysis.

☞ *Measures of Relationship:*

There measures are Co-efficient of Correlation, partial correlation and multiple correlations. All of them are used in educational statistics for the analysis of data. However the use of rank method is made more in comparison to Karl Pearson method.

2. The inferential statistics may be in any one of the following forms:

☞ *Significance of Difference between Means:*

It is used to determine whether a true difference exists between population means of two samples.

- *Analysis of Variance:*

  The Z or t tests are used to determine whether there was any significant difference between the means of two random samples. The F test enables the researcher to determine whether the sample means differ from one another to a greater extent than the test scores differ from their own sample means using the F ratio.

- *Analysis of Co-Variance:*

  It is an extension of analysis of variance to test the significance of difference between means of final experimental data by taking into account the Correlation between the dependent variable and one or more Co-variate or control variables and by adjusting initial mean differences in the group.

- *Correlation Methods:*

  Either of two methods of correlation can be used for the purpose of calculating the significance of the difference between Co-efficient of Correlation.

- *Chi Square Test:*

  It is used to estimate the like hood that some factor other than chance accounts to the observed relationship. In this test the expected frequency and observed frequency are used for evaluating Chi Square.

- *Regression Analysis:*

  For calculating the probability of occurrence of any phenomenon or for predicting the phenomenon or relationship between different variables regression analysis is cone.

CHAPTER NINE

DATA INTERPRETATION

Introduction

According to Whitney (), interpretation means an adequate exposition of the true meaning of the material presented in terms of the purposes of the study being reported and of the chapter and section topic involved.

Purposes:

The following are the main purposes of interpretation of data or results;

- To throw light on the real significance of the material in the context.
- To understand implications of the data.
- To provide hints of conclusions and recommendations of the researcher.
- To show the values of greatest worth that has resulted from the research.
- To refer important generalization.

Factors:

The researcher should keep the following factors in consideration in interpretation of data;

- *Not to ignore those factors which are unstudied:*

  In social / behavioral researches there are many factors which have their impact upon the findings of the research but no researcher is in the position to study all the factors. Naturally he does not take into account in interpretation of the results those factors which have not been studied. It has its effect upon the search of truth. Thus the researcher should take into consideration such factors in his interpretation. For example if a comparison has been made between the traditional method of teaching and any modern method of teaching in respect of effectiveness of teaching, the interpretation that successful attainment is the result of method of teaching only is complete denial of the role of general mental ability, high achievement motivation and better study habits etc.

- *Not to ignore those factors which have not been selected for study:*

In social / behavioral researches, the subjects are generally so large that the researcher collects the data from a selected group only. The researcher should remember that some factors which have not been included in selective group are equally important in their impact upon findings. For example if the researcher collects data from a particular school in a particular area and then he concludes about all the schools/colleges.

☞ *Not to over –interpret the expected results:*

The researcher should remember that even if he finds the findings of the research as per his expectations he should not interpret more than what can be interpreted on the basis of data available. The researcher should be cautious that he reports all such factors which might be responsible for the findings.

☞ *Not to exercise defense mechanism in interpreting the results:*

The researcher should remember that it is not necessary that the hypotheses should always be confirmed. It is possible that the researcher may exercise defense mechanism if the results of the study are not found as per expectations of the research. In such a situation he should not try to find faults in tools or samples for the results against his expectations. If any researcher tries to do so, his interpretation will not be considered fair. The hypotheses are made in the beginning of the research when the knowledge of the researcher about the problem is very limited. Agreement between the tentative and the results is not necessary.

CHAPTER TEN

RESEARCH METHODS

Introduction

Historical Research Method:

History is the record of the changing processes. History consists of changes which social structures undergo. Social scientists studies the past to gain a better understanding of the present state of affairs. History is the meaningful record of man's achievement. It is not merely a list of characteristics of chronological events, but an integrated account of the relationship between persons, events, times and places.

Man uses history to understand the past, and try to understand the present in the light of past events and developments (Best, 1986).

Historical research is the application of the scientific method of inquiry to historical problems (Kerlinger, 1973).

Historical research deals with the past experiences….its aim is to apply the method of reflective thinking of social problems , still unsolved , by means of discovery of past trends of event, fact and attitude. It traces the lines of development in human thought and action in order to reach some basis for social activity (Miller, 1977).

Historical method may be defined as a system in which present day events are studied with reference to the events that took place in the past.

Historical method seeks to find explanation of questions of current interest by an intensive study of the past. Many studies in the field of economics, politics, sociology, education and psychology are essentially historical in approach.

Purpose of Historical Research:

i. Historical researches provide important information concerning the effects of certain past practices and may suggest plans for future actions.
ii. It also offers explanation of the how and why of many of the theories and practices that has developed and now prevails in the school/college.
iii. It contributes to an understanding of the significance of the phenomenon studied.

iv. It helps to gain an accurate account of the past.
v. It helps to gain a clear perspective of the present.

Sources of Historical Research:

There are many sources for collection of historical data like; Autobiographies, Diaries, Confessions, Memories, Personal letters, Accessible documents, news-papers and literature, books and Magazines, Cultural and Analytical history material, Artistic materials, historical paintings, Portraits , charts etc.

These sources can be divided into two categories i.e. Primary sources and Secondary sources.

☞ **Primary sources:**

The original documents are termed as Primary sources. These are solid basis of historical research and are highly prized by a historian.

According to Kerlinger (1973), a primary source is the only repository of an historical datum, like an original record kept of an important occasion, an eye witness description of an event, a photograph, minutes of organization meeting and so on.

☞ **Document or records:**

These are maintained and written by actual participant or witness of an event. These sources are produced for the purpose of transmitting information to be used in the future. Documents classified as primary sources are constitution, charters, laws, court decisions, diaries, deeds, genealogies, contracts, wills, autobiographies, letters, official minutes or records, permits, licenses, affidavits, depositions, declarations, proclamations certificates, lists, bills, handbills, receipts, newspapers, magazines, accounts, maps, diagrams, books, pamphlets, catalogues, films, pictures, paintings, recordings, transcriptions and research reports.

☞ **Remains or Relics:**

These are associated with a person, group, period, fossils, skeletons, tools, weapons, food utensils, clothing, buildings, furniture, coins, art objects, pictures and paintings are examples of relics.

☞ **Oral Testimony:**

These are spoken account of witness or participant in an event. It is obtained in a personal interview. It may be recorded or transcript as the witness relates his experiences.

Secondary Sources of Data:

In the words of Kerlinger (1973), "a secondary source is an account or record of an historical event or circumstance one or more steps removed from an original history."

Secondary sources are the reports of a person who relates the testimony of actual witness of, or participant in an event. The writer of the secondary source who was not on the scene of the event, merely reports what the person who was there said or wrote. Most history books and encyclopedias are the examples of secondary source.

Characteristics of Historical Method:

- Historical method is universal.
- Historical method involves very deep and intensive investigation of material that already exists.
- Historical facts cannot be repeated in an accurate fashion as can be done in laboratory observation.
- Only such problems which are based on historical records can be investigated by following this approach.
- Historical approach to research is the application of scientific method to historical problems.
- In Historical Method hypothesis may or may not be formulated depending upon the nature of the research.
- The interpretation of data entirely depends upon the topic of research.

Approaches to Historical Research:

- *Perspective Approach:*

It means to study the events from the past towards present. It is ancient approach. Ancient approach was to study the political personality approach.

- *Retrospective Approach:*

It means to study the events of present and proceed to past events. It is a recent approach to study the phenomena in social milieu.

Types of Historical Research:

- *Approach:*

An example is the pragmatic approach used by Karl max to arrange facts of history to support his concept of socialism.

- *Subject:*

It includes the bibliography of a given person, monograph of a town, state, nation or civilization or slightly higher level the history of ideas, institutions or trends.

- Technique: It is based either on documents or relics.
- Classical studies
- Documentary research: It considers only documents.
- Bibliographical research: It includes history of a unit. (nation, person, culture)
- Legal Research

The Steps of Historical Research:

- *Identification and Definition of the Problem:*

It involves not only the location of the problem, which has a historical significance, but also the availability of adequate data.

- *Collection of Data:*

It may involve anything from digging up ancient ruins to stumbling on old documents or remains. Most educational data have to be gathered in the routine fashion by giving minutes of meetings, diaries etc. Data are collected by two sources: primary or secondary.

- Criticism of Data:

The establishment of the validity of data involves a dual process, of first establishing the authenticity of the sources and then the validity of its content.

- Interpretation of Data:

This should be made from the standpoint of a hypothesis or theory of the data. Data should be considered in relation to one another and synthesized into a generalization or conclusion which places the overall significance in focus.

Limitations of Historical Research:

- It is very difficult to study historical events on the basis of cause-effect relationship.
- Many obstacles hinder the objectivity of the study.
- The investigator must have a special historical perspective.
- The importance of historical research has declined due to use of scientific method in social sciences.

Guidelines of Historical Research:

- Primary sources should be used as extensively as possible.
- Personal bias should not be allowed to influence research procedure.
- Proper recognition should be given to the inter-relationship of education with other social institutions and forces.
- Words and expressions should be interpreted in the light of their usages in earlier times.
- Various facts should be synthesized and integrated into meaningful generalization.
- Significant facts must be distinguished from trivial facts in a situation.

Descriptive or Survey Method

The term survey is used for the techniques of investigation by a direct observation of a phenomenon or a systematic gathering of data from population by applying personal contact and interviews when adequate information about certain problem is not available in records, files and other sources.

The survey is an important tool to gather evidences relating to certain social problems. The term social survey indicates the study of social phenomena through a survey of a small sampled population and also to broad segments of population. It is concerned with the present and attempts to determine the status of the phenomenon under investigation.

Definitions:

A social survey is a process by which quantitative facts are collected about the social aspects of a community composition and activities (Denzin, 1986).

The survey is in other words a method of analysis in scientific and orderly form for defined purpose of given social situation of problem and population.

Objects of Social Survey:

- Direct and close contact of researcher to the phenomenon under study.
- To collect general information.
- A basis for hypothesis.
- To explain cause and effect relationship.
- To know opinion and attitudes of the people.

Purposes:

- It provides necessary information which helps the administrator for making decisions.
- It provides necessary information and plan for improvement so it is forward-looking.
- It interprets, synthesizes and integrates data and points out their implications.
- It is more realistic because investigation is done in this method in natural setting.
- It is the only method through which the researcher can obtain the opinions, attitudes and suggestions for improvement.
- It is useful in the development of research tools such as checklists, questionnaires etc.

A descriptive method is divided into four parts namely: survey studies; inter-relationship; development studies; and content analysis.

The Content Analysis deals with the nature utility and procedure of content analysis. The important problems in this area are as follows;

i. Developing and modifying curriculum.
ii. Developing a standardized test in any subject.
iii. Differentiating aspects of different writing styles.

Characteristics of Survey Method:

- ☞ Social survey is confined to the study of specific current problems of society e.g. poverty, unemployment etc.
- ☞ A survey research is planned collection of data for prediction of relations between the variables.
- ☞ Survey is concerned with large or widely dispersed group of peoples contrasted with the lab experiments.
- ☞ Under this method observation, interviews, attitude scales, projective techniques, small scale experiments etc. are used to collect data.
- ☞ The facts collected here may form the basis of further social researches.

Planning a Survey Method:

The following are the steps which are involved in survey methods;

i. Select a problem.
ii. Preliminary or pilot study should be done.
iii. General and Specific objectives of the study are to be framed.
iv. It should be determined that for which of the variables, identified in the problem whether; adequate techniques for data collection are available, and if not then is it possible for the researcher to design them.
v. Population should be identified and representative sample should be selected.
vi. Data collection design should be prepared.
vii. The data should be collected.
viii. The data should be analyzed.
ix. The report should be prepared which should have descriptive past, comparative or evaluative past and findings.

Merits of Survey Methods:

i. Direct and close contact between researcher and respondents.
ii. Create objectivity.
iii. Testing the validity of theories.
iv. Formulation and testing of hypothesis.
v. Social surveys are based on actual observation.
vi. It has universal application.

Limitations:

i. Survey method is costly, time consuming and wasteful in certain cases where the objectives are limited.
ii. The survey method is unsuitable if the numbers of persons to be surveyed are very large or if they spread over a large geographical area.
iii. In this method personal bias may vitiate the result.
iv. It lacks the flexibility.
v. In this method, it is very difficult to verify the accuracy of the data collection.
vi. Only useful for current problems.
vii. It does not permit more comprehensive and dynamic study of the society but deals with the problems of immediate importance only.
viii. Under this method most of the surveys are conducted on sample basis. If the sample is not carefully planned, inferences drawn may be inaccurate and misleading.

Experimental Method

It may be defined as the study of the relationships among variables-those manipulated and those measured. It simply enables the researcher to improve the conditions under which the researcher observes and thus to arrive at a more precise results. It enables him to relate a given consequent to a specific antecedent rather than to a vague conglomeration of antecedents.

It is a scientific method; give more precise, accurate and reliable results. It is just like an observation under controlled conditions. It acts on the law of single variable and causing factors. It studies cause and effect relationship. It is a systematic and logical method for answering the questions. In this the researcher seeks to evaluate something new. It leads to contribution to the already acquired fund of knowledge. The three essential elements in an experiment are; control, manipulation and observation. In this, the experimenter has to imagine that research conditions are entirely new; they did not exist previously and recently.

It is a method in which we study the effect of d dependent variable on independent variable. Whatever we know about the environment, is possible only by observation. All types of experiments are related with observation and generalization of these observed facts and it is also possible to test the internal validity.

Definitions:

It is a method of testing hypothesis.

An experiment is an observation under controlled conditioned (Kothari, 1984).

Experimental research is the description and analysis of what will be or what will occur, under carefully controlled condition (Best, 1973).

Experiment is a means of providing the hypothesis whereby the causal relations between two facts are studied (Ghosh, 1992).

The essence of an experiment may be described as observing the effect on a dependent variable of the manipulation of an independent variable.

Characteristics:

i. Based on the law of single variable.
ii. This method of research is mostly used in educational / social researches where the factors can be controlled.
iii. Experimental method is a method of testing of clear specific hypothesis of different intensions.
iv. It is a bias free estimation of the true effect.
v. It emphasizes control of conditions and the experimentation of certain variables in controlled conditions.
vi. It sets out more or less of the causal type relationship between the phenomenon.
vii. It uses standardized tool for experimentation and makes the evidences very much objective.
viii. The sample is selected with great precaution and very care is taken to safe guard extraneous factors.
ix. This method helps in developing laws, postulate and theories.
x. It allows for precision and definiteness.

Elements:

Control: The extent to which different factors are accounted for

1. *Purposes of Control:*

- ☞ Intervening variables are isolated so that they may affect the dependent variable.
- ☞ Not only intervening variables are to be isolated from independent variables but it is also to be ascertained how much it contributed.
- ☞ The magnitude is not only ascertained terms of larger or small but also in quantitative terms.

2. *Degree of Control:*

It has to be remembered that in social researches high degree of control is not possible as in laboratory situation.

3. *Methods of Control:*

The researcher directs efforts towards controlling the variables which are related to the independent variable otherwise it will be difficult to ascertain which is responsible for effect on dependent variable.

The following methods are used for controlling;

- ☞ *Random assignment of subjects to groups:*

It means that subjects are assigned in such a way that every member has an equal opportunity of being chosen.

- ☞ *Matching subjects with random assignment:*

The subjects are assigned to groups to match individual's subjects on as many extraneous variables as the researcher can identify. They may be; (a) Subject to subject matching, (b) matching for mean and standard deviation,(c)Ranking of subjects on matching variable.

- ☞ *Random assignment on the basis of homogeneous selection:*

It is done to make groups comparable on an extraneous variable so as to select groups those are as homogenous as possible on the variable. The variable may be like socio-economic –status and sex etc.

4. *Techniques of analysis of Co-variance:*

It is attempted to control the variation within the groups .A co-variate is a variable which the researcher has not been able to control.

5. *Methods of using subjects as their own controls:*

It is done to assign the same subjects to two experimental treatments and then to obtain measurements of the subjects under one treatment and then on the other. But there is practical difficulty in this method in some cases.

6. *Manipulation:*

In the experimental method manipulation is done to set the stage for the occurrence of the factor whose performance is to be studied under conditions in which all other factors are controlled. Variables which can be manipulated may be personality characteristics, attitudes, teaching methods, type of motivation etc.

7. *Observation:*

Another element of the experimental method is that the effect of the manipulation of independent variable on the dependent variable is studied or observed. The technique of observation is applied if measurement is not possible.

8. *Replication:*

In spite of attempts of controlling extraneous variables, some extraneous variable and some discrepancies remain and influence the results. Thus replication is a matter of conducting a number of sub-experiments within the frame work of an overall experiment design.

Features:

- ☞ It is based on law of the single variable. It means if one element is added or subtracted in one of the two situations and other situation is kept as it is, the change in the two situations is the result of that single variable.
- ☞ It is applicable when significant factor or conditions can be controlled.
- ☞ It is not a perfectly precise method in educational research as in scientific method.
- ☞ Control group and experimental group are never identical as they should be for an exact experiment.

Experimental Validity:

Two types of validity are involved;

1. Internal Validity:

It is the minimum without which an experiment is useless. The crucial point is whether the independent variable created the effect on the dependent variable. It means that some uncontrolled extraneous factors do not affect the dependent variable. The following eight extraneous factors are to be controlled for obtaining internal validity;

- Contemporary confounding factor.
- Maturation of the subject with the passage of time,
- Experience in pre-test reflecting itself in the post test,
- Change in the calibration of the measuring instruments,
- Tendency for extreme scores to regress towards the mean,
- Difference in the selection of subject in the pre-test and post-test,
- Differential loss of subjects from the experimental and control groups tend to bias the results of the experiment,
- Interaction of selection and maturation and selection and history.

2. External Validity:

The crucial point is the applicability of the findings beyond the limits of particular experiment. Are the results valid in general for students? The following factors are to be controlled for obtaining external validity;

- Selections of sample with some special characteristics make the application restrictive.
- Pre-testing may sensitize the subject to the experimental factor.
- Effects of experimental procedures restrict the generalize ability of the findings.
- Effects of a treatment on a subject previously exposed to other treatments cannot be generalized to other subjects who have not undergone the same sequence of treatments.

Types of Experimental Designs:

It is to the researcher what a blue –print is to an architect. The following are the factors upon which the selection of designs depends;

- What is the nature of the experiment?
- What is the main purpose of the experiment?
- What types of the variables are to be manipulated?
- What is the nature of data?
- What is the competence level of the experimenter?

The experimental designs are classified as follows;

a) Pre-experimental designs:

In this type of design there is no control over extraneous or situation variables. They are divided into the following categories;

Design No.1:

One Group Pre-test-Post-test Design

Pretest	Independent Variable	Post-test
T_1	x	T_2

Since there is no control group in this research design it cannot be checked whether the obtained result is due to treatment or extraneous variables.

Design No.2:

Two Group, Static Design

Group	**Independent Variable**	**Post-Test**
Experiment		T_2
Control		T_2

In this design, the two groups are assigned but neither on the basis of randomization nor matching. There is no pre-test so the researcher cannot measure the difference on account of treatment. In this design, comparison is made on the basis of post-test, in experimental group and control group.

b) True-experimental designs:

In these designs, the researcher attempts to control the effects of history, maturation, testing, measuring instruments etc.

Design No.3:

Two groups, Randomized Subject, Post –test only Design

Randomly Assigned Group	**Independent Variable**	**Post-Test**
Experiment		T_2
Control		T_2

In this design, there is provision of randomization of subjects to the two groups, it assures the equivalence of groups and since there is no provision of pre-test there is probability of interaction effect. However, the use of the designs restricts the external validity of the experiment. There are some situations which do not permit selection of subjects at random.

DesignNo.4:

Two groups, Randomized Matched Subjects, Post-test only Design

Randomly Assigned Group after matching	**Independent Variable**	**Post-Test**
Experiment		T_2
Control		T_2

This design is the most useful where small groups are to be used. In this design the subjects are randomly assigned to two groups after matching, it ensures strengths to design.

But it is very difficult to match the subjects with precision because it reduces the sizes of the sample. In some cases it is not possible to match one or more potential subjects. If some subjects are to be reduced for this purpose, a bias is introduced in the sample.

Design No.5:

Randomized groups—Pre-test, Post-test Design

Randomly Assigned	Pre-Test	Independent Variable	Post-Test
Experiment	T_1 E		T_2 E
Control	T_1 C		T_2 C

In this design additional check is provided for the equality of Experimental group and control group because there is provision of pre-test. The nature of the design is such that it controls most of the extraneous variables.

However, the design has certain limitations. Firstly interaction between pre-test and treatment may sensitize subjects which may affect the results. Secondly, interaction of experimental variable with other factor limits its generalization. Thirdly, experimental procedure may affect normalcy.

Design No.6:

The Randomized Solomon Three Group Design

Randomly assigned	**Pre-test**	**Independent variable**	**Post-test**
Experimental (E)	T_1 E		T_2 E
Control group (C_1)	T_1 C_1		T_2 C_1
Control group 2 (C_2)	No pre-test		T_2 C_2

In this design check is provided for the equality of Experimental group and control group because there is provision of pre-test. The nature of the design is such that it controls most of the extraneous variables. The provision of the second control group ensures control interaction effect of Pre-test and treatment.

Steps of Experimental Research Methods:

The procedures of the experimental method are to be executed under the following steps;

- *Identifying, defining and delimiting the problem:*

The problem that can be verified or refuted by the experimental data should be selected first. The variables to be investigated are defined in operational terms.

- *Reviewing the literature:*

After selecting the problem, the related literature and experiments should be reviewed and the method of approach or experimental design to be pursued should be planned or outlined.

☞ *Formulating the hypothesis and deducing their consequences:*

The problem has to be converted into a hypothesis that can be verified or refuted by experimental method.

☞ *Drawing up the experimental design:*

This section should place primary emphasis on the question of control, randomization, replication, place of the experiment, duration of the experiment, selecting or constructing and validating instruments to measure the outcomes of the experiment and conducting pilot for trial run tests to perfect instrument.

☞ *Defining the population:*

It is necessary to define the population precisely so that there can be no question about population to which the conclusions are to apply. It may consist of selecting a sample of subjects to represent a given population and pairing of subjects to secure homogeneity.

☞ *Administration of test / Carrying out the study:*

It is necessary to insist on close adherence to plans and experimental design. This will involve controlling variable or non-experimental factors, applying the experimental factors and keeping the careful record of steps in the procedure.

☞ *Measuring the outcomes / Collection of Data:*

Careful consideration must be given to the selection of the criterion on the basis of which the results are measured.

☞ *Analyzing and interpreting the outcomes;*

The result pertaining to the factors under study should be clearly noted. The analysis of data demands expert use of statistical procedures. Only then the analysis becomes the basis for valid interpretation.

☞ *Drawing the conclusions:*

The conclusions of the study must be restricted to the population actually covered; care must be taken not to over generalize the results. The result also pertains to the conditions under which they were derived. Care must be taken to restrict the conclusions to the conditions actually present in the experiment.

☞ *Reporting the results:*

The study must be reported in sufficient details.

CHAPTER ELEVEN

RESEARCH PROPOSAL

Introduction

Each researcher has to write a research proposal before he undertakes any research work. For a new researcher it presents a great problem because he does not know the components of any research proposal. Even an experienced research worker is required to write a research proposal if he proposes to obtain financial assistance for a research project from any research organization. In Zambia, University of Edenberg, Zambia Open University, Cavendish University, Rusangu University etc. have developed their own research formats but a few basic components are common to all well-prepared research proposals.

Title of the Proposal:

The first part of any research proposal is its title. If the title is not clearly stated it will not help the researcher in his work. A good title should clearly identify the research proposal and must clearly state about the following:

- What variables are included in the research proposal?
- What is the relationship between the different variables?
- Which is the population to which the results may be generalized?

While independent and dependent variables are stated in the research proposal title, which are of experimental nature, the variants and criterion variables are written in non-experimental studies.

One example of each is given below;

Experimental Study:

"The Effect of Computer Aided Learning on the Academic Achievement of Students"

Non-Experimental Study:

"The Relationship between Socio-Economic Status and Academic Achievement in Computer Aided Learning"

In the experimental study the title of the research proposal is so stated that it shows the effect of independent variable upon dependent variable. This type of title indicates which variable will be manipulated by the research and upon which variable its effect will be observed. In non- experimental study, the title should indicate the relationship between the variant and the criterion variable. In non – experimental study the variables are not manipulated, only relationship between variant and criterion variable is stated. In the above examples, "Computer Aided Learning" is an independent variable and academic achievement is dependent variable. In the second example the 'Socio-Economic Status' is an example of criterion variable.

The boundaries should be identified for which the research findings may be generalized. They are generally expressed in the terms of 'Target Population'.

In the above examples, students are target population in experimental and non-experimental population respectively.

Another requirement for a good, research title is that it should not be too lengthy. Attempts should not be made to answer all questions relating to variables and the population in a title. *Fifteen to twenty words are the maximum can be included in a research title*.

Some good titles are given below;

1. "Assessment of Computer Aided Learning Integration and Innovation: Education for the 21stcentury, a Case of Selected Secondary Schools in Lusaka, Zambia."
2. "The Effects of Grading on Achievement in Mathematics."
3. "The Relationship between Spelling, Achievement and a Personality Factor".
4. "A Comparison of the Evaluation of Teacher Performance by Principals and Teachers".
5. "The Role of Workers Education in Raising Critical Consciousness amongst Workers".

☞ *Research Problem:*

The second part of any research proposal is the research problem. It is of special importance on account of its strategic location. The problem should define and delimit the specific area of the proposed research. It should begin with the general background of the problem and end with a specific statement of the problem. The research problem should be so structured that it should begin with a broad base of general problems and explanations. It should be followed by a survey of related research literature. It should end with the problem statement. The background of the research should identify the variables of the research problem; discuss the variables which are selected for the research study. Other important variables which are not included in the research study should also be briefly discussed. It should also be made clear that which criteria were used for the selection of the variables. This part of the research proposal should be written in simple language and should also be précised.

- ☞ *The significance of the problem should also be written. It should meet the following requirements;*
  i. The research proposal is time bound document. Thrust areas of research changes from time to time. Only such areas should be selected which are of crucial importance these days.
  ii. The research proposal should be related with practical problems. It should provide solution to any existing social / behavioral /educational /institutional/library related problem etc.
  iii. The research problem should not have small target population, because its result cannot be verified.
  iv. Target population of any research problem should be related to a popular population.

If the research proposal is to be submitted for financial assistance it should also show what the areas of priority of the funding agency are. Each agency grants financial assistance to those research studies which it considers as central to its area of concern and others as peripheral.

The statement of the problem is the last stone in the pyramid of the research problem. It specifies the variate and criterion variables in non-experimental studies and independent and dependent variables in an experimental study, the type of relationship between variables and target population.

Another criterion of a good problem statement is that it can be measured. A research problem in which the relationship between variables cannot be measured empirically cannot be categorized a research problem.

The statement which seeks to answer the question of value-judgment should not be included in research problem. Such questions cannot be answered by a research study. They should be avoided in a research proposal.

☞ *Statement of Hypothesis:*

The third part of a research proposal is statement of Hypotheses. It is done more sophistically than the statement of problem. The research hypothesis is presented in an affirmative form rather than in the interrogative form. They state what is expected to occur if various conditions are evoked or presumed. The researcher should review the related literature thoroughly before formulating hypotheses.

All the terms which are used in any hypothesis should be carefully defined. The hypothesis should be unambiguous and testable. Since the quantum of achievement is difficult to predict at the time of statement of hypothesis, researchers prefer 'null hypothesis' which assumes that only a chance difference is expected to occur between the groups .A null hypothesis merely states that there is no relationship between the variables. It is expressed in statistical terms; Xa - Xb= 0.

Suppose a researcher observed that Mr.X appeared to have better teacher-student relation than Mr.Y. It was observed that Mr.X used to discuss personal problems of the students and find out their solutions while Mr.Y used to have only formal relationship of classroom teaching. The researcher formulated the following problem.

☞ "What are the effects of discussion of personal problems of the students on the teacher-student relationship"?

The problem statement could be written as substantive hypothesis in the following words;

☞ "The discussion of personal problems of the students will have better teacher-student relationship than not having any such discussion."

This hypothesis can be written as null hypothesis in the following form;

- "Discussion of personal problems of the students by the teachers with them and no discussion will have no differential effect upon the teacher-student relationship."

The following criteria should be used for the formulation of testable and significant hypothesis;

i. The hypothesis must be clearly stated in operational terms.
ii. The hypothesis must be specific and testable.
iii. Research problems should be selected which are directly related to previous research or theoretical formulations.

Procedures:

The fourth part of a research proposal is called procedures. It is also called as 'Methodology' and 'Method of Procedure.'

It comprises of the following;

1. Target Population:

It is also called universe. The salient characteristics of the population should be thoroughly described so that it should be definite that what is the target population for which sample is to be drawn and to which the results of the study could be generalized.

2. Sampling Plan:

The method of sampling should be specified in the research proposal. If the sample is not thoroughly analyzed and precisely described, faulty generalizations may be made. The sample should be made the true representative of the population. The sampling plan should also be described in the proposal. It should describe how the units in the target population will be selected and used .A good sampling plan should meet the following criteria;

- Obtaining or constructing an accurate, current list of the target population units.
- Method of drawing the sample.
- Number of subjects or population units to be selected.

3. Research Design:

The research design should indicate how the research setting will be arranged in order to yield the desired data with the least possible contamination/ error by intervening variables. There is no single design that can be applied in all the cases. It depends upon individual researcher to devise his design. The design should ensure the answer of every hypothesis designed in the proposed research work.

A well prepared research design should contain the following characteristics;

- Specifications of its relationship to each research hypothesis.
- Description of the methods of proposed control of confounding variables and threats to validity.
- Description of the design in statistical terms.
- Identification of the types of interferences that may be made.

4. Stimulus Materials:

It should also be specified in the research proposal that what stimulus materials will be used in the study. Kinds and ways of stimuli should be described. Most commonly used stimuli are printed instructional materials. Instructional materials should include the following elements;

1. Title
2. Author/Editor
3. Publisher
4. Year of publication
5. Intended population
6. Time required for administration
7. Cost of material
8. Response Measures:

The researcher should specify clearly what raw data are required by the research design and how they will be collected. Each instrument should be described including the following items of information:

- Title
- Author/Editor
- Publisher
- Population
- Forms

- Test Objectives
- Description of test ,items, scoring procedures
- Traits represented in score
- Predictive / Concurrent validity
- Reliability data
- Normative data
- Internal consistency of tests
- Time required for administration
- Cost of material
- Data of publication
- Data Collection Methods:

The research proposal should identify the schedules and procedures to be used for acquiring the data and recording it accurately. If they are lengthy, they should be placed in an appendix and reference be given in the body of the proposal.

Data Analysis:

The researcher should specify how the data will be ordered and reduced to relate directly to the research problem. The statistical procedure to be used in the analysis of data they should be described. It will be done hypothesis wise or not, it should be indicated in the research proposal.

If a complex design or obscure statistical test is to be used, it should be indicated in the proposal.

If the research proposal is to be submitted to a Funding agency, the following information should also be provided in the research proposal;

Logistics:

It consists of the following;

- Time Schedule
- Personnel
- Facilities, equipment and supplies
- Travel expenses
- Publication costs and other direct costs
- Budget forms

The researcher should identify the funding agency such as; Universities, NGOs and Private companies.

The researcher should also obtain the research format from the funding agency and prepare research proposal on the guidelines provided by the funding agency.

CHAPTER TWELVE

RESEARCH REPORT

Introduction

A detailed account of the research experience from selection and definition of the problem, formulation of hypotheses, gathering, analyzing and interpreting data, testing of hypotheses, making conclusion and suggesting further research in the related problem area is called a research report.

Components:

The basic components of a research report are as follows;

1. Introduction of the research problem:
   - ☞ The researcher will write in it;
   - ☞ What is the problem?
   - ☞ What is its importance?
   - ☞ What is the relation of the problem with previous theory and research,
   - ☞ What are the objectives of the study?
   - ☞ What are the hypotheses?
2. Description of the procedure of the research:

The researcher will write in it;

- ☞ How did he select the subjects?
- ☞ How many subjects were used?
- ☞ How were the subjects assigned to groups?
- ☞ What was done to the subjects?
- ☞ How was it done?
- ☞ When was it done?
- ☞ How long was it done?
- ☞ How was the reliability of the measuring instruments measured?
- ☞ How was the validity of the measuring instruments measured?

3. Description and presentation of the results:

The researcher will write in it;

- ☞ Which statistical procedures he used to test the hypotheses?

- What were the outcomes of those procedures?
- What were the subsidiary findings of the research?

4. Discussion of the study findings:

The researcher will write in it;

- Why did the results manifest themselves in a particular way?
- What did there results signify?
- What was the relationship between this research and the previous research upon which it was based?

Features:

The following are the essential features of a good research report;

- Clarity
- Conciseness
- Veracity
- No place for figures of speech, lyrical prose and in using anecdotes.
- No lengthy digressions
- Only necessary details
- Absolute uncompromising honesty
- Serious attempt and not a game

Reasons for Writing:

The following are the main reasons on account of which the researcher should write the research report.

i. It is a logical conclusion of doing the research.
ii. It enriches the curriculum vitae of the researcher which helps him in appointment and promotion.
iii. Writing of the research report is an easy task and it is not that difficult as understood.

Mode of Communications:

The researcher may use any of the following modes for communicating his research results;

1. *A research monograph:*

The researcher may publish a research monograph on the basis of his research results through a research journals or a reputed research publisher.ph depends upon the standard of the research work and the reputation of the researcher.

2. *A research journal:*

The researcher may publish a research paper in a reputed research journal. But this requires that the paper should be acceptable to the Editor of the journal. The prestigious journals send these papers to reviewers who are conversant with the research area in which the research paper has been written.

3. *Presenting in the meeting of the Association/ Society /Congress:* There are annual conferences of the associations, societies and Congress in each subject area. They provide opportunities to the researchers to present their research results in the form of a research paper before the members of the association or the society or the delegates of the Congress which are followed by the discussions. The journals of those organizations publish these papers in the form of the proceedings of the Association / Society / Congress.

Format:

The research reports are divided into the following parts;

1. Preliminary Section:

It consists of the following:

- ☞ Title Page
- ☞ Preface
- ☞ Table of Contents
- ☞ List of Tables
- ☞ List of figure, maps and illustrations

2. Introduction:

It consists of the following:

- ☞ Importance of the problem under investigation.
- ☞ A review of related literature

- ☞ Statement of Hypotheses or relationships being studied
- ☞ Delimitations of the study
- ☞ Assumptions of the study
- ☞ Definition of important terms

3. Methods:

It consists of the following;

- ☞ How was the study conducted?
- ☞ From which population was the sample selected?
- ☞ How many subjects were selected?
- ☞ What were the demographic characteristics of the subjects?(male/female, average age)
- ☞ Was there any characteristic which make the sample a typical to the population?
- ☞ How were the subjects assigned to groups?
- ☞ What instructions were given to the subjects?
- ☞ How conditions were controlled?
- ☞ What was the treatment of variables?
- ☞ How, when and on what were subjects measured?
- ☞ What data collection instruments were used?
- ☞ What was the format of items?
- ☞ What was the reliability of the instrument?
- ☞ What was the validity of the instrument?
- ☞ What are the details of the instruments which were prepared by the researcher?

4. *Results:*

It consists of the following

- ☞ What statistical procedure was used to study the hypotheses?
- ☞ What was the probability level of each hypotheses test?
- ☞ What was the probability level of each statistics?
- ☞ What was the attendant degree of freedom?
- ☞ What was the strength of the relationship of the variables?
- ☞ What were the group means and standard deviation?
- ☞ What were principle finding?

5. *Discussion:*

It consists of the following;

- ☞ What were the original purposes of the study?
- ☞ How were these purpose met?
- ☞ Why the obtained occurred?
- ☞ What were the conclusions of the researcher for practice, theory and future research?
- ☞ What is the contribution of the study to the research literature?
- ☞ What are the strengths and weaknesses of the study?

6. *Reference Section:*

It consists of the following:

- ☞ Bibliography
- ☞ Appendices: Questionnaires, Copies of letters used, evaluation sheets, checklists etc.

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