BUSINESS RESEARCH METHODS

Introduction

The word 'research' stands for re-search. It refers to a search for knowledge. But here we should remember that it must be a scientific and systematic search for pertinent information on a specific topic. Research is an organized and systematic way of finding answers to questions. In fact, research is an art of scientific investigation.

Research is a careful investigation or inquiry specifically through search for new facts in any branch of knowledge. It is an original contribution to the existing stock of knowledge making for its advancement.

Research can be about anything, and we hear about all different types of research in the news. Research really begins with the right question, because your question must be answerable.

Definitions

Some people consider that research is a movement, a movement from the known to the unknown. It is a journey of discovery. We all possess the vital character of curiosity because when the unknown confronts us, we all wonder at it and our curiosity makes us probe and by to attain full and fuller understanding of the unknown.

C.R. Kothari in his book, Research Methodology, defines that this curiosity is the mother of all knowledge and the method, which men employ for obtaining the knowledge of whatever the unknown can be, is termed as research. Research is an academic activity and, as such, the term should be used in a technical sense.

Let us discuss some definitions of research

L.V. Redman and A.V.H. Mory in their book "The Romance of Research" have defined research as "a systematized effort to gain new knowledge".

"Research is a scientific and systematic search for pertinent information on a specific topic" (C.R. Kothari; 'Research Methodology – Methods and Techniques').

"A careful investigation or inquiry specially through search for new facts in any branch of knowledge" (Advanced Learners' Dictionary of Current English).

D. Slesinger and M. Stephenson in the 'Encyclopedia of social Sciences' have defined research as- "manipulation of things, concepts or symbols for the purpose of generalizing and to extend, correct or verify knowledge, whether that knowledge aids in the construction of theory or in the practice of an art".

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

OBJECTIVES OF RESEARCH

The purpose of research is to discover answers to questions through the application of scientific procedures. 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, we may think of research objectives as falling into a number of following broad groupings:

1. To gain familiarity or achieve a new insight towards a certain topic.
2. To verify and test important facts
3. To analyze an event, process or phenomenon
4. To identify the cause and effect relationship
5. To find solutions to scientific non-scientific and social problems
6. To determine the frequency at which something occurs
7. To test a hypothesis of a causal relationship between variables.

Criteria of Good Research

Whatever may be the types of research works and studies, one thing that is important is that they all meet on the common ground of scientific method employed by them. One expects scientific research to satisfy the following criteria:

1. The purpose of the research should be clearly defined and common concepts be used.
2. The research procedure used should be described in sufficient detail to permit another researcher to repeat the research for further advancement, keeping the continuity of what has already been attained.
3. The procedural design of the research should be carefully planned to yield results that areas objective as possible.
4. The researcher should report with complete frankness, flaws in procedural design and estimate their effects upon the findings.
5. 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.

6. 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.
7. Greater confidence in research is warranted if the researcher is experienced, has a good reputation in research and is a person of integrity.

In other words, we can state the qualities of a good research as under:

1. **Good research is systematic:**

   It means that research is structured with specified steps to be taken in a specified sequence in accordance with the well-defined set of rules. Systematic characteristic of the research does not rule out creative thinking but it certainly does reject the use of guessing and intuition in arriving at conclusions.

2. **Good research is logical:**

   This implies that research is guided by the rules of logical reasoning and the logical process of induction and deduction are of great value in carrying out research. Induction is the process of reasoning from a part to the whole whereas deduction is the process of reasoning from some premise to a conclusion which follows from that very premise. In fact, logical reasoning makes research more meaningful in the context of decision making.

3. **Good research is empirical:**

   It implies that research is related basically to one or more aspects of a real situation and deals with concrete data that provides a basis for external validity to research results.

4. **Good research is replicable:**

   This characteristic allows research results to be verified by replicating the study and thereby building a sound basis for decisions.

Research and Scientific Method

For a clear perception of the term research, one should know the meaning of scientific method. The two terms, research and scientific method, are closely related. Research, as we have already stated,can be termed as "an inquiry into the nature of, the reasons for, and the consequences of any particular set of circumstances, whether these circumstances are experimentally controlled or recorded just as they occur.

In this context, Karl Pearson writes, "The scientific method is one and same in the branches (of science) and that method is the method of all logically trained minds … the unity of all sciences consists alone in its methods, not its material; the man who classifies facts of any kind whatever, who sees their mutual relation and describes their sequences, is applying the Scientific Method

and is a man of science." Scientific method is the pursuit of truth as determined by logical considerations.

The ideal of science is to achieve a systematic interrelation of facts. Scientific method attempts to achieve "this ideal by experimentation, observation, logical arguments from accepted postulates and a combination of these three in varying proportions." In scientific method, logic aid sin formulating propositions explicitly and accurately so that their possible alternatives become clear .Further, logic develops the consequences of such alternatives, and when these are compared with observable phenomena, it becomes possible for the researcher or the scientist to state which alternatives most in harmony with the observed facts. All this is done through experimentation and survey investigations which constitute the integral parts of scientific method.

Experimentation is done to test hypotheses and to discover new relationships. If any, among variables. But the conclusions drawn on the basis of experimental data are generally criticized for either faulty assumptions, poorly designed experiments, badly executed experiments or faulty interpretations. As such the researcher must pay all possible attention while developing the experimental design and must state only probable inferences. The purpose of survey investigations may also be to provide scientifically gathered information to work as a basis for the researchers for their conclusions.

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

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

Thus, "the scientific method encourages a rigorous, impersonal mode of procedure dictated by the demands of logic and objective procedure." Accordingly, scientific method implies an objective, logical and systematic method, i.e., a method free from personal bias or prejudice, a method to ascertain demonstrable qualities of a phenomenon capable of being verified, a method wherein the researcher is guided by the rules of logical reasoning, a method wherein the investigation proceeds inane orderly manner and a method that implies internal consistency.

TYPES OF RESEARCH

Types of research can be classified in many different ways. some major ways of classifying research include the following.

1. **Descriptive Vs Analytical Research**

Descriptive research includes surveys and fact finding enquiries of different types. The main objective of this type of research is to describe the state of affairs as it exists at present. In social sciences research we use the term "export facto research" for descriptive research study. The main characteristic of this method is that the researcher has no control over the variables; he can only report what has happened or what is going on.

On the other hand, the researcher has to use facts and information which are available and after collecting these data the researcher can analyse and make a critical evaluation on the materials in the method of analytical research.

2. **Applied Vs Fundamental Research**

Applied research is based on action and the main objective of this research is to find a solution for an immediate problem facing the society, media industry or business organization. It focuses on analysis and solving social and real life problems.

Fundamental research is carried out as more to satisfy intellectual curiosity, than with the intention of using the research findings for any immediate practical application. The main motivation here is to expand man's knowledge, not to create or invent something. According to Travers, "Basic Research is designed to add to an organized body of scientific knowledge and does not necessarily produce results of immediate practical value.

3. **Quantitative Vs Qualitative Research**

This research is based on numeric figures or numbers. Quantitative research aims to measure the quantity or amount and compares it with past records and tries to project for future period. In social sciences, "quantitative research refers to the systematic empirical investigation of quantitative properties and phenomena and their relationships". The objective of quantitative research is to develop and employ mathematical models, theories or hypothesis pertaining to phenomena..

Qualitative research presents non-quantitative type of analysis. Qualitative research is collecting, analyzing and interpreting data by observing what people do and say. Qualitative research refers to the meanings, definitions, characteristics, symbols, metaphors, and description of things. Qualitative research is much more subjective and uses very different methods of collecting information, mainly individual, in-depth interviews and focus groups.

4. Conceptual Vs Empirical Research

Conceptual research is involves investigation of thoughts and ideas and developing new ideas or interpreting the old ones based on logical reasoning. In contrast empirical research is based on firm verifiable data collected by either observation of facts under natural condition or obtained through experimentation.

5. Explanatory research:

Explanatory research goes beyond description and attempts to explain the reasons for the phenomenon that the descriptive research only observed. The research would use theories or at least hypothesis to account for the forces that caused a certain phenomenon to occur.

6. Futuristic research:

Futures research is the systematic study of possible future conditions. It includes analysis of how those conditions might change as a result of the implementation of policies and actions, and the consequences of these policies and actions.

7. Historical research

It allows one to discuss past and present events in the context of the present condition, and allows one to reflect and provide possible answers to current issues and problems. Eg:-the lending pattern of business in the 19th century.

8. Case study research

It is a form of qualitative research that is focused on providing a detailed account of one or more cases. Eg:-we may study a classroom that was given a new curriculum for technology use.

9. Problem oriented research

Research is done by industry apex body for sorting out problems faced by all the companies. Eg:- WTO does problem oriented research for developing countries, in India agriculture and processed food export development authority (APEDA) conduct regular research for the benefit of agri-industry.

Scope of Business Research

Business research is almost always applied research. This means that it is problem-oriented with the objective of obtaining information to help solve a specific business problem or make a decision.

Business research is described as the systematic and objective procedure for producing information for help in making business decisions. Business research should be objective, which means that the information found needs to be detached and impersonal instead of biased. Research facilitates the managerial decision process for all aspects of a business.

Scope of Business Research Includes the Following Areas

1. **Production Management:** The research performs an important function in product development, diversification, introducing a new product, product improvement, process technologies, choosing a site, new investment etc.
2. **Personnel Management:** Research works well for job redesign, organization restructuring, development of motivational strategies and organizational development.
3. **Marketing Management:** Research performs an important part in choice and size of target market, the consumer behavior with regards to attitudes, life style, and influences of the target market. It is the primary tool in determining price policy, selection of channel of distribution and development of sales strategies, product mix, promotional strategies, etc.
4. **Financial Management:** Research can be useful for portfolio management, distribution of dividend, capital raising, hedging and looking after fluctuations in foreign currency and product cycles.
5. **Materials Management:** It is utilized in choosing the supplier, making the decisions relevant to make or buy as well as in selecting negotiation strategies.
6. **General Management:** It contributes greatly in developing the standards, objectives, long-term goals, and growth strategies.

RESEARCH PROCESS

Research process contains a series of closely related activities which has to carry out by a researcher. Research process requires patients. There is no measure that shows your research is the best. It is an art rather than a science. Following are the main steps in social or business research process.

1. Selection of Research Problem
2. Extensive Literature Survey
3. Making Hypothesis
4. Preparing the Research Design
5. Sampling
6. Data collection
7. Data Analysis
8. Hypothesis Testing
9. Generalization and Interpretation
10. Preparation of Report

1. Selection of Research Problem

The selection of topic for research is a difficult job. When we select a title or research statement, then other activities would be easy to perform. So, for the understanding thoroughly the problem it must have to discuss with colleagues, friend, experts and teachers. The research topic or problem should be practical, relatively important, feasible, ethically and politically acceptable.

2. Literature Review or Extensive Literature Survey

After the selection of research problem, the second step is that of literature mostly connected with the topics. The availability of the literature may bring ease in the research. For this purpose academic journals, conference and govt. reports and library must be studied.

3. Making Hypothesis

The development of hypothesis is a technical work depends on the researcher experience. The hypothesis is to draw the positive & negative cause and effect aspects of a problem. Hypothesis narrows down the area of a research and keep a researcher on the right path.

4. Preparing the Research Design

After the formulation of the problem and creating hypothesis for it, research Design is to prepare by the researcher. It may draw the conceptual structure of the problem. Any type of research design may be made, depend on the nature and purpose of the study. Daring R. Design the information about sources, skill, time and finance is taken into consideration.

5. Sampling

The researcher must design a sample. It is a plan for taking its respondents from a specific areas or universe. The sample may be of two types:

1. **Probability Sampling**
2. **Non-probability Sampling**

6. Data collection

Data collection is the most important work, is researcher. The collection of information must be containing on facts which is from the following two types of researcher.

Primary Data Collection: Primary data may be from the following.

1. Experiment
2. Questionnaire
3. Observation
4. Interview

Secondary data collection: it has the following categories:

1. Review of literature
2. Official and non-official reports
3. Library approach

7. Data Analysis

When data is collected, it is forwarded for analysis which is the most technical job. Data analysis may be divided into two main categories.

Data Processing: it is sub-divided into the following.

Data editing, Data coding, Data classification, Data tabulation, Data presentation, Data measurement

Data Exposition: Date Exposition has the following sub-categories.

Description, Explanation, Narration, Conclusion/Findings, Recommendations/Suggestions

8. Hypothesis Testing

Research data is then forwarded to test the hypothesis. Do the hypothesis are related to the facts or not? To find the answer the process of testing hypothesis is undertaken which may result in accepting or rejecting the hypothesis.

9. Generalization and Interpretation

The acceptable hypothesis is possible for researcher to arrival at the process of generalization or to make & theory. Some types of research has no hypothesis for which researcher depends upon on theory which is known as interpretation.

10. Preparation of Report

A researcher should prepare a report for which he has done is his work. He must keep in his mind the following points:

11. Report Design in Primary Stages

The report should carry a title, brief introduction of the problem and background followed by acknowledgement. There should be a table of contents, grapes and charts.

12. Main Text of the Report

It should contain objectives, hypothesis, explanations and methodology of the research. It must be divided into chapters and every chapter explains separate title in which summary of the findings should be enlisted. The last section would be clearly of conclusions to show the main theme of the R-study.

13. Closing the Report

After the preparation of report, the last step in business research process contains of bibliography, references, appendices, index and maps or charts for illustration. For this purpose the information should more clearer.

LITERATURE REVIEW

A literature review is a body of text that aims to review the critical points of current knowledge including applicable findings as well as theoretical and methodological contributions to a particular topic.

Most often associated with academic-oriented literature, such as thesis. Its ultimate goal is to bring the reader up to date with current literature on a topic and forms the basis for another goal, such as future research that may be needed in the area.

A literature review is an account of what has been published on a topic by accredited scholars and researchers. Occasionally, we are asked to write one as a separate assignment (sometimes in the form of an annotated bibliography), but more often it is part of the introduction to an essay, research report, dissertation or thesis.

Meaning

- ✓ Review of literature is one of the most important steps in the research process.
- ✓ It is an account of what is already known about a particular phenomenon.
- ✓ The main purpose of literature review is to convey to the readers about the work already done & the knowledge & ideas that have been already established on a particular topic of research.
- ✓ Literature review is a laborious task, but it is essential if the research process is to be successful.

A *literature review* "contains a critical analysis and the integration of information from a number of sources, as well as a consideration of any gaps in the literature and possibilities for future research".

Literature review - Definition

- A body of text that aims to review the critical points of current knowledge on a particular topic
- A comprehensive survey of publications in a specific field of study or related to a particular line of research
- Non-quantitative summary of existing published literature made by experts who select and weigh findings available from the literature
- A summary and interpretation of research findings reported in the literature
- A process and documentation of the current relevant research literature regarding a particular topic or subject of interest

Purpose of a Literature Review

1. Attain a good knowledge of the field of inquiry - facts, scholars, etc.
2. Methodologies common to the field
3. Proposed research is really needed
4. Helps to narrow a problem
5. Generation of hypotheses, or questions for further studies
6. Commence a long-term study of interest.

A Good Literature Review is:

- **Focused -** The topic should be narrow. You should only present ideas and only report on studies that are closely related to topic.
- **Concise -** Ideas should be presented economically. Don't take any more space than you need to present your ideas.
- **Logical -** The flow within and among paragraphs should be a smooth, logical progression from one idea to the next
- **Developed -** Don't leave the story half told.
- **Integrative -** Your paper should stress how the ideas in the studies are related. Focus on the big picture. Your paper should stress how all the studies reviewed contribute to your topic.
- **Current -** Your review should focus on work being done on the cutting edge of your topic.

DEFINING THE RESEARCH PROBLEM

In research process, the first and foremost step happens to be that of selecting and properly defining a research problem. A researcher must find the problem and formulate it so that it becomes susceptible to research. Like a medical doctor, a researcher must examine all the symptoms (presented to him or observed by him) concerning a problem before he can diagnose correctly. To define a problem correctly, a researcher must know: what a problem is?

A research problem, in general, refers to some difficulty which a researcher experiences in the context of either a theoretical or practical situation and wants to obtain a solution for the same.

SELECTING THE PROBLEM

The research problem undertaken for study must be carefully selected. The task is a difficult one, although it may not appear to be so. Help may be taken from a research guide in this

connection. Nevertheless, every researcher must find out his own salvation for research problems cannot be borrowed.

A problem must spring from the researcher's mind like a plant springing from its own seed. If our eyes need glasses, it is not the optician alone who decides about the number of the lens we require. We have to see ourselves and enable him to prescribe for us the right number by cooperating with him. Thus, a research guide can at the most only help a researcher choose a subject.

However, the following points may be observed by a researcher in selecting a research problem or a subject for research:

(i) Subject which is overdone should not be normally chosen, for it will be a difficult task to throw any new light in such a case.

(ii) Controversial subject should not become the choice of an average researcher.

(iii) Too narrow or too vague problems should be avoided.

(iv) The subject selected for research should be familiar and feasible so that the related research material or sources of research are within one's reach. Even then it is quite difficult to supply definitive ideas concerning how a researcher should obtain ideas for his research. For this purpose, a researcher should contact an expert or a professor in the University who is already engaged in research. He may as well read articles published in current literature available on the subject and may think how the techniques and ideas discussed therein might be applied to the solution of other problems. He may discuss with others what he has in mind concerning a problem. In this way he should make all possible efforts in selecting a problem.

(v) The importance of the subject, the qualifications and the training of a researcher, the costs involved, the time factor are few other criteria that must also be considered in selecting a problem.

In other words, before the final selection of a problem is done, a researcher must ask himself the following questions:

(a) Whether he is well equipped in terms of his background to carry out the research?

(b) Whether the study falls within the budget he can afford?

(c) Whether the necessary cooperation can be obtained from those who must participate in research as subjects? If the answers to all these questions are in the affirmative, one may become sure so far as the practicability of the study is concerned.

(vi) The selection of a problem must be preceded by a preliminary study. This may not be necessary when the problem requires the conduct of a research closely similar to one that has already been done. But when the field of inquiry is relatively new and does not have available a

set of well developed techniques, a brief feasibility study must always be undertaken. If the subject for research is selected properly by observing the above mentioned points, the research will not be a boring drudgery, rather it will be love's labour. In fact, zest for work is a must.

The subject or the problem selected must involve the researcher and must have an upper most place in his mind so that he may undertake all pains needed for the study.

FORMULATING THE RESEARCH PROBLEM

Once the general topic or problem has been identified, this should then be stated as a clear research problem, that is, taken from just a statement about a problematic situation to a clearly defined researchable problem that identifies the issues you are trying to address.

It is not always easy to formulate the research problem simply and clearly. In some areas of scientific research the investigator might spend years exploring, thinking, and researching before they are clear about what research questions they are seeking to answer. Many topics may prove too wide-ranging to provide a researchable problem. Choosing to study, for instance a social issue such as child poverty, does not in itself provide a researchable problem. The problem is too wide-ranging for one researcher to address. Time and resources would make this unfeasible and the results from such a study would consequently lack depth and focus.

STATEMENT OF RESEARCH PROBLEM

An adequate statement of the research problem is one of the most important parts of the research. Different researchers are likely to generate a variety of researchable problems from the same situation since there are many research issues that can arise out of a general problem situation. Your research will be able to pursue only one in depth.

For a problem statement to be effective in the planning of applied research it should have the following characteristics (Andrew and Hildebrand 1982).

1. The problem reflects felt needs
2. The problem is non-hypothetical, ie it must be based on factual evidence
3. It should suggest meaningful and testable hypotheses - to avoid answers that are of little or no use to the alleviation of the problem
4. The problems should be relevant and manageable

Formulating the research problem allows you to make clear, both to yourself and the reader, what the purpose of your research is. Subsequent elaboration of method should be oriented to providing information to address that problem. The problem statement is therefore a very important device for keeping you on track with your research. It is also one means by which your research will be evaluated - does the research address the problem as stated.

5 Ways to Formulate the Research Problem

1.Specify the Research Objectives

A clear statement of objectives will help you develop effective research. It will help the decision makers evaluate your project. It's critical that you have manageable objectives. (Two or three clear goals will help to keep your research project focused and relevant.)

2.Review the Environment or Context of the Research Problem

As a marketing researcher, you must work closely with your team. This will help you determine whether the findings of your project will produce enough information to be worth the cost.

In order to do this, you have to identify the environmental variables that will affect the research project.

3.Explore the Nature of the Problem

Research problems range from simple to complex, depending on the number of variables and the nature of their relationship.

If you understand the nature of the problem as a researcher, you will be able to better develop a solution for the problem.

To help you understand all dimensions, you might want to consider focus groups of consumers, sales people, managers, or professionals to provide what is sometimes much needed insight.

4. Define the Variable Relationships

Marketing plans often focus on creating a sequence of behaviors that occur over time, as in the adoption of a new package design, or the introduction of a new product.

Such programs create a commitment to follow some behavioral pattern in the future.

Studying such a process involves:

- Determining which variables affect the solution to the problem.
- Determining the degree to which each variable can be controlled.
- Determining the functional relationships between the variables and which variables are critical to the solution of the problem.

During the problem formulation stage, you will want to generate and consider as many courses of action and variable relationships as possible.

5.The Consequences of Alternative Courses of Action

There are always consequences to any course of action. Anticipating and communicating the possible outcomes of various courses of action is a primary responsibility in the research process.

SAMPLING

Sampling means selecting a particular group or sample to represent the entire population. Sampling methods are majorly divided into two categories probability sampling and non-probability sampling. In the first case, each member has a fixed, known opportunity to belong to the sample, whereas in the second case, there is no specific probability of an individual to be a part of the sample.

Advantages of sampling

Sampling ensures convenience, collection of intensive and exhaustive data, suitability in limited resources and better rapport. In addition to this, sampling has the following advantages also.

1. Low cost of sampling

If data were to be collected for the entire population, the cost will be quite high. A sample is a small proportion of a population. So, the cost will be lower if data is collected for a sample of population which is a big advantage.

2. Less time consuming in sampling

Use of sampling takes less time also. It consumes less time than census technique. Tabulation, analysis etc., take much less time in the case of a sample than in the case of a population.

3. Scope of sampling is high

The investigator is concerned with the generalization of data. To study a whole population in order to arrive at generalizations would be impractical.

Some populations are so large that their characteristics could not be measured. Before the measurement has been completed, the population would have changed. But the process of sampling makes it possible to arrive at generalizations by studying the variables within a relatively small proportion of the population.

4. Accuracy of data is high

Having drawn a sample and computed the desired descriptive statistics, it is possible to determine the stability of the obtained sample value. A sample represents the population from which its is drawn. It permits a high degree of accuracy due to a limited area of operations. Moreover, careful execution of field work is possible. Ultimately, the results of sampling studies turn out to be sufficiently accurate.

5. Organization of convenience

Organizational problems involved in sampling are very few. Since sample is of a small size, vast facilities are not required. Sampling is therefore economical in respect of resources. Study of samples involves less space and equipment.

6. Intensive and exhaustive data

In sample studies, measurements or observations are made of a limited number. So, intensive and exhaustive data are collected.

7. Suitable in limited resources

The resources available within an organization may be limited. Studying the entire universe is not viable. The population can be satisfactorily covered through sampling. Where limited resources exist, use of sampling is an appropriate strategy while conducting marketing research.

8. Better rapport

An effective research study requires a good rapport between the researcher and the respondents. When the population of the study is large, the problem of rapport arises. But manageable samples permit the researcher to establish adequate rapport with the respondents.

Disadvantages of sampling

The reliability of the sample depends upon the appropriateness of the sampling method used. The purpose of sampling theory is to make sampling more efficient. But the real difficulties lie in selection, estimation and administration of samples.

1. Chances of bias

The serious limitation of the sampling method is that it involves biased selection and thereby leads us to draw erroneous conclusions. Bias arises when the method of selection of sample employed is faulty. Relative small samples properly selected may be much more reliable than large samples poorly selected.

2. Difficulties in selecting a truly representative sample

Difficulties in selecting a truly representative sample produces reliable and accurate results only when they are representative of the whole group. Selection of a truly representative sample is difficult when the phenomena under study are of a complex nature. Selecting good samples is difficult.

3. In adequate knowledge in the subject

Use of sampling method requires adequate subject specific knowledge in **sampling technique**. Sampling involves statistical analysis and calculation of probable error. When the researcher lacks specialized knowledge in sampling, he may commit serious mistakes. Consequently, the results of the study will be misleading.

4. Changeability of units

When the units of the population are not in homogeneous, the sampling technique will be unscientific. In sampling, though the number of cases is small, it is not always easy to stick to the, selected cases. The units of sample may be widely dispersed.

Some of the cases of sample may not cooperate with the researcher and some others may be inaccessible. Because of these problems, all the cases may not be taken up. The selected cases may have to be replaced by other cases. Changeability of units stands in the way of results of the study.

5. Impossibility of sampling

Deriving a representative sample is difficult, when the universe is too small or too heterogeneous. In this case, census study is the only alternative. Moreover, in studies requiring a very high standard of accuracy, the sampling method may be unsuitable. There will be chances of errors even if samples are drawn most carefully.

TYPES OF SAMPLING

Sampling takes on two forms in statistics: probability sampling and non-probability sampling:

Probability sampling is a sampling technique, in which the subjects of the population get an equal opportunity to be selected as a representative sample.

Nonprobability sampling is a method of sampling wherein, it is not known that which individual from the population will be selected as a sample

Probability sampling

Probability sampling is based on the fact that every member of a population has a known and equal chance of being selected. For example, if you had a population of 100 people, each person would have odds of 1 out of 100 of being chosen. With non-probability sampling, those odds are not equal. For example, a person might have a better chance of being chosen if they live close to the researcher or have access to a computer. Probability sampling gives you the best chance to create a sample that is truly representative of the population.

Types of Probability Sampling

1. **Simple random sampling** is a completely random method of selecting subjects. These can include assigning numbers to all subjects and then using a random number generator to choose random numbers. Classic ball and urn experiments are another example of this process (assuming the balls are sufficiently mixed). The members whose numbers are chosen are included in the sample.
2. **Stratified Random Sampling** involves splitting subjects into mutually exclusive groups and then using simple random sampling to choose members from groups.

3. **Systematic Sampling** means that you choose every "nth" participant from a complete list. For example, you could choose every 10th person listed.
4. **Cluster Random Sampling** is a way to randomly select participants from a list that is too large for simple random sampling. For example, if you wanted to choose 1000 participants from the entire population of the India, it is likely impossible to get a complete list of everyone. Instead, the researcher randomly selects areas (i.e. cities or counties) and randomly selects from within those boundaries.
5. **Multi-Stage Random sampling** uses a combination of techniques.

   Multi-stage sampling (also known as multi-stage cluster sampling) is a more complex form of cluster sampling which contains two or more stages in sample selection. In simple terms, in multi-stage sampling large clusters of population are divided into smaller clusters in several stages in order to make primary data collection more manageable. It has to be acknowledged that multi-stage sampling is not as effective as true random sampling; however, it addresses certain disadvantages associated with true random sampling such as being overly expensive and time-consuming.

Non-probability sampling

Non-probability sampling is a sampling technique where the odds of any member being selected for a sample cannot be calculated. It's the opposite of probability sampling, where you can calculate the odds. In addition, probability sampling involves random selection, while non-probability sampling does not–it relies on the subjective judgement of the researcher.

Types of Non-Probability Sampling

1. **Convenience Sampling:** as the name suggests, this involves collecting a sample from somewhere convenient to you: the mall, your local school, your church. Sometimes called accidental sampling, opportunity sampling or grab sampling.
2. **Haphazard Sampling:** where a researcher chooses items haphazardly, trying to simulate randomness. However, the result may not be random at all and is often tainted by selection bias.
3. **Purposive Sampling:** where the researcher chooses a sample based on their knowledge about the population and the study itself. The study participants are chosen based on the study's purpose. There are several types of purposive sampling. For a full list, advantages and disadvantages of the method, see the article: Purposive Sampling.
4. **Expert Sampling:** in this method, the researcher draws the sample from a list of experts in the field.

5. **Heterogeneity Sampling / Diversity Sampling:** a type of sampling where you deliberately choose members so that all views are represented. However, those views may or may not be represented proportionally.
6. **Modal Instance Sampling:** The most "typical" members are chosen from a set.
7. **Quota Sampling:** where the groups (i.e. men and women) in the sample are proportional to the groups in the population.
8. **Snowball Sampling:** where research participants recruit other members for the study. This method is particularly useful when participants might be hard to find. For example, a study on working prostitutes or current heroin users.

RESEARCH DESIGN

Designing of the research is done mainly to solve the problem of getting the various stages of the research under control. This control factor is very important for the researcher during any of the research operation. Preparation of the design for the research forms a very critical stage in the process of carrying out some research work or a research project.

Research Design in general terms can be referred to as the scheme of work to be done or performed by a researcher during the various stages of a research project.

With the help of the research design, one can very easily handle and operate research work as research design acts as a working plan, which is made by a researcher even before he starts working on his research project. By this, researcher gets a great help and guidance in achieving his aims and goals.

According to Russell Ackoff, research design is the process of making decisions before a situation arises in which the decision has to be carried out. It is actually a process of deliberate anticipation directed towards bringing an unexpected situation under control.

Russell Ackoff has in a great way explained about the research design in his book 'Designs of Social Research'.

Meaning of research design

Like an architect prepares a blue print before he approves a construction in the same way researcher makes or prepares a plan or a schedule of his own study before he starts his research work. This helps the researcher to save time and also save some of his crucial resources. This plan or blue print of study is referred to as the research design.

Research design is also called as the research strategy and the various steps or stages that a research design may include can be summarized as follows

1. Research problem selection
2. Problem presentation
3. Hypothesis formulation
4. Conceptual clarity
5. Methodology
6. Literature survey
7. Bibliography
8. Collection of the data
9. Hypothesis testing
10. Interpretation of the result
11. Report writing

This specific presentation of the various steps in the process of research was given by Cook Jahoda.

Factors affecting research design

1. Availability of scientific information
2. Availability of sufficient data
3. Time availability
4. Proper exposure to the data source
5. Availability of the money
6. Manpower availability
7. Magnitude of the management problem
8. Degree of Top management' s support
9. Ability, knowledge, skill, technical understanding and technical background of the researcher
10. Controllable variables
11. Un – controllable variables
12. Internal variables
13. External variables

Advantages of research design

1. Consumes less time.
2. Ensures project time schedule.
3. Helps researcher to prepare himself to carry out research in a proper and a systematic way.
4. Better documentation of the various activities while the project work is going on.
5. Helps in proper planning of the resources and their procurement in right time.
6. Provides satisfaction and confidence, accompanied with a sense of success from the beginning of the work of the research project..

The key elements of a good research design are as under :

- It is a plan which describes the sources and kinds of information strongly related to the research problem.
- It is a strategy indicating which method will be employed for collecting and examining the data.
- It also consists of the time and cost budgets because most studies are done under these two limitations.

In a nutshell, research design must, at least, contain

(a) A clear statement of the research problem;

(b) Processes and methods to be utilized for collecting data;

(c) The population to be researched; and

(d) Techniques to be employed in processing and examining data.

More explicitly, the design decisions happen to be in respect of:

- ✓ What is the study about?
- ✓ Why is the study being made?
- ✓ Where will the study be carried out?
- ✓ What type of data is required?
- ✓ Where can the required data be found?
- ✓ What periods of time will the study include?
- ✓ What will be the sample design?
- ✓ What techniques of data collection will be used?
- ✓ How will the data be analyzed?
- ✓ In what style will the report be prepared?

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Need for Research Design

Research design is needed because it facilitates the smooth sailing of the various research operations, thereby making research as efficient as possible yielding maximal information with minimal expenditure of effort, time and money. Research design has a significant impact on the reliability of the results obtained. It thus acts as a firm foundation for the entire research.

For example, economical and attractive construction of house we need a blueprint (or what is commonly called the map of the house) well thought out and prepared by an expert architect, similarly we need a research design or a plan in advance of data collection and analysis for our research project.

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.

The need for research design is as follows:

- It reduces inaccuracy;
- Helps to get maximum efficiency and reliability;
- Eliminates bias and marginal errors;
- Minimizes wastage of time;
- Helpful for collecting research materials;
- Helpful for testing of hypothesis;
- Gives an idea regarding the type of resources required in terms of money, manpower, time, and efforts;
- Provides an overview to other experts;
- Guides the research in the right direction.

Steps in Research Design

Following are the steps in research design:

1. The Problem – The first step involves the proper selection and then carefully defining the problem. By this researcher will be enabled to know about what he has to search, but it should be kept in mind that the problems selected should not be unmanageable in nature and also should not be based on the desires.

2. Objective of the study – The objective should be very clear in the mind of the researcher as this will lead to the clarity of the design and proper response from the respondents.

3. Nature of the study – The research design should be very much in relation with the nature of the study, which is to be carried out.

4. Data sources – The various sources of the data or the information should be very clearly stated by the researcher.

5. Techniques of data collection – For the collection of the required information, it sometimes becomes very necessary to use some especial techniques.

6. Social cultural context – Research design based on the social cultural concept is prepared in order to avoid the various study variations.

7. Geographical limit – This step becomes a necessity at this point of time as with the help of this step, research linked to the hypothesis applies only to certain number of social groups.

8.Basis of selection – Selecting a proper sample acts as a very important and critical step and this is done with the help of some mechanics like drawing a random stratified, deliberate, double cluster or quota sample etc.

DATA COLLECTION

Data collection is the process of gathering and measuring information on variables of interest, in an established systematic fashion that enables one to answer stated research questions, test hypotheses, and evaluate outcomes.

Types of data

Primary Data

Primary data means original data that has been collected specially for the purpose in mind. It means someone collected the data from the original source first hand. Data collected this way is called primary data.

Secondary Data

Secondary data refers to data that was collected by someone other than the user. Common sources of secondary data for social science include censuses, information collected by

government departments, organisational records and data that was originally collected for other research purposes.

Collection of Primary Data

Statistical data as we have seen can be either primary or secondary. Primary data are those which are collected for the first time and so are in crude form. But secondary data are those which have already been collected.

Primary data are always collected from the source. It is collected either by the investigator himself or through his agents. There are different methods of collecting primary data. Each method has its relative merits and demerits. The investigator has to choose a particular method to collect the information. The choice to a large extent depends on the preliminaries to data collection some of the commonly used methods are discussed below.

I. Observation Method

Observation means viewing or seeing. We go on observing something or other while we are awake. Most of such observations are just casual and have no specific purpose. But observation in a method of data collection is different from such casual viewing.

The most common method used for getting information about the various things around us, is to observe those things and also the various processes related to those things. Hence, it can be said that observation acts as a fundamental and the basic method of getting information about anything. But it must be kept in mind that observation is not just seeing things but it is carefully watching the things and trying to understand them in depth, in order to get some information about them.

Observation may be defined as a systematic viewing of a specific phenomenon in its proper setting for the specific purpose of gathering data for a particular study.

Observations sometimes act scientifically, when used by the researchers in various research works but it should be noted that all observations are not scientific in nature.

According to Oxford Concise Dictionary, observation means 'accurate watching, noting the phenomenon by which they occur in the nature with regard to the cause and effect of mutual relations.'

Science begins with observation and at the end also uses observation for the final validation so it can be said that Observation acts as very elegant method in case of scientific investigation.

Features of observation

1. Eye Observation

In an accurate sense, observation involves the use of the eyes rather than the use of the ears and the voice. An experienced worker never believes in hearsay he only trusts if he has observed that with his own eyes or if the report is a first hand evidence of his eyes. So it can be said that observation done with the help of the eyes acts as a most trustworthy medium for making an observation.

2. Aim

Observations which act on scientific grounds are brought in use by the scientists or the researchers with some or the other aim to achieve something. Such scientists make their observations in a very minute and a detailed manner which helps them in achieving specific goals. These goals can include discovery of something, verification of the hypothesis etc.

3. Planning

The value of an observation in an operation is only if it is done properly – in a planned manner as, if it is done in a careless sense then the chance of making such an observation again may come or not. Hence, observation should be carried out in a very phased and a planned manner in order to get in depth understanding of an activity.

4. Recording

The various operations that we perform and the results that we obtain should be remembered but a known fact is that memory is very deceptive in nature. With the passage of time things tend to get out of mind, so it is very important to keep a record of such activities. One very common method to keep a track of these activities is to write down the various impressions, but now a days a tape or in some cases a video camera is used for the recording purposes.

One of the major advantages of the recording done by a tape or a video camera is that the chances of going wrong i.e. committing any mistake are very less or almost negative. In tape, actual words can be recorded which results in zero chance of committing an error.

5. Physical and mental activity

Sense organs have a very critical role to play in the observation process. During the observation researcher or an investigator has to use his sense organs for seeing and hearing things and then has to keep in mind the whole set of observations for an in depth analysis of the matter later on.

6. Exactness

Observation should be based on standardized tools of research which makes an observation exact in its nature of working.

7. Direct study

Observation is a very vital scientific method that helps a lot in the collection of the primary information that is reliable in nature in which direct study of the situation is involved.

Types of Observation

1. Casual and Scientific observation – An observation can be sometimes casual in nature or sometimes it may act scientifically. An observation with a casual approach involves observing the right thing at the right place and also at the right time by a matter of chance or by luck whereas a scientific observation involves the use of the tools of the measurement, but a very important point to be kept in mind here is that all the observations are not scientific in nature.

2. Natural Observation – Natural observation involves observing the behaviour in a normal setting and in this type of observation, no efforts are made to bring any type of change in the behavior of the observed. Improvement in the collection of the information and improvement in the environment of making an observation can be done with the help of natural observations.

3. Subjective and Objective observation – All the observations consist of the two main components, the subject and the object. The subject refers to the observer whereas the object refers to the activity or any type of operation that is being observed. Subjective observation involves the observation of the one's own immediate experience whereas the observations involving observer as an entity apart from the thing being observed, are referred to as the objective observation. Objective observation is also called as the retrospection.

4. Direct and Indirect observation – With the help of the direct method of observation, one comes to know how the observer is physically present in which type of situation is he present and then this type of observation monitors what takes place. Indirect method of observation involves studies of mechanical recording or the recording by some of the other means like photographic or electronic. Direct observation is relatively more straight forward as compared to the indirect observation**.**

5. Participant and Non Participant observation – Participation by the observers with the various types of operations of the group under study refers to the participant type of observation. In participant observation, the degree of the participation is largely affected by the nature of the study and it also depends on the type of the situation and also on its demands.But in the non

participant type of observation, no participation of the observer in the activities of the group takes place and also there occurs no relationship between the researcher and the group.

6. Structured and Unstructured observation – Structured observation works according to a plan and involves specific information of the units that are to be observed and also about the information that is to be recorded. The operations that are to be observed and the various features that are to be noted or recorded are decided well in advance. Such observations involve the use of especial instruments for the purpose of data collection that are also structured in nature. But in the case of the unstructured observation, its basics are diametrically against the structured observation. In such observation, observer has the freedom to note down what he or she feels is correct and relevant to the point of study and also this approach of observation is very suitable in the case of exploratory research.

7. Controlled and Non Controlled observation: Controlled observations are the observations made under the influence of some of the external forces and such observations rarely lead to improvement in the precision of the research results. But these observations can be very effective in the working if these are made to work in the coordination with mechanical synchronizing devices, film recording etc. Non controlled observations are made in the natural environment and reverse to the controlled observation these observations involve no influence or guidance of any type of external force.

Advantages of Observation

1. Very direct method for collecting data or information – best for the study of human behavior.
2. Data collected is very accurate in nature and also very reliable.
3. Improves precision of the research results.
4. Problem of depending on respondents is decreased.
5. Helps in understanding the verbal response more efficiently.
6. By using good and modern gadgets – observations can be made continuously and also for a larger duration of time period.
7. Observation is less demanding in nature, which makes it less bias in working abilities.
8. By observation, one can identify a problem by making an in depth analysis of the problems.

Disadvantages of Observation

1. Problems of the past cannot be studied by means of observation.
2. Having no other option one has to depend on the documents available.
3. Observations like the controlled observations require some especial instruments or tools for effective working, which are very much costly.
4. One cannot study opinions by this means.
5. Attitudes cannot be studied with the help of observations.
6. Sampling cannot be brought into use.
7. Observation involves a lot of time as one has to wait for an event to happen to study that particular event.
8. The actual presence of the observer himself Vis a Vis the event to occur is almost unknown, which acts as a major disadvantage of observation.
9. Complete answer to any problem or any issue cannot be obtained by observation alone.

2. Interview Method

This method of collecting data involves presentation of oral verbal stimuli and reply in terms of oral - verbal responses.

According to Vivien Palmar, "the interview constitutes a social situation between the two persons, the psychological process involved requiring both the individuals mutually respond through the social research. The purpose of the interview calls for a varied response from the two parties concerned".

This method acts as a very vital tool for the collection of the data in the social research as it is all about the direct systematic conversation between an interviewer and the respondent. By this the interviewer is able to get relevant information for a particular research problem.

It can be achieved by two ways :-

(A) Personal Interview - It requires a person known as interviewer to ask questions generally in a face to face contact to the other person. It can be -

1. **Direct personal investigation -** The interviewer has to collect the information personally from the services concerned.
2. **Indirect oral examination -** The interviewer has to cross examine other persons who are suppose to have a knowledge about the problem.
3. **Structured Interviews -** Interviews involving the use of pre- determined questions and of highly standard techniques of recording.
4. **Unstructured interviews -** It does not follow a system of pre-determined questions and is characterized by flexibility of approach to questioning.

5. **Focused interview -** It is meant to focus attention on the given experience of the respondent and its effect. The interviewer may ask questions in any manner or sequence with the aim to explore reasons and motives of the respondent.
6. **Clinical interviews -** It is concerned with broad underlying feeling and motives or individual's life experience which are used as method to ellict information under this method at the interviewer direction.
7. **Non directive interview -** The interviewer's function is to encourage the respondent to talk about the given topic with a bare minimum of direct questioning.

Advantages

- More information and in depth can be obtained
- Samples can be controlled
- There is greater flexibility under this method
- Personal information can as well be obtained
- Mis-interpretation can be avoided by unstructured interview.

Limitations

- It is an expensive method
- Possibility of bias interviewer or respondent
- More time consuming
- Possibility of imaginary info and less frank responses.
- High skilled interviewer is required

(B) Telephonic Interviews - It requires the interviewer to collect information by contacting respondents on telephone and asking questions or opinions orally.

Advantages

- It is flexible, fast and cheaper than other methods
- Recall is easy and there is a higher rate of response
- No field staff is required.

Limitations

- Interview period exceed five minutes maximum which is less
- Restricted to people with telephone facilities.
- Questions have to be short and to the point
- Less information can be collected.

3. Questionnaire

This method acts as a great source or a facility for the collection of the data from the diverse and scattered group of people. A questionnaire consists of a variety of the questions printed or typed in a definite order on a form which are mailed further to the respondents. The respondent has to answer these questions on his own.

The main function or the objective of the questionnaire is to collect data from the respondents, who are generally scattered in a vast diverse area.

This method also helps in the collection of reliable and dependable data.

According to Bogardus, "a questionnaire is a list of the questions sent to a number of persons to answer. It secures the standardized results that can be tabulated and also treated statistically."

Essentials of a good questionnaire

To draft a questionnaire or schedule is an art. The success of statistical investigation depends on proper drafting of the questionnaire. It is a highly specialized job and following points should be borne in mind:

1. Brief and Limited Questionnaire:

The number of questions in a schedule should be brief and limited as possible. Only relevant questions to the problem under investigation should be added.

2. Simple and Clear:

The questions should be simple, clear and precise. Its language should be very simple so that informants may easily understand.

3. Unambiguous Questions:

All unambiguous questions should be avoided at all, complicated and long-worded questions irritate the respondents which results in careless; replies.

4. No Personal Questions:

No personal question should be asked from, respondents. Such questions should be avoided.

5. Use of Proper Words:

Questions should be framed with right words. This ensures the validity.

6. Avoidance of Calculations:

Questions should not be based on calculations. Only those questions should be asked which the respondents may reply immediately. Moreover, questions should avoid memories.

7. Only Objective Questions:

The questions should be objective. It should be based on opinions of the individuals.

8. Sequence of the Questions:

The arrangement of the questions should be such so that no question may slip back. It must involve a logical flow of questions.

9. Pre-testing:

Before sending the questionnaire to the respondents, it must be properly tested.

10. Instructions:

Precise and simple instructions of filling the questionnaire should be added in the foot note.

11. Cross Examination:

The questionnaire should be set in such a way that there may be cross examination of the information supplied by the informants. In fact, it is a check on false or inaccurate answers.

12. Secret Information:

Every respondent should be ensured that information given by them shall be kept secret.

13. Attractive Questionnaire:

Proper care should be taken to make the questionnaire attractive. A well set questionnaire will certainly impress the recipient

Advantages

- Free from bias of interviewer
- Respondents have adequate time to give
- Respondents have adequate time to give answers
- Respondents are easily and conveniently approachable
- Large samples can be used to be more reliable

Limitations

- Low rate of return of duly filled questionnaire
- Control over questions is lost once it is sent
- It is inflexible once sent
- Possibility of ambiguous or omission of replies
- Time taking and slow process

4. Schedules

In case the informants are largely uneducated and non-responsive data cannot be collected by the mailed questionnaire method. In such cases, schedule method is used to collect data. Here the questionnaires are sent through the enumerators to collect information. Enumerators are persons appointed by the investigator for the purpose. They directly meet the informants with the questionnaire. They explain the scope and objective of the enquiry to the informants and solicit their cooperation.

The enumerators ask the questions to the informants and record their answers in the questionnaire and compile them. The success of this method depends on the sincerity and efficiency of the enumerators. So the enumerator should be sweet-tempered, good-natured, trained and well-behaved.

Schedule method is widely used in extensive studies. It gives fairly correct result as the enumerators directly collect the information. The accuracy of the information depends upon the honesty of the enumerators. They should be unbiased. This method is relatively more costly and time-consuming than the mailed questionnaire method.

Overview of Different Techniques Data Collection Techniques

Technique	Key Facts	Example
Interviews	• Interviews can be conducted in person or over the telephone • Interviews can be done formally (structured), semi-structured, or informally • Questions should be focused, clear, and encourage open- ended responses • Interviews are mainly qualitative in nature	One-on-one conversation with parent of at-risk youth who can help you understand the issueto see a sample key informant interview.
Questionnaires and Surveys	• Responses can be analyzed with quantitative methods by assigning numerical values to Likert-type scales • Results are generally easier (than qualitative techniques) to analyze • Pretest/Posttest can be compared and analyzed	Results of a satisfaction survey or opinion survey to see an example of a survey created using the CYFERnetSEARCH Interactive Survey Builder feature.to see a sample survey on middle school youth risk behavior.

Observations	• Allows for the study of the dynamics of a situation, frequency counts of target behaviors, or other behaviors as indicated by needs of the evaluation • Good source for providing additional information about a particular group, can use video to provide documentation • Can produce qualitative (e.g., narrative data) and quantitative data	Site visits to an after-school program to document the interaction between youth and staff within the program
Focus Groups	• A facilitated group interview with individuals that have something in common • Gathers information about combined perspectives and opinions • Responses are often coded into categories and analyzed thematically	A group of parents of teenagers in an after-school program are invited to informally discuss programs that might benefit and help their children succeed
Ethnographies , Oral History, and Case Studies	• Involves studying a single phenomenon • Examines people in their natural settings • Uses a combination of techniques such as observation, interviews, and surveys • Ethnography is a more holistic approach to evaluation • Researcher can become a confounding variable	Shadowing a family while recording extensive field notes to study the experience and issues associated with youth who have a parent or guardian that has been deployed for an example of an oral history. for an additional example of an oral history.

COLLECTION OF SECONDARY DATA

A researcher can obtain secondary data from various sources. Secondary data may either be published data or unpublished data.

Published data are available in :

a. Publications of government

b. Technical and trade journals

c. Reports of various businesses, banks etc.

d. Public records

e. Statistical or historical documents.

Unpublished data may be found in letters, diaries, unpublished biographies or work.

Before using secondary data, it must be checked for the following characteristics -

1. Reliability of data - Who collected the data? From what source? Which methods? Time? Possibility of bias? Accuracy?

2. Suitability of data - The object, scope and nature of the original enquiry must be studies and then carefully scrutinize the data for suitability.

3. Adequacy - The data is considered inadequate if the level of accuracy achieved in data is found inadequate or if they are related to an area which may be either narrower or wider than the area of the present enquiry.

TOOLS FOR COLLECTION OF DATA

Data Collection is an important aspect of any type of research study. Inaccurate data collection can impact the results of a study and ultimately lead to invalid results.Data collection methods for impact evaluation vary along a continuum. At the one end of this continuum are quantitative methods and at the other end of the continuum are Qualitative methods for data collection.

Depending on the nature of the information to be gathered, different instruments are used to conduct the assessment: forms for gathering data from official sources such as police or school records; surveys/interviews to gather information from youth, community residents, and others; and focus groups to elicit free-flowing perspectives.

TYPES OF TOOLS

The various methods of data gathering involve the use of appropriate recording forms. These are called tools or instruments of data collection. They consist of

- Observation schedule
- Interview guide
- Interview schedule
- Mailed questionnaire
- Rating scale
- socio-metry
- Checklist
- Document schedule/data sheet

Each of the above tools is used for a specific method of data gathering: Observation schedule for observation method, interview schedule and interview guide for interviewing, questionnaire for mail survey, and so on.

Functions

The tools of data collection translate the research objectives into specific questions/ items, the responses to which will provide the data required to achieve the research objectives. In order to achieve this pur-pose, each question/item must convey to the respondent the idea or group of ideas required by the research objectives, and each item must obtain a response which can be analysed for fulfilling the research objectives.

Information gathered through the tools provides descriptions of characteristics of individuals, institutions or other phenomena under study. It is useful for measuring the various variables pertaining to the study. The variables and their interrelationships are analysed for testing the hypothesis or for exploring the content areas set by the research objectives.

A brief description of the various tools of data collection is given below.

Observation schedule

This is a form on which observations of an object or a phenomenon are recorded. The items to be observed are determined with reference to the nature and objectives of the study. They are grouped into appropriate categories and listed in the schedule in the order in which the observer would observe them.

The schedule must be so devised as to provide the required verifiable and quantifiable data and to avoid selective bias and misinterpretation of observed items. The units of observation must be simple, and meticulously worded so as to facilitate precise and uniform recording.

Interview guide

This is used for non-directive and depth interviews. It does not contain a complete list of items on which information has to be elicited from a respondent: it just contains only the broad topics or areas to be covered in the interview.

Interview guide serves as a suggestive reference or prompter during interview. It aids in focussing attention on salient points relating to the study and in securing comparable data in different interviews by the same or different interviewers.

Interview schedule and mailed Questionnaire

Both these tools are widely used in surveys. Both are complete lists of questions on which information is elicited from the respondents. The basic difference between them lies in recording responses. While the interviewer fills out a schedule, the respondent completes a questionnaire.

Rating Scale

This is a recording form used for measuring individual's attitudes, aspirations and other psychological and behavioural aspects, and group behaviour.

Checklist

This is the simplest of all the devices. It consists of a prepared list of items pertinent to an object or a particular task. The presence or absence of each item may be indicated by checking 'yes' or 'no' or multipoint scale. The use of a checklist ensures a more complete consideration of all aspects of the object, act or task. Checklists contain terms, which the respondent understands, and which more briefly and succinctly express his views than answers to open-ended question. It is a crude device, but careful pre-test can make it less so. It is at best when used to test specific hypothesis. It may be used as an independent tool or as a part of a schedule/questionnaire.

Document Schedule/Data Sheet.

This is a list of items of information to be obtained from documents, records and other materials. In order to secure measurable data, the items included in the schedule are limited to those that can be uniformly secured from a large number of case histories or other records.

Schedule for Institutions

This is used for survey of organisations like business enterprises, educational institutions, social or cultural organisations and the like. It will include various categories of data relating to their profile, functions and performance. These data are gathered from their records, annual reports and financial statements.

Pilot Study

The term 'pilot studies' refers to mini versions of a full-scale study (also called 'feasibility' studies), as well as the specific pre-testing of a particular research instrument such as a questionnaire or interview schedule.

Pilot studies are a crucial element of a good study design. Conducting a pilot study does not guarantee success in the main study, but it does increase the likelihood.

Pilot studies fulfil a range of important functions and can provide valuable insights for other researchers. There is a need for more discussion amongst researchers of both the process and outcomes of pilot studies.

Thus, a pilot study must answer a simple question: **"Can the full-scale study be conducted in the way that has been planned or should some component(s) be altered?"**

The reporting of pilot studies must be of high quality to allow readers to interpret the results and implications correctly. This blog will highlight some key things for readers to consider when they are appraising a pilot study.

The need for Pilot Study

It is difficult to plan a major study or project without adequate knowledge of its subject matter, the population it is to cover, their level of knowledge and understanding and the like. What are the issues involved? What are the concepts associated with the subject matter? How can they be operationalised? What method of study is appropriate? How long the study will take? How much money it will cost? These and other related questions call for a good deal of knowledge of the subject matter of the study and its dimensions. In order to gain such pre-knowledge of the subject matter of an extensive study, a preliminary investigation is con-ducted. This is called a pilot study.

What are the main reasons to conduct a pilot study?

Pilot studies are conducted to evaluate the feasibility of some crucial component(s) of the full-scale study. Typically, these can be divided into 4 main aspects:

- **Process**: where the feasibility of the key steps in the main study is assessed (e.g. recruitment rate; retention levels and eligibility criteria)
- **Resources:** assessing problems with time and resources that may occur during the main study (e.g. how much time the main study will take to be completed; whether use of some equipment will be feasible or whether the form(s) of evaluation selected for the main study are as good as possible)

- **Management:** problems with data management and with the team involved in the study (e.g. whether there were problems with collecting all the data needed for future analysis; whether the collected data are highly variable and whether data from different institutions can be analyzed together).

How to interpret a pilot study

Readers must interpret pilot studies carefully. Below are some key things to consider when assessing a pilot study:

- The objectives of pilot studies must always be linked with feasibility and the crucial component that will be tested must always be stated.
- The method section must present the criteria for success. For example: "the main study will be feasible if the retention rate of the pilot study exceeds 90%". Sample size may vary in pilot studies (different articles present different sample size calculations) but the pilot study population, from which the sample is formed, must be the same as the main study. However, the participants in the pilot study should not be entered into the full-scale study. This is because participants may change their later behaviour if they had previously been involved in the research.
- The pilot study may or may not be a randomized trial (depending on the nature of the study). If the researchers do randomize the sample in the pilot study, it is important that the process for randomization is kept the same in the full-scale project. If the authors decide to test the randomization feasibility through a pilot study, different kinds of randomization procedures could be used.
- As well as the method section, the results of the pilot studies should be read carefully. Although pilot studies often present results related to the effectiveness of the interventions, these results should be interpreted as "potential effectiveness". The focus in the results of pilot studies should always be on feasibility, rather than statistical significance. However, results of the pilot studies should nonetheless be provided with measures of variability (such as confidence intervals), particularly as the sample size of these studies is usually relatively small, and this might produce biased results.

PROCESSING OF DATA

EDITING, CODING, CLASSIFICATION AND TABULATION

After the collection of the data has been done, it has to be then processed and then finally analyzed. The processing of the data involves editing, coding, classifying, tabulating and after all this analyzation of the data takes place.

Data Processing

The various aspects of the data processing can be studied as follows

Editing of data: – This aspect plays a very vital role in the detection of the errors and omissions and then helps to correct these errors. Information gathered during data collection may lack uniformity. Example: Data collected through questionnaire and schedules may have answers which may not be ticked at proper places, or some questions may be left unanswered. Sometimes information may be given in a form which needs reconstruction in a category designed for analysis, e.g., converting daily/monthly income in annual income and so on. The researcher has to take a decision as to how to edit it.

Editing also needs that data are relevant and appropriate and errors are modified. Occasionally, the investigator makes a mistake and records and impossible answer. "How much red chilies do you use in a month" The answer is written as "4 kilos". Can a family of three members use four kilo chilies in a month? The correct answer could be "0.4 kilo".

Care should be taken in editing (re-arranging) answers to open-ended questions. Example: Sometimes "don't know" answer is edited as "no response". This is wrong. "Don't know" means that the respondent is not sure and is in a double mind about his reaction or considers the questions personal and does not want to answer it. "No response" means that the respondent is not familiar with the situation/object/event/individual about which he is asked.

Editing is done at two stages: first at the fieldwork stage and second at office.

- **Field editing**

During the stress of interviewing the interviewer cannot always record responses completely and legibly. Therefore after each interview is over, he should review the schedule to complete abbreviated responses, rewrite illegible responses and correct omissions.

- **Office editing**

All completed schedules/questionnaires should be thoroughly checked in the office for Completeness, accuracy and. Uniformity

Coding of data:

Coding is translating answers into numerical values or assigning numbers to the various categories of a variable to be used in data analysis. Coding is done by using a code book, code sheet, and a computer card. Coding is done on the basis of the instructions given in the codebook. The code book gives a numerical code for each variable.

The coding is necessary for the efficient analysis of data. The coding decisions should usually be taken at the designing stage of the questionnaire itself so that the likely responses to questions are pre-coded. This simplifies computer tabulation of the data for further analysis. It may be noted that any errors in coding should be eliminated altogether or at least be reduced to the minimum possible level.

Coding for an open-ended question is more tedious than the closed ended question. For a closed ended or structured question, the coding scheme is very simple and designed prior to the field work. For example, consider the following question.

• ***What is your Gender? Male [ ] Female [ ]***

We may assign a code of '0' to male and '1' to female respondent. These codes may be specified prior to the field work and if the codes are written on all questions of a questionnaire, it is said to be wholly precoded.

The same approach could also be used for coding numeric data that either are not be coded into categories or have had their relevant categories specified. For example,

- ***What is your monthly income?***

Here the respondent would indicate his monthly income which may be entered in the relevant column. The same question may also be asked like this:

- What is your monthly income?
- < Rs. 5000
- Rs.5000 - 8999
- Rs.13000 - 12999
- Rs.13000 or above.

We may code the class less than Rs.5000' as **1'**, Rs. 5000 - 8999' as **'2'**, 'Rs. 9000 - 12999' as **'3'** and 'Rs. 13000 or above' as **'4'.**

Data classification/distribution:

In most research studies, voluminous raw data collected through a survey need to be reduced into homogeneous groups for any meaningful analysis. This necessitates classification of data, which in simple terms is the process of arranging data in groups or classes on the basis of some characteristics. Classification condenses the data, facilitates comparisons, helps to study the relationships and facilitates in statistical treatment of data. The classification should be unambiguous and mutually exclusive and collectively exhaustive. Further, it should not only be flexible but also suitable for the purpose for which it is sought.' Classification can either be according to attributes or numerical characteristics.

Sarantakos (1998: 343) defines distribution of data as a form of classification of scores obtained for the various categories or a particular variable. There are four types of distributions:

1. Frequency distribution
2. Percentage distribution
3. Cumulative distribution
4. Statistical distributions

Frequency distribution:

In social science research, frequency distribution is very common. It presents the frequency of occurrences of certain categories. This distribution appears in two forms:

- **Ungrouped:** Here, the scores are not collapsed into categories, e.g., distribution of ages of the students of a BJ (MC) class, each age value (e.g., 18, 19, 20, and so on) will be presented separately in the distribution.
- **Grouped:** Here, the scores are collapsed into categories, so that 2 or 3 scores are presented together as a group. For example, in the above age distribution groups like 18-20, 21-22 etc., can be formed)

Percentage distribution:

It is also possible to give frequencies not in absolute numbers but in percentages. For instance instead of saying 200 respondents of total 2000 had a monthly income of less than Rs. 500, we can say 10% of the respondents have a monthly income of less than Rs. 500.

Cumulative distribution:

It tells how often the value of the random variable is less than or equal to a particular reference value.

Statistical data distribution:

In this type of data distribution, some measure of average is found out of a sample of respondents. Several kind of averages are available (mean, median, mode) and the researcher must decide which is most suitable to his purpose. Once the average has been calculated, the question arises: how representative a figure it is, i.e., how closely the answers are bunched around it. Are most of them very close to it or is there a wide range of variation?

TABULATION OF DATA

Statistical data can be presented in the form of tables and graphs. In the tabular foam, the classification of data is made with reference to time or some other variables. The graphs are used as a visual form of presentation of data.

The tabulation is used for summarization and condensation of data. It aids in analysis of relationships, trends and other summarization of the given data.

Construction of Tables

After the data have been tabulated, they are arranged in statistical tables in vertical columns and horizontal rows according to some clas-sification. Tables provide a "shorthand" summary of data. The importance of presenting statistical data in tabular form needs no emphasis. Tables facilitate comprehending masses of data at a glance; they conserve space and reduce explanations and descriptions to a minimum; they give a visual picture of relationships between variables and categories; they facilitate summation of items and the detection of errors and omissions; and they provide a basis for computations.

Components of a Table

The major components of a table are:

A. Heading

1. Table Number
2. Title of the table
3. Designation of units

B. Body

1. Stub-head - heading of all rows or blocks of stub items.
2. Boxhead - headings of all columns or main captions and their sub captions
3. Field or body - the cells in rows and columns

C. Notations

1. Footnotes, if necessary
2. Source

Principles of Table construction:

There are certain generally accepted principles of rules relating to construction of tables. They are:

1. Every table should have a title.
2. Every table should be identified by a number to facilitate easy reference
3. The captions (or column headings) should be clear and brief.
4. The units of measurement under each heading must always be indicated.
5. Any explanatory footnotes concerning the table itself are placed directly beneath the table and in order to obviate any possible confusion with the textual footnotes such reference symbols as the asterisk (*) dagger (+) and the like may be used.
6. If the data in a series of tables have been obtained from different sources, it is ordinarily advisable to indicate the specific sources in a place just below the table.
7. Usually columns are separated from one another by lines. Lines are always drawn at the top and bottom of the table and below the captions.
8. The columns may be numbered to facilitate reference.
9. All column figures should be properly aligned. Decimal points and 'plus' or 'minus' signs should be in perfect alignment.
10. Columns and rows which are to be compared with one another should be brought close together.
11. Totals of rows should be placed at the extreme right column and totals of columns at the bottom.
12. In order to emphasize the relative significance of certain categories, different kinds of type, spacing and indentations can be used.
13. The arrangement of the categories in a table may be chronological, geographical, alphabetical or according to magnitude. Numerical categories are usually arranged in descending order of magnitude.
14. Miscellaneous and exceptional items are generally placed in the last row of the table.
15. Usually the larger number of items are listed vertically. This means that a table's length is more than its width.
16. Abbreviations should be avoided whenever possible and ditto marks should not be used in a table.
17. The table should be made as logical, clear, accurate and simple as possible.

GRAPHIC REPRESENTATIONS

Graphic presentation involves use of graphics, charts and other pictorial devices. These forms and devices reduce large masses of statistical data to a form that can be quickly understood at a glance. The meaning of figures in tabular form may be difficult for the mind to grasp or retain. "Properly constructed graphs and charts relieve the mind of burdensome details by portraying facts concisely, logically and simply." They, by emphasizing new and significant relationships, are also useful in discovering new facts and in developing hypotheses.

The device of graphic representation is particularly useful when the prospective readers are non-technical people or general public. It is useful to even technical people for dramatizing certain points about the data, for important points can be more effective captured in pictures than in tables. However, graphic forms are not substitutes for tables, but are additional devices.

Types and General Rules

The most commonly used graphic forms may be grouped into the following categories:

1. Line graphs or charts
2. Bar Charts
3. Segmental representations
4. Pictographs.

Line Graphs

The line graph is useful for showing changes in data relationships over a period of time. In this graph, figures are plotted in relation to two interesting lines or axes. The horizontal line is called the abscissa or X-axis and the vertical, the ordinal or Y-axis. The point at which the two axes, interest is zero for both X and Y. The '0' is the origin of coordinates. The two lines divide the region of the plane into four sections known as quadrants, which are numbered anti-clockwise. Measurements to the right and above '0' are positive (plus), and measurements to the left and below '0' are negative (minus). Any point in the plane of the two axes is plotted in terms of the two axes reading from the origin '0'. Scale intervals in both the axes should he equal. If a part of the scale is omitted, a set of parallel jagged lines should be used to indicate the break in the scale. The time dimension or independent variable is represented by the X-axis and the other variable by Y-axis.

Histogram.

This is another form of line chart used for presenting a frequency distribution. It is constructed by erecting vertical lines on the limits of the class intervals marked on the base line. The vertical

lines so drawn from a series of contiguous rectangles or columns. The Width of each rectangle represents its class interval, and the height represents the class frequency.

Frequency Polygons

It is often more convenient to draw a frequency polygon instead of drawing a histogram of a distribution. In laying out a frequency polygon, the frequency of each class is located at the midpoint of the interval and the plotted points are then connected by straight lines. If two or more series are shown on the same graph, the curves can be made with different kinds of ruling. If the total number of cases in the two series is of different size, the frequencies are often reduced to percentages. The frequency polygon is particularly appropriate for portraying continuous series. It is sometimes desirable to portray the data by a smoothed curve. The chart is then called a frequency curve.

Ogive

The ogive is a line chart plotted on arithmetic graph paper from a cumulative frequency distribution, which may be cumulated downward or upward. It is useful in representing population, per capita income, per capita earnings etc. Two or more distributions may be compared by converting the data of the distributions to percentages of the total, then cumulating the percentages and plotting the ogives on the same grid. The differences in steepness and shape of the ogives facilitate comparative observations.

Lorenz Curve

The Lorenz Curve is a line chart used to compare the proportionality in two quantitative variables. It is commonly used to show the degree by which the distribution of income per family departs from the distribution' of the number of families; it shows that it disparate proportion of the income goes to a few families.

Bar Charts

These charts consist of either vertical or horizontal bars to represent variables. The length of the bars varies corresponding to the values of the variable. Bar charts are the most effective pictorial device for comparing data. The bars may be depicted in solid blocks or in patterns of dots, dishes etc. They may be of different forms: (1) linear or one-dimensional, (2) areal or two-dimensional, and (3) cubic or three-dimensional. The actual numerical values may be shown on the X-axis or Y-axis, as the case may be, or at the immediate ends of the bars.

Pie or Circle Charts

The circle or pie chart is a component parts chart. The component parts form the segments of the circle. The circle chart is usually a percentage chart. The data are converted to percentage of the total; and the proportional segments, therefore, give a clear picture of the relationship among the component parts.

Pictograms

A pictogram is a variation of the bar chart. In it the values are represented by identical symbol or pictures. Each one representing a fixed size of the variable. The symbols used may be appropriate to the type of data.

REPORT WRITING

"Research report is a research document that contains basic aspects of the research project".

Mostly, research work is presented in a written form. The practical utility of research study depends heavily on the way it is presented to those who are expected to act on the basis of research findings. Research report is a written document containing key aspects of research project.

Research report is a medium to communicate research work with relevant people. It is also a good source of preservation of research work for the future reference. Many times, research findings are not followed because of improper presentation. Preparation of research report is not an easy task. It is an art. It requires a good deal of knowledge, imagination, experience, and expertise. It demands a considerable time and money.

Definitions:

Research report is the systematic, articulate, and orderly presentation of research work in a written form.

Research report involves relevant information on the research work carried out. It may be in form of hand-written, typed, or computerized.

Report Format:

There is no one best format for all reports. Format depends on several relevant variables. One must employ a suitable format to create desirable impression with clarity. Report must be attractive. It should be written systematically and bound carefully. A report must use the format (often called structure) that best fit the needs and wants of its readers. Normally, following format is suggested as a basic outline, which has sufficient flexibly to meet the most situations.

Research report is divided into three parts as:

I. First Part (Formality Part):

(i) Cover page

(ii) Title page

(iii) Certificate or statement

(iv) Index (brief contents)

(v) Table of contents (detailed index)

(vi) Acknowledgement

(vii) List of tables and figures used

(viii) Preface/forwarding/introduction

(ix) Summary report

II. Main Report (Central Part of Report):

(i) Statement of objectives

(ii) Methodology and research design

(iii) Types of data and its sources

(iv) Sampling decisions

(v) Data collection methods

(vi) Data collection tools

(vii) Fieldwork

(viii) Analysis and interpretation (including tables, charts, figures, etc.)

(ix) Findings

(x) Limitations

(xi) Conclusions and recommendations

(xii) Any other relevant detail

III. Appendix (Additional Details):

(i) Copies of forms used

(ii) Tables not included in findings

(iii) A copy of questionnaire

(iv) Detail of sampling and rate of response

(v) Statement of expenses

(vi) Bibliography – list of books, magazines, journals, and other reports

(vii) Any other relevant information

Preparing a Research Report

Research has little value if it is not put together into some form of report. We have said that research represents a scientific method of establishing knowledge that is cumulative. And therefore, scientific findings must be properly documented and reported through appropriate media. Effective communication of research findings, both to scientist and to the general audiences, is a very important component of the research process. Decisions on writing style and method of presentation must depend on the intended purposes and prospective readers. Any researcher who hopes to do an effective report should have some idea of his probable readers or audience, some understanding of the needs, interests and capability will help him decide which points to stress in his presentation.

Effective writing is a tool that helps to insure understanding and use of the results of the study. It is helpful to have an outline to work with in preparing a research report. It will assure order in the finished work and it will help to hold down repetition and guard against omissions. The various points to be included should be given careful thought before actual writing is started.

Findings should be reported in terms of the objectives and/or hypotheses of the study. Whenever results are not conclusive, some explanation should be made. When a researcher feels he should express a personal opinion, he should say so. A researcher has the obligation to make some comments as to what the findings mean. Data do not "speak for themselves" but must be analyzed and interpreted. The researcher must draw conclusions from the analysis and in the end make recommendations. Conclusions and recommendations must be made on the basis of the data at hand because that is the best information that is available within the resource restrictions. The researcher must assume that his knowledge is vital and that he knows more about the subject studied than anyone else. The limitations of the study should also be pointed out, in all fairness to the reader.

Most research reports require a certain amount of substantiation from sources other than the research findings at hand. Some times, the researcher may want to make comparisons of the results with those obtained from other sources. These other sources should be identified by footnotes. All of the sources are assembled in a bibliography to accompany the report. The style and form of a research report are based upon clarity of organization and presentation as practiced in academic circles.

The significance of a research report

As noted above, research findings must be communicated in one way or another. First and foremost, reports are necessary to account to the funding body the expenditure of the funds allocated, manpower and other resources. Even more importantly, research reports make scientific information more accessible to people and social groups or organizations interested in

particular research data. In doing so, the researcher must have some understanding of the needs, interests and capability of the target audience. This will help him decide the format and points he needs to elaborate and stress in his report. If the audience constitutes the scientific community, his emphasis would be the results, methods, and scientific tools he employed to analyse, interpret, and conclude from the findings of his study. His work may be published as an article in a journal, or bulletin. If the target audience is made up of extension agents, development workers, policy makers, etc. his emphasis will be the conclusion and recommendations drawn from the study.

The nature of scientific writing

Writing is first and foremost analysing, revising, and polishing the text. It is unusual for one to produce ready-made text right away. Assess your results before starting to write. In the process of writing, the researcher learns from his mistakes and comments/ advices he gets from peers, reviewers, or supervisor. These are very essential during the writing process. Nevertheless, the writer must assume responsibility and keep his confidence in his own experience and knowledge about the problem he studied. No one else can know better than himself about the work he did accomplish.

Also writing a research report is not something left to the end of the research work. Rather, it is a continuous process. So, you should start writing whenever you have something to write. The list of contents need to be prepared at an early stage and continually revised as need be. It will assure order in the finished work and it will help to hold down repetition and guard against omissions. The various points to be included should be given careful thought when preparing the table of contents.

The key to scientific writing is clarity. Scientists are required to write in clear and simple terms. Ideas should be explained in simple language and short, coherent sentences. The personal pronouns I, we, you, my, our and us are avoided by the use of such expressions as the researcher or the investigator. Minimize the use of jargons and imprecise words. Concepts and definitions must be sufficiently described depending upon the type and capability of the target audience. The past tense should be used in describing research procedures that have been completed.

Generally, a researcher has the obligation to make some comments as to what the data mean. Data do not always "speak for themselves" but must be analysed and interpreted. It is based on these that conclusions and recommendations must be drawn. Whenever results are not conclusive, some explanations should be made. When a researcher feels he should express a personal opinion, he should say so very clearly.

Following are some checklist to consider reviewing a scientific report or paper.

- Are concepts and definitions described sufficiently?
- Are the main points/results clearly spelled out and described?
- Has the text a clear focus?
- Is the text well organized?
- Are the different chapters well connected?
- Is the text written in clear terms with adequate explanations?

Format of the Research Report/ Guidelines for preparing the research report

A. Preliminary section

1. Title page: Some basic considerations

The title page usually includes:

- The name of the topic
- The name of the author
- The relationship of the report to a course or degree requirement
- The name of the institution where the report is submitted
- The date and place of the presentation

Any research work starts with a title that will almost certainly change before the research is completed and reported. It is very wise, therefore, to think of an effective title that will be finally adopted. So it is a good idea to keep notes of alternative titles or ideas as you proceed in preparing and writing the research report. The title should catch the readers' attention while informing them about the main thesis of the study. First impressions are strong and can attract attention. The title should be concise and should give a precise indication of what is to come. It should not claim more than what the study actually delivers. The title should be typed in capital letters, single spaced and centered between the right and left margins of the page.

2. Acknowledgement (if any)

An acknowledgement page is included if the writer has received unusual assistance in the conduct of the study. The author gives credit for external support received during the conduct of the study. Acknowledgement also expresses gratitude for the use of copyrighted or otherwise restricted materials. A doctoral candidate may choose to dedicate the dissertation to a person(s) who has had significant impact on his work.

3. Table of contents:

A good table of contents serves as an important purpose in providing an outline of the content of the report. The relationship between principal and minor divisions is indicated by capitalization

of chapter numbers and titles, with subheadings in small letters and with capitalized principal letters.

B. Main body of the report

1. Introduction

- As in the proposal, the introduction presents the problem addressed by the research.
- Gives sufficient background information to allow readers to understand the results of the study.
- It is written in such a way that readers will know the current status of research conclusions on the topic, the theoretical implications associated with the results of previous research on the subject, and the statement of a hypothetical resolution of the issues to be tested by the research described.
- As in the proposal, the introduction should describe the nature and purpose of the study, present the guiding research questions, and explain the significance of and justification for conducting the study. Terms likely to be used throughout the paper should be defined in this section.
- A statement of objectives is included and a research hypothesis

2. Review of Related literature

A literature review must be organized in relation to research topic you are developing. In the process you should synthesize results into a summary of what is and is not known; identify areas of controversy in the literature; formulate questions that need further research.

3. Materials and Methods (Methodology)

The methodology section is used to describe what the researcher did and how the study was conducted. One important purpose is to enable others repeat the experiment and verify the results if they wish to. In doing so, you should summarize the procedures in the execution of each of the stage of your work. This section should build on the description of methods outlined in the proposal. You should label subsections similar to those in the proposal. It may include subsections describe participants or subjects, another describing testing or measurement procedures undertaken with the participants, and a section describing limitations of the methodology. These are all done in the past tense or past perfect tense.

This section should present the following:

- Procedures used and kind of design
- Sources of data
- Methods of gathering data
- Description of data gathering instruments used
-

4. Analysis of data/Results

- This section summarizes the data collected and details the statistical treatment of that data.
- Present your results in a logical sequence using only observations pertinent to your stated objectives.
- After a brief statement of the main results or findings of the study, the data are reported in sufficient detail to justify the conclusions.
- Tables and illustrations may be used to report data when these methods are seen to present the data more clearly and economically.
- Do not replicate observations in your tables. Give only means and measures of variability.
- Use tables to present exact values and figures to show trends and relationships.
- All tables and illustrations should be mentioned in the text, with appropriate titles or captions and enough explanations to make them readily identifiable.
- Avoid repetition of numerical data from the tables and figures in the text.

5. Discussion

This section should reflect the implications of the study. Here the researcher evaluates the data and interprets the findings in the context of the research questions or hypothesis. He is guided by questions like the following.

- What do my results mean and what are their implications?
- Should interpret your results clearly, concisely and logically. For each objective, describe how your results relate to meeting the objectives.
- Here, the major results are picked or summarized, evaluate, and interpreted with respect to the original research questions and hypotheses and related with previous works.
- Theoretical and practical consequences of the results and the validity of conclusions may appropriately be discussed in this section.
- The limitations of the study and suggestions for future work may also be included.
- Emphasize on new results and suggest new lines of work or further research.

6. Conclusions and Recommendations

In this section you should describe briefly what you did, the main results and recommendations for further research or applicability. Implications what the findings of the research imply (consider suggestions).

7. References

At the end of your report you need to list all the sources cited in the text. Details regarding citations and references are given part four.

BIBLIOGRAPHIC CITATIONS

Introduction

The principle of fairness and the role of personal recognition within the reward system of science account for the emphasis given to the proper allocation of credit. In the standard scientific paper, credit is explicitly acknowledged in three places: in the list of authors, in the acknowledgments of contributions from others, and in the list of references or citations. Conflicts over proper attribution can arise in any of these places. Citations serve many purposes in a scientific paper. They acknowledge the work of other scientists, direct the reader toward additional sources of information, acknowledge conflicts with other results, and provide support for the views expressed in the paper. More broadly, citations place a paper within its scientific context, relating it to the present state of scientific knowledge. Failure to cite the work of others can give rise to more than just hard feelings. Citations are part of the reward system of science. They are connected to funding decisions and to the future careers of researchers. More generally, the misallocation of credit undermines the incentive system for publication. In addition, scientists who routinely fail to cite the work of others may find themselves excluded from the fellowship of their peers. This consideration is particularly important in one of the more intangible aspects of a scientific career-that of building a reputation. Published papers document a person's approach to science, which is why it is important that they be clear, verifiable, and honest. In addition, a researcher who is open, helpful, and full of ideas becomes known to colleagues and will benefit much more than someone who is secretive or uncooperative.

Features of citations

(a) Footnoting

- Footnotes are very useful devices because they serve a number of purposes
- They enable you to substantiate your presentation by citing other authorities
- They also enable you to present explanatory statements that would interfere with the logic of your text
- Traditionally, footnote citations are placed at the bottom of the page
- They are separated from the text by a horizontal line from the text margin.

(b) Abbreviations

- You may use abbreviations in bibliographic and footnote citations if you want to conserve space. Examples: bk., bks. = book, books.

(c) Bibliography (Reference/Literature Cited)

Points to consider in preparing the references:

- The reference list at the end of the paper should list all works cited in the paper, and all items listed as references must have been cited in the text.
- Special attention should be given to ensure appropriate citations of less common sources, such as unpublished manuscripts.
- There are many ways of presenting the bibliography but be accurate and consistent in the way you list
- Follow guidelines required by the particular journal, proceeding, etc. They do have their own style of citations.
- Citing a source without having read/seen the original can lead to embarrassment and loss of credibility if the secondary source from which you gained the information is in error.
- Again, the APA Manual can provide guidance for ensuring accuracy in these details.
- General rule: Author (s). Year of Publication. Title of Work. Publication data.

(i) In-text references (citations)-References are citations of other works such as books, journal articles, or private communications. References in text are treated somewhat differently from references in the complete list at the end of a paper.

- Use the author-date format to cite references in text. For example: as Smith (1990) points out,
- For two-author citations, spell out both authors on all occurrences.
- For multiple-author citations (up to five authors) name all authors the first time, then use et al., so the first time it is Smith, Jones, Pearson and Sherwin (1990), but the second time it is Smith et al., with a period after "al" but no underlining.
- For six or more authors, use et al. the first time and give the full citation in references.
- Include page reference after the year, outside quotes but inside the comma, for example: The author stated, "The effect disappeared within minutes" (Lopez, 1993, p. 311) , but she did not say which effect. Another example would be: Lopez found that "the effect disappeared within minutes" (p. 311). Notice also that the sentence is capitalized only if presented after a comma, as a complete sentence.
- If two or more multiple-author references which shorten to the same "et al." form, making it ambiguous, give as many author names as necessary to make them distinct,

before et al. For example: (Smith, Jones, et al., 1991) to distinguish it from (Smith, Burke, et al., 1991).

- Join names in a multiple-author citation with and (in text) or an ampersand (&) in reference lists and parenthetical comments. For example: As Smith and Sarason (1990) point out, the same argument was made by in an earlier study (Smith & Sarason, 1990).
- If a group is readily identified by its initials, spell it out only the first time. For example, "As reported in a government study (National Institute of Mental Health [NIMH], 1991), blah blah..." and thereafter, "The previously cited study (NIMH, 1991) found that...
- If the author is unknown or unspecified, use the first few words of the reference list entry (usually the title), for example: ("Study Finds," 1992).
- If citing multiple works by the same author at the same time, arrange dates in order. In general, use letters after years to distinguish multiple publications by the same author in the same year. For example: Several studies (Johnson, 1988, 1990a, 1990b, 1995 in press-a, 1995 in press-b) showed the same thing.
- For old works cite the translation or the original and modern copyright dates if both are known, for example: (Aristotle, trans. 1931) or (James, 1890/1983).
- Always give page numbers for quotations, for example: (Cheek & Buss, 1981, p. 332) or (Shimamura, 1989, chap. 3, p. 5).
- For e-mail and other "unrecoverable data" use personal communication, for example: (V.-G. Nguyen, personal communication, September 28, 1993). These do not appear in the reference list.

Abbreviating within a reference

Here are approved abbreviations for use in a reference list:

- chap. for chapter
- ed. for edition
- rev. ed. for revised edition
- 2nd ed. for second edition
- Ed. for Edited by
- (Eds.) for multiple editors
- Trans. for Translated by
- p. for page number, with a space after the period
- pp. for page numbers in encyclopaedia entries, multi-page newspaper articles, chapters or articles in edited books, but not in journal or magazine article citations, where numbers alone should be used (see examples of reference formats).

- Vol. for Volume
- vols. for volumes
- No. for Number
- Pt. for Part
- Suppl. for Supplement,
- Tech. Rep. for Technical Report

Quotations: When a direct quotation is used, always include the author, year, and page number as part of the citation.

1. A quotation of fewer than 40 words should be enclosed in double quotation marks and should be incorporated into the formal structure of the sentence. Consider the following example:

   Patients receiving prayer had "less congestive heart failure, required less diuretic and antibiotic therapy, had fewer episodes of pneumonia, had fewer cardiac arrests, and were less frequently incubated and ventilated" (Byrd, 1988, p. 829).
2. A lengthier quotation of 40 or more words should appear (without quotation marks) apart from the surrounding text, in block format, with each line indented five spaces from the left margin.

(ii) Lists of References

General Rule:

- *Pagination:* The References section begins on a new page.
- *Format:* The references lists are organized alphabetically by surnames of first authors.
- *Most reference entries have three components:*
- *Authors:* Authors are listed in the same order as specified in the source, using surnames and initials. Commas separate all authors. When there are seven or more authors, list the first six and then use "et al." for remaining authors. If no author is identified, the title of the document begins the reference. The first author always starts with its surname followed by initials. The rest of authors are listed following the first author either starts by initials followed by surnames or vice versa.
- *Year of Publication:* In parentheses following authors, with a period following the closing parenthesis. Or without parenthesis following authors, with a period following authors and after it. If no publication date is identified, use "n.d." in parentheses or without parenthesis following the authors.
- *Source Reference:* Includes title, journal, volume, pages (for journal article) or title, edition, city of publication, publisher (for book). [Note: Italicize titles of books, titles of periodicals, and periodical volume numbers.]

Examples of sources

i. Journal article

Murzynski, J., & Degelman, D. (1996). Body language of women and judgments of vulnerability to sexual assault. Journal of Applied Social Psychology, 26, 1617-1626.

PRECAUTIONS FOR WRITING RESEARCH REPORTS

Research report is a channel of communicating the research findings to the readers of the report. A good research report is one which does this task efficiently and effectively. As such it must be prepared keeping the following precautions in view:

1. While determining the length of the report (since research reports vary greatly in length), one should keep in view the fact that it should be long enough to cover the subject but short enough to maintain interest. In fact, report-writing should not be a means to learning more and more about less and less.

2. A research report should not, if this can be avoided, be dull; it should be such as to sustain reader's interest.

3. Abstract terminology and technical jargon should be avoided in a research report. The report should be able to convey the matter as simply as possible. This, in other words, means that report should be written in an objective style in simple language, avoiding expressions such as "it seems," "there may be" and the like.

4. Readers are often interested in acquiring a quick knowledge of the main findings and as such the report must provide a ready availability of the findings. For this purpose, charts, 6 Claire Selltiz and others, *Research Methods in Social Relations* rev., Methuen & Co. Ltd., London, 1959, p. 454. *Interpretation and Report Writing* **359** graphs and the statistical tables may be used for the various results in the main report in addition to the summary of important findings.

5. The layout of the report should be well thought out and must be appropriate and in accordance with the objective of the research problem.

6. The reports should be free from grammatical mistakes and must be prepared strictly in accordance with the techniques of composition of report-writing such as the use of quotations, footnotes, documentation, proper punctuation and use of abbreviations in footnotes and the like.

7. The report must present the logical analysis of the subject matter. It must reflect a structure wherein the different pieces of analysis relating to the research problem fit well.

8. A research report should show originality and should necessarily be an attempt to solve some intellectual problem. It must contribute to the solution of a problem and must add to the store of knowledge.

9. Towards the end, the report must also state the policy implications relating to the problem under consideration. It is usually considered desirable if the report makes a forecast of the probable future of the subject concerned and indicates the kinds of research still needs to be done in that particular field.

10. Appendices should be enlisted in respect of all the technical data in the report.

11. Bibliography of sources consulted is a must for a good report and must necessarily be given.

12. Index is also considered an essential part of a good report and as such must be prepared and appended at the end.

13. Report must be attractive in appearance, neat and clean, whether typed or printed.

14. Calculated confidence limits must be mentioned and the various constraints experienced in conducting the research study may also be stated in the report.

15. Objective of the study, the nature of the problem, the methods employed and the analysis techniques adopted must all be clearly stated in the beginning of the report in the form of introduction.

FORMULATION OF HYPOTHESIS

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."

J.S. 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:

(i) Conceptual: Some kind of conceptual elements in the framework are involved in a hypothesis.

(ii) 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.

(iii) It represents the tentative relationship between two or more variables.

(iv) Forward or future oriented: A hypothesis is future-oriented. It relates to the future verification not the past facts and information.

(v) Pivot of a scientific research: All research activities are designed for verification of hypothesis.

Importance of a Hypothesis:

(i) **Investigator's eyes: Carter V. Good** thinks that by guiding the investigator in further investigation hypothesis serves as the investigator's eyes in seeking answers to tentatively adopted generalization**.**

(ii) **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.

(iii) **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.

(iv) **Links together**: According to **Barr and Scates**, "It serves the important function of linking together related facts and information and organizing them into wholes."

(v) **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."

(vi) **Guiding Light**: "A hypothesis serves as powerful beacon that lights the way for the research work."

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

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

(ix) It enables the investigator to understand with greater clarity his problem and its ramification.

(x) 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.

(xi) It provides the investigator with the most efficient instrument for exploring and explaining the unknown facts.

(xii) It provides a frame work for drawing conclusion.

(xiii) It stimulates the investigator for further research.

TYPES OF HYPOTHESIS

Simple Hypothesis

Simple hypothesis is that one in which there exists relationship between two variables one is called independent variable or cause and other is dependent variable or effect. For example

Smoking leads to Cancer

The higher ratio of unemployment leads to crimes.

Complex Hypothesis

Complex hypothesis is that one in which as relationship among variables exists. I recommend you should read **characteristics of a good research hypothesis**. In this type dependent as well as independent variables are more than two. For example

1. Smoking and other drugs leads to cancer, tension chest infections etc.
2. The higher ration of unemployment poverty, illiteracy leads to crimes like dacoit, Robbery, Rape, prostitution & killing etc.

Empirical Hypothesis

Working hypothesis is that one which is applied to a field. During the formulation it is an assumption only but when it is pat to a test become an empirical or working hypothesis.

Null Hypothesis

Null hypothesis is contrary to the positive statement of a working hypothesis. According to null hypothesis there is no relationship between dependent and independent variable. It is denoted by 'HO".

Alternative Hypothesis

Firstly many hypotheses are selected then among them select one which is more workable and most efficient. That hypothesis is introduced latter on due to changes in the old formulated hypothesis. It is denote by "HI".

Logical Hypothesis

It is that type in which hypothesis is verified logically. J.S. Mill has given four cannons of these hypothesis e.g. agreement, disagreement, difference and residue.

Statistical Hypothesis

A hypothesis which can be verified statistically called statistical hypothesis. The statement would be logical or illogical but if statistic verifies it, it will be statistical hypothesis.

HYPOTHESIS TESTING

The process of hypothesis testing can seem to be quite varied with a multitude of test statistics. But the general process is the same. Hypothesis testing involves the statement of a null hypothesis, and the selection of a level of significance. The null hypothesis is either true or false, and represents the default claim for a treatment or procedure. For example, when examining the effectiveness of a drug, the null hypothesis would be that the drug has no effect on a disease.

After formulating the null hypothesis and choosing a level of significance, we acquire data through observation.

Statistical calculations tell us whether or not we should reject the null hypothesis.

In an ideal world we would always reject the null hypothesis when it is false, and we would not reject the null hypothesis when it is indeed true. But there are two other scenarios that are possible, each of which will result in an error.

Type I Error

The first kind of error that is possible involves the rejection of a null hypothesis that is actually true. This kind of error is called a type I error, and is sometimes called an error of the first kind.

Type I errors are equivalent to false positives. Let's go back to the example of a drug being used to treat a disease. If we reject the null hypothesis in this situation, then our claim is that the drug does in fact have some effect on a disease. But if the null hypothesis is true, then in reality the drug does not combat the disease at all. The drug is falsely claimed to have a positive effect on a disease.

Type I errors can be controlled. The value of alpha, which is related to the level of significance that we selected has a direct bearing on type I errors. Alpha is the maximum probability that we have a type I error. For a 95% confidence level, the value of alpha is 0.05. This means that there is a 5% probability that we will reject a true null hypothesis. In the long run, one out of every twenty hypothesis tests that we perform at this level will result in a type I error.

Type II Error

The other kind of error that is possible occurs when we do not reject a null hypothesis that is false.

This sort of error is called a type II error, and is also referred to as an error of the second kind.

Type II errors are equivalent to false negatives. If we think back again to the scenario in which we are testing a drug, what would a type II error look like? A type II error would occur if we accepted that the drug had no effect on a disease, but in reality it did.

The probability of a type II error is given by the Greek letter beta. This number is related to the power or sensitivity of the hypothesis test, denoted by 1 – beta.

How to Avoid Errors

Type I and type II errors are part of the process of hypothesis testing. Although the errors cannot be completely eliminated, we can minimize one type of error.

Typically when we try to decrease the probability one type of error, the probability for the other type increases.

We could decrease the value of alpha from 0.05 to 0.01, corresponding to a 99% level of confidence. However, if everything else remains the same, then the probability of a type II error will nearly always increase.

Many times the real world application of our hypothesis test will determine if we are more accepting of type I or type II errors. This will then be used when we design our statistical experiment.

Comparison Chart

BASIS FOR COMPARISON	**TYPE I ERROR**	**TYPE II ERROR**
Meaning	Type I error refers to non-acceptance of hypothesis which ought to be accepted.	Type II error is the acceptance of hypothesis which ought to be rejected.
Equivalent to	False positive	False negative
What is it?	It is incorrect rejection of true null hypothesis.	It is incorrect acceptance of false null hypothesis.
Represents	A false hit	A miss
Probability of committing error	Equals the level of significance.	Equals the power of test.
Indicated by	Greek letter 'α'	Greek letter 'β'

SURVEY METHOD OF DATA COLLECTION

The Survey method is the technique of gathering data by asking questions to people who are thought to have desired information. A formal list of questionnaire is prepared. Generally a non disguised approach is used. The respondents are asked questions on their demographic interest opinion.

Advantages of Survey Method

1. As compared to other methods (direct observation, experimentation) survey yield a broader range of information. Surveys are effective to produce information on socio-economic characteristics, attitudes, opinions, motives etc and to gather information for planning product features, advertising media, sales promotion, channels of distribution and other marketing variables.
2. Questioning is usually faster and cheaper that Observation.
3. Questions are simple to administer.
4. Data is reliable
5. The variability of results is reduced.
6. It is relatively simple to analyze, quote and interrelate the data obtained by survey method

Disadvantages of Survey Method

1. Unwillingness of respondents to provide information- This requires salesmanship on the part of the interviewer. The interviewer may assure that the information will be kept secret or apply the technique of offering some presents.
2. Inability of the respondents to provide information- This may be due to
3. Lack of knowledge
4. Lapse of memory
5. Inability to identify their motives and provide "reasons why?" for their actions
6. Human Biases of the respondents are there, for eg: "Ego"
7. Symantec difficulties are there - it is difficult, if not impossible, to state a given question in such a way that it will mean exactly same thing to each respondent. Similarly two different wordings of the same question will frequently produce quite different results.