

Business Research

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1.1 Nature and Scope of Business Research

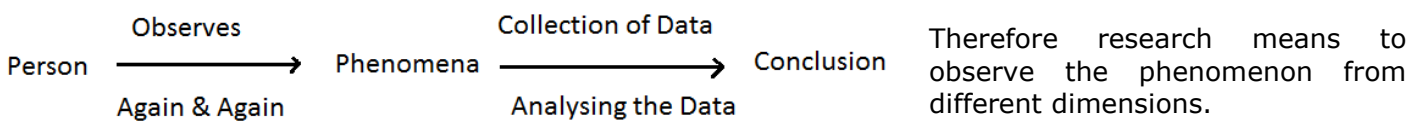
What is Science?

- The main purpose of science is to know the mystery of the world where we live.
- Science may be defined as accumulation of systematic, organised and formulated knowledge about the real world.
- Scientific thinking includes empiricism, rationalism and scepticism.
- Concepts are accepted abstraction of Behaviour, Situation, Object and Event

What is Research?

Research in simple word means – “Something new – Physical or Conceptual Knowledge”

The term research consists of two words as Research = Re + Search, Re means again and Search means to find out something – the following is the process



The research is a process of which a person observes the phenomena again and again and collects the data and on the basis of data he draws some conclusion.

Research is endless quest for knowledge or unending search for truth. Research is oriented towards the discovery of relationship that exists among the phenomena of the world in which live.

To Advanced Learner's Dictionary, "Research as a careful investigation or inquiry especially through search for new facts in any branch of knowledge."

To Redman and Mory define research as a "Systematized effort to gain new knowledge."

What are the Characteristics of Research?

1. Research begins with a problem in the form of a question in the mind of the researcher.
2. Research demands the identification of a problem, stated in clear, unambiguous terms.
3. Research requires a plan.
4. Research deals with the main problem through appropriate sub-problems.
5. Research seeks direction through appropriate hypotheses and is based upon obvious assumptions.
6. Research deals with facts and their meaning.
7. Research is circular.

What is Methodology?

- Methodology refers to a set of methods and principles used to perform a particular activity.
- A methodology is usually a guideline system for solving a problem, with specific components such as phases, tasks, methods, techniques and tools.

What is Research Methodology?

- A Research methodology is a system of explicit rules and procedures upon which research is based.
- Research methodology is a systematic and an organized way to solve the research problems.

What are the difference between Research Methods and Research Methodology?

Research Methods	Research Methodology
Research methods may be understood as all those methods/techniques that are used for conduction of research	Research methodology is a way to systematically solve the research problem
Researcher must know all those methods and their limitation during the course of studying his research problem.	Research methodology includes <ul style="list-style-type: none">• Listing of appropriate research methods• Logic behind the selection of method used• Context and objective of each method• Scope and limitation of each method
The sample / test population	How the design is implemented

Data collection method and instruments Data analysis techniques Presentation of findings	How the research is carried out Solving the research problem scientifically and systematically (why, how, when, who, what, where, which)
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What is Business Research Method?

Business research is a systematic enquiry with defined objectives to provide information to business managers, entrepreneurs to solve the managerial problems.

The study of business research provides necessary knowledge and skills to solve the problems associated with decision making in business world, which is very complex in nature.

What is the Nature of Business Research?

1. Business research as an economic resource
2. Business research as a system of authority
3. Business research as an activity of business management
4. Business research as a Team effort
5. Business research as an art or science
6. Business research as a profession
7. Business research as an interdisciplinary system

What is the Scope of Business Research?

Marketing Management	<ul style="list-style-type: none"> • Advertising research (Motivational research, Copy research, Media research, Ad-effectiveness research) • Product research • Packaging research • Buying behaviour • Design of distribution channel • Sales and market research • Retail management
Human Resource Management	<ul style="list-style-type: none"> • Manpower planning • Conflict management • Change and reshuffling of management • Employee attitudes • Recruitment and retention policy • Performance appraisal and reward system • Staff retention • Material incentives • Training methods • Labour disputes and wage settlement • Welfare programme for workers
Financial Management	<ul style="list-style-type: none"> • Forecasting • Capital Budgeting • Ratio analysis • Portfolio management • Risk management • Efficiency of accounting software • Derivative future and options • Mergers and acquisitions
Production and Operation Management	<ul style="list-style-type: none"> • Plant location studies • Forecasting • Production scheduling • Warehousing decision and location studies • Product mix studies • Maintenance management • Supply chain management • Quality control • Six sigma
Information Technology	<ul style="list-style-type: none"> • Website management • Network management • Decision support system • Business intelligence and data mining
Business Environment	<ul style="list-style-type: none"> • Short range forecasting

and Corporate Research	<ul style="list-style-type: none"> • Long range forecasting • Studies of business trends • Pricing studies • Acquisition Studies • Export and international studies
Corporate Responsibility Research	<ul style="list-style-type: none"> • Consumers' "rights to know" studies • Ecological impact studies • Studies of legal constraint • Social values and policies studies

What are the Essential Qualities of Research?

Research is a process of collecting, analyzing and interpreting information to answer questions. But to qualify as research, the process must have certain characteristics: it must, as far as possible, be controlled, rigorous, systematic, valid and verifiable, empirical and critical.

(1) Controlled- in real life there are many factors that affect an outcome. The concept of control implies that, in exploring causality in relation to two variables (factors), you set up your study in a way that minimizes the effects of other factors affecting the relationship.

(2) Rigorous- a research worker is expected to be highly scholarly and possessing high integrity. He keeps the work scrupulous free from loopholes because research is a job high responsibility.

(3) Systematic-this implies that the procedure adopted to undertake an investigation follow a certain logical sequence. The different steps cannot be taken in a haphazard way. Some procedures must follow others.

(4) Valid and verifiable-this concept implies that whatever you conclude on the basis of your findings is correct and can be verified by you and others.

(5) Empirical-this means that any conclusion drawn are based upon hard evidence gathered from information collected from real life experiences or observations.

(6) Critical-critical scrutiny of the procedures used and the methods employed is crucial to a research enquiry. The process of investigation must be foolproof and free from drawbacks. The process adopted and the procedures used must be able to withstand critical scrutiny.

(7) Validity- it can be stated that a research has highly validity if the study only contains what one wants to study and nothing else. Validity refers to how well the data collection and data analysis of the Research captures the reality being studied. In other words the researcher must obtain the reality of responses of those people who are under the test through comparing their responses with such truth that in deed is truth.

(8) Reliability- Supposes that if other person were to repeat a specific research study, he should be able to capture the same results. Reliability demonstrates that the operation of a study, such as the data collection procedures, can be repeated with the same outcome.

Logic of Research {Deductive Vs Inductive}

Deductive Logic	Inductive Logic
The research proceeds from general to specific	The research proceeds from specific to general
Top to bottom research	Bottom to top research
Deduction is a form of argument which is supposed to be conclusive, that is conclusion must necessarily follow from the reason	Inductive logic includes to draw conclusions from one or more particular facts or piece of information/evidence.

Relevance for MBA Students

- Encourage critical thinking
- Developing reflective practices
- Introducing the system of recognition

1.2 Identification of Research Problem

Right from the evolution of the society every aspects of human behaviour or facet of life has a problem. In society there were problems, there is problem and there will be problem. We have to find out answers to these problems. Hence, this is the requirement of the society to conduct research.

What is Research Problem?

A research problem refers to some difficulty which a researchers experiences in the context of either a theoretical or conceptual situation and wants a solution for it.

A research problem is one which requires a researcher to find out the best solution for the given problem

Why defining Research Problem?

1. A problem clearly stated is a problem half solved
2. A proper definition of research problem will enable the researcher to be on the track whereas an ill-defined problem may create hurdles
3. Formulation of a problem is often more essential than its solution
4. It is only on careful detailing the research problem that we can work out the research design and can smoothly carry on all the consequential steps involved while doing research.

What are the components of Research Problem?

1. There must be an individual or a group which has some difficulty or the problem.
2. There must be some objective(s) to be attained at. If one wants nothing, one cannot have a problem.
3. There must be alternative means (or the courses of action) for obtaining the objective(s) one wishes to attain.
4. There must remain some doubt in the mind of a researcher with regard to the selection of alternatives.
5. There must be some environment(s) to which the difficulty pertains.

What are the Precautions need to be taken for Selecting a Research 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. A problem must spring from the researcher's mind like a plant springing from its own seed. 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.

1. 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.
2. Controversial subject should not become the choice of an average researcher.
3. Too narrow or too vague problems should be avoided.
4. 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.
5. 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.
6. The selection of a problem must be preceded by a preliminary study.

What are the techniques involved in defining Research Problem?

Defining a problem involves the task of laying down boundaries within which a researcher shall study the problem with a pre-determined objective in view. Defining a research problem properly and clearly is a crucial part of a research study and must in no case be accomplished hurriedly. However, in practice this is a frequently overlooked which causes a lot of problems later on.

(1) Statement of the problem in a general way: First of all the problem should be stated in a broad general way, keeping in view either some practical concern or some scientific or intellectual interest. For this purpose, the researcher must immerse himself thoroughly in the subject matter concerning which he wishes to pose a problem.

(2) Understanding the nature of the problem: The next step in defining the problem is to understand its origin and nature clearly. The best way of understanding the problem is to discuss it with those who first raised it in order to find out how the problem originally came about and with what objectives in view

(3) Surveying the available literature: All available literature concerning the problem at hand must necessarily be surveyed and examined before a definition of the research problem is given. This means that the researcher must be well-versed with relevant theories in the field, reports and records as also all other relevant literature.

(4) Developing the ideas through discussions: Discussion concerning a problem often produces useful information. Various new ideas can be developed through such an exercise. Hence, a researcher must discuss his problem with his colleagues and others who have enough experience in the same area or in working on similar problems. This is quite often known as an experience survey. People with rich experience are in a position to enlighten the researcher on different aspects of his proposed study and their advice and comments are usually invaluable to the researcher

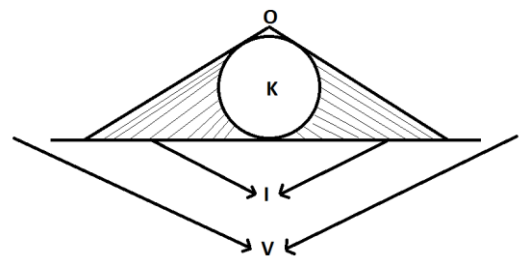
(5) Rephrasing the research problem: Finally, the researcher must sit to rephrase the research problem into a working proposition. Through rephrasing, the researcher puts the research problem in

as specific terms as possible so that it may become operationally viable and may help in the development of working hypotheses

1.3 Research Objective

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:

- To seek insight into an observed phenomenon and explain its logic and reasoning of happening. Eg declining sales and profit.
- To help the mankind in solving many problems faced form time to time and make life more comfortable and entertaining. Eg telecommunication, e-ticket
- To explore the possibility and methodology of doing things which have not been done so far but are useful for mankind, in general, and an entity, in particular.
- To continuously improve the effectiveness of the present systems and procedures in any field. E.g. compensation, recruitment and retention policy.
- Test and challenge the existing beliefs, notions etc, which have not empirically proven so far.
- Exploring new areas which might have become relevant or even might become relevant in the near future. E.g. alternative sources of energy to reduce carbon emission.
- Analyse the past data for discovering trends, patterns and relationships.
- To test a hypothesis of a causal relationship between variables (such studies are known as hypothesis-testing research studies).
- To expand the sphere of knowledge (K) and increase in horizon of vision(V). However this simultaneously increases the realization of ignorance (I).



Motivation in Research

1. Desire to get a research degree along with its consequential benefits;
2. Desire to face the challenge in solving the unsolved problems, i.e., concern over practical problems initiates research;
3. Desire to get intellectual joy of doing some creative work;
4. Desire to be of service to society;
5. Desire to get respectability.

1. 4 Type of Business Research.

1. Applied research: also known as decisional research, use existing knowledge as an aid to the solution of some given problem or set of problems. Applied research aims at finding a solution for an immediate problem facing a society or an industrial/business organisation.

2. Fundamental research: is also called basic or pure research, seeks to extend the boundaries of knowledge in a given area with no necessary immediate application to existing problems. Fundamental research is mainly concerned with generalisations and with the formulation of a theory.

3. 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.

4. Descriptive research: Descriptive research as the name suggests is designed to describe something includes surveys and fact-finding enquiries of different kinds. It tries to discover answers to the questions who, what, when and sometimes how. Here the researcher attempts to describe or define a subject, often by creating a profile of a group of problems, people, or events. The major purpose of descriptive research is description of the state of affairs as it exists at present

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. Predictive research: If we can provide a plausible explanation for an event after it has occurred, it is desirable to be able to predict when and in what situations the event will occur. This research is just as rooted in theory as explanation. This research calls for a high order of inference making. In

business research, prediction is found in studies conducted to evaluate specific courses of action or to forecast current and future values.

7. Analytical research: The researcher has to use facts or information already available, and analyse these to make a critical evaluation of the material.

8. Quantitative research: Quantitative research is based on the measurement of quantity or amount. It is applicable to phenomena that can be expressed in terms of quantity.

9. Qualitative research: It is concerned with qualitative phenomenon (i.e.) phenomena relating to or involving quality or kind. This type of research aims at discovering the underlying motives and desires, using in depth interviews for the purpose. Other techniques of such research are word association test, sentence completion test, story completion tests and similar other projective techniques. Attitude or opinion research i.e., research designed to find out how people feel or what they think about a particular subject or institution is also qualitative research.

10. Conceptual research: Conceptual research is that related to some abstract idea(s) or theory. It is generally used by philosophers and thinkers to develop new concepts or to reinterpret existing ones.

11. Empirical research: It is appropriate when proof is sought that certain variables affect other variables in some way. Evidence gathered through experiments or empirical studies is today considered to be the most powerful support possible for a given hypothesis.

1.5 Research Process

"All progress is born of inquiry. Doubt is often better than overconfidence, for it leads to inquiry, and inquiry leads to invention"

Research process consists of series of actions or steps necessary to effectively carry out research and the desired sequencing of these steps. The various steps involved in a research process are not mutually exclusive; nor are they separate and distinct.

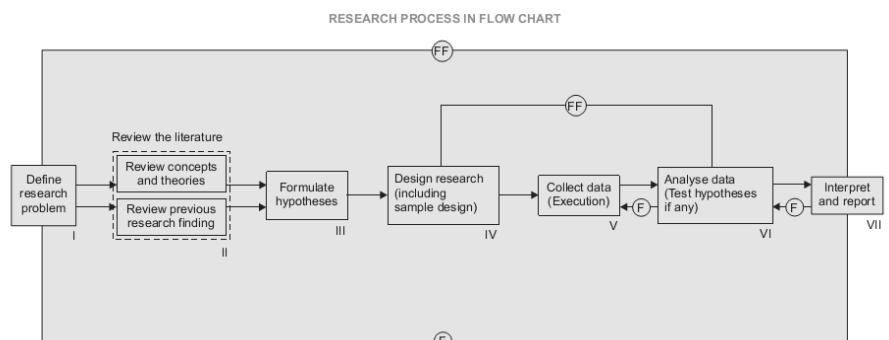
1. Formulating the research problem: At the very outset the researcher must single out the problem he wants to study, i.e., he must decide the general area of interest or aspect of a subject-matter that he would like to inquire into. The best way of understanding the problem is to discuss it with one's own colleagues or with those having some expertise in the matter. In an academic institution the researcher can seek the help from a guide who is usually an experienced man and has several research problems in mind

2. Extensive literature survey: Once the problem is formulated, a brief summary of it should be written down. For this purpose, the abstracting and indexing journals and published or unpublished bibliographies are the first place to go to. Academic journals, conference proceedings, government reports, books etc., must be tapped depending on the nature of the problem.

3. Development of working hypotheses: Working hypothesis is tentative assumption made in order to draw out and test its logical or empirical consequences. As such the manner in which research hypotheses are developed is particularly important since they provide the focal point for research. The role of the hypothesis is to guide the researcher by delimiting the area of research and to keep him on the right track. It sharpens his thinking and focuses attention on the more important facets of the problem

4. Preparing the research design: research design, i.e., he will have to state the conceptual structure within which research would be conducted. In other words, the function of research design is to provide for the collection of relevant evidence with minimal expenditure of effort, time and money. But how all these can be achieved depends mainly on the research purpose. Research purposes may be grouped into four categories, viz., (i) Exploration, (ii) Description, (iii) Diagnosis, and (iv) Experimentation.

5. Determining sample design: The researcher must decide the way of selecting a sample or what is popularly known as the sample design. In other words, a sample design is a definite plan determined



before any data are actually collected for obtaining a sample from a given population. Samples can be either probability samples or non-probability samples

6. Collecting the data: There are several ways of collecting the appropriate data which differ considerably in context of money costs, time and other resources at the disposal of the researcher.

Primary data can be collected either through experiment or through survey.

7. Execution of the project: Execution of the project is a very important step in the research process. If the execution of the project proceeds on correct lines, the data to be collected would be adequate and dependable. The researcher should see that the project is executed in a systematic manner and in time.

8. Analysis of data: After the data have been collected, the researcher turns to the task of analysing them. The analysis of data requires a number of closely related operations such as establishment of categories, the application of these categories to raw data through coding, tabulation and then drawing statistical inferences. The unwieldy data should necessarily be condensed into a few manageable groups and tables for further analysis.

9. Hypothesis-testing: After analysing the data as stated above, the researcher is in a position to test the hypotheses. Various tests, such as Chi square test, t-test, F-test, have been developed by statisticians for the purpose. The hypotheses may be tested through the use of one or more of such tests, depending upon the nature and object of research inquiry.

10. Generalisations and interpretation: If a hypothesis is tested and upheld several times, it may be possible for the researcher to arrive at generalisation, i.e., to build a theory.

11. Preparation of the report or the thesis: Finally, the researcher has to prepare the report of what has been done by him. Writing of report must be done with great care

1.6 Research Designs: Exploratory, Descriptive, Experimental and Observational

Why Research Design? (The need for Research Design)

1. Research design is needed because it facilitates the smooth sailing of the various research operations.
2. Research design is needed for making research as efficient as possible, i.e. yielding maximal information with minimal expenditure of effort, time and money
3. 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.
4. A proper research design enhances the reliability of research results and minimises any error that may upset the entire project.

What is Research Design?

A research design or designing of study streamlines the research. It is basically a blue print of activities carried out from the beginning of the research process till its completion, involving collection, measurement and analysis of data.

Research design basically deals with decisions regarding what, where, when, how much, by what means concerning an inquiry or a research study constitute a research design.

A research design is not just a work plan, but a plan with all details that has to be done to complete the project.

The Research Strategy is a subset of research design, includes elements of data collection and interpretation and emerges both from research purpose and question.

What contains a Research Design?

1. A clear statement of the research problem;
2. Procedures and techniques to be used for gathering information;
3. The population to be studied;
4. Methods to be used in processing and analysing data.
5. Communication of findings
6. The research design tell the researcher how the research was operationalized as regards to what, how, and why

Different Research Designs

{1} Exploratory Research

Exploratory research studies are also termed as formulative research studies. The major emphasis in such studies is on the discovery of ideas and insights. Exploratory research are useful when the researcher does not have clear idea about the problems at hand and sometimes may have certain vague idea in mind. As such the research design appropriate for such studies must be flexible enough to provide opportunity for considering different aspects of a problem under study

- Exploratory research only exist when little or no previous study has ever been done and knowledge in minimal in a certain field of study.
- Exploratory research tends to rely on secondary data and qualitative research techniques.
- Exploration helps us to know more about dilemma facing the manager / sponsor and knowledge about certain variables, which are not yet known completely.

The exploration in research is carried out both by qualitative and quantitative techniques, but relies heavily on qualitative ones. There are various approaches in qualitative research which can be used in exploration.

- In-depth interview
- Participants observation
- Film, photographs and videotape
- Case studies
- Expert interviewing
- Secondary data analysis
- Experience survey
- The focus group

{2} Descriptive and Diagnostic Research

Descriptive research studies are those studies which are concerned with describing the characteristics of a particular individual, or of a group, whereas diagnostic research studies determine the frequency with which something occurs or its association with something else.

- Descriptive research or statistical research provides data about the population or universe being studied.
- Descriptive research is used when the objective is to provide a systematic description, that is factual and accurate as possible.
- Most of the social research comes under this category.
- In descriptive as well as in diagnostic studies, the researcher must be able to define clearly, what he wants to measure and must find adequate methods for measuring it along with a clear cut definition of 'population' he wants to study.

The various methods used under the descriptive research are

- Secondary data
- Surveys
- Panels
- Observational and other data

Research Design	Type of study	
	Exploratory of Formulative	Descriptive/Diagnostic
Overall design	Flexible design (design must provide opportunity for considering different aspects of the problem)	Rigid design (design must make enough provision for protection against bias and must maximise reliability)
(i) Sampling design	Non-probability sampling design (purposive or judgement sampling)	Probability sampling design (random sampling)
(ii) Statistical design	No pre-planned design for analysis	Pre-planned design for analysis
(iii) Observational design	Unstructured instruments for collection of data	Structured or well thought out instruments for collection of data
(iv) Operational design	No fixed decisions about the operational procedures	Advanced decisions about operational procedures.

{3} Experimental Research / Hypothesis Testing Research

An experiment is a orderly procedure carried out with the goal of verifying, falsifying, or establishing the validity of a hypothesis. Experiments provide insight into cause-and-effect by demonstrating what outcome occurs when a particular factor is manipulated. Hypothesis-testing research studies (generally known as experimental studies) are those where the researcher tests the

hypotheses of causal relationships between variables. Such studies require procedures that will not only reduce bias and increase reliability, but will permit drawing inferences about causality.

- A controlled experiment generally compares the results obtained from an experimental sample against a control sample
- Natural experiments rely solely on observations of the variables of the system under study, rather than manipulation of just one or a few variables as occurs in controlled experiments.
- Field experiments are so named in order to draw a contrast with laboratory experiments, which enforce scientific control by testing a hypothesis in the artificial and highly controlled setting of a laboratory

{4} Observational Research

Observational research is type of correlational (i.e., nonexperimental) research in which a researcher observes ongoing behavior. There are a variety of types of observational research, each of which has both strengths and weaknesses. Generally, there are three types of observational research:

(1) Covert observational research - The researchers do not identify themselves. Either they mix in with the subjects undetected, or they observe from a distance. The advantages of this approach are:

- It is not necessary to get the subjects' cooperation, and
- The subjects' behaviour will not be contaminated by the presence of the researcher.

(2) Overt observational research - The researchers identify themselves as researchers and explain the purpose of their observations. The problem with this approach is subjects may modify their behaviour when they know they are being watched. They portray their "ideal self" rather than their true self. The advantage that the overt approach has over the covert approach is that there is no deception

(3) Researcher Participation - The researcher participates in what they are observing so as to get a finer appreciation of the phenomena.

Conclusion

A good design is often characterised by adjectives like flexible, appropriate, efficient, and economical and so on. Generally, the design which minimises bias and maximises the reliability of the data collected and analysed is considered a good design. The design which gives the smallest experimental error is supposed to be the best design in many investigations

1.7 Planning and Formulation of Research Projects

What is Research Project?

Research project is detailed analysis of research proposal with defined objective and constraints. Important note about writing a proposal: Proposals are informative and persuasive writing because they attempt to educate the reader and to convince that reader to do something (give you money). The goal of the writer is not only to persuade the reader to do what is being requested, but also to make the reader believe that the solution is practical and appropriate.

Planning for Formulation of Research Project

- (1) Need for the Study: Explain the need for and importance of this study and its relevance.
- (2) Review of Previous Studies: Review the previous works done on this topic, understand what they did, identify gaps and make a case for this study and justify it.
- (3) Statement of Problem: State the research problem in clear terms and give a title to the study.
- (4) Objectives of Study: What is the purpose of this study? What are the objectives you want to achieve by this study? The statement of objectives should not be vague. They must be specific and focussed.
- (5) Formulation of Hypothesis: Conceive possible outcome or answers to the research questions and formulate into hypothesis tests so that they can be tested.
- (6) Operational Definitions: If the study is using uncommon concepts or unfamiliar tools or using even the familiar tools and concepts in a specific sense, they must be specified and defined.
- (7) Scope of the Study: It is important to define the scope of the study, because the scope decides what is within its purview and what is outside.
- (8) Sources of Data: is an important stage in the research design. At this stage, keeping in view the nature of research, the researcher has to decide the sources of data from which the data are to be collected. Basically the sources are divided into primary source (field sources) and secondary source (documentary sources).

Scope includes

- Geographical area to be covered.
- Subject content to be covered.
- Time period to be covered.

(9) Method of Collection: After deciding the sources for data collection, the researcher has to determine the methods to be employed for data collection, primarily, either census method or sampling method. This decision may depend on the nature, purpose, scope of the research and also time factor and financial resources.

(10) Tools & Techniques: The tools and techniques to be used for collecting data such as observation, interview, survey, schedule, questionnaire, etc., have to be decided and prepared.

(11) Sampling Design: If it is a sample study, the sampling techniques, the size of sample, the way samples are to be drawn etc., are to be decided.

(12) Data Analysis: How are you going to process and analyze the data and information collected? What simple or advanced statistical techniques are going to be used for analysis and testing of hypothesis, so that necessary care can be taken at the collection stage.

(13) Presentation of the Results of Study: How are you going to present the results of the study? How many chapters? What is the chapter scheme? The chapters, their purpose, their titles have to be outlined. It is known as chapterisation.

(14) Time Estimates: What is the time available for this study? Is it limited or unlimited time? Generally, it is a time bound study. The available or permitted time must be apportioned between different activities and the activities to be carried out within the specified time. For example, preparation of research design one month, preparation of questionnaire one month, data collection two months, analysis of data two months, drafting of the report two months etc.,

(15) Financial Budget: The design should also take into consideration the various costs involved and the sources available to meet them. The expenditures like salaries (if any), printing and stationery, postage and telephone, computer and secretarial assistance etc.

(16) Administration of the Enquiry: How is the whole thing to be executed? Who does what and when? All these activities have to be organized systematically, research personnel have to be identified and trained. They must be entrusted with the tasks, the various activities are to be coordinated and the whole project must be completed as per schedule

1.8 Preparation of Questionnaire and Schedules

Questionnaire is a most popular and widely used technique in which information is obtained. In the other words with the help of asset of questions, all the required data is collected.

What is Questionnaire?

To Goode and Hatt, "In general, the word questionnaire refers to a device for securing answers to questions by using a form which the respondent fills in him/herself."

To Bogardus, "A questionnaire is a list of questions sent to a numbers of persons for them to answers. It secures standardized result that can be tabulated and treated statistically."

Questionnaire Method

Under this method, questionnaires are sent personally or by post to various informants with a request to answer the questions and return the questionnaire. If the questionnaire is posted to informants, it is called a Mail Questionnaire. Sometimes questionnaires may also sent through E-mail depending upon the nature of study and availability of time and resources. After receiving the questionnaires the informants read the questions and record their responses in the space meant for the purpose on the questionnaire. It is desirable to send the questionnaire with self-addressed envelopes for quick and high rate of response.

What are the Characteristics of Questionnaire?

- It is an indirect technique of primary data collection.
- Mailing process is essentials in questionnaire technique.
- Questionnaire technique is self-administered.
- Respondents must be literate to use this technique.
- Larger number of respondents can be included.
- Wide area can be covered by questionnaire technique.
- It is a quantitative technique rather than qualitative.

What are the Advantages and Disadvantages of Questionnaire?

Advantages

- Through the help of post office and drop-and-collect technique a single researcher can gather data from a large and representative sample at a relatively low cost.

- Questionnaires ensure the anonymity (secrecy) of the respondents and provide sufficient time to the respondents to think, fill- up and sent it back.
- It is less expensive than other technique of primary data collection. The researcher can save his/her time, resources and efforts by proper handling of questionnaire.
- All the respondents get the same questions with a self –administered (self-managed or controlled) questionnaire; therefore there is no possibility of interviewer bias.
- Questionnaire stimulates free thought and is convenient to fill up; it provides a chance for respondents to express feelings and opinions.
- Respondents report socially undesirable behaviour and traits (i.e. arrest records; alcohol dependency, family violence, premarital sexual experience etc.) more willingly in questionnaire than they do in face to face interviews.
- More complex questions can be raised in self administered questionnaire than in personal interview.
- One can put long array of items instead of questions, which is not possible to ask in personal interviews.

Disadvantages

- There is no control over how people interpret questions on a self administered instrument.
- There is possibility of low response rate in developing societies. It is difficult to draw conclusion with low response rate.
- In some cases, you may want respondents to answer a question without knowing what coming next. This is impossible in a self administered questionnaire.
- If a questionnaire is returned back, you can't be sure that the respondent who received it is the person who filled it out.
- Sometimes mailed questionnaires are prone to serious sampling problems. Sampling frames of addresses are almost always imperfect i.e. if you use a phone diary to select sample you may miss all those people who don't have phones or who choose not to list their numbers.
- The use of questionnaire is limited only up to literate respondents viz simply this is not useful for studying illiterate community/ society.
- Response is difficult if the response list is too long and sometimes response categories may be superficial or biased.
- The responses of questionnaire are totally dependent on respondent's recall and there is lack of response to help clarify the ambiguous questions.
- Hand written responses of respondents are difficult to understand.

Types of questions

Basically, two distinct type of questions are asked in a survey

1. Closed ended questions: Closed ended questionnaires are used when some sort of categorized data is required. In other words when the data needs to be put into definite classification. In this the questions in the questionnaires are so worded that the replies can be found out from the alternative replies provided therein. For e.g.

i. Is the application of your employing agency policy consistent? (Yes / No / I do not know)

2. Open ended questions: Open-ended questions allow respondents to answer in their own words rather than select from predetermined answers. For e.g.

i. What are the specific goals of your B.Sc. forestry program?

ii. What do you think should be done to improve this training program for next year?

Characteristics of a good questionnaire

1. It should appear professional (qualified, specialized)
2. It is short and easy to read.
3. It introduces respondents about the purpose of the evaluation, explains why their cooperation is needed, and provides clear direction to complete and return the questionnaire.
4. It is unambiguous and vocabulary used in the questionnaire should be easily understandable to the respondents.
5. The questions are organized in a logical order.
6. Branching is clear.
7. It uses capitalized key words to reduce the chance of misreading instructions.
8. A good questionnaire always provides alternatives, but doesn't use double- barreled questions.
9. It doesn't put false premises (grounds) into questions.
10. It asks both closed and open ended questions. Usually a good questionnaire ends with an open ended questions, 'Are there any other comments or concerns you would like to mention?'
11. The title should reflect the content of the instruments.
12. It comes with a cover letter.

13. It has an attractive front cover.
14. The good questionnaire should end with `` thank you."

Major processes in questionnaire

- Constructing appropriate questionnaire
- Pre-testing and editing the questionnaire
- Covering letter
- Manage self-addressed envelope and stamped
- Dispatch(send out) by mail
- Follow up letters or telephone calls
- Collection/coding/ tabulation and reporting

Collection of Data through Schedules

A Schedule is also a list of questions, which is used to collect the data from the field. This is generally filled in by the researcher or the enumerators. If the scope of the study is wide, then the researcher appoints people who are called enumerators for the purpose of collecting the data. The enumerators go to the informants, ask them the questions from the schedule in the order they are listed and record the responses in the space meant for the answers in the schedule itself. For example, the population census all over the world is conducted through this method. The difference between questionnaire and schedule is that the former is filled in by the informants, the latter is filled in by the researcher or enumerator.

Merits

- 1) It is a useful method in case the informants are illiterates.
- 2) The researcher can overcome the problem of non-response as the enumerators go personally to obtain the information.
- 3) It is very useful in extensive studies and can obtain more reliable data.

Limitations

- 1) It is a very expensive and time-consuming method as enumerators are paid persons and also have to be trained.
- 2) Since the enumerator is present, the respondents may not respond to some personal questions.
- 3) Reliability depends upon the sincerity and commitment in data collection.

Designing the Questionnaire

The success of collecting data either through the questionnaire method or through the schedule method depends largely on the proper design of the questionnaire. This is a specialised job and requires high degree of skill, experience, thorough knowledge of the research topic, ability to frame questions and a great deal of patience. There are no hard and fast rules in designing the questionnaire. However, the following general guidelines may be helpful in this connection.

- (1) The number of questions should be minimised as far as possible because informants may not like to spend much time to answer a lengthy questionnaires.
- (2) The questions should be precise, clear and unambiguous. Lengthy questions tend to confuse the informant.
- (3) Choose the appropriate type of questions. Generally there are five kinds of questions used in questionnaires. They are as follows:
 - Simple choice questions / Dichotomous questions: which offer the respondents a choice between two answers, such as, 'Yes' or 'No', 'Right' or 'Wrong'. 'Do you own a computer?' Can easily be answered with 'Yes' or 'No'.
 - Multiple choice questions are often used as a follow-up to simple choice questions. This type of questions provide a choice between a number of factors that might influence informant preferences. For example, where do you sell your agricultural products? a) In village market, b) In a regulated market, c) To commission agent, d) Any other...
 - Open-ended questions allow the informants to give any related answer in their own words. For example, what should be done to enhance the practical utility of commerce programmes?
 - Specific questions which require specific information. For example, "From where did you take the loan for your business."
 - Scaled questions / Likart questions are used to record how strongly the opinions are expressed. For example, How do you rate the facilities provided by the market committee? a) Very good, b) Good, c) Normal, d) Bad, or e) Very bad.
- (4) The questions should be arranged in a logical sequence to avoid embarrassment. For example, asking a question how many children do you have? Then the next question : Are you married?
- (5) Questions which require calculations should be avoided. For example, question regarding yearly income of the respondents who are getting daily wage or piece wages, should not be asked.
 - Questions that put too great a strain on the memory or intellect of the respondent;

- Questions of a personal character;
- Questions related to personal wealth, etc.

1.9 Measurement Problem and Scaling Techniques

The data consists of quantitative variables like price, income, sales etc., and qualitative variables like knowledge, performance, character etc. The qualitative information must be converted into numerical form for further analysis. This is possible through measurement and scaling techniques.

What is Measurement?

- The act or the process of finding the size, quantity or degree to measure.
- Measurement is defined as the assignment of numbers to characteristics of objects or events according to rules.
- Measurement is the process of observing and recording the observations that are collected as part of research.
- The most important aspect of measurement is the specification of rules for assigning numbers to characteristics. The rules for assigning numbers should be standardised and applied uniformly. This must not change over time or objects.

What is Scaling?

- A range of levels or numbers used for measuring.
- Scale measures the characteristics of the objects or event.
- Scaling is the assignment of objects to numbers or semantics according to a rule. In scaling, the objects are text statements, usually statements of attitude, opinion, or feeling.

What are the issues in Measurement?

When a researcher is interested in measuring the attitudes, feelings or opinions of respondents he/she should be clear about the following:

- What is to be measured? (The definition of the problem, based on our judgments or prior research indicates the concept to be investigated.)
- Who is to be measured? (That means who are the people we are interested in. The characteristics of the people such as age, sex, education, income, location, profession, etc. May have a bearing on the choice of measurement. The measurement procedure must be designed keeping in mind the characteristics of the respondents under consideration.)
- The choices available in data collection techniques (various methods of data collection. Normally, questionnaires are used for measuring attitudes, opinions or feelings.)

Levels of Measurement Scale

The level of measurement refers to the relationship among the values that are assigned to the attributes, feelings or opinions for a variable. We simply use the values as a shorter name for the attributes, opinions, or feelings. Knowing the level of measurement helps you to decide on how to interpret the data.

The assigned values of attributes allow the researcher more scope for further processing of data and statistical analysis. Typically, there are four levels of measurement scales or methods of assigning numbers: (a) Nominal scale, (b) Ordinal scale, (c) Interval scale, and (d) Ratio scale.

(1) Nominal Scale: Nominal scale is simply a system of assigning number symbols to events in order to label them. In this scale the different scores on a measurement simply indicate different categories. Nominal scales are the lowest form of measurement. The simple rule to be followed while developing a nominal scale:

- Do not assign the same numerals to different objects or events or different numbers to the same object or event.
- In marketing nominal scales are used substantially in many occasions. For example, nominal scale is used to identify and classify brands, sales regions, awareness of brands, working status of women etc.,
- The nominal scale is often referred to as a categorical scale. The assigned numbers have no arithmetic properties and act only as labels. The only statistical operation that can be performed on nominal scales is a frequency count. We cannot determine an average except mode.
- Also, you should be careful and be sure that the categories provided are mutually exclusive so that they do not overlap or get duplicated in any way.

(2) Ordinal Scale: Ordinal scale is a ranking scale that indicates ordered relationship among the objects or events. It involves assigning numbers to objects to indicate the relative extent to which the objects possess some characteristic.

- It measure whether an object or event has the same characteristic than some other object or event. It is an improvement over nominal scale in that it indicates an order.
- Involves the ranking of items along the continuum of the characteristic being scaled.
- Hence, the important feature of ordinal scale over nominal scale is that it indicates relative position, not the magnitude of the difference between the objects.
- The main characteristic of the ordinal scale is that the categories have a logical or ordered relationship. This type of scale permits the measurement of degrees of difference, (that is, 'more' or 'less') but not the specific amount of differences (that is, how much 'more' or 'less').

TV Channel	Viewers preferences
Doordarshan-1	1
Star plus	2
NDTV News	3
Aaaj Tak TV	4

This scale is very common in marketing, satisfaction and attitudinal research.

- In marketing research, ordinal scales are used to measure relative attitudes, opinions, and preferences.
- Using ordinal scale data, we can perform statistical analysis like Median and Mode, but not the Mean.

(3) Interval Scale: Interval scale is otherwise called as rating scale. It involves the use of numbers to rate objects or events.

- It interval scales, numerically equal distances on the scale represent equal values in the characteristic being measured.
- Interval scale is an advancement over the ordinal scale that it has all the properties of an ordinal scale plus it allows the researcher to compare the differences between objects.
- It also possesses the property of equality of difference between each levels of measurement. The feature of this scale is that the difference between any two scale values is identical to the difference between any other two adjacent values of an interval scale. Examples of interval scales are the Fahrenheit and Celsius scales.
- Interval scale is a scale in which the numbers are used to rank attributes such that numerically equal distances on the scale represent equal distance in the characteristic being measured
- However, in an interval scale, the zero point is arbitrary and is not true zero. This, of course, has implications for the type of data manipulation and analysis
- In research, most of the research on attitudes, opinions and perceptions are done using scales treated as interval scales. All statistical techniques that are employed on nominal and ordinal scales could also be employed on data generated using interval scales.

<i>Food supplied is:</i>						<i>Indicate your score on the concerned blank and circle the appropriate number on each line.</i>
Fresh	1	2	3	4	5	
Tastes good	1	2	3	4	5	
Value for money	1	2	3	4	5	
Attractive packaging	1	2	3	4	5	
Prompt time delivery	1	2	3	4	5	

(4) Ratio Scales: Ratio scales differ from interval scales in that it has a natural/absolute zero. It possesses all the properties of the normal, ordinal and interval scales.

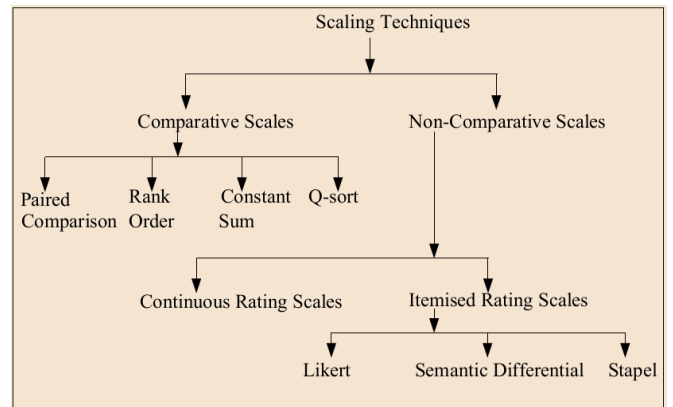
- Ration scale is the highest level of measurement scales. This has the properties of an interval scale together with a fixed (absolute) zero point. The absolute zero point allows us to construct a meaningful ratio.
- Data generated using ratio scales may be identified, classified into categories, ranked and compared with others properties. It could also be expressed in terms of relativity in that one can be expressed in terms of a division of the other. Hence, it may be called as relative scales.
- Ratio scales have great many number of application in research. They include sales, market share, costs, ages, and number of customers. In all these cases, natural zero exists. All statistical techniques can be applied on ratio data.

Various Types of Scaling Techniques

The various types of scaling techniques used in research can be classified in to two categories: (a) comparative scales, and (b) Non-comparative scales.

{A} Comparative Scaling Techniques

In comparative scaling, the respondent is asked to compare one object with another. The comparative scales can further be divided into the following four types of scaling techniques: (a) Paired Comparison Scale, (b) Rank Order Scale, (c) Constant Sum Scale, and (d) Q-sort Scale.



(a) Paired Comparison Scaling: Paired comparison scaling as its name indicates involves presentation of two objects and asking the respondents to select one according to some criteria.

- The data are obtained using ordinal scale. For example, a respondent may be asked to indicate his/her preference for TVs in a paired manner.
- Paired comparison data can be analysed in several ways. In the above example, the researcher can calculate the percentage of respondents who prefer one particular brand of soft drinks over the other.
- Paired comparison technique is useful when the number of brands is limited, as it requires direct comparison and overt choice.
- However, it is not so, that possible comparison could not be made, but comparisons would become so much unwieldy. The most common method of taste testing is done by paired comparison where the consumer may be, for example, asked to taste two different brands of soft drinks and select the one with the most appealing taste.

Brand	Coke	Pepsi	Sprite	Limca
Coke	—	√		
Pepsi		—		
Sprite	√	√	—	
Limca	√	√	√	—
No. of times preferred	2	3	1	0

(b) Rank Order Scaling: This is another popular comparative scaling technique.

- In rank order scaling is done by presenting the respondents with several objects simultaneously and asked to order or rank them based on a particular criterion.
- In this scaling technique, ordinal scale is used. The consumers may be asked to rank several brands of soft drinks in an order, 1 being the most preferred brand, followed by 2, 3 and so on.
- Like paired comparison, it is also comparative in nature. Data generated using this technique are employed with conjoint analysis because of the discriminatory potential of the scaling, stimulating the consumers to discriminate one brand from the other.
- Under the assumptions of transitivity, rank order can be converted to equivalent paired comparison data, and vice versa.
- This method is more realistic in obtaining the responses and it yields better results when direct comparison is required between the given objects. The major disadvantage of this technique is that only ordinal data can be generated.

Brand	Rank
(a) Coke	3
(b) Pepsi	1
(c) Limca	2
(d) Sprite	4

(c) Constant Sum Scaling: This technique allows the respondents to allocate a constant sum of units, such as points, rupees or among a set of stimulus objects with respect to some criterion.

- The attributes are scaled by counting the points assigned to each one by all the respondents and dividing the number of respondents.
- This predominantly uses ordinal because of its comparative nature and the resulting lack of generalisability.
- Constant sum scaling has advantage in that it allows for discrimination among stimulus objects without requiring too much time.
- The advantage of this technique is saving time.
- However, there are two main disadvantages. The respondents may allocate more or fewer points than those specified. The second problem is rounding off error if too few attributes are used and the use of a large number of attributes may be too taxing on the respondent and cause confusion and fatigue.

Attribute	Number of Points
(a) Price	50
(b) Fragrance	05
(c) Packaging	10
(d) Cleaning Power	30
(e) Lather	05
Total Points	100




[illegible]

- ## {B} Non-Comparative Scaling Techniques

(a) Continuous Rating Scale: This is also otherwise called as graphic rating scale. This is a type of scale that offers respondents a form of continuum (such as a line) on which to provide a rating of an object.

- Scale Type B
- Strongly disagree ————— Strongly agree
- Scale Type C
- Strongly agree ————— Strongly disagree
- 10 9 8 7 6 5 4 3 2 1 0

- The respondents are provided with a scale that has a number or brief description associated with each category.
- This scale allows the respondents to choose from a more limited number of categories, usually five to seven, although 10 or more are rarely used.
- The categories are ordered in terms of scale position; and the respondents are required to select the specified category that best describes the object being rated. The categories are given verbal description, although this is not absolutely necessary.
- These scales are widely used in research and nowadays, more complex types such as multi-item rating scales are used. There are few variants among itemised rating scales. They are Likert, Semantic differential and staple scales.

Itemised Graphic Scale	Itemised Verbal Scale	Itemised Numeric Scale
 Favourable	Completely satisfied	-5
	Somewhat satisfied	-4
 Indifferent	Neither satisfied nor dissatisfied	-3
	Somewhat dissatisfied	-2
 Unfavourable	Completely dissatisfied	-1
		0
		+1
		+2
		+3
		+4
		+5

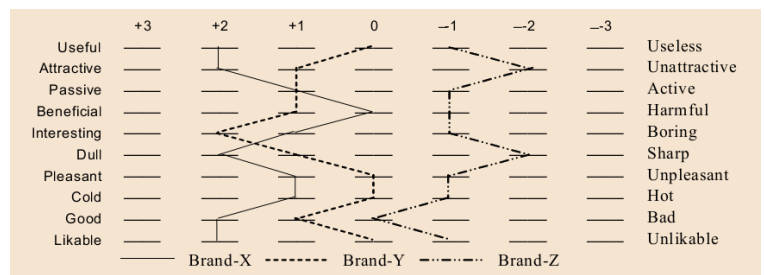
i> Likert Scale:In business research, the Likert scale, developed by Rensis Likert, is extremely popular for measuring attitudes, because, the method is simple to administer.

- With the Likert scale, the respondents indicate their own attitudes by checking how strongly they agree or disagree with carefully worded statements that range from very positive to very negative towards the attitudinal object.
- Respondents generally choose from five alternatives (say strongly agree, agree, neither agree nor disagree, disagree, strongly disagree).
- To measure the attitude, the researchers assign weights or scores to the alternative responses.

	Strongly agree	Agree	Not sure	Disagree	Strongly disagree
It is more fun to play a tough, competitive cricket match than to play an easy one.	5	4	3	2	1

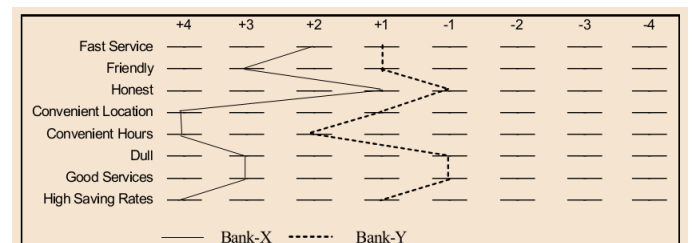
ii> Semantic Differential Scale: Semantic differential scale is a popular scaling technique next to Likert scale. In this scale, the respondents associate their response with bipolar labels that have semantic meaning.

- The respondents rate objects on a number of itemised, seven point rating scales bounded at each end by one of two bipolar adjectives such as "Excellent" and "Very bad". The respondents indicate their response choosing the one that best describes their choice.
- The Semantic Differential scale is used for a variety of purposes. It can be used to find whether a respondent has a positive or negative attitude towards an object.
- It has been widely used in comparing brands, products and company images. It has also been used to develop advertising and promotion strategies and in a new product development study.
- In the semantic Differential scale, the phrases used to describe the object form a basis for attitude formation in the form of positive and negative phrases. The negative phrase is sometimes put on the left side of the scale and sometimes on the right side. This is done to prevent a respondent with a positive attitude from simply checking the left side and a respondent with a negative attitude checking on the right side without reading the description of the words.



iii> Stapel Scale: This scale is named after Jan Stapel, who developed it. This is a unipolar rating scale with in general 10 categories number from -5 to +5 without a neutral point (zero).

- This scale is usually presented vertically and respondents choose their response based on how accurately or inaccurately each item describes the object by selecting an appropriate numerical response category.
- The higher number indicates more accurate description of the object and lower number indicates lower description of the object.
- The data generated using staple scale could be analysed in the same way as semantic differential scale. The main advantage of Stapel Scale is that it does not require a pretest of the adjectives or phrases to ensure true bipolarity, and it can be administered over the telephone.



Conclusion: A number of scaling techniques are available for measurement of attitudes. There is no unique way that you can use to select a particular scaling technique for your research study. A number of issues, such as

- Problem definition and statistical analysis,
- Choice between comparative and non-comparative scales,
- Type of category labels,
- Number of categories etc.,

The above issues should be considered before arriving at a particular scaling technique.

1.10 Collection of Data: Primary and Secondary Data

What is Data?

Facts or information, especially when examined and used to find out things or to make decisions

Why we need Data?

- Data is required to make a decision in any business situation.

- The quality of the research results depends upon the reliability of the data

Primary Data Vs Secondary Data

Primary Data	Secondary Data
The Primary data are original data which are collected for the first time for a specific purpose.	The Secondary data on the other hand, are those which have already been collected by some other agency and which have already been processed
Such data are published by authorities who themselves are responsible for their collection.	Secondary data may be available in the form of Published or unpublished sources.

Sources of Secondary Data

Secondary data source may also be termed as Paper Source. The main sources of documentary data can be broadly classified into two categories:

{A} Published Sources

There are various national and international institutions, semi-official reports of various committees and commissions and private publications which collect and publish statistical data relating to industry, trade, commerce, health etc. These publications of various organisations are useful sources of secondary data.

Government Publications: Central and State Governments publish current information along with statistical data on various subjects, quarterly and annually.

- Economic Survey,
- Reports of National Council of Applied Economic Research (NCEAR),
- Federation of Indian Chambers of Commerce and Industry (FICCI),
- Central Statistical Organisation (CSO), etc.

International Publications

- The United Nations Organisation (UNO),
- International Labour Organisation (ILO),
- International Monetary Fund (IMF),
- World Bank,
- Asian Development Bank (ADB) etc.,

Semi-official Publications: Semi-official organisations like Corporations, District Boards, Panchayat etc. publish reports.

Committees and Commissions: Several committees and commissions appointed by State and Central Governments provide useful secondary data. For example, the report of the 10th Financial Commission or Fifth Pay Commissions etc

Private Publications: Newspapers and journals publish the data on different fields of Economics, Commerce and Trade. For example, Economic Times, Financial Express etc. and Journals like Economist, Indian Journal of Commerce, Journal of Industry and Trade, Business Today etc. Some of the research and financial institutions also publish their reports annually like Indian Institute of Finance. In addition to this, reports prepared by research scholars, universities etc. also provide secondary source of information.

{B} Unpublished Sources

It is not necessary that all the information/data maintained by the institutions or individuals are available in published form. Certain research institutions, trade associations, universities, research scholars, private firms, business institutions etc., do collect data but they normally do not publish it. We can get this information from their registers, files etc

{C} Electronic Sources

The secondary data is also available through electronic media (through Internet). one can download data from such sources by entering web sites like google.com; yahoo.com; msn.com; etc., and typing your subject for which the information is needed.

Merits of Secondary Data

- 1) Secondary data is much more economical and quicker to collect than primary data, as we need not spend time and money on designing and printing data collection forms (questionnaire/schedule), appointing enumerators, editing and tabulating data etc.
- 2) It is impossible to an individual or small institutions to collect primary data with regard to some subjects such as population census, imports and exports of different countries, national income data etc. but can obtain from secondary data.

Limitations of Secondary Data

- 1) Secondary data is very risky because it may not be suitable, reliable, adequate and also difficult to find which exactly fit the need of the present investigation.
- 2) It is difficult to judge whether the secondary data is sufficiently accurate or not for our investigation.
- 3) Secondary data may not be available for some investigations. For example, bargaining strategies in live products marketing, impact of T.V. advertisements on viewers, opinion polls on a specific subject, etc. In such situations we have to collect primary data.

Sources of Primary Data

The data which is collected for the first time by the researcher for his own purpose is called primary data. There are several methods of collecting primary data, such as observation, interview through reporters, questionnaires and schedules.

{A} Observation Method

The Oxford Dictionary defines observation as, 'the act of watching carefully for a period of time, especially to learn'. Thus observation involves three processes. They are: sensation, attention or concentration and perception. Under this method, the researcher collects information directly through observation. It is a process of recording relevant information without asking anyone specific questions and in some cases, even without the knowledge of the respondents. This method of collection is highly effective in behavioural surveys. Observation can be participant observation or non-participant observation.

- In Participant Observation Method, the researcher joins in the daily life of informants or organisations, and observes how they behave.
- In the Non-participant Observation Method, the researcher will not join the informants or organisations but will watch from outside.

Merits

- 1) This is the most suitable method when the informants are unable or reluctant to provide information.
- 2) This method provides deeper insights into the problem and generally the data is accurate and quicker to process. Therefore, this is useful for intensive study rather than extensive study.

Limitations

- 1) In many situations, the researcher cannot predict when the events will occur. So when an event occurs there may not be a ready observer to observe the event.
- 2) Participants may be aware of the observer and as a result may alter their behaviour.
- 3) Observer, because of personal biases and lack of training, may not record specifically what he/she observes.
- 4) This method cannot be used extensively if the inquiry is large and spread over a wide area.

{B} Interview Method

Interview is one of the most powerful tools and most widely used method for primary data collection in business research. Thus an interview is basically, a meeting between two persons to obtain the information related to the proposed study. The person who is interviewing is named as interviewer and the person who is being interviewed is named as informant. It is to be noted that, the research data/information collect through this method is not a simple conversation between the investigator and the informant, but also the glances, gestures, facial expressions, level of speech etc., are all part of the process. Through this method, the researcher can collect varied types of data intensively and extensively. Interview can be classified as direct personal interviews and indirect personal interviews.

1. **Direct Personal Interview:-** Under the techniques of direct personal interview, the investigator meets the informants (who come under the study) personally, asks them questions pertaining to enquiry and collects the desired information.
2. **Indirect personal interview:-** is another technique of interview method where it is not possible to collect data directly from the informants who come under the study. Under this method, the investigator contacts third parties or witnesses, who are closely associated with the persons/situations under study and are capable of providing necessary information. (CBI Enquiry)

Another technique for data collection through this method can be structured and unstructured interviewing.

1. **Structured interview / Formal Interview :-** In the Structured interview set questions are asked and the responses are recorded in a standardised form. This is useful in large scale interviews where a number of investigators are assigned the job of interviewing. The researcher can minimise the bias of the interviewer. This technique is also named as formal interview.

2. **Un-structured interview / Informal Interview** :- In Un-structured interview, the investigator may not have a set of questions but have only a number of key points around which to build the interview. Normally, such type of interviews are conducted in the case of an explorative survey where the researcher is not completely sure about the type of data he/ she collects. It is also named as informal interview. Generally, this method is used as a supplementary method of data collection in conducting research in business areas.

Now-a-days, telephone or cell phone interviews are widely used to obtain the desired information for small surveys. For instance, interviewing credit card holders by banks about the level of services they are receiving. This technique is used in industrial surveys specially in developed regions.

Precautions: While using this method, the following precautions should be taken:

- Obtain thorough details of the theoretical aspects of the research problem.
- Identify who is to be interviewed.
- The questions should be simple, clear and limited in number.
- The investigator should be sincere, efficient and polite while collecting data.
- The investigator should be of the same area (field of study, district, state etc.).

Merits of Interview Method

- 1) People are more willing to supply information if approached directly. Therefore, personal interviews tend to yield high response rates.
- 2) This method enables the interviewer to clarify any doubt that the interviewee might have while asking him/her questions. Therefore, interviews are helpful in getting reliable and valid responses.
- 3) The informant's reactions to questions can be properly studied.
- 4) The researcher can use the language of communication according to the standard of the information, so as to obtain personal information of informants which are helpful in interpreting the results.

Limitations of Interview Method

- 1) The chance of the subjective factors or the views of the investigator may come in either consciously or unconsciously.
- 2) The interviewers must be properly trained, otherwise the entire work may be spoiled.
- 3) It is a relatively expensive and time-consuming method of data collection especially when the number of persons to be interviewed is large and they are spread over a wide area.
- 4) It cannot be used when the field of enquiry is large (large sample).

{C} Through Local Reporters and Correspondents

Under this method, local investigators/agents or correspondents are appointed in different parts of the area under investigation. This method is generally adopted by government departments in those cases where regular information is to be collected. This method is also useful for newspapers, magazines, radio and TV news channels. This method has been used when regular information is required and a high degree of accuracy is not of much importance.

Merits

- 1) This method is cheap and economical for extensive investigations.
- 2) It gives results easily and promptly.
- 3) It can cover a wide area under investigation.

Limitations

- 1) The data obtained may not be reliable.
- 2) It gives approximate and rough results.
- 3) It is unsuited where a high degree of accuracy is desired.
- 4) As the agent/reporter or correspondent uses his own judgement, his personal bias may affect the accuracy of the information sent.

{D} Questionnaire and Schedule Methods

Discussed in Previous Chapter (1.8)

Conclusion: researcher should be careful while selecting the method which should be appropriate and effective. The selection of the methods depends upon various factors like scope and objectives of the inquiry, time, availability of funds, subject matter of the research, the kind of information required, degree of accuracy etc.

1.11 Purpose of Research Application

1. Exploration
2. Descriptive
3. Conclusion
4. Generalisation

1.12 Type of Research Reports

What is Report?

- Present a written or spoken account of an event
- It is only a statement of the most significant facts that are necessary for understanding the conclusions drawn by the investigator.

What is Reporting?

- Reporting simply means communicating or informing through reports.
- Reporting is communicating the facts, data and information through reports to the persons for whom such facts and data are collected and compiled

Purpose of Research Report

- Writing of a report is the last step in a research study and requires a set of skills
- The purpose of a report is thus the dissipation of knowledge, broadcasting of generalizations so as to ensure their widest use.
- Thus, the purpose of a report is to convey to the interested persons the results and findings of the study in sufficient detail.
- Report writing is common to both academics and organizations. However, the purpose may be different. In academics, reports are used for comprehensive and application-oriented learning. Whereas in organizations, reports form the basis for decision making.

Types of Research Reports

Broadly speaking reporting can be done in two ways:

(A) Oral or Verbal Report: reporting verbally in person, for example; Presenting the findings in a conference or seminar or reporting orally to the superiors.

(B) Written Report: Written reports are more formal, authentic and popular. Written reports can be presented in different ways as follows.

- Sentence form reports : Communicating in sentence form
- Tabular reports : Communicating through figures in tables
- Graphic reports : Communicating through graphs and diagrams
- Combined reports: Communicating using all the three of the above. Generally, this is the most popular

It is; thus, clear that the results of a research enquiry can be presented in a number of ways. They may be termed as a technical report, a popular report, an article, or a monograph.

(A) Technical Report: A technical report is used whenever a full written report (ex: Ph.D. thesis) of the study is required either for evaluation or for record keeping or for public dissemination. The main emphasis in a technical report is on :

- The methodology employed.
- The objectives of the study.
- The assumptions made / hypotheses formulated in the course of the study.
- How and from what sources the data are collected and how have the data been analyzed.
- The detailed presentation of the findings with evidence, and their limitations.

(B) Popular Report: A popular report is one which gives emphasis on simplicity and attractiveness. Its aim is to make the general public understand the findings and implications. Generally, it is simple. Simplicity is sought to be achieved through clear language and minimization of technical details. Attention of the readers is sought to be achieved through attractive layout, liberal use of graphs, charts, diagrams and pictures. In a popular report emphasis is given on practical aspects and policy implications.

(C) Research Article: Some times the findings of a research study can be published in the form of a short paper called an article. This is one form of dissemination. The research papers are generally prepared either to present in seminars and conferences or to publish in research journals. Since one of

the objectives of doing research is to make a positive contribution to knowledge, in the field, publication (publicity) of the work serves the purpose.

(D) Monograph: a detailed written study of a single subject, usually in the form of a short book. For the sake of convenience, reports may also be classified either on the basis of approach or on the basis of the nature of presentation such as:

- **Journalistic Report:** Reports prepared by journalists for publication in the media may be journalistic reports. These reports have news and information value.
- **Business Report:** A business report may be defined as report for business communication from one departmental head to another, one functional area to another, or even from top to bottom in the organizational structure on any specific aspect of business activity. These are observational reports which facilitate business decisions.
- **Project Report:** A project report is the report on a project undertaken by an individual or a group of individuals relating to any functional area or any segment of a functional area or any aspect of business, industry or society.
- **Dissertation:** A dissertation, on the other hand, is a detailed discourse or report on the subject of study. Dissertations are generally used as documents to be submitted for the acquisition of higher research degrees from a university or an academic institution.
- **Enquiry Report (Commission Report):** An enquiry report or a commission of enquiry report is a detailed report prepared by a commission appointed for the specific purpose of conducting a detailed study of any matter of dispute or of a subject requiring greater insight.
- **Thesis:** a long piece of writing completed by a student as part of a university degree, based on their own research

Stages in Preparation of Report

Research reports are the product of slow and painstaking and accurate work. Therefore, the preparation of the report may be viewed in the following major stages.

- The logical understanding and analysis of the subject matter.
- Designing the final outline of the report.
- Preparation of rough draft.
- Finalization of the Report.

1.13 Structure of Research Report

A technical report has a number of clearly defined sections. The headings of the sections and their order may differ from one situation to another. The contents of a report can broadly be divided into three parts as : 1) The front matter or prefatory items. 2) The body or text of the report. 3) The back matter or terminal items.

{A} Prefatory Items

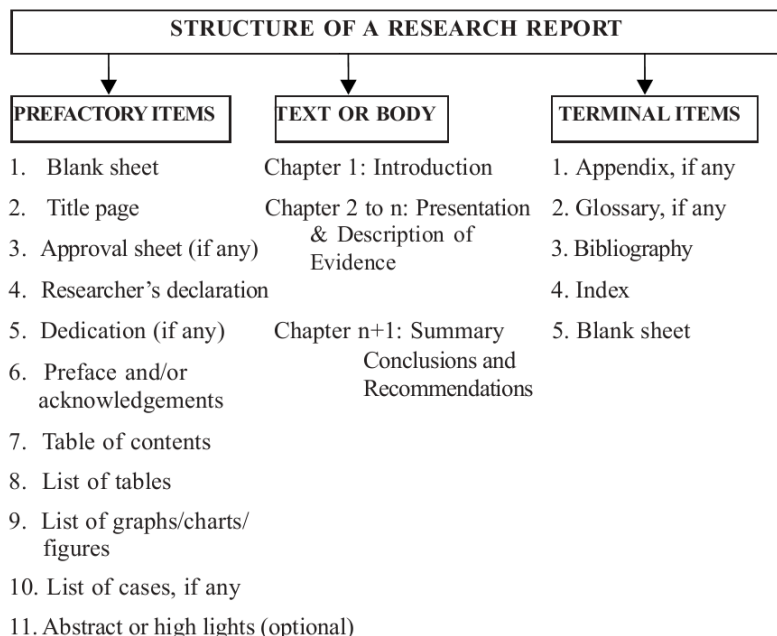
(1) **Title Page:** The first page of the report is the title page. The title page should carry a concise and adequately descriptive title of the research study, the name of the author, the name of the institution to whom it is submitted, the date of presentation.

(2) **Approval Sheet:** If a certificate of approval is required either from the research supervisor or from the institution which provided the research facilities, it must be given.

(3) **Researcher’s Declaration:** Generally the researcher has to declare/certify that it is his/her bonafide and original work done by him/her.

(4) **Dedication:** If the author wants to dedicate the work to whom soever he/she likes, he/she may do so.

(5) **Preface or Acknowledgements:** A preface includes the background and reasons for the study. This is an appropriate place for him/her to make acknowledgements also. But if the researcher has opted to discuss the significance, reasons of the study else where in the report he/she may not write ‘preface’.



But he/she may use the page for only acknowledgements. In acknowledgements the researcher acknowledges the assistance and support received from individuals and organizations in conducting the research. It is intended to express his/her gratitude to them.

(6) Table of Contents: A table of contents gives an outline of the contents of the report. It contains a list of the chapters and their titles with page numbers. It facilitates easy location of topics in the report. The chapter headings may be typed with capital letters.

(7) List of Tables: The researcher must have collected lot of data and analyzed the same and presented in the form of tables. These tables may be listed chapter wise and the list be presented with page numbers for easy location and reference.

(8) List of Graphs/Charts/Figures: If there are many graphs and charts they should also be listed with page numbers, after the list of tables separately.

(9) List of Cases/Exhibits: If there are many cases/exhibits they should also be listed.

(10) Abstract: An abstract is a synopsis. It should be as brief as possible and run about one or two pages. It is placed at the prefatory part of the report so that a reader can get a quick over view of the report.

{B} The Text/Body of the Report

After the preliminary items, the body of the report is presented. It is the major and main part of the report. Normally the body may be divided into 3 (three) parts.

(1) Introduction: Generally this is the first chapter in the body of the report. It is devoted introducing the theoretical background of the problem and the methodology adopted for attacking the problem. It may consist of the following aspects:

- Significance and justification of the topic.
- Theoretical background of the topic.
- Statement of the problem.
- Review of literature.
- Objectives of the study.
- Hypotheses to be tested.
- Definition of special terms, concepts and units of study.
- Scope of the study – geographical scope i.e. area/places to be covered, content, scope i.e., aspects to be included/excluded.
- Period of study i.e., reference period.
- Sources of data i.e., primary or secondary or both.
- Methods of data collection i.e., sample or census.
- Sampling design.
- Data collection instruments .
- Field work.
- Data processing and analysis plan.
- Limitations of the study, if any.
- An over view of the report i.e., chapter plan.

(2) Description and Discussion of Evidence: This is the major and main part of the report. It is divided into several chapters depending upon the number of objectives of the study, each being devoted to presenting the results pertaining to some aspect.

- The chapters should be well balanced, mutually related and arranged in logical sequence.
- The results should be reported as accurately and completely as possible explaining as to their bearing on the research questions and hypotheses.
- Each chapter should be given an appropriate heading.
- Depending upon the need, a chapter may also be divided into sections.
- Each chapter should end with a summary and lead into the next chapter with a smooth transition sentence.
- While dealing with the subject matter of text the following aspects should be taken care of.
They are : Headings, Quotations, Foot notes and Exhibits.

(3) The summary, conclusions and recommendations

{C} Terminal Items

- First comes the appendices section, then the bibliography and glossary.
- Each section is separated by a divider page on which only the words APPENDICES, BIBLIOGRAPHY, or GLOSSARY all in capital letters appear.
- All reference section pages are numbered in Arabic numerals in continuation with the page numbers of the text.

(1) Appendices: Supplementary or secondary references are put in the appendices section. The appendices help the author to authenticate the thesis and help the reader to check the data. The material that is usually put in the appendices is indicated below:

- Original data
- Long tables
- Long quotations
- Supportive legal decisions, laws and documents
- Illustrative material
- Extensive computations
- Questionnaires and letters
- Schedules or forms used in collecting data
- Case studies / histories
- Transcripts of interviews

The appendices can be serialized with capital letters (Appendix A, Appendix B) to differentiate from the chapter or table numbers.

(2) Bibliographies: The bibliography comes after the appendices section and is separated from it by a division sheet written BIBLIOGRAPHY. It is listed as a major section in all capital letters in the table of contents. A bibliography contains the source of every reference cited in the footnote and any other relevant works that the author has consulted. It gives the reader an idea of the literature available on the subject that has influenced or aided the author.

- Books: Author, Title(underlined), Place of publication, Publisher, Date of publication and Date of issue
- Magazines and Newspapers: Authors, Title of the article(Within quotation marks) , Title of the magazine(underlined), Volume number (Roman numerals) and Serial number(Arabic numerals)

(3) Glossary: A glossary is a short dictionary giving definitions and examples of terms and phrases which are technical, used in a special connotation by the author, unfamiliar to the reader, or foreign to the language in which the book is written. It is listed as a major section in capital letters in the table of contents. The glossary appears after the bibliography. It may also appear in the introductory pages of a book after the lists of tables and illustrations. Items are listed in alphabetical order.

(4) Index: Index may be either subject index or author index.

- Author index consists of important names of persons discussed in the report, arranged in alphabetical order.
- Subject index includes a detailed reference to all important matters discussed in the report such as places, events, definitions, concepts etc., and presented in alphabetical order.

Index is not generally included in graduate /post graduate students research reports. However, if the report is prepared for publication or intended as a work of reference, an index is desirable.

1.14 Report Writing and Presentation

Presentation has become an important communication medium in organizations because a report is understood better if it is accompanied by a presentation. Presentation skills include the ability to mix in the right proportion various elements of

1. Communication dimensions,
2. Presentation package, and
3. Use of audio-visual aids to achieve the given purpose with an audience.
4. Presenters poise

Moreover, the presenter needs to acquire the public conversation (rather than public speaking or oratory) skills.

(1) Communication Dimensions: The major elements of communication dimension, which are relevant to a presentation, are:

1. Purpose: The first step to think through the purpose of the presentation and to focus it sharply.
2. Audience: The audience interest can be held on if the presenter focuses on issues of their immediate interest and allows them to participate in understanding the information.
3. Media: In a presentation, sound, sight, and body language come into play. Therefore, the coordination of all three at one shot becomes an important aspect of presentation.
4. Message: The presenter has to think of the focus of the message-its breadth and depth-as much as a writer does.
5. Time: The element of time in a presentation situation depends on various factors like availability of the room, audience, and presenter.

6. Place: The presenter may not have much choice in selecting the place. But to make the best use of the place and the facilities available will depend on the presenter.
7. Cost: The preparation of a good presentation is time consuming and expensive.

(2) Presentation Package: The presentation package could be as follows:

1. Pre-presentation handout if necessary to prepare the audience for understanding the presentation,
2. Presentation.
3. Two-way feedback between the audience and the presenter and among the audience members through question and answer or discussion.
4. Post-presentation handout if necessary to reinforce the message or help recall.

(3) Audio-visual aids: Audio-visual aids can be broadly classified as follows:

{I} Audio

- Tape recorder
- Gramophone or compact disc

{II} Visual

- Non- Projected
- Blackboard
- Bulletin boards or flip charts
- Models
- Projected
- Epidiascope
- Overhead
- Slide
- Filmstrip
- Tachistoscope (Slide projector with a timer)

{III} Audio-Visual

- Film (8 mm, 16 mm)
- Video cassette

Since AV aids help in recreating reality in a miniature form through visuals and sound, greater CREDIBILITY and CLARITY can be achieved in presentation.

Since both sound and sight senses are activated at the same time along with the body language, CONCENTRATION, RETENTION, and RECALL, can be obtained in presentation.

AV aids can also help in collapsing DISTANCE and TIME. They help us to present to the audience materials and experiences from far-off places and from different times in the past to make the message concrete and clear

(4) Presenters Poise: The presenter himself is an essential part of the presentation. His poise and confidence matter a lot in putting across the ideas.

1. The presenter's posture and movement on the dais or at the speaking place and, his hand gestures indicate the level of confidence of the presenter.
2. The presenter's ability to maintain eye contact with the audience and keep his facial expressions suited to the subject become also important.
3. The fluency, pace of delivery, level of the voice, and command of the language signal to the audience the level of confidence and preparedness of the presenter

1.15 SPSS and Report Presentation: Use of Statistical Package for Social Sciences.

The abbreviations SPSS stands for Statistical Package for Social Science and is a comprehensive system for analysing data. SPSS Statistics is a software package used for statistical analysis. It is now officially named "IBM SPSS Statistics This package of programmes consists of software tools for data entry, data management, statistical analysis and presentation. SPSS can take data from almost any type of file and use them to generate tabulated reports, charts and plots of distributions and trends, descriptive statistics and complex statistical analyses.

SPSS is among the most widely used programs for statistical analysis in social science. It is used by market researchers, health researchers, survey companies, government, education researchers, marketing organizations and others.

Features of SPSS

1. It is easy to learn and use
2. It includes a full range of data management system and editing tools
3. It provides in-depth statistical capabilities
4. It offers complete plotting, reporting and presentation features.

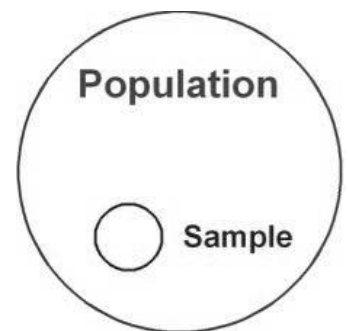
Statistics included in the base software:

1. Descriptive statistics: Cross tabulation, Frequencies, Descriptives, Explore, Descriptive Ratio Statistics
2. Bivariate statistics: Means, t-test, ANOVA, Correlation (bivariate, partial, distances), Nonparametric tests
3. Prediction for numerical outcomes: Linear regression
4. Prediction for identifying groups: Factor analysis, cluster analysis (two-step, K-means, hierarchical), Discriminant

2.1 Sampling

What is population or universe?

All items in any field of inquiry constitute a 'Universe' or 'Population.' A population is the total collection of elements about which we wish to make some inferences. A census is a count of all the elements in a population. A complete enumeration of all items in the 'population' is known as a census inquiry. The population or universe can be finite or infinite.



What is sample?

The sample represents a subset of manageable size of population. Samples are collected and statistics are calculated from the samples so that one can make inferences or extrapolations from the sample to the population. The total number of members of the population and the number included in the sample are called Population Size and Sample Size respectively.

What is sampling?

The terminology "sampling" indicates the selection of a part of a group or an aggregate with a view to obtaining information about the whole. This process of collecting information from a sample is referred to as sampling.

Why sampling?

1. Sampling can save time and money. A sample study is usually less expensive than a census study and produces results at a relatively faster speed.
2. Sampling may enable more accurate measurements for a sample study is generally conducted by trained and experienced investigators.
3. Sampling remains the only way when population contains infinitely many members.
4. Sampling remains the only choice when a test involves the destruction of the item under study.
5. Sampling usually enables to estimate the sampling errors and, thus, assists in obtaining information concerning some characteristic of the population.

What is Sample Design?

A sample design is a definite plan for obtaining a sample from a given population. It refers to the technique or the procedure the researcher would adopt in selecting items for the sample. Sample design may as well lay down the number of items to be included in the sample i.e., the size of the sample. Sample design is determined before data are collected. While developing a sampling design, the researcher must pay attention to the following points

(1) Type of universe:- The first step in developing any sample design is to clearly define the set of objects, technically called the Universe, to be studied. The universe can be finite or infinite. In finite universe the number of items is certain, but in case of an infinite universe the number of items is infinite

(2) Sampling unit:- A decision has to be taken concerning a sampling unit before selecting sample. Sampling unit may be a geographical one such as state, district, village, etc., or a construction unit

such as house, flat, etc., or it may be a social unit such as family, club, school, etc., or it may be an individual.

(3) Source list:- It is also known as 'sampling frame' from which sample is to be drawn. It contains the names of all items of a universe (in case of finite universe only). If source list is not available, researcher has to prepare it.

(4) Size of sample:- This refers to the number of items to be selected from the universe to constitute a sample. This is a major problem before a researcher. The size of sample should neither be excessively large, nor too small. It should be optimum. An optimum sample is one which fulfils the requirements of efficiency, representativeness, reliability and flexibility.

(5) Parameters of interest:- In determining the sample design, one must consider the question of the specific population parameters which are of interest.

(6) Budgetary constraint:- Cost considerations, from practical point of view, have a major impact upon decisions relating to not only the size of the sample but also to the type of sample. This fact can even lead to the use of a non-probability sample.

(7) Sampling procedure:- Finally, the researcher must decide about the technique to be used in selecting the items for the sample. There are several probabilistic and non-probabilistic methods available. The researcher must select that design which, for a given sample size and for a given cost, has a smaller sampling error.

What are the characteristics of Sample Design?

1. Sample design must result in a truly representative sample.
2. Sample design must be such which results in a small sampling error.
3. Sample design must be viable in the context of funds available for the research study.
4. Sample design must be such so that systematic bias can be controlled in a better way.
5. Sample should be such that the results of the sample study can be applied, in general, for the universe with a reasonable level of confidence.

2.2 Probabilistic and Non-probabilistic Sampling

Probabilistic Sampling	Non-probabilistic
Probability sampling, or random sampling, is a sampling technique in which the probability of getting any particular sample may be calculated.	Non-probability sampling does not meet this criterion and should be used with caution. Non-probability sampling techniques cannot be used to infer from the sample to the general population. In other words, any generalizations obtained from a non-probability sample must be filtered through one's knowledge of the topic being studied
The results of studies conducted using non-probability sampling are of high value.	The results of studies conducted using non-probability sampling are of extremely limited value.
Performing probability sampling can be more expensive.	Performing non-probability sampling can be considerably less expensive than doing probability sampling
Several types of random samples are simple random samples, systematic samples, stratified random samples, and cluster random samples.	A sample that is not random is called a non-random sample or a non-probability sampling. Some examples of non-random samples are convenience samples, judgment samples, purposive samples, quota samples, snowball samples.

2.3 Methods of Drawing Samples

On the representation basis, the sample may be probability sampling or it may be non-probability sampling. Probability sampling is based on the concept of random selection, whereas non-probability sampling is 'non-random' sampling.

Element selection technique ↓	Representation basis	
	Probability sampling	Non-probability sampling
	Unrestricted sampling Simple random sampling	Haphazard sampling or convenience sampling
Restricted sampling	Complex random sampling (such as cluster sampling, systematic sampling, stratified sampling etc.)	Purposive sampling (such as quota sampling, judgement sampling)

I. Probability Sampling Techniques

Probability samples are characterised by the fact that, the sampling units are selected by chance. In such case, each member of the population has a known, non-zero probability of being selected.

(1) Simple Random Sampling:- The simple random sample assigns equal probability to each unit of the population. In simple random sample, each individual is chosen randomly and entirely by chance, such that each individual has the same probability of being chosen at any stage during the sampling process. The simple random sample can be chosen both with and without replacement. Simple random sampling has a definite process, though not, so rigid. Some of the features of simple random sampling are

1. This is the most important and widely used probability sampling technique.
2. Another important feature is that it allows each element in the population to have a known and equal probability of selection.
3. This method resembles lottery method where a in a system names are placed in a box, the box is shuffled, and the names of the winners are then drawn out in an unbiased manner.

(2) Systematic Sampling:- Systematic sampling is a statistical method involving the selection of elements from an ordered sampling frame. The most common form of systematic sampling is an equal-probability method. As in the case of simple random sampling, it is conducted choosing a random starting point and then picking every element in succession from the sampling frame. The sampling starts by selecting an element from the list at random and then every k^{th} element in the frame is selected, where k , the sampling interval (sometimes known as the skip): this is calculated as $k = N/n$ where n is the sample size, and N is the population size.

Systematic sampling is almost similar to simple random sampling in that each population element has a known and equal probability of selection. However, the difference lies in that simple random sampling allows only the permissible samples of size n drawn have a known and equal probability of selection. The remaining samples of size n have a zero probability of being selected

(3) Stratified sampling:- In statistical surveys, when subpopulations within an overall population vary, it is advantageous to sample each subpopulation (stratum) independently. Stratification is the process of dividing members of the population into homogeneous subgroups before sampling. The strata should be mutually exclusive: every element in the population must be assigned to only one stratum. The strata should also be collectively exhaustive: no population element can be excluded. Then simple random sampling or systematic sampling is applied within each stratum. This often improves the representativeness of the sample by reducing sampling error.

This type of sampling is done in order to get homogenous elements within each strata and, the elements between each strata should have a higher degree of heterogeneity. The number of strata to be formed for the research is left to the discretion of the researcher, though, researchers agree that the optimum number of strata may be 6.

The reasons for using stratified sampling are as follows:

1. It ensures representation of all important sub-populations in the sample;
2. The cost per observation in the survey may be reduced;
3. It combines the use of simple random sampling with potential gains in precision;
4. Estimates of the population parameters may be wanted for each sub-population and;
5. Increased accuracy at given cost.

(4) Cluster sampling:- in cluster sampling the population is divided into groups of elements with some group randomly selected for study. Thus in cluster sampling the total population is divided into a

number of relatively small subdivisions which are themselves clusters of still smaller units and then some of these clusters are randomly selected for inclusion in the overall sample. Suppose we want to estimate the proportion of machine-parts in an inventory which are defective.

1. Each cluster should be a small scale representation of the total population
2. Cluster sampling, no doubt, reduces cost by concentrating surveys in selected clusters. But certainly it is less precise than random sampling.
3. Cluster sampling is used only because of the economic advantage it possesses; estimates based on cluster samples are usually more reliable per unit cost.
4. The population within a cluster should ideally be as heterogeneous as possible, but there should be homogeneity between cluster means.
5. In stratified sampling, a random sample is drawn from each of the strata, whereas in cluster sampling only the selected clusters are studied.
6. One version of cluster sampling is area sampling or geographical cluster sampling.

(5) Area sampling:- If clusters happen to be some geographic subdivisions, in that case cluster sampling is better known as area sampling. In other words, cluster designs, where the primary sampling unit represents a cluster of units based on geographic area, are distinguished as area sampling. The plus and minus points of cluster sampling are also applicable to area sampling.

(6) Multistage sampling:- is a complex form of cluster sampling. Using all the sample elements in all the selected clusters may be prohibitively expensive or not necessary. Under these circumstances, multistage cluster sampling becomes useful. Instead of using all the elements contained in the selected clusters, the researcher randomly selects elements from each cluster. Constructing the clusters is the first stage. Deciding what elements within the cluster to use is the second stage. The technique is used frequently when a complete list of all members of the population does not exist and is inappropriate. Ordinarily multi-stage sampling is applied in big inquiries extending to a considerable large geographical area, say, the entire country.

Advantages

1. The survey can be cost-effective and speed-effective under execution of multi-stage sampling.
2. Convenience of finding the survey sample
3. Normally more accurate than cluster sampling for the same size sample

Disadvantages

1. Is not as accurate as SRS(simple random sampling) if the sample is the same size
2. More testing is difficult to do

II. Non-probability Sampling Methods

Non-probability sampling does not involve random selection. It involves personal judgement of the researcher rather than chance to select sample elements. Sometimes this judgement is imposed by the researcher, while in other cases the selection of population elements to be included is left to the individual field workers. The decision maker may also contribute to including a particular individual in the sampling frame. Evidently, non probability sampling does not include elements selected probabilistically and hence, leaves a degree of "sampling error" associated with the sample. The most commonly used non-probability sampling methods are follows

(1) Convenience Sampling, Haphazard or Accidental sampling:- Convenience samples are sometimes called accidental samples because the elements included in the sample enter by "accident". It is a sampling technique where samples are obtained from convenient elements. The selection of the respondents is left to the discretion of the interviewer. The popular examples of convenience sampling include (a) respondents who gather in a church (b) students in a class room (c) mall intercept interviews (d) people on the street. In the above examples, the people may not be qualified respondents, however, form part of the sample by virtue of assembling in the place where the researcher is conveniently placed.

Advantages

1. Convenience sampling is the least expensive
2. Convenience sampling is least time consuming of all sampling techniques.

Disadvantages

1. The disadvantage with convenience sampling is that the researcher would have no way of knowing if the sample chosen is representative of the target population.

(2) Judgement Sampling or Purposive sampling:- This is a form of convenience sampling otherwise called as purposive sampling because the sample elements are chosen since it is expected that they can serve the research purpose. The sample elements are chosen based on the judgement

that prevails in the researchers mind about the prospective individual. The researcher may use his wisdom to conclude that a particular individual may be a representative of the population in which one is interested.

1. The distinguishing feature of judgment sampling is that the population elements are purposively selected.
2. The selection is not based on that they are representative, but rather because they can offer the contributions sought.
3. It may be possible that the researcher has ideas and insights about the respondent's requisite experience and knowledge to offer some perspective on the research question.

(3) Quota Sampling:- Quota sampling is another non-probability sampling. It attempts to ensure that the sample chosen by the researcher is a representative by selecting elements in such a way that the proportion of the sample elements possessing a certain characteristic is approximately the same as the proportion of the elements with the characteristic in the population.

Quota sampling is viewed as two-staged restricted judgemental sampling technique. The first stage consists of developing control categories, or quotas, of population elements. Control characteristics involve age, sex, and race identified on the basis of judgement. Then the distribution of these characteristics in the target population is determined. For example, the researcher may use control categories in that, he/she intends to study 40% of men and 60% of women in a population. Sex is the control group and the percentages fixed are the quotas. In the second stage, sample elements are selected based on convenience or judgement.

(4) Snowball Sampling:- This is another popular non-probability technique widely used, especially in academic research. In this technique, an initial group of respondents is selected, usually at random. After being interviewed, these respondents are asked to identify others who belong to the target population of interest. Subsequent respondents are selected based on the information provided by the selected group members. The group members may provide information based on their understanding about the qualification of the other prospective respondents. This method involves probability and non-probability methods. The initial respondents are chosen by a random method and the subsequent respondents are chosen by non-probability methods.

2.4 Lottery Methods and Using Random Number Table

The simple random sample is the basic sampling method assumed in statistical methods and computations. The main benefit of the simple random sample is that each member of the population has an equal chance of being chosen. This means that it guarantees that the sample chosen is representative of the population. In turn, the statistical conclusions drawn from analysis of the sample will be valid. While the name 'simple random sample' implies that it is simple, the mathematics of random sampling are actually very complex.

Lottery Method of Sampling

There are several different ways to draw a simple random sample. The most common way is the lottery method. Here, each member or item of the population at hand is assigned a unique number. The numbers are then thoroughly mixed, like if you put them in a bowl or jar and shook it. Then, without looking, the researcher selects n numbers. The population members or items that are assigned that number are then included in the sample.

Simple Random Sampling with Replacement

Suppose the population consists of N units and we want to select a sample of size n . In simple random sampling with replacement we choose an observation from the population in such a manner that every unit of the population has an equal chance of $1/N$ to be included in the sample. After the first unit is selected its value is recorded and it is again placed back in the population. The second unit is drawn exactly in the same manner as the first unit. This procedure is continued until n th unit of the sample is selected. Clearly, in this case each unit of the population has an equal chance of $1/N$ to be included in each of the n units of the sample.

Sampling with replacement is a method of random sampling in which members or items of the population can be chosen more than once for inclusion in the sample. Let's say we have 100 names each written on a piece of paper. All of those pieces of paper are put into a bowl and mixed up. The researcher picks a name from the bowl, records the information to include that person in the sample, then puts the name back in the bowl, mixes up the names, and selects another piece of paper. The

person that was just sampled has the same chance of being selected again. This is known as sampling with replacement.

Simple Random Sampling without Replacement

In this case when the first unit is chosen every unit of the population has a chance of $1/N$ to be included in the sample. After the first unit is chosen it is no longer replaced in the population. The second unit is selected from the remaining $N-1$ members of the population so that each unit has a chance of $1/N-1$ to be included in the sample. The procedure is continued till n th unit of the sample is chosen with probability $1 / N-n+1$

Sampling without replacement is a method of random sampling in which members or items of the population can only be selected one time for inclusion in the sample. Using the same example above, let's say we put the 100 pieces of paper in a bowl, mix them up, and randomly select one name to include in the sample. This time, however, we record the information to include that person in the sample and then set that piece of paper aside rather than putting it back into the bowl. Here, each element of the population can only be selected one time.

Let's say you have a population of 1,000 people and you wish to choose a simple random sample of 50 people. First, each person is numbered 1 through 1,000. Then, you generate a list of 50 random numbers (typically with a computer program) and those individuals assigned those numbers are the ones you include in the sample.

Using a Random Number Table

Most statistics books and many research methods books contain a table of random numbers as a part of the appendices. A random number table typically contains 10,000 random digits between 0 and 9 that are arranged in groups of 5 and displayed in rows. In the table, all digits are equally probable and the probability of any given digit is unaffected by the digits that precede it.

After numbering each member of the population 1 to N , determining the population size and the sample size, the researcher selects a starting point on the random number table. This is done by closing one's eyes and pointing randomly on the page. Whichever number your finger is touching is the number you start with. Then, you must choose a direction in which to read (up to down, left to right, or right to left). Next, you select the first n numbers (however many numbers are in your sample) whose last X digits are between 0 and N . For instance, if N is a 3 digit number, then X would be 3. Put another way, if your population contained 350 people, you would use numbers from the table whose last 3 digits were between 0 and 350. If the number on the table was 23957, you would not use it because the last 3 digits (957) is greater than 350. You would skip this number and move to the next one. If the number is 84301, you would use it and you would select the person in the population who is assigned the number 301. You continue this way through the table until you have selected your entire sample.

Using a Computer

In practice, the lottery method of selecting a random sample can be quite burdensome if done by hand. Typically, the population being studied is large and choosing a random sample by hand would be very time consuming. Instead, there are several computer programs that can assign numbers and select n random numbers quickly and easily. Many can be found online for free.

2.5 Sampling vs. Complete Enumeration

The census or complete enumeration consists in collecting data from each and every unit from the population. The sampling only chooses a part of the units from the population for the same study. The sampling has a number of advantages as compared to complete enumeration due to a variety of reasons.

(1) Less Expensive:- The first obvious advantage of sampling is that it is less expensive. If we want to study the consumer reaction before launching a new product it will be much less expensive to carryout a consumer survey based on a sample rather than studying the entire population which is the potential group of customers. Although in decennial census every individual is enumerated, certain aspects of the population are studied on a sample basis with a view to reduce cost.

(2) Less Time Consuming:- The smaller size of the sample enables us to collect the data more quickly than to survey all the units of the population even if we are willing to spend money. This is particularly the case if the decision is time bound. If we want to measure the consumer price index in a particular month we cannot collect data of all the consumer prices even if the expenditure is not a hindrance. The collection of data on all the consumer items and their processing in all probability are

going to take more than a month. Thus when ready, the price index will not serve any meaningful purpose.

(3) Greater Accuracy:- It is possible to achieve greater accuracy by using appropriate sampling techniques than by a complete enumeration of all the units of the population. Complete enumeration may result in inaccuracies of the data. Consider an inspector who is visually inspecting the quality of finishing of a certain machinery. After observing a large number of such items he cannot just distinguish items with defective finish from good ones. Once such inspection fatigue develops the accuracy of examining the population completely is considerably decreased. On the other hand, if a small number of items is observed the basic data will be much more accurate. It is of course true that the conclusion about a population characteristic such as the proportion of defective items from a sample will also introduce error in the system. However, such errors, known as sampling errors, can be studied, controlled and probability statements can be made about their magnitude. The accuracy which results due to fatigue of the inspector is known as non sampling error. It is difficult to recognise the pattern of the non-sampling error and it is not possible to make any comment about its magnitude even probabilistically.

(4) Destructive Enumeration:- Sampling is indispensable if the enumeration is destructive. If you are interested in computing the average life of fluorescent lamps supplied in a batch the life of the entire batch cannot be examined to compute the average since this means that the entire supply will be wasted. Thus, in this case there is no other alternative than to examine the life of a sample of lamps-and draw an inference about the entire batch.

2.6 Sampling and Non-sampling Errors

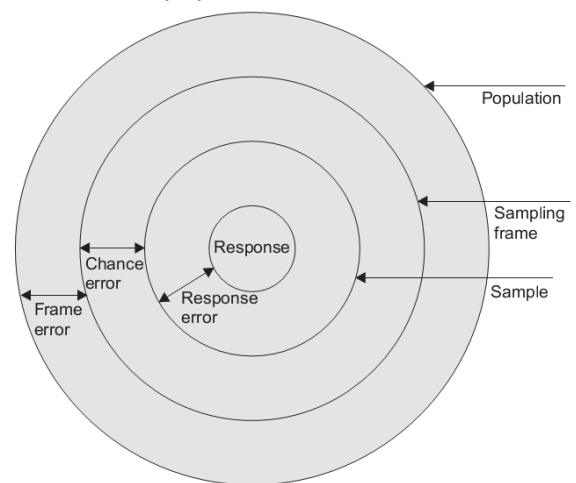
Sampling error is the degree to which a sample might differ from the population. Therefore, while inferring to the population, results could not be reported plus or minus the sampling error. In non-probability sampling, the degree to which the sample differs from the population remains unknown. However, we cannot come to a conclusion that sampling error is an inherent of non probability sample.

Sample surveys do imply the study of a small portion of the population and as such there would naturally be a certain amount of inaccuracy in the information collected. This inaccuracy may be termed as sampling error or error variance. In other words, sampling errors are those errors which arise on account of sampling and they generally happen to be random variations (in case of random sampling) in the sample estimates around the true population values.

The meaning of sampling error can be easily understood from the following diagram:

Sampling Error = Frame Error + Chance Error + Response Error

Total error = Sampling Error + Non-sampling Error



Sampling Error:-

1. Sampling errors occur randomly and are equally likely to be in either direction.
2. The magnitude of the sampling error depends upon the nature of the universe; the more homogeneous the universe, the smaller the sampling error.
3. Sampling error is inversely related to the size of the sample i.e., sampling error decreases as the sample size increases and vice-versa.
4. A measure of the random sampling error can be calculated for a given sample design and size and this measure is often called the precision of the sampling plan.
5. Sampling error is usually worked out as the product of the critical value at a certain level of significance and the standard error.

Non-sampling Error:-

1. Non-sampling errors which may creep in during the process of collecting actual information and such errors occur in all surveys whether census or sample.
2. We have no way to measure non-sampling errors.

2.7 Concept of Different Sampling Methods: Simple Random Sampling, Stratified Random Sampling, Cluster Sampling and Multistage Sampling.

{Refer Previous Chapters}

Probability sampling techniques differ in terms of sampling efficiency which is a concept that refers to trade off between sampling cost and precision. Precision refers to the level of uncertainty about the characteristics being measured. Precision is inversely related to sampling errors but directly related to cost. The greater the precision, the greater the cost and there should be a trade-off between sampling cost and precision. The researcher is required to design the most efficient sampling design in order to increase the efficiency of the sampling.