BUSINESS RESEARCH METHODS

CORE COURSE

V SEMESTER

B Com/BBA

(2011 Admission)

UNIVERSITY OF CALICUT

SCHOOL OF DISTANCE EDUCATION

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BUSINESS RESEARCH METHODS

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CHAPTER -1

BUSINESS RESEARCH

The word research is composed of two syllables, ***re*** and ***search***. The dictionary defines the former as a prefix meaning again, anew or over again and the latter as a verb meaning to examine closely and carefully, to test and try, or to probe. Together they form a noun describing a careful, systematic, patient study and investigation in some field of knowledge, undertaken to establish facts or principles.

According to Robert Ross, "research is essentially an investigation, a recording and an analysis of evidence for the purpose of gaining knowledge." It can generally be defined as a systematic method of finding solutions to problems.

A research need not lead to ideal solution but it may give rise to new problems which may require further research. In other words research is not an end to a problem since every research gives birth to a new question. It is carried on both for discovering new facts and verification of old ones.

Features of Research

- ✓ It means the discovery of new knowledge
- ✓ Is essentially an investigation
- ✓ Is related with the solution of a problem
- ✓ It is based on observation or experimental evidences.
- ✓ It demands accurate observation or experimentation.
- ✓ In research, the researchers try to find out answers for unsolved questions
- ✓ It should be carefully recorded and reported

Business Research

Business research refers to systematic collection and analysis of data with the purpose of finding answers to problems facing management. It can be carried out with the objective to explore, to describe or to diagnose a phenomenon. It involves establishing objectives and gathering relevant information to obtain the answer to a business issue and it can be conducted to answer a business-related question, such as: What is the target market of my product? Business research can also be used to solve a business-related problem, such as determining how to decrease the amount of excess inventory on hand.

When deciding whether business research is to be conducted or not, the firm keeps in mind factors like the availability of data, time constraints and the value of the research information to the company. Adequate planning and information-gathering are essential to derive results for business.

Social Research

Social research refers to research conducted by social scientists. It is the scientific investigation conducted in the field of social sciences and also in the behavioral sciences. Social research methods can generally vary along a quantitative/qualitative dimension. While various methods may sometimes be classified as quantitative or qualitative, most methods contain elements of both. Social scientists employ a range of methods in order to analyse a vast breadth of social phenomena; from census survey data derived from millions of individuals, to the in-depth analysis of a single agents' social experiences; from monitoring what is happening on contemporary streets, to the investigation of ancient historical documents.

The social science research is a systematic method of exploring, analyzing and conceptualizing social life in order to expand, correct or verify knowledge whether that knowledge aids in the construction of theory or in the practice of an art.

Educational Research

Educational Research is that activity which is directed towards development of a science of behaviour in educational situations. The ultimate aim of this research is to provide knowledge that will permit the educator to achieve his goals by most effective methods. Educational research refers to a variety of methods, in which individuals evaluate different aspects of education including: "student learning, teaching methods, teacher training, and classroom dynamics".

Educational researchers have come to the consensus that, educational research must be conducted in a rigorous and systematic way although what this implies is often debated. There are a variety of disciplines which are each present to some degree in educational research. These include psychology, sociology, anthropology, and philosophy. The overlap in disciplines creates a broad range from which methodology can be drawn. The findings of educational research also need to be interpreted within the context in which they were discovered as they may not be applicable in every time or place.

Need For Research (Importance of Research)

The main importance of research is to produce knowledge that can be applied outside a research setting. Research also forms the foundation of program development and policies everywhere around the universe. It also solves particular existing problems of concern. Research is important because we are able to learn more about things, people, and events. In doing research, we are able to make smart decisions.

Marketing research is important because it allows consumers and producers to become more familiar with the products, goods, and services around them. Research is important to society because it allows us to discover more and more that might make are lives easier, more comfortable,

and safer. It presents more information for investigation. This allows for improvements based on greater information and study. It is very important. Research encourages interdisciplinary approaches to find solution to problems and to make new discoveries. Research is a basic ingredient for development and therefore serves as a means for rapid economic development.

The main importance or uses may be listed as under:

- It provides basis for government policies
- Helps in solving various operational and planning problems of business and industry
- Research helps in problem solving
- Is useful to students, professionals, philosophers, literary men, analysts and intellectuals.

Purpose / Aims / Objectives of Research

1. To find out the truth which is hidden and which has not been discovered so far.
2. Aims at advancing systematic knowledge and formulating basic theories about the forces influencing the relation between groups as well as those acting on personality development and is adjustment with individuals.
3. Try to improve tools of analysis or to test these against the complex human behaviour and institutions.
4. To understand social life and thereby to gain a greater measure of control over social behaviour.
5. To provide an educational program in the accumulated knowledge of group dynamics, in skills of research, in techniques of training leaders and in social action.

Qualities / Characteristics of A Good Research

- A good research must be systematic
- A good research must be logical
- A good research must be empirical
- A good research must be verifiable
- As far as possible common concepts must be used
- Procedure followed in research must be sufficiently described
- Research procedure should be so described that objective of research can be achieved.

Limitations of Research

- Conclusions in research are based upon data collected. Therefore when the data collected are not valid or adequate, the conclusion will not be conclusive or appropriate.

- Research results in theory
- Activities in a society are influenced by various internal and external factors

  Small organizations cannot afford to have research on various issues
- Many people in society depend on customs, traditions, routines and practices for taking decision; instead of going for research.
  Research is usually based on sample studies. But in many cases samples are not true representatives. Therefore the research reports based on these samples may not be accurate.

Theory and Concept

Theory is defined as a set of systematically interrelated concepts, definitions and propositions that are advanced to explain and predict a phenomenon. It may also specify causal relationship among variables. A theory is an integrated body of definitions, assumptions, and general propositions covering a given subject matter from which a comprehensive and consistent set of specific and testable principles can be deducted logically. This theory provides a basis for studying consumer behaviour and formulating appropriate marketing strategies.

Requisites (Criteria) of Theory

Theory starts out as ideas. The criteria to be met by the set of ideas are:

- ✓ They must be logically consistent.
- ✓ They must be interrelated.
- ✓ The statements must be exhaustive.
- ✓ The propositions should be mutually exclusive.
- ✓ They must be capable of being tested through research.

Role of Theory in Research

1. Theory narrows the range of facts to be studied
2. Theory provides a conceptual framework for a study
3. Summarizes concisely what is already known about the object of study.
4. Theory states a general uniformity beyond the immediate observations.
5. Theoretical generalization can be used to predict further facts.

General Principles Regarding the Use of Theory in Research

1. Knowledge of the existing theory in one's area of research is essential for conducting research.
2. Concepts are crucial components of theory and so their clear definitions are essential to the designing of the study.

3. One should view theory as hypothetical proposition and not as conclusive fact.
4. One should pay attention to all odd and puzzling unexpected observations in one's research and enquire into them. They may be a source for new theoretical approaches.

Methods of Formation of Theory

Deduction: It is one of the important methods employed in theory building. It is a process of drawing generalizations, through a process of reasoning on the basis of certain assumptions which are either self evident or based on observation. By deduction, is meant reasoning or inference from the general to particular or from the universal to the individual.

Eg.,	All men are mortal	(Major Premise)
	A is a man	(Minor premise)
Therefore	A is mortal	**(**Conclusion)

The conclusion follows from the two premises logically. Therefore it is valid. The deduction is the logical conclusion obtained by deducting it from the statements, called premise of the argument. The argument is so constructed that if the premises are true, conclusion must also be true. The logical deduction derives only conclusions from given premises and it cannot affirm the truth of given statements. It serves in connecting different truths and thus logical derivation is not a means to find ultimate truth.

Induction: It is the process of reasoning from a part to the whole, from particular to general or from the individual to the universal. It gives rise to empirical generalizations. It is a passage from observed to unobserved. It involves two processes namely observation and generalization. Induction may be regarded as a method by means of which material truth of the premises is established. Generating ideas from empirical observation is the process of induction. As a matter of fact, concepts can be generated from experience which justifies the description of particular situations towards theory- building. It is generally observed that experience is regarded as a sum of individual observations held together by the loose tie of association and constantly extended by the idea of inductive inferences.

It is generally stated that knowledge is based on the foundations of particular facts. In empirical sciences, we start from the consideration of a single case, go on to prove many cases. Consider the following illustration.

"I saw a raven in black colour. Other revens seen by me were also black in colour".

"All ravens are therefore black".

Inductive method is classified into two types- enumerative induction and analytical induction.

Retroduction: It is a technique of successive approximation by which, the concepts and assumptions of theories are brought into closer alignment with relevant evidence. At the same time it maintains the logical consistency required of deductive systems.

The purpose of theory is to systematize the data of every experience. The three methods- deduction induction and retroduction based on the relationships among the observed data, concepts and theoretical assumptions are adopted for generating theory.

Concept

A concept symbolizes a phenomenon and helps to communicate its finding. For instance labour is a concept. Concepts are logical constructs created from sense impression or complex experiences. It symbolizes the empirical relationship and phenomena which are indicated by facts. Thus, concepts and facts are not the same. A fact is a logical construct of concepts. The process of conceptualization arises out of abstraction and generalization of sense impression.

Types of concepts

On the basis of origin, concepts may be classified into two categories:

1) **Postulational Concepts:** It has meaning only with reference to some deductively postulated theory. Its meaning will be different when it will be used in some other context or theories. For instance, the concept 'function' has one meaning in Economics and another meaning in Physics.

2) **Intuitive Concepts:** It has a particular meaning. The meaning is never changed by the people who use it. This type of concept denotes something, which is immediately understood. For example, 'black' as a colour, its meaning is abstracted from a wider and empirical context.

Intuitive concepts are divided into two forms (a) those by sensation and (b) those by introspection. Similarly, Postulational concepts are divided into (a)those by imagination and (b)those by intellection. However, for the matter of social science research, such classification does not convey any special significance.

Requisites of a concept

- ✓ In every field of study, concepts are used to convey special meaning.
- ✓ Concepts should be precise, comprehensive and clear. There should be no misunderstanding about them.
- ✓ Concepts must not have multiple meaning. It is possible that different terms may refer to the same phenomenon; and there may be danger of overlapping of meaning.
- ✓ Concepts should be well understood. A concept may have a very complex series of references. Ultimately there may be an empirical reference. If one empirical reference is not immediate then the concepts will less well be understood.

How to use concepts

In research, the proper concept has to be carefully chosen and its usage should be explained thoroughly. The meaning of a concept does not remain fixed all the time. The meaning of the concept is modified with the accumulation of knowledge. In course of time, some concepts may become outmoded and irrelevant, and therefore, they are to be discarded.

Theory is a statement of the meaningful relation between concepts. Therefore the first stage in the development of a theory is concept formation. A scientific theory is a statement of a specific type of invariance in the conceptual representation of a phenomenon. Therefore, the choice we make in the representation of phenomenon is a critical step in the development of scientific theory.

Theory implies an explanatory relationship. The development and validity of a theory is dependent on the conceptual apparatus used. Concepts are the medium of scientific explanations. Conceptual definition and theory formulation are two major requirements of unified process of scientific explanation. Formulation of concepts is therefore a major step of one unified process of complex scientific inquiry towards theory building.

Types of Research

Research may be broadly classified as (1) Fundamental and Applied Research (2) Descriptive and Analytical Research or (3) Quantitative and Qualitative Research or (4) Conceptual and Empirical Research

Fundamental (or Basic) and Applied Research

Fundamental research is mainly concerned with generalization with the formulation of a theory. It is a research concerning principles or laws or rules. It aims at the achievement of knowledge and truth. Research studies concentrating on some natural phenomenon or relating to pure mathematics are examples of fundamental research. It aims at some theoretical conclusions. It may verify the old theory or establish a new one. It tries to explain the cause and effect relationship in social phenomena. It is essentially positive and not normative. That is, it explains the phenomena as they are and not as they should be.

Applied research is concerned with the solution of particular problems. It aims at finding a solution for an immediate problem facing a society or an industrial organization. It is empirical and practical. It is concerned with applied aspects of life. Research to identify social, economic or political trends that may affect a particular institution or the marketing research are examples of applied research.

Descriptive Research and Analytical Research

Descriptive research includes survey and fact finding enquiries of different kinds. It describes the state of affairs as it exists at present. The researcher has no control over the variables. He can only report what has happened or what is happening.

In Analytical research one has to use facts or information already available and analyse these to make a critical evaluation of the material.

Quantitative Research and Qualitative Research

Quantitative research is applicable to phenomena that are measurable so that they can be expressed in terms of quantity.

Qualitative research is concerned with qualitative phenomenon. Research designed to find out how people feel or what they think about a particular subject is a qualitative research. Qualitative research is especially important in the behavioural sciences where the aim is to discover underlying motives of human behaviour.

Conceptual Research and Empirical Research

Conceptual research is that related to some abstract ideas or theory. It is generally used by philosophers and thinkers to develop new concepts or to interpret existing ones.

Empirical research relies on experience or observation alone. It is data based research coming up with conclusions capable of being verified by observation or experiment. It can be experiment research. In empirical research, the researcher has to first set up a hypothesis or guess as to the probable results. He then works out to get enough facts to prove or disprove his hypothesis.

Empirical studies have a great potential for they lead to inductions and deductions. Thus research enables one to develop theories and principles and to arrive at generalizations. As research is based on observations and empirical evidences it improves knowledge and understanding as well as decision making skill and ability.

CHAPTER-2

PLANNING OF RESEARCH AND RESEARCH PROCESS

Planning of research means deciding the question to be studied, setting the objectives of the study and determining the means of achieving those objectives. Planning research refers to determining, in advance, various steps to be followed in a research.

1. **Identifying, Evaluating and Formulating the Research Problems-:**

   After creating interest in a research work, a researcher has to think about formulating the problem related to his research work. Choosing a correct problem for study is the most important step in the entire research process. After selecting the problem, the researcher has to formulate the problem.

2. **Extensive Literature Survey:-**

   Before formulating the research it is desirable that researcher examines all available literature, both conceptual and empirical. The conceptual literature is one which deals with concepts and theories. Empirical literature is that which contains studies made earlier and so it consists of many facts and figures observed in the earlier studies.

3. **Writing a Primary Synopsis:-**

   After formulating the problems a brief summary of it should be written down. A research worker has to write a synopsis of the topic selected for research work mentioning the summary of what is going to be done under his research.

4. **Indentifying and Labeling Variables: -**

   In any research the problem under study deals with relation between variables. The variables whose change has affected the other variable, is called independent variable. Therefore there is a cause and effect relation between the variables. The research problem must be formulated in such a manner that it highlights the nature, extent and implications of relation existing between the variables. It is only through this process of establishing the effective relation between variables that meaningful conclusions are derived from the study.

5. **Setting Up Of Hypothesis: -**

   Specification of working hypothesis is a basic step in the research process. A hypothesis is a tentative conclusion logically drawn. The research work is conducted to test the truth of this hypothesis.

6. Preparing the Research Design:-

A research design is a plan that specifies the sources and types of information relevant to the research problem. It is a strategy which approach will be used for gathering and analyzing the data. It includes the time and cost budgets since most studies are done under these two constraints. A research design provides a rational approach to research enabling one to decide in advance what to do, how to do, in investigating the subjects.

7. Determining the Sample Design:-

A sample design is a definite plan determined before any data are actually collected for obtaining a sample from a given universe.Sample design refers to the technique or the procedure which the researcher would adopt in selecting some sampling units from the universe for drawing inferences about the universe. If the proper procedure is followed to select the sample, definitely the sample will give all dependable information.

8. Collecting of Data: -

There are several ways of collecting the appropriate data. Some of the methods of collecting primary data are (1) Observation method. (2) Direct personal interview method. (3) Telephone interview method. (4) Questionnaire method. (5) Schedule method. A choice of one of these methods.

9. Execution of the Project: -

The researcher has to see that the project is executed in a systematic manner and in time. He should make necessary preparations for successful conduct of the project.

10. Processing, Analysis and Interpretation of Data by Statistical Methods: - The processing of data consists of classification, tabulation and coding. By classification and tabulation the unwieldy data can be condense into few manageable and purposeful groups and tables so that further analysis becomes simple. Coding converts the data into symbols and small figures so that the data can be dealt with in an easy manner. Editing improves the quality of the data since it is at this stage that data which is irrelevant can be dropped. Analysis and interpretation of data results in observation, analysis, conclusion, induction and deduction. For this various statistical measures are computed.

11. Testing of Hypothesis: - Depending upon the nature of data and conclusions to be arrived one or two of these tests can be applied. Testing of hypothesis will results in either accepting or rejecting the hypothesis. Testing of hypothesis may prove or disprove a theory and a theory facilitates formulating of a further hypothesis. Testing of hypothesis will result in contribution to existing theory or the generation of a new theory.

12. Preparation of the Report or Thesis:-

A report is a detailed description of what has been done and how it has been done with respect to a particular area or topic. The report should contain the preliminary section, the main body and the end matter. The preliminary section contains only titles, data, acknowledgement foreword and table of contents. The important section of a report is its main body. It carries introduction, methodology, statements of findings, conclusions and recommendations. The end matter includes appendix, literature selected and bibliography. The appendix includes letters, questions or other tools used. Bibliography is the list of books, journals. Reports, bulletins etc. used for reference.

Selection and Formulation of Research Problems

Research Problem

Problem means a question or an issue to be examined. A research problem refers to some kind of problem which a researcher experiences or observes in the context of either a theoretical or practical situation. The researcher has to find out suitable course of action by which the objective can be attained optimally in the context of given environment. Thus, selection of research problem has high value to the society and the researcher must be able to identify those problems that need an urgent solution.

Requisites or Characteristics of a Good Research Problem

- clear and unambiguous
- logical and systematic
- empirical
- relation between variables
- verifiable
- interesting

Various Aspects of a Research Problem

For an effective formulation of the problem following aspects of the problem are to be considered by the researcher.

- **Definition of the problem: -** Before one takes up a problem for the study one needs to define it properly. The issues for inquiry are to be identified clearly and specified in details. If any existing theoretical framework is tested, the particular theorem or theories must be identified. Similarly if there are any assumptions made and terms used the meaning of them must be made clear. As far as possible the statement of the problem should not give any scope for ambiguity.
- **Scope of the problem: -** The research scholar has to fix up the four walls of the study. The researcher must identify which of the aspects he is trying to prove. Taking the example of

sickness he should specify. (1) Whether his study extends to all types of small scale industries, or limited to only few of them. (2) Whether the study is limited to find cause for sickness or also to prescribe certain prescriptions etc.

- **Justification of the problem: -** Many a time research studies are put to the test of justification or relevance. In the scientific curiosity of the problems, th problem that needs urgent solution must be given preference.

- **Feasibility of the problem: -** Although a problem needs urgent attention and is justifiable in several respects, one has to consider the feasibility of the same. Feasibility means the possibility of conducting the study successfully. The elements of time, data, Cost is to be taken into consideration before a topic is selected for study.

- **Originality of the problem: -** In social sciences, particularly in commerce and management, there is no systematic compilation of the works already done or on hand. Two people may be doing a work more or less on similar topic. In such situations it is not advisable to continue work in the same manner. What is advisable is that, each of them should try to focus on different aspects, so that they could enrich the field of knowledge with their studies. Another problem faced by a researcher is that a problem which he intends to do is already worked out. Should he repeat the same or not? This depends upon the situation or circumstances which engage his attention.

Defining and Formulating a Research Problem

A research is to be defined along with the bounds in which it is to be studied. Therefore defining a problem involves the task of laying down boundaries within which a researcher shall study the problem with a predetermined objective in view. Defining a research problem and clearly is a crucial part of a research study and must in no case be accomplished hurriedly.

Steps for Defining and Formulating a Research Problem

(1) Stating the problem in a general way: - The researcher should state the problem in general terms, keeping in view either some practical concern or some scientific or intellectual interest. Often the guides put forth the problem in geneal terms and researcher narrows down the problem and phrase the problem in operational terms. The problem stated generally may contain various ambiguities which must be resolved by proper thinking and rethinking over the problem. There are two ways of stating a problem by way of posing questions and by way of making statements.

(2) Understanding the nature of the problem: - For understanding the nature of the problem in a better way, the researcher has to hold discussions with those who have Knowledge of the problem.

(3) Surveying the available literature:- This is necessary because only through such a survey, a researcher can understand the relevant theories, reports etc.studies on related problems are useful for knowing the type of difficulties that may encounter in the present study.

(4) Developing the ideas through discussions: - A researcher must discuss his problem with his colleagues and those who have enough experience in the same area or in working on similar problems. People with experience can enlighten the researcher on various aspects of his study.

(5) Rephrasing the research problem: - A researcher must rephrase the research problems into a working proposition. 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 hypothesis.

Terms defined

Relevant Variables

A variable is a measurable concept such as height, age, income etc. it takes quantitative values. It may vary from individuals to individuals or groups to groups. When there are two variables in a study such that the values of one variable change in response to the change in the values of the other variable, then the former is said to be depending variable and latter is said to be independent variable. A variable may be discrete or continuous. When a variable assumes only certain specified values in an interval, it is called discrete variable. But a continuous variable is one which can assume any number of values in an interval.

Extraneous variables: Besides the independent variable, a dependent variable can be influenced by other variables, which are not part of the study. They are called extraneous variable. They are variables working from outside.

Unit of analysis: A variable can be measured and analyzed by statistical units. The statistical units used for analysis and interpretation are known as units of analysis. Rations percentages, coefficients etc are such units. They can be used for the purpose of comparison.

Hypothesis

Hypothesis is a tentative statement showing the relationship between two or more variables, the reliability and validity of which is to be tested and verified. It expresses the nature and degree of relationship between variables. Hypotheses are -

- Assumptions
- Tentative statements
- Propositions
- Answering the questions
- Proposed solution to a problem
- Statements which are to be tested
- To be accepted of rejected
- To be verified empirically on the basis of sample

Why Hypothesis

- Gives the direction of research
- Specifies the sources of data
- Determines the data needs
- Type of research
- Appropriate techniques of research
- Contributes to the development of theory

Role of Hypothesis

- It guides the direction of the study
- It identifies facts that are relevant and those that are not
- It suggests which form of research design is likely to be most appropriate
- It provides a frame work for organising the conclusions that result

Sources of Hypothesis

- Observation –based on the behavior pattern
- Relation between price and demand is hypothesized,
- the sales and ad may be hypothesized
- Analogies casual observations in nature
- Poor people buy more lottery
- Intuitions and personal experiences –
- The story of Newton and falling of apple,
- The wisdom of Budha under the banyan tree
- A sparking in our mind at particular occasions
- Findings of studies
- State of Knowledge – the theorems may be modified
- Culture –castes, beliefs, habits, behaviour
- Contribution of research – the rejection of certain hypothesis may lead to further research
- Theory –large concerns earn more profit, return on capital is an index of business success

Different Types of Hypothesis

Descriptive Hypothesis – Describing the characteristics of a variable (may be an object, person, organisation, event, and situation)

- Eg. Employment opportunity of commerce graduates is more than the arts students.

Relational Hypothesis – Establishes relationship between two variables. It may be positive, negative or nil relationship.

- Eg. High income leads to high savings

Causal Hypothesis – The change in one variable leads to change in another variable i.e. Dependent and independent variables, one variable is a cause and the other one is the effect

Statistical Hypothesis – association or difference between two variables are hypothesized

Null Hypothesis – it points out there is no difference between two populations in respect of same property.

Alternative Hypothesis- when we reject the null hypothesis, we accept another hypothesis known as alternate hypothesis.

Working Hypothesis

Complex Hypothesis

How to test

- State the two hypotheses - null and alternative
- Decide the test statistic t, Z, F, Chi-square
- Fix the level of significance
- Make the computations
- Take the decision
- Type 1 error and Type 11 error
- Degree of freedom (based on probability, distribution)

CHAPTER 3

RESEARCH DESIGN

A research design is a "Blue Print" for collection, measurement and analysis of data. It outlines how the research will be carried out. It is like glue which sticks together the entire process of research. It provides answers to various questions like - What techniques will be used to gather data. What kind of sampling will be used? How time and cost constraints be dealt with? Etc.

Essentials of Research Design

1. The design should be an activity and time based plan
2. It is always based on research question
3. It guides the selection of sources and types of information
4. It indicates a framework for specifying the relationship among the study's variables
5. Outlines procedures for every research activity
6. It must be appropriate, efficient and economical
7. It should be flexible
8. It must be adequate

Types of Research Design

"*You cannot put the same shoe on every foot*" - Syrus

Although every problem and research objective may seem unique, there are usually enough similarities among problems and objectives to allow decisions to be made in advance about the best plan to resolve the problem. There are some basic research designs that can be successfully matched to given problems and research objectives.

Three traditional categories of research design:

- Exploratory
- Descriptive
- Causal

The choice of the most appropriate design depends largely on the objectives of the research and how much is known about the problem and these objectives. The overall research design for a project may include one or more of these three designs as part(s) of it.

Further, if more than one design is to be used, typically we progress from Exploratory toward Causal.

Basic Research Objectives and Research Design

Research Objective	Appropriate Design
To gain background information, to define terms, to clarify problems and develop hypotheses, to establish research priorities, to develop questions to be answered	Exploratory
To describe and measure phenomena at a point In time	Descriptive
To determine causality, test hypotheses, to make "if-then" Statements, to answer questions	Causal

Research Design: Exploratory Research

Exploratory research is most commonly unstructured, "informal" research that is undertaken to gain background information about the general nature of the research problem. Exploratory research is usually conducted when the researcher does not know much about the problem and needs additional information or desires new or more recent information. Exploratory research helps diagnose the dimensions of the problem so that successive research will be on target. It helps to set priorities for research. Exploratory research is used in a number of situations:

- To gain background information
- To define terms
- To clarify problems and hypotheses
- To establish research priorities

A variety of methods are available to conduct exploratory research:

- Secondary Data Analysis
- Experience Surveys
- Case Analysis
- Focus Groups
- Projective Techniques

Categories of Exploratory Research

- Experience Surveys: - Issues and ideas may be discussed with persons who have had personal experience in the field.
- Secondary data analysis:- Another quick and economical source of background information is existing literature containing data that has been compiled for some purpose other than the purpose in hand

- Case Study method: -obtains information from one or a few situations that are similar to the problem situation. Primary advantage is that an entire organisation or entity can be investigated in depth and with meticulous attention to detail.

- Pilot Studies are used in different types of designs. - Within the context of exploratory research it covers some part of the research on a small scale. Major categories of pilot study include focus group interviews, projective techniques, and depth interviews.

Categories of Pilot Studies

- Focus Group interviews: - Unstructured, free flowing, group dynamic sessions that allow individuals the opportunity to initiate the topics of discussion. There is synergistic and spontaneous interaction among the respondents. Found to be highly advantageous.

- Projective techniques; - An indirect means of questioning the respondents. Uses word association tests, sentence completion test, third person test, role playing technique and Thematic Apperception Test.

- Depth interviews:- unstructured,, extensive interviews that encourage an individual to talk freely and in depth about a topic

Historical Research

History, the meaningful record of human achievement, helps us to understand the present and to some extent, to predict the future.

- Used to “prevent reinventing the wheel” every few years.

- It is the application of scientific method to the description and analysis of past events

Descriptive Research

Descriptive research is undertaken to provide answers to questions of who, what, where, when, and how – but not why.

Two basic classifications:

- **Cross-sectional studies**

- **Longitudinal studies**

Research Design

Descriptive Research -Cross-sectional Studies

- Cross-sectional studies measure units from a sample of the population at only one point in time.

- Sample surveys are cross-sectional studies whose samples are drawn in such a way as to be representative of a specific population.
- On-line survey research is being used to collect data for cross-sectional surveys at a faster rate of speed.

Descriptive Research -Longitudinal Studies

- Longitudinal studies repeatedly draw sample units of a population over time.
- One method is to draw different units from the same sampling frame.
- A second method is to use a "panel" where the same people are asked to respond periodically.
- On-line survey research firms recruit panel members to respond to online queries.

Research Design: Causal Research

- Causality may be thought of as understanding a phenomenon in terms of conditional statements of the form "If x, then y."
- Causal relationships are typically determined by the use of experiments, but other methods are also used.

Experiments

An experiment is defined as manipulating (changing values/situations) one or more independent variables to see how the dependent variable(s) is/are affected, while also controlling the affects of additional extraneous variables.

– Independent variables: - that over which the researcher has control and wishes to manipulate i.e. package size, ad copy, price.

– Dependent variables: - that over which the researcher has little to no direct control, but has a strong interest in testing i.e. sales, profit, market share.

– Extraneous variables: - those that may affect a dependent variable but are not independent variables.

Experimental Design

An experimental design is a procedure for devising an experimental setting such that a change in the dependent variable may be solely attributed to a change in an independent variable.

Symbols of an experimental design***:***

- *O* = measurement of a dependent variable
- *X* = manipulation, or change, of an independent variable
- *R* = random assignment of subjects to experimental and control groups
- *E* = experimental effect

After-Only Design: X O_1

One-Group, Before-After Design: O_1 X O_2

Before-After with Control Group:

- Experimental group: O_1 X O_2
- Control group: O_3 O_4
- Where E = (O_2 – O_1) – (O_4 – O_3)

How Valid Are Experiments?

An experiment is valid if:

- the observed change in the dependent variable is, in fact, due to the independent variable (internal validity)
- if the results of the experiment apply to the "real world" outside the experimental setting (external validity)

Choosing the right instrument for data collection

- The instrument you choose for data collection affects your entire study.
- Validity is your primary concern!
- Reliability is a secondary concern

What is the Validity of a Study?

Internal Validity – The degree to which changes in the dependent variable are affected by the manipulated independent variable. Maintaining high internal validity means controlling for all other independent variables other than the one(s) being studied

External Validity – The degree to which the results of a study can be generalized to the "real world". Factors that negatively affect external validity also negatively affect the generalizability of the results

Instrument Validity

Does an instrument measure what it is supposed to measure? Four types of instrument validity are as follows:

– Construct

– Criterion related

– Content

– Inter-rater / Intra-rater

Construct Validity

It is the most important type of validity. Construct validity is the degree to which the instrument actually measures whether or not an underlying construct is being measured.

For example, does a math test actually measure math achievement? Does a personality test actually measure personality?

Criterion Related Validity

Criterion Related Validity is of two types:-

- Concurrent validity – Degree to which scores on one test are correlated with scores on another test administered at the same time. Only one group is used.
- Predictive validity – Degree to which scores on one test predicts scores on a test administered in the future. Only one group is used.

Reliability

Reliability is the consistency with which an instrument measures the construct or content area it is intended to measure. Reliability is established using such techniques as

- split-half,
- rationale equivalence and inter-rater

Reliability is reported as a coefficient ranging from 0.00 (low) to +1.00 (high). Anything above .70 is considered sufficient for most cases

Measures of Reliability

- Stability (test / re-test)
- Equivalence (alternate forms)
- Equivalence and Stability Combined
- Internal consistency
- Scorer / Rater

Internal Consistency

Questions on tests should be equally difficult throughout entire instrument

- Split-half – Used with dichotomous tests
- Kuder-Richardson 20 / 21 – Improvement on split-half
- Cronbach's Alpha – Only used with instruments with more than two scores (e.g., Likert Scales)

Sampling Design

Sampling is concerned with the selection of a subset of individuals from within a statistical population to estimate characteristics of the whole population. Two advantages of sampling are that the cost is lower and data collection is faster than measuring the entire population. A Sample design is a definite plan for obtaining a sample from a given population

Definition

According to Gerald Hursh "a Sample Design is the theoretical basis and the practical means by which we infer the characteristics of some population by generalizing from the characteristics of relatively few of the units comprising the population

Steps in Sampling Design

1. Define the population or universe
2. State the sampling frame
3. Identify the sampling unit
4. State sampling method
5. Determine the sample size
6. Spell out the sampling plan
7. Select the sample

Population Definition

Successful statistical practice is based on focused problem definition. In sampling, this includes defining the population from which our sample is drawn. A population can be defined as including all people or items with the characteristic one wish to understand. Because there is very rarely enough time or money to gather information from everyone or everything in a population, the goal becomes finding a representative sample (or subset) of that population.

Sometimes that which defines a population is obvious. For example, a manufacturer needs to decide whether a batch of material from production is of high enough quality to be released to the customer, or should be sentenced for scrap or rework due to poor quality. In this case, the batch is the population.

Although the population of interest often consists of physical objects, sometimes we need to sample over time, space, or some combination of these dimensions. For instance, an investigation of supermarket staffing could examine checkout line length at various times, or a study on endangered penguins might aim to understand their usage of various hunting grounds over time. For the time dimension, the focus may be on periods or discrete occasions.

In other cases, our 'population' may be even less tangible. For example, Joseph Jagger studied the behaviour of roulette wheels at a casino in Monte Carlo, and used this to identify a biased wheel. In this case, the 'population' Jagger wanted to investigate was the overall behaviour of the wheel (i.e. the probability distribution of its results over infinitely many trials), while his 'sample' was formed from observed results from that wheel. Similar considerations arise when taking repeated measurements of some physical characteristic such as the electrical conductivity of copper.

This situation often arises when we seek knowledge about the cause system of which the *observed* population is an outcome. In such cases, sampling theory may treat the observed population as a sample from a larger 'super population'. For example, a researcher might study the success rate of a new 'quit smoking' program on a test group of 100 patients, in order to predict the effects of the program if it were made available nationwide. Here the super population is "everybody in the country, given access to this treatment" - a group which does not yet exists, since the program isn't yet available to all.

Note also that the population from which the sample is drawn may not be the same as the population about which we actually want information. Often there is large but not complete overlap between these two groups due to frame issues etc. (see below). Sometimes they may be entirely separate - for instance, we might study rats in order to get a better understanding of human health, or we might study records from people born in 2008 in order to make predictions about people born in 2009.

Time spent in making the sampled population and population of concern precise is often well spent, because it raises many issues, ambiguities and questions that would otherwise have been overlooked at this stage.

Sampling Frame

In the most straightforward case, such as the sentencing of a batch of material from production (acceptance sampling by lots), it is possible to identify and measure every single item in the population and to include any one of them in our sample. However, in the more general case this is not possible. Where voting is not compulsory, there is no way to identify which people will actually vote at a forthcoming election (in advance of the election). These imprecise populations are not amenable to sampling in any of the ways below and to which we could apply statistical theory.

As a remedy, we seek a sampling frame which has the property that we can identify every single element and include any in our sample. The most straightforward type of frame is a list of elements of the population (preferably the entire population) with appropriate contact information. For example, in an opinion poll, possible sampling frames include an electoral register and a telephone directory.

Problem Related With Sampling Frame

1. Non coverage and incompleteness.
2. Appearance of cluster of element.
3. Inclusion of foreign element in the list.

Probability and Non-Probability Sampling

A probability sampling is one in which every unit in the population has a chance (greater than zero) of being selected in the sample, and this probability can be accurately determined. The combination of these traits makes it possible to produce unbiased estimates of population totals, by weighting sampled units according to their probability of selection.

Example: We want to estimate the total income of adults living in a given street. We visit each household in that street, identify all adults living there, and randomly select one adult from each household. (For example, we can allocate each person a random number, generated from a uniform distribution between 0 and 1, and select the person with the highest number in each household). We then interview the selected person and find their income. People living on their own are certain to be selected, so we simply add their income to our estimate of the total. But a person living in a household of two adults has only a one-in-two chance of selection. To reflect this, when we come to such a household, we would count the selected person's income twice towards the total. (The person who is selected from that household can be loosely viewed as also representing the person who isn't selected.)

In the above example, not everybody has the same probability of selection; what makes it a probability sample is the fact that each person's probability is known. When every element in the population *does* have the same probability of selection, this is known as an 'equal probability of selection' (EPS) design. Such designs are also referred to as 'self-weighting' because all sampled units are given the same weight.

Probability sampling includes: Simple Random Sampling, Systematic Sampling, Stratified Sampling, Probability Proportional to Size Sampling, and Cluster or Multistage Sampling. These various ways of probability sampling have two things in common:

1. Every element has a known nonzero probability of being sampled and
2. Involves random selection at some point.

Non Probability Sampling ; - Non Probability Sampling is any sampling method where some elements of the population have *no* chance of selection (these are sometimes referred to as 'out of coverage'/'under covered'), or where the probability of selection can't be accurately determined. It involves the selection of elements based on assumptions regarding the population of interest, which forms the criteria for selection. Hence, because the selection of elements is nonrandom, non probability sampling does not allow the estimation of sampling errors. These conditions give rise to exclusion bias, placing limits on how much information a sample can provide about the population. Information about the relationship between sample and population is limited, making it difficult to extrapolate from the sample to the population.

Example: We visit every household in a given street, and interview the first person to answer the door. In any household with more than one occupant, this is a nonprobability sample, because some people are more likely to answer the door (e.g. an unemployed person who spends most of their

time at home is more likely to answer than an employed housemate who might be at work when the interviewer calls) and it's not practical to calculate these probabilities.

Non probability sampling methods include accidental sampling, quota sampling and purposive sampling. In addition, non response effects may turn *any* probability design into a non probability design if the characteristics of non response are not well understood, since non response effectively modifies each element's probability of being sampled.

Sampling Methods

Within any of the types of frame identified above, a variety of sampling methods can be employed, individually or in combination. Factors commonly influencing the choice between these designs include:

- Nature and quality of the frame
- Availability of auxiliary information about units on the frame
- Accuracy requirements, and the need to measure accuracy
- Whether detailed analysis of the sample is expected
- Cost/operational concerns

Simple Random Sampling

In a simple random sample (SRS) of a given size, all such subsets of the frame are given an equal probability. Each element of the frame thus has an equal probability of selection: the frame is not subdivided or partitioned. Furthermore, any given *pair* of elements has the same chance of selection as any other such pair (and similarly for triples, and so on). This minimises bias and simplifies analysis of results. In particular, the variance between individual results within the sample is a good indicator of variance in the overall population, which makes it relatively easy to estimate the accuracy of results.

However, SRS can be vulnerable to sampling error because the randomness of the selection may result in a sample that doesn't reflect the makeup of the population. For instance, a simple random sample of ten people from a given country will *on average* produce five men and five women, but any given trial is likely to over represent one sex and under represent the other. Systematic and stratified techniques, discussed below, attempt to overcome this problem by using information about the population to choose a more representative sample.

SRS may also be cumbersome and tedious when sampling from an unusually large target population. In some cases, investigators are interested in research questions specific to subgroups of the population. For example, researchers might be interested in examining whether cognitive ability as a predictor of job performance is equally applicable across racial groups. SRS cannot accommodate the needs of researchers in this situation because it does not provide subsamples of the population. Stratified sampling, which is discussed below, addresses this weakness of SRS.

Simple random sampling is always an EPS design (equal probability of selection), but not all EPS designs are simple random sampling.

Systematic Sampling

Systematic sampling relies on arranging the study population according to some ordering scheme and then selecting elements at regular intervals through that ordered list. Systematic sampling involves a random start and then proceeds with the selection of every *k*th element from then onwards. In this case, *k* = (population size/sample size). It is important that the starting point is not automatically the first in the list, but is instead randomly chosen from within the first to the *k*th element in the list. A simple example would be to select every 10th name from the telephone directory (an 'every 10th' sample, also referred to as 'sampling with a skip of 10').

As long as the starting point is randomized, systematic sampling is a type of probability sampling. It is easy to implement and the stratification induced can make it efficient, *if* the variable by which the list is ordered is correlated with the variable of interest. 'Every 10th' sampling is especially useful for efficient sampling from databases.

For example, suppose we wish to sample people from a long street that starts in a poor area (house No. 1) and ends in an expensive district (house No. 1000). A simple random selection of addresses from this street could easily end up with too many from the high end and too few from the low end (or vice versa), leading to an unrepresentative sample. Selecting (e.g.) every 10th street number along the street ensures that the sample is spread evenly along the length of the street, representing all of these districts. (Note that if we always start at house #1 and end at #991, the sample is slightly biased towards the low end; by randomly selecting the start between #1 and #10, this bias is eliminated.

However, systematic sampling is especially vulnerable to periodicities in the list. If periodicity is present and the period is a multiple or factor of the interval used, the sample is especially likely to be *un*representative of the overall population, making the scheme less accurate than simple random sampling.

For example, consider a street where the odd-numbered houses are all on the north (expensive) side of the road, and the even-numbered houses are all on the south (cheap) side. Under the sampling scheme given above, it is impossible to get a representative sample; either the houses sampled will *all* be from the odd-numbered, expensive side, or they will *all* be from the even-numbered, cheap side.

Another drawback of systematic sampling is that even in scenarios where it is more accurate than SRS, its theoretical properties make it difficult to *quantify* that accuracy. (In the two examples of systematic sampling that are given above, much of the potential sampling error is due to variation between neighbouring houses - but because this method never selects two neighbouring houses, the sample will not give us any information on that variation.)

As described above, systematic sampling is an EPS method, because all elements have the same probability of selection (in the example given, one in ten). It is *not* 'simple random sampling' because different subsets of the same size have different selection probabilities - e.g. the set {4, 14, 24,..., 994} has a one-in-ten probability of selection, but the set {4,13,24,34,...} has zero probability of selection.

Systematic sampling can also be adapted to a non-EPS approach; for an example, see discussion of PPS samples below.

Stratified Sampling

Where the population embraces a number of distinct categories, the frame can be organized by these categories into separate "strata." Each stratum is then sampled as an independent sub-population, out of which individual elements can be randomly selected. There are several potential benefits to stratified sampling.

First, dividing the population into distinct, independent strata can enable researchers to draw inferences about specific subgroups that may be lost in a more generalized random sample.

Second, utilizing a stratified sampling method can lead to more efficient statistical estimates (provided that strata are selected based upon relevance to the criterion in question, instead of availability of the samples). Even if a stratified sampling approach does not lead to increased statistical efficiency, such a tactic will not result in less efficiency than would simple random sampling, provided that each stratum is proportional to the group's size in the population.

Third, it is sometimes the case that data are more readily available for individual, pre-existing strata within a population than for the overall population; in such cases, using a stratified sampling approach may be more convenient than aggregating data across groups (though this may potentially be at odds with the previously noted importance of utilizing criterion-relevant strata).

Finally, since each stratum is treated as an independent population, different sampling approaches can be applied to different strata, potentially enabling researchers to use the approach best suited (or most cost-effective) for each identified subgroup within the population.

There are, however, some potential drawbacks to using stratified sampling. First, identifying strata and implementing such an approach can increase the cost and complexity of sample selection, as well as leading to increased complexity of population estimates. Second, when examining multiple criteria, stratifying variables may be related to some, but not to others, further complicating the design, and potentially reducing the utility of the strata. Finally, in some cases (such as designs with a large number of strata, or those with a specified minimum sample size per group), stratified sampling can potentially require a larger sample than would other methods (although in most cases, the required sample size would be no larger than would be required for simple random sampling.

A stratified sampling approach is most effective when three conditions are met

1. Variability within strata are minimized
2. Variability between strata are maximized
3. The variables upon which the population is stratified are strongly correlated with the desired dependent variable.

Advantages over other sampling methods

1. Focuses on important subpopulations and ignores irrelevant ones.
2. Allows use of different sampling techniques for different subpopulations.
3. Improves the accuracy/efficiency of estimation.
4. Permits greater balancing of statistical power of tests of differences between strata by sampling equal numbers from strata varying widely in size.

Disadvantages

1. Requires selection of relevant stratification variables which can be difficult.
2. Is not useful when there are no homogeneous subgroups.
3. Can be expensive to implement.

Poststratification

Stratification is sometimes introduced after the sampling phase in a process called "poststratification". This approach is typically implemented due to a lack of prior knowledge of an appropriate stratifying variable or when the experimenter lacks the necessary information to create a stratifying variable during the sampling phase. Although the method is susceptible to the pitfalls of post hoc approaches, it can provide several benefits in the right situation. Implementation usually follows a simple random sample. In addition to allowing for stratification on an ancillary variable, poststratification can be used to implement weighting, which can improve the precision of a sample's estimates.

Oversampling

Choice-based sampling is one of the stratified sampling strategies. In choice-based sampling, the data are stratified on the target and a sample is taken from each stratum so that the rare target class will be more represented in the sample. The model is then built on this biased sample. The effects of the input variables on the target are often estimated with more precision with the choice-based sample even when a smaller overall sample size is taken compared to a random sample. The results usually must be adjusted to correct for the oversampling.

Probability-Proportional-To-Size Sampling

In some cases the sample designer has access to an "auxiliary variable" or "size measure", believed to be correlated to the variable of interest, for each element in the population. These data

can be used to improve accuracy in sample design. One option is to use the auxiliary variable as a basis for stratification, as discussed above.

Another option is probability-proportional-to-size ('PPS') sampling, in which the selection probability for each element is set to be proportional to its size measure, up to a maximum of 1. In a simple PPS design, these selection probabilities can then be used as the basis for Poisson sampling. However, this has the drawback of variable sample size, and different portions of the population may still be over- or under-represented due to chance variation in selections. To address this problem, PPS may be combined with a systematic approach.

Example: Suppose we have six schools with populations of 150, 180, 200, 220, 260, and 490 students respectively (total 1500 students), and we want to use student population as the basis for a PPS sample of size three. To do this, we could allocate the first school numbers 1 to 150, the second school 151 to 330 (= 150 + 180), the third school 331 to 530, and so on to the last school (1011 to 1500). We then generate a random start between 1 and 500 (equal to 1500/3) and count through the school populations by multiples of 500. If our random start was 137, we would select the schools which have been allocated numbers 137, 637, and 1137, i.e. the first, fourth, and sixth schools.

The PPS approach can improve accuracy for a given sample size by concentrating sample on large elements that have the greatest impact on population estimates. PPS sampling is commonly used for surveys of businesses, where element size varies greatly and auxiliary information is often available - for instance, a survey attempting to measure the number of guest-nights spent in hotels might use each hotel's number of rooms as an auxiliary variable. In some cases, an older measurement of the variable of interest can be used as an auxiliary variable when attempting to produce more current estimates.

Cluster Sampling

Sometimes it is more cost-effective to select respondents in groups ('clusters'). Sampling is often clustered by geography, or by time periods. (Nearly all samples are in some sense 'clustered' in time - although this is rarely taken into account in the analysis.) For instance, if surveying households within a city, we might choose to select 100 city blocks and then interview every household within the selected blocks.

Clustering can reduce travel and administrative costs. In the example above, an interviewer can make a single trip to visit several households in one block, rather than having to drive to a different block for each household.

It also means that one does not need a sampling frame listing all elements in the target population. Instead, clusters can be chosen from a cluster-level frame, with an element-level frame created only for the selected clusters. In the example above, the sample only requires a block-level city map for initial selections, and then a household-level map of the 100 selected blocks, rather than a household-level map of the whole city.

Cluster sampling generally increases the variability of sample estimates above that of simple random sampling, depending on how the clusters differ between themselves, as compared with the within-cluster variation. For this reason, cluster sampling requires a larger sample than SRS to achieve the same level of accuracy - but cost savings from clustering might still make this a cheaper option.

Cluster sampling is commonly implemented as multistage sampling. This is a complex form of cluster sampling in which two or more levels of units are embedded one in the other. The first stage consists of constructing the clusters that will be used to sample from. In the second stage, a sample of primary units is randomly selected from each cluster (rather than using all units contained in all selected clusters). In following stages, in each of those selected clusters, additional samples of units are selected, and so on. All ultimate units (individuals, for instance) selected at the last step of this procedure are then surveyed. This technique, thus, is essentially the process of taking random subsamples of preceding random samples.

Multistage sampling can substantially reduce sampling costs, where the complete population list would need to be constructed (before other sampling methods could be applied). By eliminating the work involved in describing clusters that are not selected, multistage sampling can reduce the large costs associated with traditional cluster sampling.

Quota Sampling

In quota sampling, the population is first segmented into mutually exclusive sub-groups, just as in stratified sampling. Then judgement is used to select the subjects or units from each segment based on a specified proportion. For example, an interviewer may be told to sample 200 females and 300 males between the age of 45 and 60.

It is this second step which makes the technique one of non-probability sampling. In quota sampling the selection of the sample is non-random. For example interviewers might be tempted to interview those who look most helpful. The problem is that these samples may be biased because not everyone gets a chance of selection. This random element is its greatest weakness and quota versus probability has been a matter of controversy for several years.

Accidental Sampling

Accidental sampling (sometimes known as grab, convenience or opportunity sampling) is a type of non probability sampling which involves the sample being drawn from that part of the population which is close to hand. That is, a population is selected because it is readily available and convenient. It may be through meeting the person or including a person in the sample when one meets them or chosen by finding them through technological means such as the internet or through phone. The researcher using such a sample cannot scientifically make generalizations about the total population from this sample because it would not be representative enough. For example, if the interviewer were to conduct such a survey at a shopping center early in the morning on a given day, the people that he/she could interview would be limited to those given there at that given time, which would not represent the views of other members of society in such an area, if the survey

were to be conducted at different times of day and several times per week. This type of sampling is most useful for pilot testing. Several important considerations for researchers using convenience samples include:

1. Are there controls within the research design or experiment which can serve to lessen the impact of a non-random convenience sample, thereby ensuring the results will be more representative of the population?
2. Is there good reason to believe that a particular convenience sample would or should respond or behave differently than a random sample from the same population?
3. Is the question being asked by the research one that can adequately be answered using a convenience sample?

In social science research, snowball sampling is a similar technique, where existing study subjects are used to recruit more subjects into the sample. Some variants of snowball sampling, such as respondent driven sampling, allow calculation of selection probabilities and are probability sampling methods under certain conditions.

4. Duplication.

Sample Size

Sample size is the number of items to be selected from the universe. It should be optimum. Formulas, tables, and power function charts are well known approaches to determine sample size.

Steps for Using Sample Size Tables

1. Postulate the effect size of interest, α, and β.
2. Check sample size table
    1. Select the table corresponding to the selected α
    2. Locate the row corresponding to the desired power
    3. Locate the column corresponding to the estimated effect size.
    4. The intersection of the column and row is the minimum sample size required.

The Factors Considering While Deciding The Size Of The Sample

a) Nature of the population.

b) Complexity of tabulation.

c) Problem relate with collection of data.

d) Type of sampling.

e) Basic information.

f) Degree of accuracy required for the study.

Characteristics of Good Sample Design

a. Representative.
b. Viable.
c. The selected sample design should not cause more errors.
d. A good sample design able to control systematic bias efficiently.
e. If the sample is well design and selected, decision makers can use this info with confidence.

Criteria of Selecting a Sampling Procedure

1. Nature of the problem.
2. Goal of researchers.
3. Geographical area covered by the survey.
4. Size of the population under study.
5. Extent of fact available about population.
6. Availability of funds
7. Available time for study.
8. Desired reliability of the result.

Criteria Used For Selecting Sampling Techniques

- The purpose of the survey.
- Measurability.
- Degree of precision.
- Information about population.
- The nature of the population.
- The geographical area covered by the survey.
- Fund availability.
- Time.
- Economy.

Errors in Sample Surveys

Survey results are typically subject to some error. Total errors can be classified into sampling errors and non-sampling errors. The term "error" here includes systematic biases as well as random errors.

Sampling Errors and Biases

Sampling errors and biases are induced by the sample design. They include:

1. **Selection Bias:** When the true selection probabilities differ from those assumed in calculating the results.
2. **Random Sampling Error:** Random variation in the results due to the elements in the sample being selected at random.

Sampling Bias

Sampling analysis involve to type of cost namely cost of collecting data and cost of an incorrect inference resulting from the data. They are to causes for incorrect inference resulting from data. They are

i. Systematic bias

ii. Sampling errors

Causes of systematic bias

- Unsuitable sample frame or source list.
- Faulty measuring device.
- Non respondent
- Indeterminacy principle.
- Usual bias in reporting data.

Sampling errors

The errors which arise due to the use of sampling survey are known as sampling errors. These are random variation in the sample estimate around the true population parameters.

Type of sampling errors

Biased errors: These errors are occurring due to the faulty selection of sampling method due to the prejudice of the researchers.

Unbiased errors: This type of bias is occurring due to chance difference between the items included in the sample.

Causes of bias

Bias may arise due to,

1. Faulty process selection.
2. Faulty work during the collection of information.
3. Faulty method of analysis.

Non-Sampling Error

Non-sampling errors are other errors which can impact the final survey estimates, caused by problems in data collection, processing, or sample design. They include:

1. **Over coverage**: Inclusion of data from outside of the population.
2. **Under coverage**: Sampling frame does not include elements in the population.
3. **Measurement error**: e.g. when respondents misunderstand a question, or find it difficult to answer.
4. **Processing error**: Mistakes in data coding.
5. **Non-response**: Failure to obtain complete data from all selected individuals.

After sampling, a review should be held of the exact process followed in sampling, rather than that intended, in order to study any effects that any divergences might have on subsequent analysis. A particular problem is that of non-response.

Two major types of non-response exist: unit non-response (referring to lack of completion of any part of the survey) and item non-response (submission or participation in survey but failing to complete one or more components/questions of the survey). In survey sampling, many of the individuals identified as part of the sample may be unwilling to participate, not have the time to participate (opportunity cost), or survey administrators may not have been able to contact them. In this case, there is a risk of differences, between respondents and non respondents, leading to biased estimates of population parameters. This is often addressed by improving survey design, offering incentives, and conducting follow-up studies which make a repeated attempt to contact the unresponsive and to characterize their similarities and differences with the rest of the frame. The effects can also be mitigated by weighting the data when population benchmarks are available or by imputing data based on answers to other questions.

Non-response is particularly a problem in internet sampling. Reasons for this problem include improperly designed surveys,[1] over-surveying (or survey fatigue), and the fact that potential participants hold multiple e-mail addresses, which they don't use anymore or don't check regularly.

Sampling and Data Collection

Good data collection involves:

- Following the defined sampling process
- Keeping the data in time order
- Noting comments and other contextual events

Methods of Data Collection

1. Primary data collection
2. Secondary data collection

Collection of Primary Data

Primary data are those data which are collected for the first time and these are in original in character.

Methods of Collecting Primary Data

1. Observation
2. Interview
3. Questionnaire
4. Schedule
5. Experimentation
6. Simulation
7. Use of telephone
8. Panel method
9. Mail survey
10. Projective technique
11. Sociometry
12. Focus group discussion
13. Content analysis

Observation

Observation is the systematic viewing of specific phenomenon in its proper setting for the specific purpose of gathering data for a particular study.

Features of observation

- Physical & mental activity
- Selective
- Purposive & not informal
- Grasps the significant events & occurrences
- Should be exact & based on standardized tools of research

Types of observation

1. Simple and systematic
2. Subjective and objective
3. Casual and scientific
4. Intra subjective and inter subjective
5. Factual and inferential
6. Direct and indirect
7. Participant and non participant
8. Structured and unstructured

Advantages

- Actual or habits of person are observed
- Obtain information from those who are unable to effectively communicate in written or oral form
- No better way to gather information than through observation
- Most reliable method of data collection

Disadvantages

- Result of observation depends on the skill of the observer
- Options and attitudes cannot be obtained by observation
- It should be expensive to tie up personnel in such tasks
- The researcher's findings are limited to those observed

Component of process of observation

1. Sensation
2. Attention
3. perception

Experimental method

it is the least used method for collecting primary data. This method is commonly used by marketers in test marketing.

Types;

1. Laboratory experiments
2. Field experiments

Laboratory experiment

A laboratory experiment is an investigation conducted in situation created specifically for that purpose

Field experiment

This is an experiment conducted in real life situation in which the experiments manipulate an independent variable in order to test a hypothesis

Advantages of experimental method

- the power to determine the causal relationship between variables is more compared with other methods
- The human errors can be reduced to the minimum
- It helps to produce exact measurement

Limitations of experimental method

- Difficult to establish comparable control & experimental group
- Limited scope
- Lacks realism
- Cannot be used for future study
- Not used for determine opinion ,motive & intention of individual

Simulation

Simulation is a recent research technique. It is a realistic enactment of roles in an imagined situation. There are three uses;

1. Assessment of a situation
2. Understanding a situation
3. Decision making in a situation

Types of Simulation

1. Computer simulation
2. Man simulation
3. Man computer simulation

CHAPTER-4

MEASUREMENT AND SCALING

The word scale or scaling is generally used for indicating measurements or measuring something. Many aspects of social phenomena like emotion, attitude, faiths etc. are not measurable directly. They are not quantitative in nature. In social phenomena there are two types of variables- quantitative and qualitative. Measurement or scaling implies conversion of qualitative data into quantitative data and then measuring them. Various kinds of statistical measurements are used for this purpose. Scaling is an attempt to bring about greater accuracy which is desired in both physical and social sciences.

Essentials of Scaling (Criteria for Good Scaling)

- Continuum means judging the scalability of the phenomenon under study.
- Reliability means that it should consistently produce the same result when applied to the same design.
- Validity implies correct measurement. A scale is valid if it measures correctly what is expected to measure.
- Weighting items means proper weights are to be provided to the attributes involved in the study because they are not of equal importance.
- Equality of units is a desirable characteristic but not essential for sound scientific procedure. In order to make the units equal, sometimes subtraction or addition can be made.

Measurement

Measurement is a systematic way of assigning numbers or names to objects and their attributes. It is easy to assign numbers in respect of properties of some objects, properties like weight, height.

Why Measurement?

“When you can measure what you are talking about and express it in numbers, you know something about it” Lord Kelvin

Rules of Measurement

- A rule is a guide which instructs us to do.
- Operational definitions help us to specify the rules for assigning the numbers.

Concept	Conceptual definition	Operational definition	Measurement
Job Challenge	Reflects a worker's desire for stimulation and challenge in his job and ability to exercise skills	I have an opportunity to develop my own special abilities I am given a chance to do things I do best I love my work	Very true/ somewhat true/ not very true/ not at all true
Shopping time	Time spent in a shop	Interval between entering the door and receiving receipt	Time in minutes

Scales

Scales are devised for measuring variable in social science research. Scaling is the procedure for determining the quantitative measure of abstract concepts like leadership style, brand image of product etc. It is therefore -

- Any series of items which is progressively arranged according to value or magnitude into which an item can be placed according to its quantification.
- A continuous spectrum or series of categories
- Used to represent , usually quantitatively, an item's or person's place in that spectrum

Scale Classification

(A) Level of Measurement

I. Nominal scales
II. Ordinal scales
III. Interval scales
IV. Ratio scale

- **Nominal Scale**
- Numbers or letters assigned to objects which serve as labels for identification or classification. They are Scales "in name only"
- **Ordinal Scale**
- Arranges objects or alternatives according to their magnitude in an ordered relationship. eg rating career opportunities as excellent, good, average poor or very poor.

- **Interval Scale**
- Interval scales not only indicate order, they also measure order or distance in units of equal intervals. When an interval scale is used to measure psychological attribute, the researcher can comment on the magnitude of differences or compare the average differences on attributes that are measured, but cannot determine the actual strength of the attitude towards an object
- **Ratio Scale**
- A ratio scale has equal interval properties of an interval scale but has two additional features:
- Has a true zero. Possible to indicate the complete absence of a property.

- The numerals of the ratio scale have the qualities of real numbers and can be added, subtracted, multiplied, Divided and expressed in ratio relationships.

Analysis of Scales

Type of scale	Numerical Operation	Descriptive statistics
Nominal	Counting	Frequency in each category Percentage in each category Mode
Ordinal	Rank ordering	Median Range Percentile ranking
Interval	Arithmetic operations on intervals between numbers	Mean Standard Deviation Variance
Ratio	Arithmetic operations on actual quantities	Geometric mean Coefficient of variation

Lickert Scale

Respondents indicate their attitude by checking how strongly they agree or disagree with carefully constructed statements that range from the very positive to the very negative towards the attitudinal object. Individuals generally choose from five alternatives: strongly agree, agree, uncertain, disagree and strongly disagree

Example of Lickert scale:

1) If the price of raw materials fell firms would reduce the price of their food product.	SA	A	N	DA	SD
2) Without Government regulation the firms would exploit the customers.					
3) Most food companies are so concerned about making profit they do not care about quality.					
4) The food industry spends a great deal of money making sure that its manufacturing is hygienic.					

Semantic Differential

An attitude measure consisting of a series of seven –point bipolar rating scales allowing response to a concept. Bi Polar adjectives such as "good and bad", "clean or dirty" anchor the beginning and end poles of the scale.

Numerical Scales

An attitude rating scale similar to a semantic differential except that it uses numbers as response options to identify response positions instead of verbal descriptions. Usually five point scale or seven point scale

Constant Sum Scale

A measure of attitudes in which the respondents are asked to divide a constant sum to indicate the relative importance of the attributes

Stapel Scale

Measures the direction and intensity of an attitude simultaneously. E.g. To measure attitudes towards a supervisor

Supervisor's name

+3

+2

+1

Supportive

-1

-2

-3

Scaling Techniques

Some of the important scaling techniques are as follows:

- **Rating Scale:** It means measuring an attribute by judgement in a continuum. For eg. Students are rated by their teachers. In rating three elements are taken into consideration namely judges, continuum and subjects. Judges must be impartial. Continuum must accommodate the attributes realistically. Subjects should be amenable to rating. Rating scales are generally used for measuring the attitudes and the intensity of attitudes.
- **Ranking Scales:** Ranking scales are identical to rating scales. In ranking scales, we make relative the score will place judgements against other similar objects. There are two generally used approaches of ranking scales namely.
    1. **Method of Paired Comparison** where the respondent can express his attitude by making a choice between two objects.
    2. **Method of Ranking Order** where the respondents are asked to rank their choices.
- **Attitude Scales:** In this type of scale, the attitude of an individual towards a matter can be known from the score of his responses given on a questionnaire. The score will place him in a scale. He simply expresses his likes or dislikes, agreement or disagreement with the issue involved as given in the forms of questions. On the basis of reply, he is assigned a score which indicates his position. In the attitude scale some relevant statements are to be considered by the respondents. The statements are found in such a way as to be intimately related to the attribute which is sought to be measured.
- **Factor Scaling:** This is a type of scaling in which multi dimensions of a complex attitude is identified.

Sources of Error in Measurement

a) **Response Error –** sometimes the respondent may be reluctant to express strong negative feelings or they may have very little knowledge about various aspects but he will not admit his ignorance. The figure, boredom, anxiety etc of the respondents may limit the ability of the respondent to express his response accurately. In these situations the researcher has to make guesses in interviews. These guesses may sometimes be erroneous, thus resulting into wrong measurement.

b) **Situational Error –** situational factors also cause error in measurement. If something happens at the time of interview which places a strain on the interview that will have serious effects on the response from the respondent. For example, if somebody is present at the time of interview the respondent may not reveal facts correctly.

c) **Errors Due To Faulty Instruments –** Use of complex words, ambiguous meanings, poor printing, inadequate space for replies etc may result in measurement errors.

Pilot Study

Pilot study is a standard scientific tool for 'soft' research, allowing scientists to conduct a preliminary analysis before committing to a full-blown study or experiment. A small chemistry experiment in a college laboratory, for example, costs very little, and mistakes or validity problems easily rectified. At the other end of the scale, a medical experiment taking samples from thousands of people from across the world is expensive, often running into the millions of dollars.

- Finding out that there was a problem with the equipment or with the statistics used is unacceptable, and there will be dire consequences.
- A field research project in the Amazon Basin costs a lot of time and money, so finding out that the electronics used do not function in the humid and warm conditions is too late.
- To test the feasibility, equipment and methods, researchers will often use a pilot study, a small-scale rehearsal of the larger research design. Generally, the pilot study technique specifically refers to a smaller scale version of the experiment, although equipment tests are an increasingly important part of this sub-group of experiments.
- For example, the medical researchers may conduct a smaller survey upon a hundred people, to check that the protocols are fine.
- Pilot studies are also excellent for training inexperienced researchers, allowing them to make mistakes without fear of losing their job or failing the assignment.
- Logistical and financial estimates can be extrapolated from the pilot study, and the research question, and the project can be streamlined to reduce wastage of resources and time.
- Pilots can be an important part of attracting grants for research as the results can be placed before the funding body.
- Generally, most funding bodies see research as an investment, so are not going to dole out money unless they are certain that there is a chance of a financial return.
- Unfortunately, there are seldom paper reporting the preliminary pilot study, especially if problems were reported, is often stigmatized and sidelined. This is unfair, and punishes researchers for being methodical, so these attitudes are under a period of re-evaluation
- Discouraging researchers from reporting methodological errors, as found in pilot studies, means that later researchers may make the same mistakes.
- The other major problem is deciding whether the results from the pilot study can be included in the final results and analysis, a procedure that varies wildly between disciplines.
- Pilots are rapidly becoming an essential pre-cursor to many research projects, especially when universities are constantly striving to reduce costs. Whilst there are weaknesses, they are extremely useful for driving procedures in an age increasingly dominated by technology, much of it untested under field conditions.

Survey and Questionnaire Method

The survey research design is often used because of the low cost and easy accessible information.

Introduction

Conducting accurate and meaningful surveys is one of the most important facets of market research in the consumer driven 21st century. Businesses, governments and media spend billions of dollars on finding out what people think and feel. Accurate research can generate vast amounts of revenue; bad or inaccurate research can cost millions, or even bring down governments. The survey research design is a very valuable tool for assessing opinions and trends. Even on a small scale, such as local government or small businesses, judging opinion with carefully designed surveys can dramatically change strategies. Television chat-shows and newspapers are usually full of facts and figures gleaned from surveys but often no information is given as to where this information comes from or what kind of people were asked.

When you decide to enter this minefield and design a survey, how do you avoid falling into the trap of inaccuracy and bias? How do you ensure that your survey research design reflects the views of a genuine cross-section of the population? The simple answer is that you cannot; even with unlimited budget, time and resources, there is no way of achieving 100% accuracy. Opinions, on all levels, are very fluid and can change on a daily or even hourly basis.

Despite this, surveys are still a powerful tool and can be an extremely powerful research tool. As long as you design your survey well and are prepared to be self-critical, you can still obtain an accurate representation of opinion.

Establishing the Aims of Your Research

This is the single most important step of your survey research design and can make or break your research; every single element of your survey must refer back to this design or it will be fatally flawed. If your research is too broad, you will have to ask too many questions; too narrow and you will not be researching the topic thoroughly enough.

Researching and Determining Your Sample Group

This is the next crucial step in determining your survey and depends upon many factors. The first is accuracy; you want to try and interview as broad a base of people as possible. Quantity is not always the answer; if you were researching a detergent, for example, you would want to target your questions at those who actually use such products.

For a political or ethical survey, about which anybody can have a valid opinion, you want to try and represent a well balanced cross section of society. It is always worth checking beforehand what quantity and breadth of response you need to provide significant results or your hard work may be in vain.

Methodology

How do you make sure that your questionnaire reaches the target group? There are many methods of reaching people but all have advantages and disadvantages. For a college or university study it is unlikely that you will have the facilities to use internet, e-mail or phone surveying so we will concentrate on only the likely methods you will use.

Face to Face

This is probably the most traditional method of the survey research design. It can be very accurate. It allows you to be selective about to whom you ask questions and you can explain anything that they do not understand. In addition, you can make a judgment about who you think is wasting your time or giving stupid answers. There are a few things to be careful of with this approach; firstly, people can be reluctant to give up their time without some form of incentive. Another factor to bear in mind is that is difficult to ask personal questions face to face without embarrassing people. It is also very time consuming and difficult to obtain a representative sample. Finally, if you are going to be asking questions door-to-door, it is essential to ensure that you have some official identification to prove who you are.

Mail

This does not necessarily mean using the postal service; putting in the legwork and delivering questionnaires around a campus or workplace is another method. This is a good way of targeting a certain section of people and is excellent if you need to ask personal or potentially embarrassing questions.

The problems with this method are that you cannot be sure of how many responses you will receive until a long time period has passed. You must also be wary of collecting personal data; most countries have laws about how much information you can keep about people so it is always wise to check with somebody more knowledgeable.

Questionnaire

Questionnaire is a document containing a list of questions designed to solicit information from respondents appropriate for analysis.

Questionnaire Objectives

- Translate the information needed into a set of specific questions
- Motivate, and encourage the respondent to become involved in the interview, to cooperate, and to complete the interview.
- Minimize response error.

Structuring and Designing the Questionnaire

The design of your questionnaire depends very much upon the type of survey and the target audience. If you are asking questions face to face it is easy to explain if people are unsure of a question. On the other hand, if your questionnaire is going to include many personal questions then mailing methods are preferable (but may violate local legislation). You must keep your questionnaire as short as possible; people will either refuse to fill in a long questionnaire or get bored halfway through. If you do have lots of information then it may be preferable to offer multiple-choice or rating questions to make life easier.

Cover Note

It is also polite, especially with mailed questionnaires, to send a short cover note explaining what you are doing and how the subject should return the surveys to you. You should introduce yourself; explain why you are doing the research, what will happen with the results and who to contact if the subject has any queries.

Developing a Questionnaire

There are no hard and fast rules, only guidelines can be provided in developing a questionnaire.

Major Decisions

- What
- How
- Sequence
- Questionnaire Layout
- Pretested and Revised?

Question Content

- Should this question be asked?
- Is the question of proper scope and coverage?
- Can the participant adequately answer this question, as asked?
- Will the participant willingly answer this question, as asked?

Type of Questions

Open-Ended questions

- The respondent is asked to provide his or her own answers.
- Open-ended questions must be coded before they can be processed for computer analysis.

Do you intend to go on an outstaion holiday within the next six months?

Closed-Ended Questions

- Also known as *structured question*
- The respondents are offered a set of answers from which they are asked to select one that most closely represent their views.
- The response categories should be exhaustive and mutually exclusive.
- A structured question may be multiple-choice, dichotomous, or a scale.

Multiple-Choice Questions

- The researcher provides a choice of answers and respondents are asked to select one or more of the alternatives given.

Do you intend to go on an outstation holiday within the next six months?

____ Definitely will not go

____ Probably will not go

____ Undecided

____ Probably will go

____ Definitely will go

____ Other (please specify)

Dichotomous Questions

- It has only two response alternatives:

  Yes or no, agree or disagree, and so on.

Often, the two alternatives of interest are supplemented by a neutral alternative, such as

"No opinion," "don't know," "both," or "none."

Do you intend to go on an outstation holiday within the next six months?

_____Yes

_____No

_____ Don't know

Scales

Do you intend to go on an outstation holiday within the next six months?

Definitely will not go	Probably will not go	Undecided	Probably will go	Definitely will go
1	2	3	4	5

Contingency Question

A survey question is intended for only some respondents, determined by their responses to some other questions.

- E.g. do you smoke cigarette?
- Yes No
- If yes, how many cigarettes you smoke per day?

Question Wording- Do's & Don'ts

Define the Issue

Who, What, When, Where, Why, and Way (The Six Ws). Who, What, When, and Where are particularly important.

- Which brand of shampoo do you use? (Incorrect)
- Which brand or brands of shampoo have you personally used at home during the last month?

  In case of more than one brand, please list all the brands that apply.
  (Correct)

Use Simple Ordinary Words

- Respondents may not be highly educated
- May not know some of the simple technical jargon that you are used to.

"Do you think the distribution of soft drinks is adequate?"
(Incorrect)

"Do you think soft drinks are readily available when you want to buy them?"
(Correct)

Use Unambiguous Words

Ambiguous question contains more than one meaning and that can be interpreted differently by different respondents.

- 'Is your work made difficult because you are expecting a baby?'
  Yes No

- 'Are you satisfied with your canteen?'
  Yes No

Avoid Leading or Biasing Questions

- Gives the respondent a clue as to what the answer is desired, or
- leads the respondents to answer in a certain way

Do you think that patriotic Indians should buy imported automobiles when that would put Indian labour out of work?

_____ Yes _____ No _____ Don't know
(Incorrect)

Do you think that Indians should buy imported automobiles?

_____ Yes _____ No _____ Don't know
(Correct)

Avoid Double-barreled Questions

It includes two or more questions in one.

- Difficult to know which particular question a respondent has answered.

Do you think fanta is a tasty and refreshing soft drink?

Yes ___ No _____ (Incorrect)

"Do you think fanta is a tasty soft drink?" and

"Do you think fanta is a refreshing soft drink?" (Correct)

Avoid Implicit Alternatives

- An alternative that is not explicitly expressed in the options is an implicit alternative.

1.Do you like to fly when traveling short distances?
(Incorrect)

2.Do you like to fly when traveling short distances, or would you rather drive?
(Correct)

Avoid Implicit Assumptions

Questions should not be worded so that the answer is dependent upon implicit assumptions about what will happen as a consequence.

1. Are you in favor of a balanced budget?
(Incorrect)

2. Are you in favor of a balanced budget if it would result in an increase in the personal income tax? (Correct)

Avoid Questions that are Based on Presumptions

In such questions the researcher assumes that respondents fit into a particular category and seeks information based upon that assumption.

– How May cigarettes do you smoke in a day?

Avoid Generalizations and Estimates

"What is the annual per capita expenditure on groceries in your household?"
(Incorrect)

"What is the monthly (or weekly) expenditure on groceries in your household?"

and

"How many members are there in your household?"
(Correct)

Avoid Burdensome Questions

Thinking about first Saturday of this month, note each quarter-hour time period during which, so far as you can recall, you personally listened to the radio. Do the same for television

Avoid long questions.

Avoid very general questions

E.g. how satisfied are you with your job?

Avoid questions that include negatives

E.g. would you rather not use a non-medicated shampoo?

Determining the Order of Questions

- Start with easy and interesting questions.
- General to specific questions (funnel sequence).
- Use filter questions (and prompters).
- Ask sensitive or potentially embarrassing questions at the end of the questionnaire.
- Use alternative phrasings of the same question to yield more accurate total response.

Form and Layout

- Divide a questionnaire into several parts.
- The questions in each part should be numbered.
- The questionnaires should preferably be pre-coded.
- The questionnaires themselves should be numbered serially.

Pilot Study

A survey on a smaller scale conducted before a large scale filed study is termed as *pilot survey*.

Uses of Pilot Study

- To pretest the suitability of questions
- To generate fixed choice answers
- To avoid unforeseen problems during the large survey
- To provide experience and confidence to the interviewer

Pretesting

Testing of the questionnaire on a small sample of respondents to identify and eliminate potential problems. A questionnaire should not be used in the field survey without adequate pretesting.

- All aspects of the questionnaire should be tested
- The respondents for the pretest and for the actual survey should be drawn from the same population.
- Pretests are best done by personal interviews
- After the necessary changes have been made, another pretest could be conducted by mail, telephone, or electronic means if those methods are to be used in the actual survey.
- A variety of interviewers should be used for pretests.
- The pretest sample size varies from 15 to 30 respondents for each wave.
- Finally, the responses obtained from the pretest should be coded and analyzed.

Schedule Method

A schedule is a device used in collecting field data when survey method is applied. It is used in direct interviews. It is a proforma containing a set of questions and tables. This proforma is filled by field staffs who are specially appointed for the purpose.

Contents of Schedules

The schedule is divided in to three parts;

i) Introductory part

It includes (a) the introductory information about the problem under investigation and the respondent such as the name, serial number etc of the survey. (b) general information about respondent like address, age, sex, education, income etc. (c) the date, place and time of interview.

ii) Main schedule

It consists of titles, columns, questions and blank tables that is meant for securing information from respondents in respect of the problem under investigation.

iii) Instructions

Here, the researcher is given direction regarding the method of interview.

Construction of Schedules

Following steps are followed while constructing a schedule.

1).The problem under study is defined

2). Framing of actual questions.

3). Arrangement of questions in the proper orders.

4). Pilot survey.

Difference between Questionnaires and Schedules

1. A schedule is generally filled out by the research worker or the field worker. Questionnaires are sent by post to respondent, to answer as specified in the covering letter.

2. Schedule is relatively more costly. Questionnaire is relatively cheap.

3. In the case of schedule the response is better since the enumerators clear the doubts of the respondents and get the replies from the respondents at the spot itself. Response to the questionnaire is poor.

4. In the case of schedule Time consumption is less. Time consumption is more in case of questionnaire.

5. Throguh Schedule Direct personal contact is established with the respondents, In the case of questionnaire there is no direct personal contact.

6. Schedules can be applied even if the respondents are not literate. Questionnaire can be used only if the respondents are literates.

Collection of Secondary Data

Secondary data are those which have been collected by some other persons for his purpose and published. They are usually in the shape of finished products.

Advantages of Secondary data

1. The information can be collected by incurring least cost.
2. The time requires for obtaining the information is very less.
3. Most of the secondary data are those published by big institutions. So they contain large quantity of information..

Disadvantages of Secondary data

1. Since the secondary data is a result of some other person's attempt, it need not be suitable for a researcher, who makes use of it.
2. It may be inaccurate and unreliable.
3. It may contain certain errors.

Precautions to be Taken before Using Secondary Data

1. **Suitability: -** The investigator should satisfy him that the data available are suitable for the enquiry on hand.
2. **Adequacy: -** the adequacy of the data should be tested by studying the items covered by the original enquiry and the items to be covered by the enquiry.
3. **Reliability:-** The reliability of secondary data should be tested

Sources of Secondary Data

There are varieties of published sources from which one can get information for his research work. The important such sources are;

1. Official report of the central, state and local government.
2. Official publications of the foreign governments and international bodies like UNO and its subordinate bodies.
3. Reports and publications of Trade Associations, Banks, Cooperative Societies and Similar Semi Government and Autonomous Organizations.
4. Technical journals, News papers, Books, Periodicals, etc
5. Publications of research Organizations, Centers, Institutes, and reports submitted by Economists, Research scholars etc.

Difference between Primary data and Secondary data

1. Primary data is Original in character. Secondary data is Not original
2. Collection of data is expensive in the case of primary data. Collection of secondary data is less expensive.
3. Primary data is in the shape of raw materials. Secondary data is the shape of finished products.

4. Primary data is adequate and suitable. Secondary data need no be ample and apposite.

Choice between Primary and Secondary Method

The following factors are to be considered while choosing between primary and secondary methods.

1. Nature and scope of enquiry
2. Availability of time and money
3. Degree of accuracy desired.
4. Status of the investigator

Case Study

Case study is a method of exploring and analyzing the life of a social unit, the social unit may be a person or a family or an institution or an organization or even a community. It is a method of collecting information and its analysis. It is a way of organizing social data so as to preserve the unitary character of the social object, being studied.

Sources of Case Study

The sources from which information are collected in a case study are;

1) **Personal documents**

They contain the description of the remarkable events of the life of the narrator as well as his reactions towards them. Therefore from these personal documents, one can study the writer's personality, social relationship and philosophy of life.

2) **Life history**

Through interviews with a respondent, his life history can be known. This is an objective study in which various events of respondent's life are studied with an attempt to find their significance for the society.

Phases of Case Study

1. The researcher has to select the problem had to study the problem.
2. The researcher ha to describe the course of events.
3. Materials about each of the units or aspects are collected.
4. There are certain factors which are responsible for every event. They must be identified and studied.
5. The role of the factors responsible for the events is analyzed and conclusions are drawn about the effect of the factors.

CHAPTER-5

DATA PROCESSIING

Data continues to be in raw form, unless and until they are processed and analyzed. Processing is a statistical method by which the collected data is so organized the further analysis and interpretation of data become easy. It is an intermediary stage between the collection of data and their analysis and interpretation.

Processing stages

There are four important stages in the processing of data. They are;

1. Editing
2. Coding
3. Classification
4. tabulation

Editing

As soon as the researcher receives the data, he should screen it for accuracy. Editing is the process of examining the data collected through various methods to detect errors and omissions and correct them for further analysis. Though editing, it is ensured that the collected data are accurate, consistent with other facts gathered, uniformly entered and well arranged so that further analysis is made easier

Practical guidelines for editing

While editing care has to be taken to see that the data are as accurate and complete as possible. The following points are to be noted;

1. The editor should familiarize with the copy of instructions given to the interviewers.
2. The original entry, if found incorrect, should not be destroyed or erased. On the other hand, it should be crossed out in such a manner that it is still eligible.
3. Any, modification to the original entry by the editor must be specifically indicated.
4. All completed schedules must bear signature of the editor an d the date.
5. Incorrect answer to the questions can be corrected only if the editor is absolutely sure of the answer, otherwise leave it as such.
6. Inconsistent, incomplete or missing answers should not be used.
7. Sere that all numerical answers are converted to same units.

Coding

Coding is the process by which r response categories are summarized by numerals or other symbols to carry out subsequent operations of data analysis. This process of assigning numerals or symbols to the responses is called coding. It facilitates efficient analysis of the collected data and helps in reducing several replies to a small number of classes which contain the critical information required for analysis. In general it reduces the huge amount of information collected in to a form that is amenable to analysis.

Steps in coding

1. Study the answers carefully.
2. Develop a coding frame by listing the answers and by aligning codes to each of them.
3. Prepare a coding manual with the detail of variable names, codes and instructions.
4. If the coding manual has already been prepared before the collection of the data, make the required additions for the open ended and partially coded questions.

Coding rules

1. Give each respondent a code number for identification.
2. Provide code number for each question.
3. All responses including ‘don’t know’, ‘no opinion’. Etc is to be coded.
4. Assign additional codes to partially coded questions.

Classification

Classification is the process of reducing large mass of data in to homogeneous groups for meaningful analysis. It converts data from complex to understandable and unintelligible to intelligible forms. It divides data in to different groups or classes according to their similarities and dissimilarities. When the data are classified, they give summary of whole information.

Objectives of classification

1. To organize data in to concise, logical and intelligible form.
2. To take the similarities and dissimilarities s between various classes clear.
3. To facilitate comparison between various classes of data.
4. To help the researcher in understanding the significance of various classes of data.
5. To facilitate analysis and formulate generalizations.

Types of classification

A. Classification according to external characteristics

In this classification, data may be classified either on geographical basis or periodical basis.

Classification on geographical basis

In this type of classification, the data that are collected from different places are placed in different classes.

Classification on periodical basis (chronological classification)

In this type of classification, the data belonging to a particular time or period are put under one class. This type of classification is based on period.

B. Classification according to internal characteristics

Data may be classified either according to attributes or according to the magnitude of variables

Classification according to Attributes

In this type data are classified on the basis of some attributes an characteristics.

Simple Classification

If the classification is based on one particular attribute only it is called simple classification.

Eg; classification on the basis of sex.

Manifold Classification

If the classification is based on more than one or several attributes it is called manifold or multiple classifications. in this data are classified in several groups.

C. Classification according variables

Here the data are classified to some characteristics that can be measured. Data are classified on the basis of quantitative characteristics such as age, height; weight etc. quantitative variables are grouped in to two

a) Discrete variable
   If the variables can take only exact value, it is called discrete variable.
b) Continuous variable
   The variables that can take any numerical value within a specified range are called continuous variable.

Characteristics of an ideal classification

1. Unambiguity- Classification should be unambiguous. The various classes should be defined properly.

2. Stable- it should not change from enquiry to enquiry

3. Flexibility- classification should have the capacity of adjustment to new situations and circumstances.

4. Homogeneity- each class should contain homogenous items.

5. Suitability- it should be suitable to objects of any statistical enquiry.

6. Exhaustiveness- there should be no item which does not find a class.

Tabulation

Tabulation is the next step to classification. It is an orderly arrangement of data in rows and columns. It is defined as the "measurement of data in columns and rows". Data presented in tabular form is much easier to read and understand than the data presented in the text the main purpose of tabulation is to prepare the data for final analysis. It is a stage between classification of data and final analysis.

Objectives of Tabulation

1. To clarify the purpose of enquiry
2. To make the significance of data clear.
3. To express the data in least possible space.
4. To enable comparative study.
5. To eliminate unnecessary data
6. To help in further analysis of the data.

Types of Tables

- **Simple Table**

Here the data are presented only for one variable or characteristic. Any frequency distribution of a single variable is simple table

- **Complex table**

In complex table, two or more characteristics are shown. If the study is related to more than two variables, it is called multivariate analysis. They may be of the following tables.

(a) One- way table

In this type of table, data of only one characteristic will be shown. It means that when one type of information is secured about different groups or individuals, it can be displayed with the help of one- way table

(b) **Two- way table**

When mutually related attributes of a phenomenon are to be displayed, two way tables are used. In other words, this table shows two types of characteristics.

(c) Three-way table

It displays three types of attributes. It is used when three inter- related or mutually related attributes or characteristics of a phenomenon are to be displayed,.

(d) Manifold tables

When information about different mutually attributes or characteristics of a phenomenon are to be displayed, manifold table is used. Such tables display information about various characteristics or attributes.

Parts of a statistical table

Following are the important parts of a statistical table.

1. **Title of the table**

The title of the table is placed above the table. If there are more than one table in a research, each should bear a number for easy reference.

2. **Caption or title of the column**

It is also termed as “box head”. There may be sub- captions under the main caption.

3. **Stub (row heading)**

Stub refers to the title given to rows

4. **Body (main data)**

This is the main body of information needed for the research work.

5. **End note (foot note)**

This is placed below the table to convey the expansions of abbreviations to caption, stub or main body.

6. **Source note**

If the table is based on outside information, it should be mentioned in the source note below.

Descriptive Analysis under Different Types of Measurement

A good understanding of the concepts related to scale so measurement of variable is imperative as it is the sole base on which decision about the choice of statistical tools for analysis rests. Separate tools of analysis need to be applied depending upon how the variables are measured namely, nominal, ordinal, interval, and ratio scales.

1. Nominal Measurement

These are the variable that is measured only nominally. In **nominal** measurement the numerical values just "name" the attribute uniquely. No ordering of the cases is implied. The nominal type, sometimes also called the qualitative type, differentiates between items or subjects based only on their names and categories and other qualitative classifications they belong to. Examples include gender, nationality, ethnicity, language, genre, style, biological species, visual pattern, and form (gestalt)....

2. Ordinal Measurement

In **ordinal** measurement the attributes can be rank-ordered. Here, distances between attributes do not have any meaning. The ordinal type allows for rank order (1st, 2nd, 3rd, etc.) by which data can be sorted, but still does not allow for relative degree of difference between them. Here comparisons of greater and less than can be made, in addition to equality and inequality.

3. Interval Measurement

In **interval** measurement the distance between attributes *does* have meaning. For example, when we measure temperature (in Fahrenheit), the distance from 30-40 is same as distance from 70-80. The interval between values is interpretable. Because of this, it makes sense to compute an average of an interval variable, where it doesn't make sense to do so for ordinal scales. But note that in interval measurement ratios don't make any sense - 80 degrees is not twice as hot as 40 degrees (although the attribute value is twice as large).

4. Ratio Measurement

Practically all quantitative data is recorded on the ratio level of measurement. The ratio level is the “highest” level of measurement. It has all the characteristics of the interval level, but in addition, the 0 point is meaningful and the ratio between two numbers is meaningful. Examples of the ratio scale of measurement include wages, units of production, weight, changes in stock prices, distance between branch offices, and height.

Common Descriptive Techniques

The most common descriptive statistics used in research consist of percentages and frequency tables

(a)Percentages

Percentages are a popular method of displaying distribution. Percentages are the most powerful in making comparisons. In percentages, we simplify the data by reducing all numbers in a range of 10 to 100.

(b) Frequency Tables

One of the most common ways to describe a single variable is with a frequency distribution. Frequency distribution can be depicted in two ways, as table or as a graph. If the frequency distribution is depicted in the form of a table, we call it frequency table.

(c) Contingency Tables

A Contingency table shows the relationship between two variables in tabular form. The term Contingency table was first used by the statistician Karl Pearson in 1904. Contingency tables are especially used in Chi- square test.

Graphs and Diagrams

In research, the data collected may be of complex nature. Diagrams and graphs is one of the methods which simplifies the complexity of quantitative data and make them easily intelligible. They present dry and uninteresting statistical facts in the shape of attracting and appealing pictures. They have a lasting effect on the human mind than the conventional numbers.

Uses of Graphs and Diagrams

1. They help in presenting quantitative facts in simple, clear and effective pictures.
2. They make the whole data readily intelligible.
3. They can be used for comparison purpose.
4. They are useful in analyzing complex economic theories.
5. They save much time in understanding data.
6. Facts can be understood without doing mathematical calculations.
7. They help in lo0cating statistical measures such as median. quartile, mode etc

Types of Graphs

The following graphs are commonly used to represent data

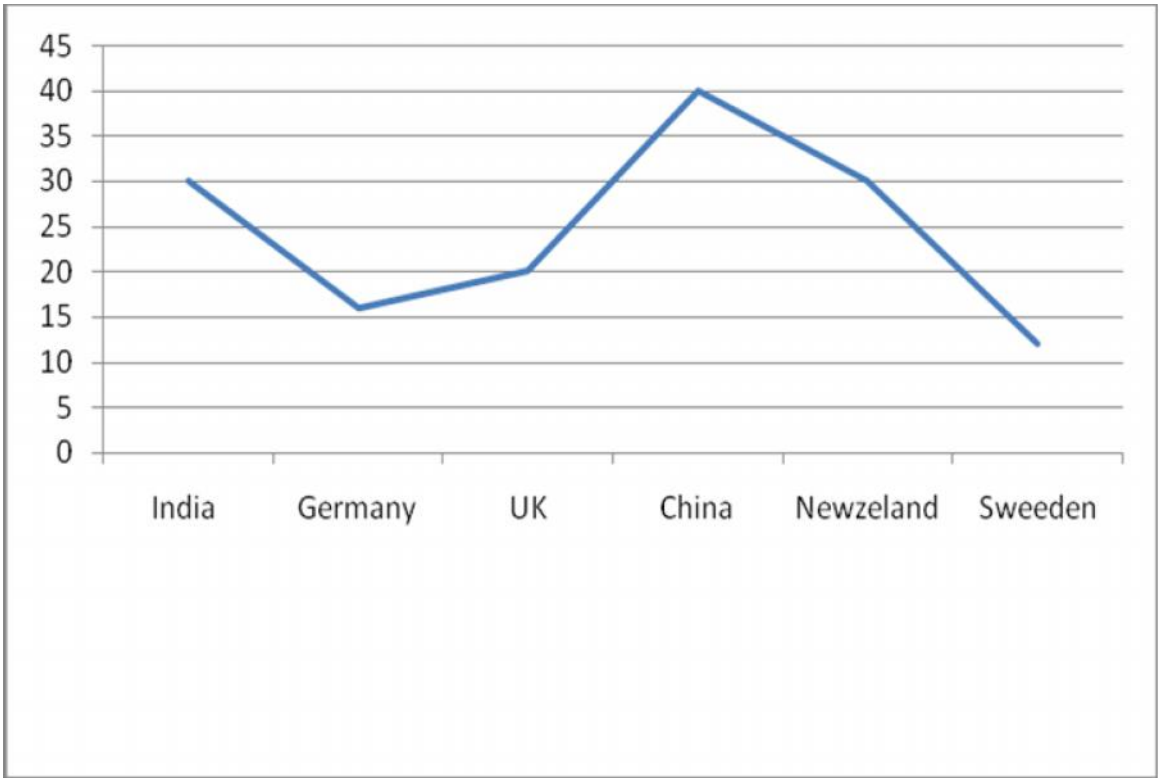
1. Charts or line graphs
2. Bar charts
3. Circle charts or pie diagram
4. Pictograms

1. Line Graphs

A line graph displays information in a series of data points that each represents an individual measurement or piece of data. The series of points are then connected by a line to show a visual trend in data over a period of time. The line is connected through each piece chronologically.

For eg; following data show birth rate per thousands of six countries over a period.

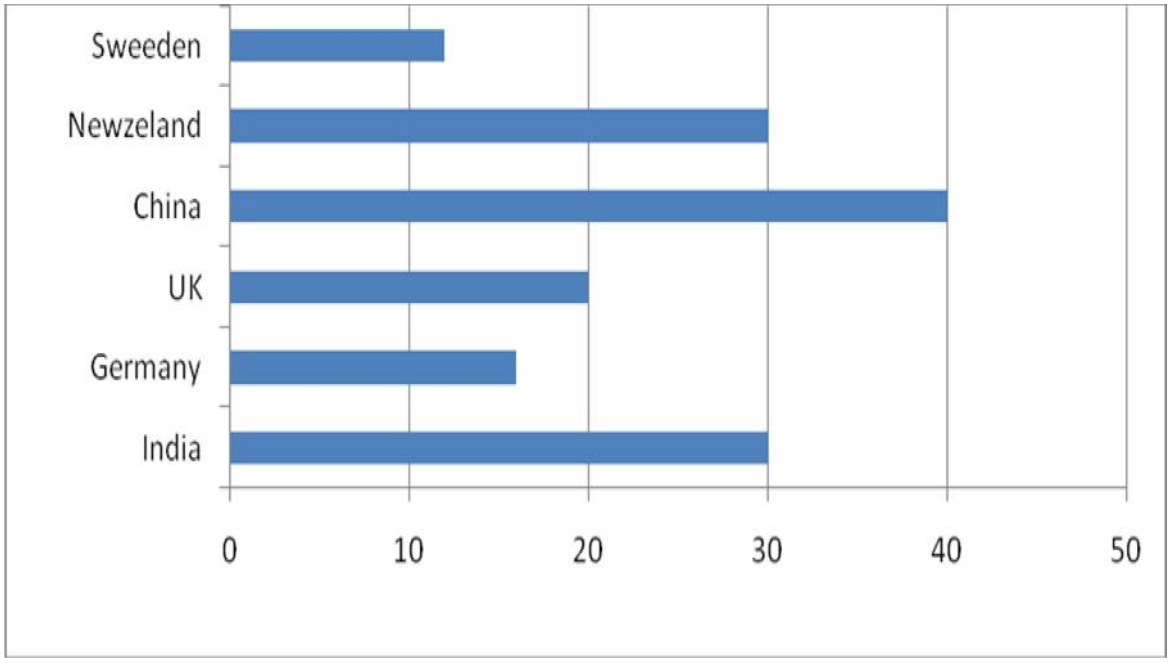
Country	Birth Rate
India	30
Germany	16
UK	20
China	40
Newzeland	30
Sweeden	12



2. BAR CHARTS

Country	Birth Rate
India	30
Germany	16
UK	20
China	40
Newzeland	30
Sweeden	12

The bar graph is a common type of graph which consists of parallel bars or rectangles with lengths that are equal to the quantities that occur in a given data set. The bars can be presented vertically or horizontally to show the contrast and record information. Bar graphs are used for plotting discontinuous (discrete) data. Discrete data contains discrete values and are not continuous.



Histogram

A histogram is a graph of frequency distributions. It is a set of vertical bars whose are proportional to the frequencies. While constructing histogram, the variable is always taken on the x- axis and the frequencies on y-axis.

Frequency Polygon

The frequency polygon is a graph of frequency distribution. Here we draw histogram of the data and then join by straight line and mid points of upper horizontal sides of these bars. Join both ends of the frequency polygon with the x- Axis.

Frequency Curves

A continuous frequency distribution can be represented by a smoothed curve known as Frequency curves

Ogive or Cumulative Frequency Curve

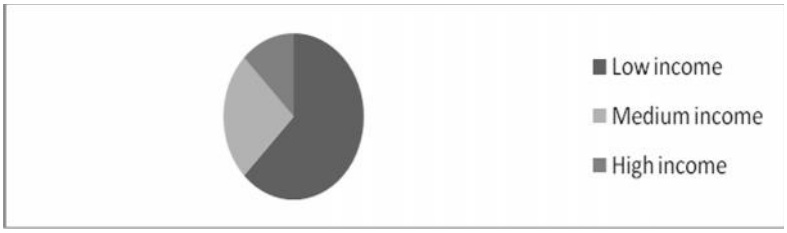
A frequency distribution can be cumulated in two ways, less than cumulative series and more than cumulative series. Smoothed frequency curves drawn for these two cumulative series are called cumulative frequency curves or ogives.

- **Less than ogive curve:** In less than ogive curve the upper limit per limit of each class interval is taken on x- axis in increasing order. For each such upper limit on x-axis, the cumulative frequency of all the class intervals from the first class interval to last class interval are taken on the y-axis.
- **More than ogive curve:** In more than ogive curve the lower limit of each class interval is taken on x- axis in increasing order. For each such lower limit on x- axis the cumulative frequency of all the class interval from that class interval to the last class interval are taken on y-axis.

3. Circle Charts or Pie Diagram

A pie graph is a circle divided into sections which each display the size of a relative piece of information. Each section of the graph comes together to form a whole. In a pie graph, the length of each sector is proportional to the percentage it represents. Pie graphs work particularly well when each slice of the pie represents 25 to 50 percent of the given data.

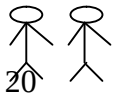
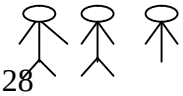
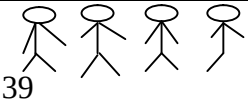
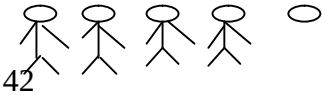
Income category	Percentage
Low income	62.5
Medium income	25.0
High income	12.5



The pie chart shows that 62.5% belong to low income group,25% to middle income group and 12.5%to high income group.

4.Pictograms

A pictogram, also called a pictogram or pictograph, is an ideogram that conveys its meaning through its pictorial resemblance to a physical object. Pictographs are often used in writing and graphic systems in which the characters are to a considerable extent pictorial in appearance. Pictography is a form of writing which uses representational, pictorial drawings. It is a basis of cuneiform and, to some extent, hieroglyphic writing, which also uses drawings as phonetic letters or determinative rhymes.

Kerala	 20
Karnataka	 28
Tamil Nadu	 39
Andhra Pradesh	 42

ANALYSIS OF DATA

Analysis of data is considered to be highly skilled and technical job which should be carried out .Only by the researcher himself or under his close supervision. Analysis of data means critical examination of the data for studying the characteristics of the object under study and for determining the patterns of relationship among the variables relating to it's using both quantitative and qualitative methods.

Purpose of Analysis

Statistical analysis of data saves several major purposes.

1. It summarizes large mass of data in to understandable and meaningful form.
2. It makes descriptions to be exact.
3. It aids the drawing of reliable inferences from observational data.
4. It facilitates identification of the casual factors unde3rlyiong complex phenomena
5. It helps making estimations or generalizations from the results of sample surveys.
6. Inferential analysis is useful for assessing the significance of specific sample results under assumed population conditions.

Steps in Analysis

Different steps in research analysis consist of the following.

1. The first step involves construction of statistical distributions and calculation of simple measures like averages, percentages, etc.
2. The second step is to compare two or more distributions or two or more subgroups within a distribution.
3. Third step is to study the nature of relationships among variables.
4. Next step is to find out the factors which affect the relationship between a set of variables
5. Testing the validity of inferences drawn from sample survey by using parametric tests of significance.

Types of Analysis

Statistical analysis may broadly classified as descriptive analysis and inferential analysis

Descriptive Analysis

Descriptive statistics are used to describe the basic features of the data in a study. They provide simple summaries about the sample and the measures. Descriptive statistics is the discipline of quantitatively describing the main features of a collection of data or the quantitative description itself. In such analysis there are univariate analysis bivariate analysis and multivariate analysis.

- **Univariate analysis**
- Univariate analysis involves describing the distribution of a single variable, including its central tendency (including the mean, median, and mode) and dispersion (including the range and quartiles of the data-set, and measures of spread such as the variance and standard deviation). The shape of the distribution may also be described via indices such as skewness and kurtosis. Characteristics of a variable's distribution may also be depicted in graphical or tabular format, including histograms and stem-and-leaf display.
- **Bivariate analysis**
- Bivariate analysis is one of the simplest forms of the quantitative (statistical) analysis. It involves the analysis of two variables (often denoted as *X*, *Y*), for the purpose of determining the empirical relationship between them. Common forms of bivariate analysis involve creating a percentage table or a scatter plot graph and computing a simple correlation coefficient
- **Multivariate analysis.**
- In multivariate analysis multiple relations between multiple variables are examined simultaneously. Multivariate analysis (MVA) is based on the statistical principle of multivariate statistics, which involves observation and analysis of more than one statistical outcome variable at a time. In design and analysis, the technique is used to perform trade studies across multiple dimensions while taking into account the effects of all variables on the responses of interest

Inferential Analysis

Inferential statistics is concerned with making predictions or inferences about a population from observations and analyses of a sample. That is, we can take the results of an analysis using a sample and can generalize it to the larger population that the sample represents. Ther are two areas of statistical inferences (a) statistiacal estimation and (b) the testing of hypothesis.

Tools and Statistical Methods For Analysis

The tools and technique of statistics can be studied under two divisions of statistics.

(A)Descriptive Statistics

In descriptive statistics we develop certain indices and measures of raw data. They are;

1. Measures of Central Tendency
2. Measures of Dispersion
3. Measures of skeweness and kurtosis
4. Measures of correlation
5. Regression analysis
6. Index numbers
7. Time series analysis
8. Coefficient of association

1. Measures of Central Tendency.

The central tendency of a distribution is an estimate of the "center" of a distribution of values. There are different types of estimates of central tendency such as mean, median, mode, geometric mean, and harmonic mean.

2. Measures of Dispersion.

Dispersion refers to the spread of the values around the central tendency. There are two common measures of dispersion, the range and the standard deviation. It can be used to compare the variability in two statistical series

3. Measures of skewness and kurtosis

A fundamental task in many statistical analyses is to characterize the *location* and *variability* of a data set. A further characterization of the data includes skewness and kurtosis. Skewness is a measure of symmetry, or more precisely, the lack of symmetry. A distribution, or data set, is symmetric if it looks the same to the left and right of the center point. Kurtosis is a measure of whether the data are peaked or flat relative to a normal distribution. That is, data sets with high kurtosis tend to have a distinct peak near the mean, decline rather rapidly, and have heavy tails.

4. Measures of correlation

Correlation refers to any of a broad class of statistical relationships involving dependence. When there are two variables, the correlation between them is called simple correlation. When there are more than two variables and we want to study relation between two of them only, treating the others as constant, the relation is called partial correlation. When there are more than two variables and we want to study relation of one variable with all other variables together, the relation is called multiple correlations.

5. Regression analysis

Regression analysis is a statistical process for estimating the relationships among variables. It includes many techniques for modeling and analyzing several variables, when the focus is on the relationship between a dependent variable and one or more independent variables.

6. Index numbers

An **index** is a statistical measure of changes in a representative group of individual data points. Index numbers are designed to measure the magnitude of economic changes over time. Because they work in a similar way to percentages they make such changes easier to compare.

7. Time series analysis

A time series is a sequence of data points, measured typically at successive points in time spaced at uniform time intervals. Time series analysis comprises methods for analyzing time series data in order to extract meaningful statistics and other characteristics of the data./

8. Coefficient of association

Coefficient of association like, Yule's coefficient, measures the extent of association between two attributes.

(B) Inferential Statistics

Inferential statistics deals with forecasting, estimating or judging some results of the universe based on some units selected from the universe. This process is called Sampling. It facilitates estimation of some population values known as parameters. It also deals with testing of hypothesis to determine with what validity the conclusions are drawn.

Ratios, percentages and averages

In statistical analysis Ratios, percentages and weighted averages play a very important role. Ratios show the relation of one figure to another. For example, if the total number of students in a school is 2000, and total number of teachers if\s 250, then the ratio between teachers and students is 250:2000. To make it percentage, multiply by 100.

Measures of central tendency (averages)

An average is a single significant figure which sums up characteristic of a group of figures. The various measures of central tendency are;

(1) Arithmetic mean

(2) Median

(3) Mode

(4) Geometric mean

(5) Harmonic mean

Arithmetic Mean

The Mean or average is probably the most commonly used method of describing central tendency. To compute the mean all you do is add up all the values and divide by the number of value.

Arithmetic mean = $\bar{X} = \frac{\sum x}{n}$

Where x stands for an observed value,

n stands for the number of observations in the data set

$\sum x$ stands for all observed x values, and

$\bar{X}$ stands for the mean value of x

For example, consider the test score values:

15, 20, 21, 20, 36, 15, 25, 15

The sum of these 8 values is 167, so the mean is 167/8 = 20.875.

Ex. 1 calculate mean from the following data

Value: 5 15 25 35 45 55 65 75

Freq: 1 20 25 24 12 31 71 52

Values	frequency	Fx
5	15	75
15	20	300
25	25	625
65	24	840
45	12	540
55	31	1705
65	71	4615
75	52	3900
	250	12600

Arithmetic mean = $\bar{X} = \frac{\Sigma x}{n}$ ==12600/250=50.4

Ex. 2 calculate mean from the following data

Age	:	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80
No of Persons dying	:	15	30	53	75	100	110	115	125

SOLUTION:

age	f	Mid value(x)	fx
0-10	15	5	75
10-20	30	15	450
20-30	53	25	1325
30-40	75	35	2625
40-50	100	45	4500
50-60	110	55	6050
60-70	115	65	7475
70-80	125	75	9375
	623		31875

Arithmetic mean = $\bar{X} = \frac{\Sigma x}{n}$ = 31875/623 =51.16 years

Median

The Median is the score found at the exact middle of the set of values. One way to compute the median is to list all scores in numerical order, and then locate the score in the center of the sample.

For example, if there are 500 scores in the list, score #250 would be the median. It is also, called **{(n + 1) ÷ 2}th value**, where **n** is the number of values in a set of data.

Example

Imagine that a top running athlete in a typical 200-metre training session runs in the following times:

26.1, 25.6, 25.7, 25.2 et 25.0 seconds.

First, the values are put in ascending order: 25.0, 25.2, 25.6, 25.7, and 26.1. Then, using the following formula, figure out which value is the middle value. Remember that n represents the number of values in the data set.

Median= {(n+1) ÷2} th value = (5+1) ÷ 2 = 3

The third value in the data set will be the median. Since 25.6 is the third value, 25.6 seconds would be the median time.

= 25.6 secondes

Example

Now, if the runner sprints the sixth 200-metre race in 24.7 seconds, what is the median value now?

Again, you first put the data in ascending order: 24.7, 25.0, 25.2, 25.6, 25.7, 26.1. Then, you use the same formula to calculate the median time.

Median={(n+1)÷2}th value
(6+1)÷2
7÷2
= 3,5

Since there is an even number of observations in this data set, there is no longer a distinct middle value. The median is the 3.5th value in the data set meaning that it lies between the third and fourth values. Thus, the median is calculated by averaging the two middle values of 25.2 and 25.6. Use the formula below to get the average value.

Average=(value below median + value above median)÷2
=(third value + fourth value)÷2
=25.2+25.6)÷2
=50.82
= 25.4

The value 25.4 falls directly between the third and fourth values in this data set, so 25.4 seconds would be the median

The various steps in the computations of median in a discrete series are as follows:

(i) Arrange the values in ascending or descending order of magnitude.

(ii) Find out the cumulative frequencies.

(iii) Find out the middle item by the formula N + 1/ 2

(iv) Now find out the value of $(N + 1/2)^{th}$ item. It can be found by first locating the cumulative frequency which is equal to or $(N + 1/2)$ next higher to it, and then determining the value corresponding to it. This will be the value of the median.

Finding the Value of Median

Find out the value of median from the following data

Daily wages	10	5	7	11	8
Number of Workers	15	20	15	18	12

.

Solution: **Calculation of median**

Wages in ascending order	Number of persons (f)	Cumulative Frequency (c.f.)
5	20	20
7	15	35
8	12	47
10	15	62
11	18	80

Median is the value of $(N+1)/2)^{th}$ or $((80+1)/2)^{th}$ or 40.5th item.

All items from 35 onwards up to 47 have a value of 8. Thus the median value would be 8.

In the case of continuous frequency distribution, median class corresponds to the cumulative frequency which includes N/2. After getting median class find median by using the following interpolation formula.

Median, $m = L_1 + [(N/2 – CF) / f]C$

L_1 means lower boundary of the median class

N means sum of frequencies

CF means cumulative frequency before the median class. Meaning that

the class before the median class what is the frequency

f means frequency of the median class

C means the size of the median class

Find out the value of median from the following data

Class : 0-10 10-20 20-30 30-40 40-50 50-60 60-70

Frequency: 8 12 20 23 18 7 2

Class	Frequency	Cumulative frequency	
0-10	8	8	
10-20	12	20	
20-30	20	40	
30-40	23	63	n/2
40-50	18	81	
50-60	7	88	
60-70	2	90	
	90		

Median=$(N/2)^{th}$ item= size of$(90/2)^{th}$ item= size of 45^{th} item

45 is included in the cumulative frequency 63. The class having cf 63 is 30-40

Therefore 30-40 is the median class

Applying interpolation formula

Median, $m = L_1 + [(N/2 – CF) / f]C$

Here L_1=30, N/2=45, cf=40, f=23, c=10

Median, = 30 + [(45 – 40) / 23]10 =30+50/23 = 32.17

Mode

Mode is the value of the item of a series which occurs most frequently. According to Kenny 'the value of the variable which occurs most frequently in a distribution is called a mode".

In the case of individual series, the value which occurs more number of times is mode. For example, a set of students of a class report the following number of video movies they see in a month.

No of movies: 10,15,20,15,15,8

Mostly the students see 15 movies in a month. Therefore mode=15

When no item appears more number of items than others we say mode is ill defined. In that case, mode is obtained by the formula, mode= 3median-2mean

Ex: find mode from the values 40, 25, 60, 35, 81, 75, 90, 10

Ans: all items appear equal number of items. So mode is ill defined.

Therefore, mode= 3median-2mean

Mean= $\bar{X} = \frac{\Sigma x}{n}$

416/8=52

Median= {(n + 1) ÷ 2}th value

=size of c4.5th item= (40+60) / 2 =50

Mode= 3median-2mean

= (3*50)-(2*52)= 150-104=46

In the case of disrete frequency distribution, the value having highest frequency is taken as mode

Ex: find mode

Size : 5 8 10 12 29 35 40 46

No of items: 3 12 25 40 31 20 18 7

Ans: the value 12 has the highest frequency. Therefore 12 is the mode.

In the case of continuous frequency distribution, mode lies in the class having highest frequency. From the model class, mode is calculated using interpolation formula.

Mode= $L_1 + [(f_1-f_0) c]/2f_1-f_0-f_2$

Where, $L_1$is the lower limit of model class. $f_0$and f_2 are respectively the frequencies of class just preceding and succeeding model class, f_1 is the frequency of the model class.

Ex: calculate mode from the following data.

Size: 10-15 15-20 20-25 25-30 30-35 35-40 40-45 45-50

Freq: 4 8 18 30 20 10 5 2

Ans: Modal class is 25-30 since it has highest frequency.

Mode= $L_1 + [(f_1-f_0) c]/2f_1-f_0-f_2$

= 25 + [(30-18) 5]/260-18-20 =25+60/22 =27.73

Index Numbers

Index numbers are designed to measure the magnitude of economic changes over time. A statistic which assigns a single number to several individual statistics in order to quantify trends. Index numbers are the indicators of the various trends in an economy. Price index numbers indicate the position of prices whether they are rising or falling and at what rate. Similarly, index numbers regarding agricultural production indicates the trend of change whether it is rising or falling at what rate over a period of time. An index number is an economic data figure reflecting price or quantity compared with a standard or base value. The base usually equals 100 and the index number is usually expressed as 100 times the ratio to the base value. For example, if a commodity costs twice as much in 1970 as it did in 1960, its index number would be 200 relative to 1960. Index numbers are used especially to compare business activity, the cost of living, and employment.

An index number is specialized average. Index numbers may be simple or weighted depending on whether we assign equal importance to every commodities or different importance to different commodities according to the percentage of income spent on them or on the basis of some other criteria. In this chapter, we shall discuss both simple and weighted index numbers.

Simple and weighted index numbers

Simple index numbers are those in the calculation of which all the items are treated as equally important. Here items are not given any weight. Weighted index numbers are those in the those in the calculation of which each item is assigned a particular weight.

Price Index Numbers

Price index numbers measure changes in the price of a commodity for a given period in comparison with another period.

Various methods used for construction of Price index numbers

1) Simple Aggressive Method

This is the simplest method. The prices for base year and current year are only required. The aggregate of current year price is divided by aggregate of base year price and multiplied by 100.

i.e. $\sum p_1 \div \sum p_0 * 100$ where, p_1 is the aggregate of price in the current year and p_0 is the aggregate no of prices in the base year.

Ex: for the data given below calculate simple index number

Commodities:	A	B	C	D	E
Price in 2008	5	8	12	25	3
Price in 2010	7	9	15	24	4

Ans: we take 2008 as base year and 2010 as current year, since 2008 is the back period

Commodities	Price in 2008(p_1)	Price in 2010 (p_0)
A	5	7
B	8	9
C	12	15
D	25	24
E	3	4
	53	59

Simple index number =$\sum p_1 \div \sum p_0$ *100 =59/53*100 = 111.3

2) Simple Average Relative Method

In this method, price relative for each item is found out.

Price relative is 1= current year price ÷ base year price * 100

The average of these relatives is found out. ie price index number =$\sum$ I/n

Ex: for the data given below calculate simple index number by average relative method

Items : 1 2 3 4 5

Price in base year : 5 10 15 20 8

price in current year : 7 12 25 18 9

Items	price in base year	price in current year	I==$\sum p_1 \div \sum p_0$ *100
1	5	7	140.0
2	10	12	120.0
3	15	25	166.7
4	20	18	90.0
5	8	9	112.5
			629.2

Simple index number=$\sum$ I/n = 629.2/5 = 125.84

3) weighted aggressive method

in this method weights are assigned to each item. The two well known methods used for assigning weights are known as Laspeyer's method and Paasche's method.

Laspeyer's method: base year quantity is taken as weight.

Laspeyer's index number = $\sum p_1q_0 / \sum p_0q_0 * 100$

Paasche's method. : current year quantity is taken as weight.

Paasche's index number = $\sum p_1q_1 / \sum p_0q_1 * 100$

Prof. Irving Fisher has suggested a formula for the construction of index numbers.

Fisher's index number = $\sqrt{\frac{\sum p_1q_0}{\sum p_0q_0} \times \frac{\sum p_1q_1}{\sum p_0q_1}}$

Ex: calculate (i) Laspeyer's (ii) Paasche's (iii) Fisher's index numbers from the following data.

Commodity	price		quantity assumed	
	2009	2010	2009	2010
A	0.80	0.70	10	11.0
B	0.85	0.90	8	9.0
C	1.30	0.80	5	5.5

Commodity	p_0	p_1	q_0	q_1	p_1q_1	p_0q_1	p_1q_0	p_0q_0
A	0.80	0.70	10	11	7.7	8.80	7.0	8.00
B	0.85	0.90	8	9	8.1	7.65	7.2	6.8
C	1.30	0.80	5	5.5	4.4	7.15	4.0	6.5
					202	23.6	18.2	21.3

Laspeyer's index number = $\sum p_1q_0 / \sum p_0q_0 * 100$

$= (18.2/21.3)*100 = 85.45$

Paasche's index number = $\sum p_1q_1 / \sum p_0q_1 * 100$

$= (20.2/23.6)*100 = 85.59$

Fisher's index number = $\sqrt{\frac{\sum p_1q_0}{\sum p_0q_0} \times \frac{\sum p_1q_1}{\sum p_0q_1}}$

$$\sqrt{\frac{18.2}{21.3} \times \frac{20.2}{23.6}} = 85.5$$

4) Weighted Average Of Price Relative Method

In this method, we are using some arbitrary numbers as weight.

The formula is ∑IV/∑V where, 'V 'is the weight and I=**$(p_1/ p_0)*100$**

Calculate index number of price for 2009 on the basis of 2008

Commodity	weight	price (2008)	price(2009)
A	40	16	20
B	25	40	60
C	5	2	2
D	20	5	6
E	10	2	1

Ans:

Commodity	V	P_0	P_1	I	IV
A	40	16	20	125	5000
B	25	40	60	150	3750
C	5	2	2	100	500
D	20	5	6	120	2400
E	10	2	1	50	500
	100				12150

Index number for 2009 = ∑IV/∑V = 12150/100 = 121.5

Interpretation

Interpretation refers to the technique of drawing inference from the collected facts and explaining the significance of those inferences after an analytical and experimental study. It is a search for broader and more abstract means of the research findings. If the interpretation is not done very carefully, misleading conclusions may be drawn. The interpreter must be creative of ideas he should be free from bias and prejudice.

Fundamental principles of interpretation

1. Sound interpretation involves willingness on the part of the interpreter to see what is in the data.
2. Sound interpretation requires that the interpreter knows something more than the mere figures.
3. Sound interpretation demands logical thinking.
4. Clear and simple language is necessary for communicating the interpretation

Need for interpretation (importance of interpretation.)

1. It is through interpretation that the interpreter is able to know the abstract principles lying in his conclusions.
2. On the basis of the principles underlying his findings, a researcher can make various predictions about the various other events which are unrelated to his area of findings.
3. Interpretation leads to the establishment of explaining concepts.
4. A researcher can appreciate only through interpretation, why his findings are and what they are.
5. The interpretation of the findings of exploratory research study usually results in to hypothesis for experimental research.

Steps involved in the technique of interpretation

1. Researcher must give reasonable explanations of the relations he have found. He must be able to see uniformity in diversified research findings so that generalization of findings is possible.
2. If any extraneous information is collected during the study, it must be considered while interpreting the final result of research study.
3. The researcher can consult with those having insight in to the study who can point out the omission and errors in logical arguments.
4. The researcher must consider all relevant factors affecting the problem at the time of interpretation.
5. The conclusions appearing correct at the beginning may prove to be inaccurate later. So researcher must not be in a hurry while interpreting.

Errors of interpretation

The errors of interpretation can be classified into two groups.

1. Errors due to false generalizations

Errors occur when (i) unwarranted conclusions are drawn from the facts available. (ii) Drawing conclusions from an argument running from effect to cause. (iii) Comparing between two sets of data with unequal base. (iv) Conclusions are drawn from data irrelevant to the problem. (v) False generalizations and faulty statistical methods are made.

2. Errors due to misuse of statistical measures

When (i) conclusions are based on what is true, on an average. (ii) Percentages are used for comparisons, when total numbers are different. (iii) Index numbers are used without proper care. (iv) Casual correlation is used as real correlation.

CHAPTER-6

RESEARCH REPORT

A report is a detailed description of what has been done and how it has been done with respect to a particular area or topic. The purpose of the written report is to present the results of your research, but more importantly to provide a persuasive argument to readers of what you have found. It is the end product of a research activity. It is highly skilled work it is the final stage of the research work.

Need For Research Report

- The aim of research is the search for knowledge.
- A research report is needed to evolve a theory or a principle.
- Reporting is a process through which a basic ground is prepared for exchange of ideas or thoughts.
- Reporting helps the researcher to make specific recommendation for course of action.
- The research ability of a candidate is revealed through the final report he presents.
- A research report is highly useful for policy formulators, practitioners, general public and others.

Functions of Research Report

- Research report serves as a means for presenting the problem studied, methods and techniques used, findings, conclusions and recommendation in an organised manner.
- It serves as a reference material for future use in the same or related area.
- It serves as a means for judging the quality of the research project.
- It is a means for evaluating research ability.
- It provides systematic knowledge on problems and issues analysed.

Qualities of a Good Report

- Clarity
- Continuity
- Consistency
- Brevity
- Readability
- Interest and Appeal
- Judicious Selection of Materials
- Avoiding personal opinion
- Concentrate on Central Ideas
- Proper Reference

Steps in Report Writing

They are to be completed through a number of steps.

- Plan the project in advance; fix the target and final date of completing the report.
- The time of report writing should be planned in advance.
- Arrange the data, documents, bibliography etc. in conformity with the structure of the report.
- The outline should be based on all main points and sub points.
- Prepare a rough report of what one has done in his studies. He has to write down the procedure adopted by him in collecting the material, the technique or analysis adopted by him, the broad findings and generalizations and his suggestions.
- Keep the rough report for few days for careful reading and then revising it on the basis of thinking and discussing with others. it is appropriate to get help of some experienced and knowledgeable person at this stage.
- Rewrite the report on the basis of the revision made and corrections effected on the report.
- Prepare final bibliography. Bibliography may contain two parts, first containing name of the books and pamphlets, second containing the names of magazines and newspaper articles.
- The last step in report writing is the writing of a final draft of the report. The final draft should be written in a concise and objective style and in simple language.

Parts/Components Of A Research Report

1. Prefatory Items
2. Introductory Part
3. Body/Text/Content/Results of the Work
4. Concluding Part/End Items/Terminal Items

I Prefatory Items

1. Title Page
2. Researcher's Declaration
3. Certificate of the Research Guide (and Head of the Dept. in the case of Project)
4. Acknowledgements
5. Contents
6. List of Abbreviations
7. List of Tables
8. List of Figures
9. List of Appendices/Appendixes

Title Page

The contents of Title Page

- The title of the research study
- The name of the faculty/subject
- Institution to which the report is to be submitted
- The degree for which report is to be submitted
- The name of the researcher
- The name of the supervising teacher & his address
- The month & Year of submission of the Report

These items are centered between the margin of the page and no terminal punctuation is used.

Researcher's Declaration

The researcher has to declare that it is a bonafide Research work done by him/her and that no part of the Thesis/Dissertation is presented for the award of any degree, diploma, associateship, fellowship or other similar title before.

Certificate of the Research Guide

The Guide has to state that the thesis is a record of bonafide research work carried out by the researcher under his supervision and no part of the thesis is submitted for any degree, diploma, associateship, fellowship or other similar title before. He/she is permitted to submit the thesis.

Acknowledgements

- This page is largely a matter of courtesy
- The researcher acknowledges the following persons/Institutions for the assistance

  - Guide
  - Other academicians and Professionals who rendered assistance
  - Authorities of Libraries
  - Respondents of questionnaire/Schedule
  - Persons from administrative assistance is received
  - Any other individuals who assisted in the research work.

Contents

- This page gives the readers a bird's eye-view of the Report
- It enables the reader to locate quickly each section of it.
- It includes the chapter headings, major sub divisions of the chapters
- All the titles of Chapters appear in the exact words.
- Correct page number is shown against the title.

List of Abbreviations

In this page the list of Abbreviations used in the Thesis is presented in the alphabetical order. Examples

1. ICSSR - Indian Council of Social Science Research
2. MLA - Modern Language Association of America.
3. KAU - Kerala Agricultural UniversityKSFE
4. KSFE - Kerala State Financial Enterprises Ltd
5. KSIDC - Kerala State Industrial Development Corporation
6. KSRTC - Kerala State Road Transport Corporation

List of Tables and Figures

In this Page a list of Tables and Figures, if any, is shown.The full titles of Tables & Figures as shown in the text are shown with corresponding Page numbers. Examples

List of Appendixes/Appendices

- In this page a list of appendixes given at the end of the Thesis/Dissertation is shown.
- Examples

II. Introductory Part

1. Introduction A brief explanation of the beginning of the problem
2. Statement of the Research Problem
3. Significance of the Study
4. Review of Previous Studies
5. Scope and Area of the Study
6. Objectives of the Study
7. Hypotheses to be tested
8. Operational Definitions of Concepts
9. Methodology and Data Base
    - Type of Method of Study Eg., Descriptive, Analytical
    - Secondary Data – Sources
    - Primary Data - Sources
    - Sampling

1. Define the Population Method
2. Identify the sample frame
3. Specify the sampling Units
4. Specify the sampling method
5. Determine the sample size
6. Specify the sampling plan
7. Select the final sample

- Tools for Data Collection
  - Interview Schedule
  - Questionnaire
  - Observation
- Method adopted for the analysis of the Data
- Period of Reference/study
- Tools for the analysis- Mathematical and Statistical
- Scheme of Presentation of the Study
- Time Frame and Resource Requirements
- Limitations of the Study

III. Body/Text/Results of The Work

- Designing of chapters based on the objectives of the Study
- Use of Tables/Graphs/Diagrams for effective representation - Title, Source etc
- Presentation style – Simple & Lucid Style with the help of apt Mathematical & Statistical Tools.
- Testing of Hypotheses

Objectives of the Study

The main objective of the present investigation is to conduct an in-depth analysis on the HRM practices of the Public Sector Financial Enterprise (ie.,KSFE) in comparison with that of financial enterprises operating in the private sector in the State of Kerala. To achieve this main objective, the following specific objectives have been set forth.

1. To study the training practices of the KSFE.

2. To assess the extent of satisfaction of the employees of the KSFE in respect of their compensation.

3. To examine the quality of work life of the employees of the KSFE and the Private Sector Financial Enterprises.

4. To evaluate the job satisfaction of the employees of KSFE and Private Sector Financial Enterprises and

5. To analyze the industrial relations of the KSFE and the Private Sector Financial Enterprises.

Designing of chapters based on the objectives of the Study-

Chapter Titles

1. Training
2. Compensation
3. Quality of Work Life
4. Job Satisfaction
5. Industrial Relations

Hypothesis -example

In line with the objective stated above, the following hypotheses were developed and tested.

1. There is no significant difference among the three levels of employees of the KSFE in respect of the training practices imparted.
2. There is significant difference among the employees at the three levels of KSFE in respect of their compensation for the services.
3. In respect of quality of work life, the employees of KSFE are more satisfied compared to that of PSFE.
4. The job satisfaction of the employees of KSFE is better than that of PSFE.
5. The industrial relation in the KSFE is better in comparison with PSFE.

Testing of Hypothesis No. 4

In order to evaluate the level of satisfaction of the employees of KSFE in comparison with PSFE towards their job and job related aspects, 20 variables have been identified and analyzed. The analysis reveals that in case of 16 variables the performance of employees of KSFE is found better compared to that of PSFE. Of these 16 variables, statistically significant difference is seen in case of 13 variables. The performance of PSFE is found better in case of only 4 variables ie., communication system, support and co-operation from subordinates, toilet and bathroom facilities and hygiene. Significant variation is observed in respect of 3 variables. Thus, it is clear that the level of satisfaction of the employees of KSFE is significantly better compared to that of PSFE employees. Therefore, the fourth hypothesis that the job satisfaction of the employees of KSFE is better than that of PSFE stands accepted.

Testing of Hypothesis No. 5

In order to conduct a comparative study on the industrial relations of KSFE and PSFE a total of 10 variables have been identified and analysed. These variables are -

1. Relationship between management and employees
2. Method adopted for maintaining discipline
3. Attitude of the management in settling grievances of employees
4. Grievance Redressal cell
5. System of handling grievances of employees
6. Approach of management towards indiscipline
7. Response of the management in initiating corrective action
8. Participation of employees in the management of organization.
9. Regularity in the convening of staff meetings
10. Information sharing in the working of the organization.

Out of these 10 variables analyzed, the performance of KSFE is found better in the case of all the 10 variables. Moreover, out of the 10 variables subjected to statistical test, significant difference is witnessed in the case of 9 variables. Thus it is clear that the industrial relations existing in the KSFE is better compared to that of the PSFE. Therefore, the discussion on the industrial relations can be concluded by accepting the last hypothesis that industrial relations in the KSFE is better than that of the PSFE.

Iv. Concluding Part / End Items/Terminal Items

- ✓ Re-caption of the Work Done
- ✓ Summary of Chapters
- ✓ Findings
- ✓ Conclusions
- ✓ Recommendations/Suggestions
- ✓ Scope for further studies
- ✓ Appendices/Appendixes
- ✓ Bibliography

Re caption of the work done

Human Resources are one of the vital ingredients for the successful functioning of every enterprise. Management of Human Resources is a dynamic and challenging function. The quality of human resources can be ensured only through effective Human Resource Management. This

research work is an attempt to study the Human Resource Management practices of the Kerala State Financial Enterprises Ltd. in comparison with that of the Private Sector Financial Enterprises in Kerala.

In the State of Kerala from the very beginning chit business were under the control of registered non-banking companies in the private sector. These chit companies exploited the small income groups and failed to cater the financial needs of lower and middle level people of the State. Under these circumstances, the Govt. of Kerala formed an agency in the public sector by name the Kerala State Financial Enterprises Ltd. (KSFE) in the year 1969. The main objective behind the establishment of the KSFE Ltd. was to release the common man from the clutches of the unscrupulous private chit groups. Currently, KSFE is the dominant foremen in the chit business in the State. However, the KSFE failed to achieve its avowed objectives due to the deficiency in HRM. The KSFE paid little care to human resources and in equipping them to withstand the challenges of the current environment. The company failed to impart adequate and regular training to its employees. The employees are not satisfied with compensation and they work without job satisfaction. The employees enjoy only poor quality of work life. Moreover, the industrial relation is not a cordial one but a strained one. Thus, HRM is still a neglected area in the KSFE.

This lapse of the KSFE in the area of HRM provided ample scope for Financial Enterprises functioning in the private sector to register a success in the HRM related aspects and to achieve a remarkable progress in their business initiatives. In this background, an investigation on the HRM of the KSFE with that of private sector financial enterprises in Kerala is quite relevant and useful. The present study seeks to fulfill this. The specific objectives of the present study are recapitulated below:

1. To study the training practices of the KSFE.

2. To assess the extent of satisfaction of the employees of the KSFE in respect of compensation.
3. To examine the quality of work life of the employees of the KSFE and private sector financial enterprises.

4. To evaluate the job satisfaction of the employees of the KSFE and the private sector financial enterprises.

5. To analyze the industrial relations of the KSFE and the private sector financial enterprises.

The Design and Methodology

This is an empirical study based on the survey method. Data have been collected from both primary and secondary sources. The primary data have been collected from the employees of the KSFE and private sector financial enterprises with the help of a pre-tested interview schedule and through discussions. The selection of the sample employees of the KSFE and PSFE has been done by following simple random sampling method. A total of 600 sample employees, consisting of 400 employees from the KSFE and 200 employees from the PSFE has been selected for the intensive study. The secondary data have been collected from the published and unpublished reports, office

records, Memorandum of Association, Articles of Association etc of KSFE Ltd., unpublished reports and records of the PSFE published and unpublished research dissertations in the field, books, periodicals, journals, magazines, and websites of the KSFE and PSFE.

The review of training practices of the KSFE has been done by analyzing various practices adopted by the KSFE for imparting training to the employees at the three levels. The assessment of the satisfaction of employees of KSFE towards their compensation has been done with the help of selected variables for the purpose. For conducting a comparative study on the quality of work life of the employees of KSFE and PSFE, the important variables affecting the QWL have been identified and analysed. The comparative analysis of job satisfaction and industrial relations has been done with the help of selected variables affecting these factors in both the KSFE and PSFE. Mathematical tools like averages and percentages and statistical tools like standard deviation, Chi-square test, 'F' test, 'Z' test, have been suitably employed for the analysis.

The present chapter is devoted to summaries the important findings of the preceding chapters, conclusions drawn from the study and recommendations made on the basis of the findings and conclusions. For the purpose of discussion, the chapter is divided into three sections. Section A contains summary of the entire study and its findings at a glance. Section B contains conclusions and section C presents recommendations and scope for future research in the field

Smmary of Chapters

- The first chapter presents the introduction and methodological design of the research.
- The second chapter deals with the literature and related studies on different aspects of HRM and KSFE.
- In the third chapter an overview of KSFE and HRM has been done in detail.
  In the fourth chapter the training practices followed by the KSFE are discussed.
- In the fifth chapter an attempt has been made to assess the level of satisfaction of the employees of KSFE in respect of their compensation.
- In the sixth chapter a comparative review on the level of satisfaction of the employees of KSFE and PSFE in respect of QWL has been done.
- In the seventh chapter an attempt has been made to analyze the job satisfaction of the employees of KSFE and PSFE on a comparative fashion.
- Eight chapters conduct a comparative evaluation on the industrial relations of KSFE and PSFE.
- In the present chapter the major findings of the study, conclusions and recommendations and scope for future research in the field have been presented.

Scope for Further Research

On the basis of the present investigation, the following topics are found relevant for further research studies in the field.

1. A Study on employee engagement and commitment in the KSFE.
2. Customer Satisfaction on the services of the KSFE and the Private Sector Financial Enterprises – A Comparative Study.
3. Marketing Practices of the Kerala State Financial Enterprises Ltd.
4. Role of the Kerala State Financial Enterprises Ltd in mobilizing the savings of the household sector in Kerala.

Bibliography

- ✓ Books
- ✓ Reports and other Official Publications
- ✓ Journals and Periodicals
- ✓ Research Dissertations., PhD, M.Phil etc
- ✓ Websites/Electronic Sources
- ✓ Seminar/Conference Papers, Working Papers etc.

Style of Listing the Sources – Books

(**Surname of Author, Name, Title, Place of Publication, Publisher, Year of Publication) - Examples**

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Research Proposal/Synopsis – Contents

- Title Page
- Introduction
- Research Problem
- Objectives of the Study
- Related Previous Studies
- Research Methodology - Method of Study, sampling design, Source of Data, Tools for Collection and analysis of Data, period of reference etc.
- Time Frame work and Cost estimates
- Chapter Scheme of the Report
- Conclusion
- References

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