5th SEM BTTM

CALICUT UNIVERSITY

TOURISM RESEARCH METHODS

2019 Admission

Prepared By

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TTM5B09: Tourism Research Methodology

Lecture Hours Per Week: 4

Credits:4

Objective: The main objective of the course is to provide the methods of research and report writing in the field of tourism and travel industry. Pedagogy: A combination of Lecture, Case Study, Seminars, Assignments, Literature Study Field visits, Industry visits, and projects.

ModuleI

Fundamentals of Research: Definition of Research –Characteristics – Purpose of research–Research and Theory. Types and methods of research: Classification of Research: Pure and Applied research – Exploratory or Formularize Research – Descriptive research –Diagnostic study–Evaluation studies –Action research – Experimental research – Analytical study or Statistical method – Historical research Survey – Case study – Field Studies – Steps in Research.

ModuleII

Review of literature: Literature classification –purpose of review – sources of literature–planning the review work – note taking.

ModuleIII

Planning of Research: The planning process – selection of a problem for research - formulation of the selected problem –hypotheses: meaning – types (descriptive, relational, causal, working, null, statistical, common sense, complex and analytical Hypotheses)- Sources of hypotheses –theory observation, intuitions and personal experience –functions / role of hypotheses –characteristics–Concepts: definition characteristics–types-(concrete,abstract)

ModuleIV

Sampling :Meaning - characteristics of a good sample – sampling techniques (probability Vs non-probability) – sample unit, size and procedure sampling errors- Method of collection of data: Meaning and importance of data – sources of data – use of secondary data – methods of collecting primary data: observation, experimentation – simulation – interviewing, panel method, mail survey, projective techniques, content analysis.

ModuleV

Tools for data collection: Type of tools – construction of schedules and questionnaires– measurement scales and indices –pilot studies and pre – tests- Processing of data: Editing–classification and coding –tabulation and graphic representation. Report Writing: Introduction –types of reports – planning report –writing – research report

format – principles of writing –documentation: footnotes and bibliography. Recommended Activity Review of different research thesis related tourism subjects.

Reference:

1. Methodology of Research in Social Sciences – O.R. Krishnaswamy
2.Methodology of Research – C. R. Kothari.
3.Research Methodology - Bhattacharya.
4.Research Methodology - K. R. Sharma.
5. Methodology and Techniques of Social Research – Wilkinson and Bhandarkar.
6. Business Research Methods – Donald R. Cooper and Pamela S Schindler.
7. Quantitative techniques for Managerial Decision Making – Shenoy G. V., Srivastava U.K.andSharmaS.C.
8.Marketing Research – David A Aaker, V. Kumar &George S Day.
9. Business Statistics – David R Anderson, Dennis Sweeney & Thomas William

MODULE 1

FUNDAMENTALS OF RESEARCH

Meaning

The systematic investigation into and study of materials and sources in order to establish facts and reach new conclusions. It refers to a search for knowledge.

It is an art of scientific investigation. Research is a detailed and systematic investigation of a certain topic in order to discover information, establish facts, achieve new understanding about a topic and reach new conclusions.

Definition

According to **Earl Robert Babbie** "Research is a systematic inquiry to describe, explain, predict and control the observed phenomena. It involves inductive and deductive methods"

According to **Century Dictionary** "systematic investigation towards increasing the sum of knowledge"

Features (features of a good research)

- Objectivity
- Accuracy
- Precision
- Systematic
- Logical
- Control
- Generalizability
- Free from bias
- Reproducible

Characteristics

- Accuracy
- Reliability
- Objectivity
- Validity
- Credibility
- Generalizability
- empirical research
- systematic
- controlled factors
- logical

Objectives

- to explore
- to describe

- to diagnose
- to establish causal relationship

SOCIAL RESEARCH

- Research in social science is called social research
- Scientific investigation conducted in the field of social and behavioural sciences
- Discovering some facts concealed in a social phenomenon or some law governing it.
- Application of scientific method for understanding, studying and analysing a social life or phenomena
- To modify, correct and verify the existing the knowledge as a system

Limitations of Social Research (Difficulties in conducting Social Research)

- Social data is based on human behaviour which is highly complex and confusing
- It is very difficult to establish cause and effect relationship
- Social phenomena is dynamic (changing)
- Subject to prejudices and bias
- Social events are non-repetitive – difficult to verify
- Problem of collecting information – human beings are reluctant to disclose information

TYPES OF RESEARCH

1) Basic Research (Pure/Fundamental/ Theoretical Research)

- Original type of research
- Pure research is undertaken for the sake of knowledge without any intention to apply it into practice.
- Undertaken out of intellectual curiosity
- For e.g. Einstein's theory of relativity, Newton's contributions etc.
- Attempts to expand the limits of knowledge.
- Not directly involved in the solution to a pragmatic problem.
- Such knowledge generated is usually later applied in organizational setting for problem solving.

Features of Pure Research

- Pure research is the basic research related with principles, laws or rules.
- The aim of basic research is the attainment of the knowledge and truth.
- It tries to find out cause and effect relationship in social phenomena.
- It verifies the old established principles and laws.
- It lays the foundation for applied research.

2) Applied Research (Action Research)

- Applied research is carried on to find solution to a real-life problem requiring an action or policy decision.
- Research done with the intention of applying the results of the findings to solve specific problems currently being experienced in the organization is called Applied Research.
- It is based on the application of theories
- E.g., Research conducted to discover medicine for AIDS

- E.g., Research conducted for developing a new product

Features of Applied Research

- It is carried on to find a solution to a real-life problem.
- It is conducted on the basis of application of theories or models for finding a solution.
- It may integrate previously existing knowledge.
- The instant purpose of applied research is to find solutions to a practical problem.

PURE RESEARCH	APPLIED RESEARCH
Original type of research	Based on pure research
It is concerned with generalizations & with the formulation of a theory.	It is related with application of theories or models for finding a solution
Knowledge oriented	Problem/goal oriented
It studies any problems or aspects in the universe.	It studies problems with social consequences.
Reports are prepared in technical language	Reports are prepared in common language
It tries to explain why things happen	It tries to explain how things can be changed
Success is measured by the nature of discovery	Success is measured by goals achieved

3. Exploratory Research (Formulative Research)

- Exploratory research is initial research.
- It is a preliminary study of a new problem about which the researcher has little or no knowledge.
- It is similar to doctor's initial investigation of a patient or the FIR prepared by police.
- Initial research conducted to clarify and define the nature of a problem
- It is ill structured
- Does not provide conclusive evidence
- Subsequent research expected

Objectives of Exploratory Research

- To generate new ideas.
- To make an exact formulation of the problem.
- To gather information for clarifying concepts.
- To increase the researcher's familiarity with the problem.
- To clarify concepts
- To determine the feasibility of the study

Exploratory Research Methods

1. Experience Survey.
2. Secondary Data Analysis.
3. Case Study.
4. Pilot Study.
5. Focus Groups.

EXPERIENCE SURVEY

It is the method of conducting surveys among the people who have had practical experience with the problem to be studied. It conducts like an informal discussion and hence there would not be any formal questionnaire. However, the researcher may simply have a list of topics to be studied**.**

Secondary Data Analysis

Analysis of secondary data helps to define the business research problem. Secondary sources may be both internal & external in character.

a) Internal Secondary Data: - It refers to the information that already exists within the company or unit. E.g., record of sales, budget, advertisement expense, previous market research studies etc.

b) External Source of Data: - It refers to information which is collected by a source external to business or unit. It may be public or private document. E.g., Govt. publications, journals, magazines etc.

Merits of Secondary Data Analysis

1. Secondary data provide an insight to the total situation.
2. Secondary data provide complementary information.
3. Secondary data are economical in nature.
4. Secondary data help to save time & cost.
5. Secondary data are most reliable in some cases.

Limitations of Secondary Data

1. Since these are collected for another purpose, these may not be suitable for the study of the researcher.
2. Since these are collected in past, they may not be the current information.
3. The analyst is not participating in the planning & execution of the data collection.

Precautions to be taken while using secondary data

1. Reliability: - It should be collected from the reliable sources.

2. Suitability: -The data should be suitable to the objective, scope & nature of the study.

3. Adequacy: - The level of accuracy should be adequate for the study.

CASE STUDY

A case study is an in-depth comprehensive study of a person, an episode, a process, a situation, a program, a community, an institution or any other social unit. It is one of the most popular types of research methods. Its purpose may be to understand the life cycle of the unit under study or the interaction between factors that explain the present status or the development over a period of time. Examples of a case study are social anthropological study of a rural or tribal community, a causative study of a successful cooperative society, a study of labour participation in Mgt in a particular enterprise etc. The case study method describes a case in terms of its peculiarities. It gives us an insight into the typical or extreme cases whose unique features are not reflected by the usual statistical method. A case study helps to secure a wealth of information about the unit of study, which may provide clues and ideas for further research.

PILOT STUDY

A pilot study is a small-scale preliminary study conducted before the main research in order to check the feasibility or to improve the design of the research. It is a mini study before the main study to eliminate all the bugs. It helps to know the nature and different aspects of the problem. The pilot study enables the researcher to gain some systematic knowledge of the universe and its population under study.

Advantages of the pilot study

1. It helps in the selection of respondents.
2. Helps to expose the inadequacies of the questionnaire.
3. It provides necessary training & motivations for the investigators to carry out the planned job.
4. It provides an opportunity to the researcher to build up self-confidence.
5. It helps to estimate time & resources for completing the work successfully.

FOCUS GROUP INTERVIEWS

It is the method of conducting an interview by a trained moderator in a non-structured and natural manner with a small group of respondents. A focus group is a form of qualitative research in which a group of people are asked about their perceptions, opinions, beliefs and attitudes towards a product, a service, a concept, an advertisement, an idea or a package etc. questions are asked in an interactive group setting where participants are free to talk with the group members.

4) DESCRIPTIVE RESEARCH

- It is the simplest type of research.
- Descriptive research is a fact-finding investigation.
- It focuses on a particular aspect of the problem
- It is designed to gather descriptive information and provides information for formulating more sophisticated studies.
- It aims at identifying various characteristics of a problem, community or an institution.
- It helps in predicting social life and helpful for planning social oriented programs.

5) CAUSAL/PREDICTIVE/EXPERIMENTAL RESEARCH

- Causal research deals with the why questions.
- it is used to obtain evidence of cause & effect relationships.
- It assesses the effect of a particular variable on a phenomenon by keeping the other variable constant.
- The objective of causal research is to test hypotheses about cause-and-effect relationship.

6) DIAGNOSTIC RESEARCH

- Research conducted to identify the causes of a problem and to find possible solutions
- It is directed towards what is happening, why it is happening, and what can be done about it.
- e.g., Research conducted to identify the causes of increasing number of HIV patients and to find solutions.
- e.g. Research conducted to find the causes of huge loss incurred by KSRTC and find solutions.

7) CASE STUDY

- It is a method of explaining or analysing the life of a social unit (such as a person, family, social group, a community, an institution etc)

- An in-depth or comprehensive analysis of a social unit.
- Studying everything about something.
- It is carried on for understanding a complex issue when it is not discoverable by usual methods.
- Quantitative and qualitative methods are applied

RESEARCH PROCESS

- Research is a systematic process which involves number of steps.
- There are some variations in the sequence of these steps suggested by different writers, but there is much similarity among their suggestions
- The process is not truly linear, moving from one step to another in an order
- The order of some steps may be changed, some steps may be avoided, and some steps may carried on simultaneously.
- Some of these steps may be covered quickly and some others may require longer time.

Steps in Research Process

1. Tentative selection of the topic or Research problem
2. Initial survey of literature
3. Finalisation of research problem
4. Formulation of the problem
5. Extensive Literature survey
6. Formulation of hypotheses
7. Preparation of research design
8. Preparation of sample design
9. Collection of data & Execution of the project
10. Analysis of data
11. Testing hypotheses
12. Generalisation and Interpretation
13. Preparation of research report/thesis.

1. Tentative selection of the problem

- The term problem means a question to be answered or an issue to be examined
- First of all the researcher has to select a problem
- In case of Govt orgns, it is suggested by the administrators or policy makers.
- In case of research scholars (students) it is to be selected in consultation with the guide.
- If the study is for a sponsoring agency, they will suggest problem
- The researcher has to discuss the problem with his friends, colleagues, experts etc
- The main sources of the topic are literatures, seminars, field visits, internships, experiences, medias etc.

2. Initial survey of Literature

- After selecting the problem, the researcher is required to go through the relevant literature to bring out a frame of reference to the work
- He should review

a) The conceptual literature – Literature explaining the concept and theories

b) The empirical literature – Studies made earlier in the topic or related topics.

3. Finalisation of research topic

- Researcher has to finalise the topic and has to represent it in analytical and specific terms
- Problem/topic should not be too wide or too narrow
- It should be suitable for the academic background – for which the research is undertaken
- Availability of time, money and other resources must also be considered.

4. Formulation of a problem

- Selected problem should be translated or transformed into a scientific research question
- It is concerned with specifying what actually the research problem and why it is studied.

It involves

a) The development of title
b) Define the objectives of the study
c) Work out the conceptual model etc.

5. Extensive Literature Review

- In order to gain the back ground knowledge of the research topic and to find out the research gaps, the researcher has to review books and other literatures.
- All kind of literatures such as books, articles, source materials, encyclopedia, latest publications, selected research theses, bibliographies of research reports, online information, reports of agencies etc.

Purpose of Review

- To gain preliminary orientation and back ground knowledge about the problem
- To gain up-to-date knowledge
- To know the work already done on the topic or related topic
- To identify research gaps in the field
- To avoid duplication of work
- To get an idea about the research work

6. Formulation of Hypothesis

- A hypothesis is a tentative assumption or proposition formulated for testing
- It is a tentative generalisation, the validity of which remains tested
- Some type of research does not need hypothesis. Eg. Mere fact finding investigation
- It is made to draw out and test its logical and empirical consequences

7. Preparation of Research Design

- It is a comprehensive plan of the series of operations that a researcher intends to carry out to accomplish the research objectives.
- It specifies the objectives of the study, the methodology and the techniques to be adopted for achieving the goal.
- It prescribes boundaries for the research work and gives a direction to the study

8. Preparation of Sample design

- It is a definite plan for obtaining a sample from a given population.
- Sampling design refers to the technique or the procedure, the researcher would adopt in selecting items as sample.
- The researcher can use probability or non probability sampling

- It is not needed for census survey

9. Collection of data/Execution of the project

- The required data is to be collected from different sources
- Primary data and secondary data are to be collected
- Different methods such as observation, interview, experimentation, survey etc can be used
- Various tools such as questionnaires, inventory schedules etc can be used
- Questionnaires and interview schedules must be formulated carefully and systematically
- Proper training should be given to interviewers

10. Analysis of Data

- In order to analyse the data collected, it should be edited, classified and tabulated.
- Statistics and quantitative techniques can be used to analyse the data
- Ratios, percentages, graphs, tables, coefficients etc can be used to analyse data
- Statistical software packages are also available to analyse the data

11. Testing of hypothesis

- It is the process under which a statistical hypothesis is tested and then accepted or rejected.
- The test conducted to accept or reject a hypothesis is known as Test of hypothesis.
- The commonly used statistical tests are Z test, t test, X2 test and F test
- Test help the researcher to conclude the validity of his hypothesis

12. Generalisation and interpretation

- After testing hypotheses, the researcher will be able to arrive at generalisation.
- The researcher has to prepare his findings and conclusions
- It should be justified with the objectives set earlier.
- It should be based on proper evidences under study.

13. Preparation of the Report/Thesis

- It is the final stage of the research process
- The researcher has to prepare a research report which indicates what he has done and how it is proved.
- It is the formal statement of the research process and its results
- It narrates the problem studied, methods used for study and the findings and conclusions.
- The purpose of the report is to communicate the research work to others.

Criteria of a good research problem

- Every problem selected for research must satisfy the following criteria:-

1. It should be original: - The purpose of research is to fill the gaps in existing knowledge to discover new facts and not to repeat already known facts. Therefore, a preliminary survey of the existing literature in the proposed area of research should be carried out to find out the possibility of making original contribution.

2. It should be neither very general nor very specific: - If the problem is very general, it is usually too vague to be tested. On the other hand, if the problem is very specific, it is usually too narrow to be important or consequential. Some kind of compromise must be made between generality and specificity.

3. It should be solvable: - Generally, a problem may be unsolvable due to two reasons –

(i) it may concern some supernatural or amorphous phenomena. For e.g., problems such as "how does the mind work?', "is it possible to change human nature?" etc.

(ii) it cannot be operationally defined.

4. It should be feasible: - The feasibility of carrying out research on the selected problem should be checked against the following considerations: -

I. Study design.

II. Access to organization and respondents.

III. Sample or universe to be studied.

IV. Source of data.

V. Funds required and availability etc.

Hurdles (Problems) faced by Researchers

1. Time and Money: Researchers have to spent their time and spend money for the collection, analysis and interpretation of data.

2. Lack of scientific training: Lack of knowledge /training in the methodology of research.

3. Lack of Technical knowledge: - Lack of Knowledge in computer, internet, software packages, statistics etc for analysis etc.

4. Lack of co-operation from respondents: Respondents (including business firms) are generally reluctant to provide data because they are of the opinion that the researcher can misuse the data.

5. Lack of Code of Conduct for researchers: Different methods and system are followed by various disciplines, departments and research centers.

6. Insufficient Interactions: between researchers and business, Government agencies etc.

7. Inadequate Assistance: From Govt and other agencies.

8. Difficulty in Social Science Research: Complex and dynamic social data, problems of collecting information.

9. Timely availability of published data: from various Government and other agencies

10. Huge misleading data on internet: There is no way to check the reliability of data available on internet

11. Lack of research centres, research guides and sponsors: Sufficient number of research centres, research guides and sponsoring agencies are not available in many subjects.

12. Improper Library management: Libraries are not managed systematically and hence the researchers are not able to get the old copies of books, journals etc.

13. High cost of publishing: Publishing research papers in national and international journals is highly expensive and discouraging factor.

Theory Building

- The word theory is derived from the Greek word "theoria" which means contemplation or speculation.
- According to Jack Gibbs, theory is a set of logically interrelated statements in the form of empirical assertions about properties of infinite class of events or things.
- A good theory is a statement of relations among concepts within a set of assumptions and constraints.

INDUCTION AND DEDUCTION

Approaches of Theory development

Induction and deduction are two techniques of reasoning used for arriving at generalization and valid conclusions.

INDUCTION METHOD

- The induction method consists of studying several individual cases and drawing a generalization.
- Moves from particular to general
- Induction method is bottom to up in nature
- It is developmental
- This does not give 100% guarantee of truth but probability of being true. Conditions for Induction
- Observation must be correctly performed and recorded; data should be accurate.
- Observation must cover representative cases drawn from a specific universe.
- Observation must cover an adequate number of cases.
- Conclusions must be confined to inferences drawn from the findings.

DEDUCTION METHOD

- Deduction follows an approach which is 'top down' or from general to particular.
- In deduction, we start from a theory and try to prove it right with the help of available information.
- It is a reasoning process of applying a generally accepted principle to a specific individual case.

Deduction	Induction
General to particular approach	Particular to general approach
Method of verification	Method of discovery
Very quick method	Very slow method
Downward movement	Upward movement

Operational Definitions

Variables

Variable means changing or changeable. A variable is anything that can change in its quantum or value. E.g.sales, profit, income, satisfaction etc.

Types of variables

1. The dependent variables.
2. The independent variables.
3. The intervening variables.

4. The moderating variables.

Dependent and Independent variables

Dependent variable is one which is dependent on another variable. On the other hand, the variable which influences another variable is known as independent variable. For e.g. with the increase in temperature, the sales of ice cream may go up. If so, one can say that the sale of ice cream depends upon the temperature. In such case, the sale of ice cream is a dependent variable whereas the temperature is an independent variable.

Intervening Variables: -

Variable which theoretically affect the observation or results but cannot be measured or manipulated is called intervening variable. It is inferred after watching the effects of the independent and moderating variables on dependent variables. For example, if the use of a particular teaching technique is the independent variable and mastery of the objectives is the dependent variable, then the language learning processes used by the subjects are the intervening variables.

Moderating Variable: -

Moderate variable is a second independent variable that is included because it believed to have a significant contributory or contingent effect on the originally stated intervening variables and dependent variable relationship. For eg; a good speaker can increase understanding of students on a particular topic. Here, good speaker is independent variable while understanding is depending variable. Good environments like air-conditioned room, good lecture hall, good facilities in the hall etc. act as moderating variables. If the speaker was good, environments were excellent, yet the students could not recall the basics of the class when asked the very next day. There may be some intervening variables which block the minds of students.

MODULE II

RESEARCH DESIGN

After the problem has been defined, the question arises how to carry out the research. The researcher has to make a plan of action before starting the research. This plan of study of a researcher is called the research design.

Research design is a comprehensive plan of the series of operations that a researcher intends to carry out to accomplish the research objectives. According to Bernard S Philips, "the research design constitutes the blue print for the collection, measurement and analysis of data in a manner that aids the scientist in the allocation of his limited resources by posing crucial choices".

Features of Research Design

1. It is a plan that denotes the sources & types of information relevant to the research problem.
2. It is a strategy which specifies the approach used for gathering & analyzing data.
3. It comprises the time & cost budgets since most studies are done under these limitations.
4. It is a guide for selecting sources & types of information needed.
5. It is a framework for specifying the relationship among the variables which are going to be studied.

Need or Importance of research Design

1. Research design is needed because it facilitates smooth, effective & economical working for various research problems. It yields maximum output with minimum efforts, time & money.
2. It is useful to prepare an advance plan for collecting & analyzing the information, keeping in view the objectives of the research & availability of man, money & time.

Concepts Relating to Research Design

1. **Dependent & Independent Variables**.

An independent variable is the variable that is changed or controlled in a scientific experiment to test the effects on the dependent variable. A dependent variable is the variable being tested and measured in a scientific experiment. The dependent variable is 'dependent' on the independent variable.

2. Extraneous Variables: - Independent variables that are not related to the purpose of the study but may affect the dependent variable are termed as extraneous variables. A study must always be designed in a way that the effect upon the dependent variable is attributed entirely to the independent variable & not to some extraneous variables.

3. Control: - One of the important characteristics of a good research design is to minimize the influence or effect of extraneous variable. The technical term control is used when we design the study in a manner which minimizes the effect of extraneous variables.

4. Confounded relationship: - When the dependent variable is not free from the influence of extraneous variables, the relationship between the dependent and independent variables is said to be confounded by an extraneous variable.

5. Research Hypothesis: - When a prediction is to be tested by scientific methods, it is termed as research hypothesis. It is a predictive statement that relates an independent variable to a dependent variable. Usually, a research hypothesis must contain at least one independent and one dependent variable.

6. Experimental & Non-Experimental Hypothesis

Testing Research: - When the purpose of research is to test a research hypothesis, it is termed as hypothesis testing research. Research in which the independent variable is manipulated is termed as experimental hypothesis testing research and research in which the independent variable is not manipulated is called non experimental hypothesis testing research.

7. Experimental & Control Groups: - In an experimental hypothesis testing research, the group, which is exposed to usual conditions, is called as a control group & the group which is exposed to some novel or special conditions, is termed as an experimental group.

8. Experiment: - The process of examining the truth of a statistical hypothesis relating to some research problem is known as an experiment.

The Contents of a Research Design

The format of research design may vary depending on the purpose for which the study is undertaken. However, in general, the research design of a research student may cover the following essential sections: -

1. **Introduction:** - The introduction of a research plan or proposal should place the research problem in its historical perspective, state the need for studying it, and the researcher's precise interest in the study of the problem.

2. **Statement of the Problem**: - The research problem should be defined, pointing out its core nature and its importance. The issue relating to the problem may also be stated. This statement gives direction to the research process.

3. Review of Literature: - On the selected topic, some studies might have been previously made by others. A review of available literature will bring out information on them. The salient features of those studies may be briefly described and the gaps may be pointed out.

4. Scope of the Study: - A complete study of any problem is unmanageable. Therefore, the scope and dimensions of the study should be delimited with reference to the topical scope – geographical area to be covered, reference period, the type of institutions/respondents to be studied etc.

5. Objectives of the study: - The specific objectives of the study should be stated clearly. These refer to the questions to which the researcher proposes to seek answers through the study. Although there is no limit to the number of research objectives, it is desirable to limit the objectives to a reasonable number. What is reasonable depends upon the time, limitation, resource constraints etc. the objectives should not be vague or nebulous.

6. Conceptual Model: - This section is the heart of the research plan. This is where the researcher formulates and develops the structure of relationships among the variables he is investigating. The logical connection of the variables is delineated; the assumptions and propositions used to develop the explanatory frame work are included.

7. Hypothesis: - These are logically deduced from the theoretical framework above. These refer to the anticipated outcome or possible answers to the research questions. They should be conceptually clear, specific and simple.

8. Operational Definition of Concepts: - The major concepts used in the title of the study, the objectives, the investigative questions and hypotheses should be identified. Each of them should be defined in operational terms pertinent to the measurement criteria or operations.

9. **The significance of the Study**: - It is important to point out the relevance and significance of

the investigation. What would be the value of the findings of the study for policy formation, theory or practice? Can the findings contribute to the enrichment of theory and/or to the solution of some practical problems? Etc. should be specified.

10. Geographical Area to be covered: - The territorial area to be covered by the study should be decided and specified in the plan.

11. Reference Period: - This period may be one year or two or more years depending upon nature of the study and availability of data.

12. Methodology: -In this section, the overall typology of the design – experimental, descriptive, survey, case study or historical study – specified. Further, the methods to be adopted for collection of data – observation, interviewing or mailing – are specified.

13. **Sampling Plan:** - If the study requires collection of primary data from the field, the universe should be delineated and the methods of sampling to be used for drawing the sample from the universe and the sample size must be stated.

14. Tools for Gathering Data: - In this section, the tools, to be used for gathering data – interview schedule or questionnaire or check list etc. are listed and each of them is described. The tools chosen should be appropriate to the methods to be adopted for gathering data.

15. **Plan of Analysis**: - The statistical techniques to be used for analyzing the various data should be specified.

16. Chapter Scheme: - The chapter scheme of the report to be prepared for communicating the findings of the study to the academic community and the users should be outlined and the purpose of each chapter should be stated.

17. **Time budget**: - The time period required for each stage of work and the total time duration of the study are specified.

18. **Financial Budget**: - This should include the estimate of the expected cost of the project under various major categories like salary, printing & stationery, postage, travel expenses etc.

Merits of Research Design

1. It helps to save researcher's time, money & energy.
2. It helps in systematic planning & execution of the study.
3. It helps the researcher to document the research activities.
4. It ensures proper time schedule for the implementation of the project.
5. It boosts the confidence of the researcher for completing the research work.
6. It provides a sense of success at every stage of work.

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.

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.

Sampling Frame

The most straightforward type of sampling 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.

MEASUREMENT AND SCALING

Measurement is a systematic way of assigning numbers or names to objects and their attributes.

Definition – According to **Kenneth D Bailey**, "measurement is the process of determining the value or level, either qualitative or quantitative, of a particular attribute for a particular unit of analysis.

Scaling: - Scaling is the procedure for determining the quantitative measure of abstract concepts like leadership, effectiveness of training programme etc.

Types of Measurement Scales

1. Nominal Scales.
2. Ordinal Scales
3. Interval Scales
4. Ratio Measurement.

Nominal Scale: - It is simply a system of assigning numbers or categories to events in order to label them. This type of measurement is used to distinguish between features only on the basis qualitative information. The nominal scale does not possess order, distance or origin. E.g. numbers are assigned to volleyball players in order to identify them or to distinguish one player from the other.

Ordinal Scale: - An ordinal scale is one that defines the relative position of objects or individuals with respect to a given characteristic. It is also known as ranking scale. On the basis of the amount of the quality possessed, the individuals are put in to different ranks. In ordinal scale, we are able to say that object A has a higher rank than object B but we cannot say by how much object 'A' is better than object 'B'.

Interval Scales: - The interval scale allows one to compare distance between attributes. For example, the difference between 1 and 2 is equal to the difference between 3 and 4. In interval scale, the zero point is arbitrary and not true zero. Measuring temperature is an example of interval scale.

Ratio Scale: - This is known as the ideal scale because of the characteristics it possesses. A ratio scale possesses the characteristics of nominal, ordinal & interval scales**.** Examples of variables which are ratio scaled include weights, lengths & times. In ratio scale there is always a meaningful absolute zero.

Scaling Techniques

Rating Scales

Rating means measuring an attribute by judgment in range. Rating scales are used for measuring the

attitudes & the intensity of the attitudes. For e.g. a customer is asked to rate a given model of TV set as to its performance. The following types of rating scales are used in business research: -

1. Dichotomous Scale: - Dichotomous scale is used to draw out 'Yes' or 'No' answer.

2. Category Scale: - This scale uses multiple items to draw out a single response.

3. Lickert Scale: - Rensis Lickert developed summated rating scale based on item analysis. A Lickert Scale is known as a summated instrument scale. It consists of a number of statements which expresses either a positive or negative attitude towards the object under study. It is designed to measure the intensity with which an attitude is expressed. The respondent is asked to agree or disagree with each statement. Each response is given a numerical score to reflect its degree of attitude. The respondents indicate their attitude by checking how strongly they agree or disagree with carefully constructed statements. It uses five grade points like strongly agree (5), agree (4), indifferent (3), disagree (2), and strongly disagree (1).

Merits of Lickert Scale

1. Easy to construct.
2. More reliable.
3. Permits the use of statements that are noticeably related to the attitude being studied.
4. It can easily be used in respondent centered & stimulus centered studies.
5. Minimum time is required.

Limitations

1. With the help of the scale, a researcher is able to examine whether the respondents are more or less favourable to a topic but it is not possible to tell how much more or less they are.
2. There is no basis to believe that the five positions indicated on the scale are equally spaced.
3. The total score of an individual respondent has little meaning since a given total score can be secured by a variety of answer patterns. Semantic Scales & Semantic Differential Scales This type of scales makes use of words rather than numbers. In semantic scales, respondents describe their feelings about the products or brands on scales with semantic labels like extremely, quite, slightly, neither etc. When bipolar adjectives like important & unimportant, expensive & inexpensive etc are used at the end points of semantic scales, these are termed as semantic differential scales.

Semantic Scale

Good **Bad**

Extremely Quite Slightly Neither Slightly Quite Extremely

Semantic Differential Scale

Expensive **Inexpensive**

5. Itemized Rating Scale: - Under this method, the respondents are provided with a scale having numbers and / or brief description associated with each category. Then the respondents are asked to select one of the limited numbers of categories ordered in terms of scale position, which best describes the product, brand, company or product attribute being studied.

Type A

Very easy	**easy**	**quite easy**	**neither**	**quite hard**	**hard**	**very hard**

Type B

Easy						**Hard**
7	**6**	**5**	**4**	**3**	**2**	**1**

Ranking Scales

These scales are used to tap preferences of respondents between or among more objects or items. Different approaches of ranking scale are: -

- Paired Comparison
- Comparative Scale
- Forced Choice

Paired Comparison: - Under this method, the respondent can express his attitude by making a choice between two objects.

Comparative Scale: - It provides a benchmark or a point of reference to assess the attitude of respondents towards the current object, event or situation under study.

Forced Choice: - It enables the respondents to rank the objects related to one another among the alternatives provided

RESEARCH DESIGN

• The researcher has to make a plan of action before starting the research. This plan of study of a researcher is called the research design.

• It is a comprehensive plan of the series of operations that a researcher intends to carry out to accomplish the research objectives.

• It is a conceptual structure within which the research is conducted.

• According to Bernard S Philips, "the research design constitutes the blue print for the collection, measurement and analysis of data in a manner that aids the scientist in the allocation of his limited resources by posing crucial choices".

Features of Research Design

1. It is a plan that denotes the sources & types of information.
2. A strategy which specifies the approach used for gathering & analyzing data.
3. It comprises the time & cost budgets.
4. It is a guide for selecting sources & types of information needed.
5. It is a framework for specifying the relationship among the variables

Need or Importance of research Design

• It gives a direction to the research

• It facilitates smooth, effective & economical working for various research problems.

• It yields maximum output with minimum efforts, time & money.

• It is useful to prepare an advance plan.

• It helps to prepare cost and time budgets
• It prescribes the boundaries of research activities
• It enables researcher to anticipate potential problems

Components of a research design

• Title of the problem – brief, precise, specify the nature of the study, self-explanatory, specific
• Statement of the Problem- problem should be stated, key questions should be specified, state significance of the problem, expected contributions.
• Objectives of the research – either in statements or in questions – one or more findings for each objective
• Scope of the study – area or aspects covered under study – it depends on time, money, accessibility of data etc
• Survey of Literature- to get an insight to the proposed work – to find out the research gap
• Conceptualisation of terms used: a term may have several meanings
• Formulation of hypothesis
• Sample design – plan for selecting sample
• Data collection – which type of data, sources, methods, tools.
• Processing and analysing of data – manual processing or mechanical processing, what type of table, charts, software, statistical techniques such linear programming, correlation etc

Module III

DATA COLLECTION

CHOOSING A BASIC METHOD OF RESEARCH

A research design is chosen based on a project's objectives. After this, the next step is to select a means of gathering data. There are three basic research methods: -

- Survey.
- Observation.
- Experiment.

SURVEY

The survey is a non experimental descriptive research method. It is a device for collecting data or factual information of certain desired characteristics of universe. Survey can be useful when a researcher wants to collect data on a phenomenon that cannot be directly observed. It requires expert & imaginative planning, careful analysis & rational interpretation of findings. Under this method, the respondents are asked a number of questions relating to the study. These questions may be asked verbally, in writing or through internet.

The Characteristics of Survey Method

1. It is always conducted in a natural setting; it is a field study.
2. It seeks responses directly from the respondents.
3. It can cover a very large population.
4. A survey may involve an extensive study or an intensive study. An extensive study covers a wider sample. An intensive study covers a few samples.
5. A survey covers a definite geographical area like a city, district etc.

Objectives of Survey

1. To provide information to Govt or planners or business enterprises.
2. It is used to explain a phenomenon.
3. Surveys are used to make comparison of demographic groups.
4. Surveys conducted to know cause & effect relationship is useful for making predictions.

Types of Surveys

1. **Cross Sectional Surveys**: - In cross sectional studies, variables are examined once & the relationship between them is determined. Cross sectional surveys are used to gather information on a population at a single point of time.

2. **Longitudinal Surveys**: - It is the method of collecting data over a period of time. In this, the respondents are questioned at different times. The main objective of this survey is to examine continuity of response & to observe changes that occur in due course.

The three types of longitudinal survey are: -

I. ***Trend Studies***: - Trend studies focus on a particular population, which is sampled & scrutinized respectively. Trend studies, since they may be conducted over a long period of time, do not have to be conducted by just one researcher or research project. A researcher may combine data from several studies of the same population in order to show a trend.

II. ***Cohort Study***: - A cohort is a group of people who share a common characteristic or experience within a defined period. A group of people who were born on a day or in a particular period form a birth cohort.

III. ***Panel Studies***: - In this method, the researcher tries to find out why changes in the population are occurring by using the same sample of people every time. It involves collecting data from the same sample of individuals over time. That sample is called a panel.

Methods of Survey

There are two methods of survey – **Census Method & Sample Method.**

CENSUS METHOD

The census method involves a complete enumeration of all units of the population or universe. Census method enables to yield correct factual data. This type of survey involves great deal of time, money and energy. When the universe is small, it is better to adopt census method for collection of information.

Merits of Census Method

1. The data are collected from each & every item of the population.
2. The results are more accurate & reliable.
3. Intensive study is possible.
4. Collected data can be used for various surveys & analysis.

Demerits

1. It requires more time, efforts & money.
2. Large number of enumerators is required.
3. If the universe is infinite, this method is not possible.

Sample Survey

Sample is that part of universe or population which we select for the purpose of our study. The selected respondents constitute sample, the selection process is called sampling & the survey so conducted is called sample survey. Sampling may be defined as the selection of part of an aggregate or totality on the basis of which a judgment or inference about the aggregate or totality is made.

Merits

1. It helps to collect more information.
2. It facilitates drawing generalizations about large population on the basis of study of their representative sample.
3. Various methods can be used to collect data.
4. It is simple to administer.
5. Coding, analysis & interpretation of data is relatively simple.
6. In certain cases, it is the only method, we can use.

Demerits

1. The success of this method depends upon the willingness& co operation of the respondents.
2. Sampling survey is subject to sampling errors.
3. It is expensive in some cases.
4. If we want data about each & every item of the population, this method cannot be used.

EXPERIMENT

Experimentation is a research process used to study the causal relationships between variables. It aims at studying the effect of an independent variable on a dependent variable, by keeping the other independent variable constant through some type of control. Experimentation requires special efforts. It is often extremely difficult to design & it is also a time-consuming process. But experiment is the only method which can show the effect of an independent variable on dependent variable. The fundamental weakness of any non experimental (Survey, observation etc) study is its inability to specify cause & effect. It can show only correlations between variables, but correlation alone never prove causation.

Planning & Conducting Experiments

It is easy to conceive ideas, but difficult to translate the ideas into a workable, credible, meaningful set of experimental operations. This to a great extent depends upon the researcher's knowledge, imagination & intelligence. However, the general procedure in experimentation can be summarized as follows: -

1. Determine the hypothesis to be tested & the independent and dependent variables involved in it.
2. Operationalize the variables by identifying their measurable dimensions.
3. Select the type of experimental plan. The types of experimental design based on types of control may be classified into – (1) one group plan, using the same group as experimental & control group and measuring it before & after experimental treatment; (2) matched group plan, consisting of two identical groups, one to be used as control group & another as experimental group, with (a) Post test only measurement or (b) pre test – post test measurements.
4. Choose the setting. The setting may be field or laboratory.
5. Make the experimental conditions as nearly same as the expected real life conditions.
6. Make a record of pre experimental conditions.
7. Introduce appropriate methods for controlling extraneous variables that are not manipulated in the experiment.
8. Apply the experimental treatment & record observations and measurements using appropriate measurement devices. If possible, repeat the tests several times in order to ensure the accuracy of results.
9. Analyse the results, using appropriate statistical devices.
10. Interpret the results, giving consideration to all possible extraneous conditions.

Advantages of Experimental Method

1. The variables can be more effectively controlled in this method.
2. The element of human errors is reduced to the minimum.
3. In this method, better conditions for conducting experiments may be created.
4. Experimentation yields generally exact measurement & can be repeated for verifying results.

Disadvantages

1. It is difficult to establish comparable control & experimental groups.
2. The scope for experimentation with human beings is extremely limited.
3. It is often difficult to design, tends to be expensive and time consuming.
4. It is artificial to some extent & may lack realism.

Laboratory Experiment: - A laboratory experiment is an investigation conducted in a setting created

specifically for the purpose. The researcher manipulates an independent variable & studies its effect on a dependent variable, keeping other variables constant.

Field Experiment: - This is an experiment conducted in a real life situation in which the experimenter manipulates an independent variable in order to test a hypothesis. Compared with laboratory experiment, a field experiment incorporates less control. As it is difficult to foresee & control extraneous factors in a field experiment, its result is subject to large uncontrolled variation.

SIMULATION

Simulation is one of the forms of observational methods. It is a process of conducting experiments on a symbolic model representing a phenomenon. **Abelson** defines simulation as "the exercise of a flexible limitation of process & outcomes for the purpose of clarifying or explaining the underlying mechanism involved". Simulation is a theoretical model of the elements, relations & processes which symbolize some referent system.

Simulation Vs Experimentation

A real life experiment may be too costly or may not be possible because of practical difficulties or of the complexities of the phenomenon. For Eg the research for an optimal approach to the problem of inventory issue & replenishment through experimentation would disrupt operations for a certain period of time & also would be very costly. Such difficulties do not arise in simulation, because it experiments with models & can artificially manipulate variables.

Types of Simulation

- Computer Simulation
- Man Simulation
- Man Computer Simulation

OBSERVATION

Observation means viewing or seeing. Observation may be defined as a systematic viewing of a specific phenomenon in its proper setting for the specific purpose of gathering data for a particular study. Observation as a method includes both seeing and hearing. It is accompanied by perceiving as well.

Characteristics

1. It is both a physical & a mental activity.
2. It is selective. A researcher does not observe anything and everything, but selects the range of things to be observed on the basis of the nature, scope & objectives of his study.
3. Observation is purposive & not casual. It is made for the specific purpose of noting things relevant to the study.
4. It captures the natural social context in which persons' behavior occurs.
5. Observation should be exact & be based on standardized tools of research such as observation schedule, social metric scales etc.

Types of Observation

- Participant Observation
- Non participant Observation
- Direct Observation
- Indirect Observation
- Controlled Observation

 Uncontrolled Observation

Participant Observation: - In this observation, the observer is a part of the phenomenon or group which is observed & he acts as both an observer & a participant.

Non participant Observation: - In this method, the observer stands apart & does not participate in the phenomenon observed. Naturally, there is no emotional involvement on the part of the observer.

Direct Observation: - This means observation of an event personally by the observer when it takes place.

Indirect Observation: - This does not involve the physical presence of the observer & the recording is done by mechanical, Photographic or electronic devices.

Controlled Observation: - This involves standardization of observational techniques & exercise of maximum control over extrinsic & intrinsic variables by adopting experimental design & systematically recording observations.

Uncontrolled Observation: - This does not involve control over extrinsic & intrinsic variables. It is primarily used for descriptive research. Participant observation is a typical uncontrolled one.

Components or Process of Observation

 Sensation
 Attention
 Perception

Sensation: - It is the first step in observation. It is gained through sense organs. It depends upon the physical attentiveness & keenness of the observer.

Attention: - It depends upon the ability of the observer to concentrate on studies concerned. The concentration is largely a matter of will power, which depends upon adequate training, experience etc.

Perception: -It comprises the interpretation of sensory reports. Perception helps the mind to recognize the fact by grouping & identifying sensations.

Advantages of Observation

1. The main virtue of observation is its directness. It makes it possible to study behavior as it occurs.
2. There is no artificiality in the collection of data especially when the observed persons are not aware of their being observed.
3. Observation is more suitable for studying subjects who are unable to articulate meaningfully, e.g. studies of children, tribal, animals, birds etc.
4. Observation improves the opportunities for analyzing the contextual background of behavior.
5. Mechanical devices may be used for recording data in order to secure more accurate data & also of making continuous observation over long periods.

Limitations

1. Observation is of no use of studying past events or activities.
2. It is not suitable for studying opinions or attitudes.
3. Observation cannot be used as and when the researcher wants to do it. He has to wait for the event to occur.
4. It is a slow & expensive process.

SAMPLING DESIGN

According to **Gerald Hursh,** "a sample design is the theoretical basis & 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". Sampling design refers to the technique or the procedure, the researcher would adopt in selecting items for sample. It is a design, or a working plan that specifies the population frame, sample size, sample selection & estimation method in detail. It is a definite plan for obtaining a sample from a given 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.

Define the Population or Universe: - The set of objects technically called universe is clearly defined.

State the Sampling Frame:- Sampling frame is the source list from which the sample is to be drawn. It contains the names of all items of the universe. Eg Telephone Directory, Admission Roll etc.

Identify the Sampling Unit: -This is the element or set of elements considered for the selection of a sample like house, households, individuals, blocks, wards etc.

State Sampling Method: - A number of methods are used for selecting samples. It includes probability sampling methods and non probability sampling methods. Researcher should select one method which is most suitable for his study.

Determine the Sample Size: - It refers to the number of items to be selected from the universe. Sample size should not be large or small. It should be optimum. That means the sample size elected is one which fulfils the requirement of consistency, competence, flexibility and representativeness.

Spell out the Sampling Plan: - In this stage, the researcher should state the operational procedures for selection of the sample.

Select the Sample: - In this stage, the needed samples are to be selected.

Sampling Techniques or Methods

Sampling techniques or methods may be classified into two generic types: -

- **Probability or Random Sampling**
- **Non Probability or Non Random Sampling**

Probability sampling is of following types: -

1. Simple Random Sampling
2. Stratified Random Sampling
3. Systematic Random Sampling
4. Cluster Sampling
5. Area Sampling
6. Multi stage Sampling

Non Probability Sampling may be classified into: -

1. Convenience Sampling

2. Purposive or Judgment Sampling
3. Quota Sampling
4. Snow ball Sampling

PROBABILITY SAMPLING METHODS

Probability sampling is based on the theory of probability. It is also known as random sampling. It provides a known non zero chance of selection for each population element.

Features of Probability Sampling

1. In probability sampling, every item of population has a chance of being selected.
2. Such chance is known as probability.
3. Probability sampling yields a representative sample, and hence the findings of the sample survey are generalisable to the population.
4. Through randomization, the danger of unknown sampling bias can be minimized.

Methods

Simple Random Sampling: - This sampling technique gives each element an equal and independent chance of being selected. For e.g. in a population of 300, each element theoretically has 1/300th chance of being selected.

Advantages

1. All elements in the population have an equal chance of being selected.
2. Of all the probability sampling techniques, simple random sampling is the easiest to apply.
3. It is the simplest type of probability sampling to understand.
4. The amount of sampling error associated with any sample drawn can easily be computed.

Disadvantages: -

1. It is often impractical because of non availability of population list or enumerating the population.
2. This technique does not ensure proportionate representation to various groups constituting the population.
3. The size of the sample required to ensure its representativeness is usually larger under this method.
4. A simple random design may be expensive in time & money.

Stratified Random Sampling

This is an improved type of random sampling. In this method, the population is sub divided into homogenous groups or strata & from each stratum, random sample is drawn. For e.g. university students may be divided on the basis of discipline, & each discipline group may again be divided into juniors & seniors. Employees of a business undertaking may be divided into managers & non managers & each of those two groups may be sub divided salary grade wise strata.

Advantages

1. It enhances the representativeness of the sample by giving proper representation to all sub groups in the population.
2. It gives higher statistical efficiency than that given by simple random sampling for a given sample size.
3. It is easy to carry out this sample method.

Disadvantages

1. A prior knowledge of the composition of the population & the distribution of the population

characteristics are required to adopt this method.

2. This method is very expensive in time & money

3. The identification of the strata might lead to classification errors.

Systematic Sampling or Fixed Interval Method

This method is an alternative to random sampling. It consists of taking every Kth item in the population after a random start with an item from 1 to K. for e.g. suppose it is desired to select a sample of 20 students from a list of 300 students. Divide the population total 300 by the sample size 20, the quotient is 15. Select a number at random between 1 & 15, using lottery method or so. Suppose the selected number is 9. Then, the student numbered 9, 24 (9+15), 39 (24+15), 54, 69, 84…are selected as sample. As the interval between the sample units is fixed, this method is also known as fixed interval method.

Advantages

1. It is much simpler than random sampling. It is easy to use.
2. It is easy to instruct this method to investigators.
3. It is easier to check whether every Kth item has been included in the sample.
4. Sample is spread evenly over the population.
5. It is statistically more efficient than a simple random sample when population elements are ordered chronologically, by size, class etc. then systematic sampling gives a better representative sample.

Disadvantages

1. This method ignores all elements between two Kth items selected. Further, except the first item, other selected items are not chosen at random.
2. As each element does not have an equal chance of being selected, the resulting sample is not a random one.
3. This method may sometimes give a biased sample. If by chance, several Kth items chosen represent a particular group, that group would be over represented in the sample.

CLUSTER SAMPLING

Where the population elements are scattered over a wider area & a list of population elements is not readily available, the use of simple or stratified random sampling method would be too expensive & time consuming. In such cases, cluster sampling is usually adopted. Cluster sampling means random selection of sampling units consisting of population elements. Each such sampling unit is a cluster of population elements. Then from each selected sampling unit, a sample of population element is drawn by either simple random selection or stratified random selection.

Difference Between Cluster Sampling & Stratified Sampling

CLUSTER SAMPLING	STRATIFIED SAMPLING
1 Sampling unit is a cluster	1 Population element itself is the sampling unit
2 Clustering is done on the basis of geographical areas or administrative divisions	2 Stratification is done on the basis of variables under study(Educational status etc)
3 The resulting sample may give a lower degree of representativeness.	3 It yields a higher degree of representative sample.

Multi Stage Sampling

Under this method, sample is prepared by stages. The population is divided into a number of large sampling units, each of which in turn is divided into smaller units, and so on. A random sample is taken of the large units at the first stage & from those selected a further random sample i.e. the second stage is collected of the smaller units. Suppose we want to take a sample of 5000 households from Kerala. At the first stage, the state may be divided into a number of districts & a few districts selected at random. At the second stage, each district may be divided into a number of villages and a sample of villages may be taken at random. At the third stage, 5000 households may be selected from the villages selected at the second stage.

Area Sampling

This is an important form of cluster sampling. In larger field surveys, clusters consisting of specific geographical areas like districts, taluks, villages or blocks in a city are randomly drawn. As the geographical areas are selected as sampling units in such cases, their sampling is called area sampling. It is not a separate method of sampling, but forms part of cluster sampling.

NON PROBABILITY SAMPLING METHODS

Non probability sampling does not adopt the theory of probability and it does not give a representative sample of the population. Following are important non probability sampling methods: -

Convenience or Accidental Sampling

It means selecting sample units in a just 'hit and miss' fashion. Eg. Interviewing people whom we happen to meet. This sampling also means selecting whatever sampling units are conveniently available. Though convenience sampling has no status, it may be used for simple purpose such as testing ideas or rough impression about a subject of interest.

Advantages

1. Convenience sampling is the cheapest & simplest method.
2. It does not require a list population.
3. It does not require any statistical expertise.

Disadvantages

1. It is highly biased because of the researcher's subjectivity & so it does not yield a representative sample.
2. It is the least reliable sampling method.
3. The findings cannot be generalized.

Positive or Judgment Sampling

This method means deliberate selection of sample units that conform to some pre determined criteria. This involves selection of cases which we judge as the most appropriate ones for the given study. It is based on the judgment of the researcher or some experts.

Advantages

1. It is less costly & more convenient.
2. It guarantees inclusion of relevant elements in the sample.

Disadvantages

1. This does not ensure the representativeness of the sample.
2. This is less efficient for generalizing when compared with random sampling.
3. This sampling does not satisfy the underlying assumption of randomness.

Quota Sampling

This is a form of convenient sampling involving selection of quota groups of accessible sampling units by traits such as sex, age, social class etc. In this method, the interviewer, instead of receiving a list of names & addresses of persons who are to be interviewed, receives the quota or the number of interviews which he has to conduct of persons who satisfy certain conditions about sex, age, income etc. Thus he may be asked to interview 20 businessmen over 50 years of age in a particular area. The interviewer can then select at his own discretion, any 20 businessmen of that area who are over 50 years of age. Quota sampling is a method of stratified sampling in which selection within the strata is nonrandom.

Merits

1. It is less costly.
2. Administration is easy.
3. It is most suited in a situation where the field work has to be done quickly.
4. It may be the only practical method of sampling a population for which no suitable frame is available.

Demerits

1. It does not meet the basic requirement of randomness.
2. It may not provide a representative sample.
3. Chance for personal bias is very high.

Snowball Sampling

This method of sampling is often used to reach research population which is difficult to find out. In this case, we initially contact a few potential respondents and then ask them whether they know of anybody with the same characteristics that we are looking for in our research. Having decided on the characteristics of the people to be included in the sample, we find one and ask that one person if they know of others like themselves and so on.

Advantages

1. It is very useful in studying social groups, informal group etc.
2. It is useful for smaller population for which no frames are readily available.

Disadvantages

1. It does not use the probability statistical methods.
2. It difficult to apply when the population is large.
3. It does not ensure the representativeness.

Sampling & Non sampling Errors

Sample survey does imply the study of a small portion of the population & as such there would naturally be a certain amount of inaccuracy in the information collected. This natural or standard inaccuracy is known as sampling error. Non sampling errors are those other than sampling errors which occur due to the fault in planning or execution of the survey. Non sampling errors include biases & mistakes.

Factors affecting the size of the Sample

1. Nature of the population: - If the population is more homogeneous in nature, fewer cases will be enough, but if the population is more heterogeneous in nature, large number of cases may be required.

2. Problems related with collection of data: - The resources available including time & money are to be considered before determining the size of the sample.
3. Type of sampling method: - If stratified sampling method is used, small sample will be enough.
4. Degree of accuracy required: - If highest degree of accuracy is required, size of the sample should be large.

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QUESTIONNAIRE & SCHEDULE

Questionnaires and schedules are used in collecting primary data by using survey method.

Mailed questionnaire

A questionnaire is a research instrument consisting of a series of questions & other prompts for the purpose of gathering information from respondents. This method of data collection is more popular in case of big surveys. In this method, a well prepared questionnaire is sent to the respondents through post with a request to return it to the investigator. According to Bogardus, a questionnaire is a list of questions sent to a number of persons for them to answer. It secures standardized results that can be tabulated & treated statistically.

Designing of a Questionnaire

The steps required to design & administer a questionnaire include: -

1. Defining the objectives of the survey.
2. Deciding on the information required.
3. Determining the sampling group.
4. Choose the method of reaching the target respondents.
5. Writing the questionnaire.
6. Administering the questionnaire.
7. Piloting the questionnaire.
8. Drafting the final questionnaire.

Define the objectives of the survey: -In order to avoid meaningless & irrelevant questions, objectives of the study are to be defined clearly.

Deciding the information required: - By referring secondary data, the researcher can assess what work has been already done on the same or similar problem in the past.

Determining the sampling group: - The factors like age, education, income etc of the prospective respondents should be taken into account while designing the questionnaire.

Choose the method of reaching the target respondents: - There are various methods for reaching the target respondents like personal interview, mailed questionnaire, telephone interview etc. before designing the questionnaire, researcher is required to determine which method he intends to use.

Writing the questionnaire: - If the researcher has been loyally executed previous steps, then the most of the questions will be on clear subjects.

Administering the questionnaire: - In order to ensure the accuracy of the data to be collected, questionnaire should be administered properly.

Piloting the questionnaire: - It will help to find out the shortcomings of the questionnaire.

Essentials of a good questionnaire

1. **Size of the Questionnaire**: - A questionnaire should be short & simple. Vocabulary used in the questionnaire should also be simple. A lengthy questionnaire will result in poor response.
2. **Appearance**: - A questionnaire should impress the respondent to respond. Hence, the appearance of paper, printing, lay out etc are important.
3. **Clarity**: - In case of questionnaire, a respondent has to read and understand on his own to give the right answer. Therefore, great care should be taken while framing the same.
4. **Specific & Explicit**: - In order to get the desired answer, the questions should be made explicit, eg. the questions should be specific & pinpoint the different alternatives.
5. **Sequence of questions**: - A proper sequence of questions avoids misinterpretations of questions & improves the rate of response. The first few questions should create interest & influence the attitude of respondent to complete the questionnaire.
6. **Make questions self explanatory**: - The questions should be self explanatory as far as possible, so that the desired information can be gathered & tabulation becomes easy.

Contents of Questionnaire

- Introductory Part
- Social Background & Factual Information.
- Main Part of the Questionnaire

Introductory Part

The details regarding name of the survey, address of the surveyor, serial number etc are to be included in this part.

Social Background & Factual Information.

The details regarding age, marital status, education, religion, political preference, size of the family, occupation, socio economic status etc are to be included in this section.

Main part

The information to be collected is given in this part of the questionnaire.

Questions to be included in the questionnaire

Closed end Questions

These questions are also called fixed alternative question. For these questions, the respondents are given a limited number of alternative responses. From these, the respondents have to select one which is most closely matches his opinion or attitude.

Merits of closed end questions

1. It gives the respondent with an easy method of indicating his answer. The respondent need not think about how to express his answer.
2. The respondent has to depend less on memory in answering a question because the option answers prompt the respondent.
3. Responses can be easily classified so analysis can be straight forward.

Demerits

1. They do not allow the respondent the opportunity to give a different response.
2. They suggest answers that respondents may not have considered before.

Open ended Questions

These questions are also called free answer questions. The respondent can answer this type of question in his own words & at any length he opts. He is free to answer such questions according to his view.

Merits

1. It permits the respondent to answer the questions in his own words instead of the alternatives suggested by the researcher.
2. It may helps to reveal findings which are not originally expected when the survey was planned.

Demerits

1. Respondent may find it difficult to express response properly.
2. Data collected is in the form of word for word comments. Hence classification & tabulation will be difficult.
3. Respondents will tend to answer open questions in different dimensions.

Open response option questions

It is a form of question which is both open ended and includes specific response options as well.

Dichotomous Questions

A dichotomous question refers to one which has two alternative options. The fixed alternatives may be yes/no, approved/ disapproved, true/ false etc.

Multiple choice questions

A multiple choice question refers to one which provides several set of alternatives for its answers. It can be used when an issue has more than two aspects.

Order & Format of Questionnaire

1. **Opening Questions**: - The first or opening questions should be simple and easy to understand. If the respondent find the first question is difficult to understand or beyond their knowledge & experience, he will be frustrated.
2. **Question Flow**: -Questions should flow in some kind of psychological order. Otherwise, the respondent may feel it as disturbing. Hence, questions on one subject or one particular aspect of a topic should be grouped together.
3. **Question Variety**: - If similar questions are asked continuously, the responds become bored & they will become restless. So, a variety of questions should be asked.
4. **Closing Questions**: - Closing questions should also be set carefully. Because of impatience & fatigue, respondent may give careless answers to the last questions. So the important questions should be included in the earlier part of the questionnaire.

Administering the Questionnaire

First of all, the researcher should provide a descriptive title for the questionnaire. Then, there should be an introduction to the questionnaire. The items are to be grouped by contents & then provide a subtitle for each group. Clear cut & simple instructions should be given for assisting the respondents. If the questionnaire will be mailed, consider including a token reward. After mailing the questionnaire, write a follow up letter to the respondent.

Piloting the questionnaire: - It means a pretest of the questionnaire before it issued for the original survey. It will help to identify the mistakes and proper corrections can be made.

Forms of Questionnaire

1. **Structured Questionnaire**: - It contains definite, concrete & direct questions. The questions are presented with exactly same wording and in the same order to all respondents. A sort of standardization is adopted to ensure that all respondents reply to the same set of questions.

2. Nonstructured Questionnaire: - It might not be in a structured form. It may consist of partially completed questions or statements which is often used as an interview guide.

3. Closed form questionnaire: - This type of questionnaires provide for marking yes or no answers or short response to check an item out
of a given list of responses. The respondent is asked to make choices from among a set of alternatives given by the researcher.

4. Open Form Questionnaire: - This type of questionnaire allows free response of the respondent.

5. **The mixed Questionnaire**: - This type of questionnaire contains both close & open type questions.

6. Fact Questionnaire: - This type of questionnaire requires certain information from the respondent without any reference to his opinion or attitude.

7. Opinion Questionnaire: - Through this type of questionnaire, respondent's opinion, attitude or preference regarding some phenomena is sought.

8. **Pictorial Questionnaire**: - In this, pictures are used to get answers. It is most useful in the case of children & illiterate persons.

Advantages of Mailed Questionnaire

1. **Low Cost**: - Mailed questionnaire is cheapest to administer as it involves only printing & postal expenditure.

2. Wide area of Coverage: - This method is most suitable for those cases where the respondents are scattered over large areas.

3. Saving in Time: - In case of interview schedule, the interviewer has to spend time for conversations, explanations etc. But in the case of mailed questionnaire, in the absence of interview, the respondents take their own time & return the filled in questionnaire. Thus, the time is saved for both the investigator &
respondents.

4. Greater Validity: - During interview, a respondent may feel shy to reveal certain facts, but in filling questionnaire, such defect will not occur.

5. Uniformity: - As the questionnaire is an impersonal technique, the uniformity can be ensured by standardized wordings of the questionnaire.

6. **Free from bias**: - It is free from the bias of the interviewer because the answers are given by the respondent in his own words.

Limitations

1. **Unreliability**: - The absence of interviewer may induce the respondent to give incorrect information or some other persons may fill the questionnaire on behalf of the respondent.

2. **Illiteracy of the respondents**: - This method is possible only among respondents who are well educated & ready to co operate with the research.

3. **Incomplete Entries**: - The absence of interviewer may lead to incomplete information owing to misunderstanding.

4. **Lack of personal Contact**: - There is no field worker to contact in person. Hence, any doubt or clarification as regards certain questions cannot be cleared.

SCHEDULE

Schedule is a standardized tool for observation or interview in order to attain the ultimate object. The schedule contains questions & blank tables which are to be filled by the interviewer after getting information from the respondents.

Purposes of Schedule

1. To offer a standardized tool for observation or interview.
2. To act as a memory reminder.
3. To facilitate tabulation & analysis.

Types of Schedules

1. Observation Schedule: - This kind of schedules are prepared and used in situations where observations are to be made.
2. Rating Schedule: - Rating schedules are used where the attitude or opinion is to be measured. The study of attitude has a great role in politics, marketing & other common matters of life.
3. Document Schedule: - This kind of schedule is used to collect preliminary information from written documents like autobiography, diary. Official records etc.
4. Interview Schedule: - This is the most important & widely used type of schedule for collecting information from the respondents.

Advantages of Schedule

1. Since the field worker is personally present, the percentage of response is much higher.
2. Presence of interviewer helps to clarify doubts.
3. The personal contact with the respondent ensures collection of better information.
4. Suitable in situations where respondents are illiterate.

Demerits

1. It is very expensive because a large number of field workers have to be appointed and trained.
2. The administration of this method is also a problem.
3. There is a chance for bias when the field workers influence the respondents.

Differences between Schedule & Questionnaire

1. A schedule is used by the interviewer for eliciting information from respondents & is filled by the interviewer himself whereas, the questionnaire is sent to the respondent through post & the respondent fills it up & returns it to the sender.
2. Collecting data through schedule is a costly affaire while collection of data through questionnaire is economical.
3. In case of schedule, the response is high whereas in case of questionnaire, non response is high as many people do not respond.
4. The identity of respondent is known in schedule while the identity of respondent may not be known in the case of questionnaire.
5. In the case of schedule, even from illiterates, the data can be collected easily but in case of questionnaire, data can be collected only when respondents are literate & co operative.

Interview Method

Interview may be regarded as a systematic method by which a person enters more or less imaginatively into the life of a comparative stranger. In social research, the purpose of interview consists of collection of information about the particular aspect which is exclusively known only to him & cannot bepossible to gather from any other source.

Types of Interview

1. **Personal Interview**: - The personal interview may be defined as an effective informal verbal & non verbal conversation initiated for specific purpose & focused on certain planned content areas. In this case, a single person is interviewed at a time.
2. **Group Interview**: - This interview is conducted for gathering routine or customary information by interviewing two or more persons simultaneously. This type of interview is conducted to identify people's reaction on a common subject.
3. **Formal Interview**: - In this, interview is conducted formally for collecting information by presenting a set of well defined questions.
4. **Informal Interview**: - It is a flexible interview in which the interviewer has full freedom to make adequate alterations in the questions to suit the specific needs of the interviewer.
5. **Focused Interview**: - It is meant to focus attention on the given experience of the respondent & its effects.

Benefits of Interview

1. More information can be collected.
2. In depth information can be collected.
3. Information will be more reliable.
4. It is a flexible method.
5. Personal information can be collected easily.
6. Supplementary information can also be collected.

Limitations

1. It is an expensive method.
2. There is the possibility of the personal bias of the interviewer.
3. It is a time consuming process.
4. Trained staff is required for this.

Telephone Interview

In this, interview is conducted over telephone. The respondent is contacted through telephone and required information is collected. It is one of the least cost methods for obtain primary information.

Internet Data Collection

It is the method of using possibilities of internet for data collection. Web or email can be used for this purpose.

Module IV

DATA PROCESSING

After collecting data, it has to be processed. The mass of data collected is to be processed for reducing them to manageable size. Data processing is the classification & summarization of data in order to make them ready for analysis.

Steps in Data Processing

- Editing
- Coding
- Classification
- Tabulation

EDITING

When data collected through schedule & questionnaire, there are chances for incompleteness, inaccuracy, inconsistency & absence of uniformity in the answers. Editing is the process of checking the data to detect errors & omissions.

Editing is of two types – Field Editing & Central Editing.

Field Editing: - In this, the investigator makes appraisal of the reporting forms for completing what he has written in abbreviated or in illegible form at the time of recording the respondent's responses.

Central Editing: - Central editing is done after getting all completed forms or schedules in office.

CODING

Coding is an act of assigning symbols or numerals to the response in a questionnaire or schedule. The purpose of coding is to classify or tabulate the data for further processing. In coding process, information from a schedule or questionnaire is transferred to a coding sheet. Coding sheet is a sheet in which a number or symbol is assigned to each item of response. Coding can be done either before data collection or after data collection. But the widely prevalent practice is to take up coding operation after completion of the collection of data. Coding is a means of quantifying the qualitative data

According to Goode & Hatt, coding is an operation by which data is organized into classes & number or symbol is given to each item according to the class in which it falls.

CLASSIFICATION

Classification of the data is the process of grouping of related facts on the basis of certain common characteristics. The process of arranging data in groups according to similarities is called classification

Objectives of Classification

1. To condense the mass of data.
2. To organize the scattered data.
3. To facilitate comparison.
4. To identify the features of data at a glance.
5. To eliminate unnecessary data.

Types of Classification

1. **Qualitative Classification**: - Classification of data on the basis of some attributes like

educational qualification, gender etc.

2. **Geographical Classification**: - Classification on the basis of geographical areas like state, districts, regions etc.

3. **Chronological Classification**: - Classification on the basis of time like year, month etc.

4. **Quantitative Classification**: - Classification on the basis of quantity.

TABULATION

Tabulation is the orderly arrangement of raw data into columns & rows. It is the summarization of results in the form of statistical tables. It is done on the basis of classification of data.

Objectives of Classification

1. Helps to simplify complex data.
2. Preserve space & reduce the mass of data.
3. To facilitate comparison.
4. To give an identity to the data.
5. Helps to detect errors & omissions.

Principles of Tabulation

1. Table should have a clear, concise & adequate title.
2. Every table should have a distinct number for easy reference.
3. The captions & stubs should be arranged in a systematic way.
4. The unit of measurement should be clearly defined.
5. Explanatory foot note if any should be given as footnotes.
6. If the data in a series of tables have been obtained from different sources, indicate the specific sources in a place just below the table.
7. Abbreviations should be avoided whenever possible & ditto marks should not be used in a table.
8. The table should be made as logical, clear, accurate & simple as possible.

Data Entry

Data entry converts information by secondary or primary methods to a medium for viewing & manipulation. The researcher can store the data in a medium. The entire data can be entered in computer for statistical packages.

Analysis & Interpretation of Data

Analysis of data means studying the tabulated material in order to determine inherent facts or meanings. It is the process of computation of certain indices or measure or co efficient along with searching for pattern of relationships that exist among data groups. Analysis can be classified into two **– Descriptive Analysis & Inferential Analysis.**

Descriptive Analysis: - It is the study of distribution of variables. This type of analysis describes the nature of the object or phenomenon under study. Descriptive analysis is of three types: -

1. Uni dimensional Analysis
2. Bi variate Analysis
3. Multi Variate Analysis

Uni Dimensional Analysis: - If the study is related withmone variable only, it is called uni dimensional analysis.

Bivariate Analysis: - If the study is related with two variables, it is called bivariate analysis.(Correlation Analysis, regression analysis etc)

Inferential Analysis: - It is concerned with testing of hypothesis & significance. It is also related with estimation of unknown population parameters.

Tools for Statistical Analysis

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

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.

2. BAR CHARTS

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.

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.

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.

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.

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.

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.

Mode

Mode is the value of the item of a series which occurs most frequently. In the case of individual

series, the value which occurs more number of times is mode.

2. Index Numbers

Index numbers are designed to measure the magnitude of economic changes over time. Index numbers are the indicators of the various trends in an economy. For example, Price index numbers indicate the position of prices whether they are rising or falling and at what rate.

Interpretation of Data

Interpretation means drawing inferences from the collected facts after analytical study.

Techniques or Methods of Interpretation

1. **Relationships**: - In this, interpretation is made on the basis of relationships. There may be three types of relationships such as symmetrical relationship, reciprocal relationship and asymmetrical relationship.

2. **Proportion**: - It is generally ascertained to determine the nature & form of absolute changes in the subject of study.

3. **Percentages:** - It is used to make a comparison between two or more series of data. Percentages are also used to describe the relationship between variables.

4. **Average**: - There are three forms of averages such as mean, median & mode.

Pre Requisites of Interpretation

1. **Adequate Data**: - The data should be large & unbiased. Then only the result will represent the population.

2. **Accurate Data:** - If the data collected are not accurate, it is very difficult to interpret it & get a true conclusion.

3. **Appropriate Type of Classification & Tabulation**: - If the classification & tabulation done is not in proper way, it will make errors or will help to reach wrong conclusion.

4. **Requirement of Homogeneous Data**: - When we want to get a uniform & accurate result, the data should be homogeneous.

5**.Data Consistency**: - If data collected are inconsistent, it will not be useful to provide accurate results.

6. **Use of Statistical Tools**: - If the researcher use inappropriate statistical tools, inadequate sample size & faulty calculations, it will produce fake results.

Types of Analysis

On the basis of the types of statistical methods discussed above, analysis can be broadly classified into two, namely, descriptive analysis and inferential analysis.

Descriptive Analysis

Descriptive analysis is undertaken with the help of descriptive statistical methods. The intention of descriptive analysis is to describe the basic features of the data in a study. They provide simple summaries about the measures. It is the study of distributions of variables. Descriptive analysis consists of three types of analysis. They are explained as follows:

1. Univariate or Unidimensional Analysis

Univariate analysis refers to the analysis of one variable at a time. A single variable has three main characteristics that are typically described as follows:

The distribution(tables and diagrams)

The central tendency(mean median mode)

The dispersion(Range ,Standard deviation etc.)

2. Bivariate analysis is concerned with the analysis of two variables at a time in order to know whether the two variables are related. The most common types of bivariate analysis are as follows:

a) Correlation Analysis: A correlation is a single number that describes the degree of relationship between two variables. If the measure of Correlation is zero, it indicates no correlation. On the other hand, if it is one, it indicates perfect correlation.

b) Regression Analysis: It is the study of functional relationship existing between two variables. It helps to predict the unknown values of one variable from known values of another variable. It is also called causal analysis.

3. Multivariate Analysis

Multivariate analysis refers to the simultaneous analysis of three or more variables. Important multivariate techniques frequently employed in research are as follows:

a) Multiple Correlation Analysis and Multiple Regression Analysis:

Correlation analysis tries to measure the magnitude and direction of relationship between two variables.

Multiple and partial correlation:

It analysis extend the same notion between a single variable and a set of variables. Multiple regression analysis is used to determine the functional relationship between a dependent variable and a set of independent variables.

(b) Discriminant Analysis: In this analysis, two or more groups are compared. In marketing research, it is often required to find out: How do the consumers, who buy a particular brand are different from others who buy competitor's brand?

c)Analysis of Variance (ANOVA): It is a statistical test. It is used to test for comparing three or more sample means by examining the variance of the sample data.

Factor Analysis: Here the information from a large number of interrelated variables are summarised into a few factors. Each factor is a combination of many variables. Factor analysis tries to identify the main factor or the basic factors underlying the subjects' response. It is also applied for reducing a large set of variables into fewer factors of manageable size.

d) Cluster Analysis: Cluster analysis is a technique used for classifying objects into groups. This can be used to sort data into homogeneous groups based on their characteristics. The resultant clusters are named by the researcher on the basis of their characteristics.

Parametric Test

• Parametric tests are used to test hypothesis concerning population parameters.

It is suitable for:

• Normal distribution of population

• Data is distributed normally

• Population variances are the same

• Example: test, Z test, f test, ANOVA

When parametric tests are used assumptions are made that

• (a) the level of measurement of the data is interval or ratio,

• (b) data are taken from populations that are normally distributed

Parametric Vs Nonparametric

• If the information about the population is completely known by means of its parameters, PT can be used

• T test, Z test, f test, ANOVA

• If there is no knowledge about the population or parameters, but still it is required to test the hypothesis, non parametric test can be used. Example: Binomial test, Chi-square test Sign test, etc.

Non parametric Test

• It is also called distribution free test

• It is used to test hypothesis that do not concern population parameters.

• There are no assumptions about population distribution.

• Less powerful than parametric

But for outcomes that are ordinal, ranked, subject to outliers (extreme values) or measured imprecisely, nonparametric tests may be the only way to analyze the data

Chi-square Test

• Used to compare between expected and observed data.

• A statistical method assessing the goodness of fit or independence between a set of observed values and those expected theoretically.

It involves:

• Test of goodness of fit

• Test of independence

• Test of homogeneity

Signed Test

Used to test the hypothesis that 'there is no difference in medians' between the continuous distributions of two random variables.

STATISTICAL INFERENCE AND TESTING OF HYPOTHESIS

Parameter:

• A function of population values or the measures obtained from population are known as parameters. Eg. Population Mean, Population standard deviation**.**

Sample Statistics

• It is the function of sample values or the measures obtained from sample. Eg. Sample mean, sample standard deviation.

STATISTICAL INFERENCE

• It is the process of selecting and using a sample statistic to draw inference about population parameter.

• Inferences are the findings and conclusions about the population.

• The two main branches of statistical inferences are

- Testing of Hypothesis
- Estimation

Statistical Hypothesis

• Hypothesis is an assumption made about the population from which the sample is drawn.

• The assumption may be about the form of the population or about the parameters of the population.

• Statistical hypothesis can be defined as a tentative conclusion logically drawn about the population for testing. Eg. 'The main reason for sickness industries is dishonesty and management

Null hypothesis and Alternative hypothesis

In a test of hypothesis, two different hypotheses are laid down. If one hypothesis is accepted, the other will be automatically rejected.

Null Hypothesis (H0)

• A statistical hypothesis which is stated for the purpose of possible acceptance is called Null Hypothesis.

• It is the original hypothesis

• It states that there is no true difference between sample and population.

Alternative Hypothesis (H1).

• Any hypothesis that contradicts a null hypothesis is known as an alternate hypothesis.

• It states that there is difference between sample and population.

Level of Significance

• The confidence with which the null hypothesis is accepted or rejected depends on significance level.

• The probability with which we may reject a null hypothesis when it is true is called level of significance.

• Level of significance is denoted by ά (Alpha)

• Eg. If the LS is 0.05(5%), the possibility of rejecting a true hypothesis is 5/100.

Degree of Freedom

• Degree of freedom is defined as the number of favourable observations that supports a null hypothesis.

• It is obtained by subtracting the number of constraints from total number of observations

Test of Hypothesis

• It is the process under which a statistical hypothesis is formed and then accepted or rejected.

• The test conducted to accept or reject a hypothesis is known as Test of hypothesis.

• The commonly used statistical tests are Z test, t test, X2 test and F test

Procedure for Testing a Hypothesis

1. Set up a Null hypothesis (H0) and Alternative hypothesis (H1)
2. Decide the Test criterion (such as Z test. t-test, F test etc)
3. Specify suitable level of significance (Level of significance may be taken as 5% if it is not given)
4. Calculate the value of test statistics using appropriate formula
5. Obtain table value of test statistics corresponding to the level of significance and degree of freedom
6. Make decision about accepting or rejecting null hypothesis.

The decision depends on whether the computed value of test statistics falls in the Acceptance region or Rejection region. Rejection region is known as Critical region

Acceptance/Rejection Rule

• When the computed value of test statistics is numerically less than table value, it falls in the acceptance region & the Null hypothesis is accepted.

• When the computed value of test statistics is numerically more than table value, it falls in the rejection region & the Null hypothesis is rejected.

Two tailed test and One tailed test

• Two tailed test is a test where the critical region (rejection region) is represented by both tails in the right and left of the graph.

• One tailed test is a test where the critical region is represented by one tail, either left or right.

Sampling Distribution

• If we select number of samples of the same size from a given population, sample statistics may be variable and therefore we can form a probability distribution.

• The probability distribution of sample statistics is called Sampling distribution.

Standard Error

• It is the standard deviation of a sampling distribution.

Uses of Standard Error:

• Used for testing hypothesis

• It give an idea about the reliability of the sample.

Type I and Type II Error

Type I Error

• Rejecting H0 when it is true

Type II Error

• Accepting H0 when it is false

Large sample and Small Sample

It is generally agreed among statisticians that a sample is to be considered large if its size exceeds 30

Module V

PREPARATION OF THE RESEARCH REPORT

The final and very important step in a research is to write its report. The research report is a means for communicating our research experiences to others and adding them to the fund of knowledge. A research report is a formal statement of the research process and its results.

Definition

A research report is an oral presentation and / or a written statement that has the purpose of communicating research findings, recommendations for courses of action, other findings to management other specific audiences.

Functions of a Research Report

1. It serves as a means for presenting the problem studied, methods & techniques used for collecting & analyzing data, the findings, conclusions & recommendations in an organized manner.
2. It serves as a basic reference material for future use in developing research proposals in the same or related area.
3. It serves as a means for judging the quality of the completed research project.
4. It is a means for evaluating the researcher's ability & competence to do research.
5. It provides factual base for formulating policies & Strategies relating to the subject matter studied.
6. It provides systematic knowledge on problems and issues analyzed.

Types of Research Reports

1. Technical Report
2. Popular Report
3. Interim Report
4. Summary Report
5. Research Abstract
6. Research Article

TECHNICAL REPORT OR THESIS

This is a comprehensive full report of the research process & its outcomes. It is primarily meant for academic community. It is a formal long report covering all the aspects of the research process: a description of the problem studied, the objectives of the study, methods & techniques used, a detailed account of sampling, field & other research procedures, sources of data, tools of data collection, methods of data processing & analysis, detailed findings & conclusions& suggestions. It is so comprehensive & complete that the study can be replicated by others. The technical report is essentially technical in nature & prepared in technical language. It follows a specified pattern & consists of several prefatory sections with appropriate headings & paragraphs.

POPULAR REPORT

This type of report is designed for an audience of executives/administrators & other technical users. The requirement of this audience is different. The reader is less concerned with methodological details but more interested in studying quickly the major findings & conclusions. He is interested in applying the findings to decisions. The organization of this report is very important. The presentation can be more forceful & persuasive without any distortion of fact. It should be clear, brief and straight forward. Complicated statistical techniques & tables need not be used. Instead,

pictorial devices may be extensively used. The style may be more journalistic but be precise & it should encourage rapid reading & quick comprehension.

INTERIM REPORT

When there is a long time lag between data collection & the presentation of the result in the case of a sponsored project, the study may lose its significance & usefulness & the sponsor may also lose interest in it. One of the most effective ways to avoid such eventualities is to present an interim report. This short report may contain either the first results of the analysis or the final outcome of the analysis of some aspects completely analysed. It facilitates the sponsoring agency to take action without waiting for the full report. The interim report contains a narration of what has been done so far & what was its outcome. It presents a summary of the findings of that part of analysis which has been completed.

SUMMARY REPORT

A summary report is prepared for the use of the lay audience i.e. the general public. The preparation of this type of report is desirable for any study whose findings are of general interest. It is written in non technical, simple language with a liberal use of pictorial charts. It just contains brief reference to the objective of the study, its major findings & their implication. It is a short report of two or three pages. Its size is so limited as to be suitable for publication in daily newspapers

RESEARCH ABSTRACT

This is a short of summary of the technical report. It is usually prepared by a doctoral student on the eve of submitting his thesis. Its copies are sent by the university along with the letters of request to the examiners invited to evaluate the thesis. It contains a brief presentation of the statement of the problem, the objectives of the study, methods and techniques used and an overview of the report .A brief summary of the result of the study may also be added. This abstract is primarily meant for enabling the examiner-invitees to decide whether the study belongs to the area of their specialization and interest.

RESEARCH ARTICLE

It is designed for publication in a professional journal. A professional journal may have its own special format for reporting research.

FORMAT OF RESEARCH REPORT

A technical report has a number of clearly defined sections. While the headings of the sections & their order may vary from one situation to another, the following is suggested as a broad sequence of contents of a research report.

A Prefatory Items

1. Title Page
2. Researcher's Declaration
3. The Certificate of the Research Supervisor
4. The Certificate of the Head of The Department
5. Table of Contents
6. List of Tables
7. List of figures

B Body of the Report

1. introduction

i) theoretical Background of the Topic
ii) statement of the Problem
iii) Review of Literature
iv) The Scope of the Study
v) Objectives of the Study
vi) Hypothesis to be tested
vii) Definition of the Concepts

2. The Design of the Study

i) Methodology (Overall typology & methods of data collection)
ii) Source of Data
iii) Sampling Plan
iv) Data Collection Instruments
v) Data Processing & Analysis Plan
vi) An overview of the Report
vii) Limitations of the Study

3. Results: Findings etc

4. Summary, Conclusion & Recommendations

C Terminal Items

1. Bibliography
2. Appendix

i) Copies of data collection instruments
ii) Technical details on sampling plan
iii) Complex tables etc

A. Prefatory Items

Title Page: - The title page is the first page which carries: (1) the title of the study, (2) the name of the degree for which it is submitted, (3) the name of the author, (4) the name of the institution on which the report is submitted & the date of presentation.

Researcher's Declaration: - In the case of a research undertaken by a student in fulfillment of the requirements of a degree, he may be required to make a declaration about the genuineness of the study.

Supervisors Certificate: - The research supervisor has to certify that it was a record of independent research work done by the student.

Acknowledgement: - In this section, the researcher acknowledges the assistance & support received from individuals & organizations in conducting the research.

Table of Contents: - A table of contents gives an outline of the contents of the report. It contains a list of the chapters & their sub titles with page numbers.

List of Tables: - It gives the outline of tables included in the report. Table number, title of the table & page number would be depicted.

List of Figures: - If there are many graphs & charts or other exhibits, they should also be listed.

B. Body of the Report

Introduction

This is the first chapter in the body of a research report. It is devoted for introducing the theoretical

background of the problem, its definition & formulation. It may consist of following sections: -

Theoretical Background of the Topic: - The first task is to introduce the back ground & nature of the problem so as to place it into a larger context to enable the reader to know its significance in a proper prospective.

The Statement of the Problem: - In this section, why & how the problem was selected are stated, the problem is clearly defined & its facets & significance are pointed out.

Review of Literature: - This section is devoted for making a brief review of previous studies on the problem & significant writings on the topic under study.

The Scope of the Present Study: - The dimensions of the study in terms of the geographical area covered, the designation of the population being studied & the level of generality of the study are specified.

The Design of the Study

This part of the report is devoted for the presentation of all the aspects of the methodology & their implementation. Much of this material is taken from the research proposal.

Methodology: - In this section, the overall typology of the research (experimental, survey, case study etc) used, data collection methods (observation, interview etc) employed etc are described.

Sources of Data: - The sources from which the secondary & or primary data were gathered are stated.

Sampling Plan: - The size of the universe from which the sample was drawn, the sampling methods adopted & the sample size & the process of sampling are described in this section.

Data Collection instruments: - The type of instruments used for data collection & their contents, scales & other devices used for measuring variables & the procedure of establishing their validity & reliability are described in this section.

Data Processing & Analysis Plan: - The method adopted for data processing & an account of methods used for data analysis & testing hypotheses must be outlined & justified.

Limitations of the Study: - No research is free from limitations & weaknesses. These arise from methodological weaknesses, sampling imperfections, non responses, data inadequacies, measurement deficiencies & the like.

Results, Finding & Discussion

This is the major part of the report. It should be an organized presentation of the results of investigation & not a clutter of tables & charts. It may be divided into several chapters depending upon the number of objectives of the study.

Summary, Conclusions & Recommendations

This chapter should be a self contained summary of the whole report, containing a summary of essential background information, findings & recommendations.

C. Terminal Items

Bibliography

• The bibliography lists in alphabetical order all published & unpublished references used by the researcher in preparing the report. A bibliography is a list of books, scholarly articles, and other sources you use when researching a topic and writing a paper.

• The bibliography will appear at the end of your paper.

• Bibliography entries must be written in a very specific format such as MLA, APA etc.

• Entries should be listed in alphabetical order by the last name of the author.

Bibliography Vs References

• **References** usually come at the end of a text (essay or research report) and should contain only those works cited within the text.

• A **Bibliography** is any list of references at the end of a text, whether cited or not.

• It includes not only texts you referred to in your paper, but your own additional background reading, and any other articles you think the reader might need as background reading.

Formats of Bibliography

MLA Format (Format suggested by Modern Language Association)

Format - Books

• Author's name (last name first), Title of book, additional information if any, City of Publication, Publishing company, date of publising

Format - Magazine and news paper articles

• Name of Author (last name first), Title of article, Title of the periodical, volume, date, inclusive pages

• **Encyclopaedia – Format**

• Author's name, title of article, title of encyclopaedia, date

• **Research Report/Thesis – Format**

• Author's name, Title of thesis, University, Date

• **Websites**

• Author, title of work, title of site, Date of electronic publication, full URL.

APA Format

• Format suggested by American Psychological Association

Format - Books

• Author's name with last name first (Publication date) Title of book, additional information if any, City of Publication, Publishing company

Format - Magazine and news paper articles

• Name of Author with last name first (Date of Publication) , Title of article, Title of the periodical, volume inclusive pages.

Encyclopaedia – Format

• Author's name, (Date) title of article, title of encyclopaedia, City & Publishing co

Research Report/Thesis – Format

• Author's name, (date) Title of thesis, University

Websites

• Author, (Date of electronic publication) title of work, title of site,, full URL .

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