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SOCIAL RESEARCH METHODOLOGY

M.A. Sociology, Semester – I, Paper-III

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103SO21: Social Research Methodology

Course Objectives: This paper will enable the students to understand the concepts of scientific method and its application to social phenomenon; theory, fact and hypothesis and their operational differences, significance of research design in research; methods of data collection and sampling; and components of research report writing.

Course Outcome: To create awareness on various social research methods such as scientific method, theory, fact and hypothesis, sampling and methods of dada collection and students will be able to write research report writing.

Unit - I:

1. Scientific Method
2. Theory, Fact and Hypotheses
3. Different Types of Research

Unit -II:

1. Selection of Research Problem
2. Research Design - Types of Research Design
3. Hypothesis

Unit - III:

1. Significance of Sampling in Social Research
2. Probability and Non-probability Sampling and Uses
3. Methods of Sampling

Unit - IV:

1. Interview
2. Questionnaire
3. Observation

Unit -

1. Use of Statistics in Social Research
2. Measures of Central tendency and Correlation
3. Writing Research Report

REFERENCES BOOKS:

1. Good and Hatt : Methods in Social Research
2. P.V. Young : Scientific Social Surveys and Research
3. Jahoda and Others : Research Methods in Social Relations
4. Black and Champion : Methods and Issues in Social Research
5. C.A. Moser and G. Kalton: Survey Methods in Social Investigation

Edwards : Attitude Scale construction techniques

SOCIAL RESEARCH METHODOLOGY

CONTENTS

LESSON - 1

SCIENTIFIC METHOD

Objectives:

The objective of this lesson is to explain the nature and characteristics of scientific method.

Structure

1.1 INTRODUCTION

The scientific method is an empirical method of acquiring knowledge that has characterized the development of science since at least the 17th century. Although scientific research method depends on the collection of empirical facts, yet facts alone do not constitute a science. For meaningful understanding facts must be ordered in some fashion, analysed, generalized and related to other facts. Thus theory construction is vital part of the scientific inquiry.

Since facts collected and findings evolved through the scientific method are interrelated with the previous findings of other scholars of earlier theories, scientific knowledge is a cumulative process.

The scientific method could either be an inductive method or the deductive method. Inductive method involves establishing generalization, i.e., building generalizations inferred from specific facts, or drawing particular principles from general instances, while deductive method involves testing generalisation, i.e., it is the process of reasoning from general principles to particular instances.

1.2 MEANING OF SCIENTIFIC METHODS

Scientific method comprises Observation, hypothesis, verification scientific methods are relative to the stage of enquiry and the types of problem. The scientific method is the most assured technique for discovering actual facts and their rational interconnection. Among the personal components of the scientific method, the researcher's imagination, independence, analytical ability, skill and independence are important. Scientific method has also has its own limitations. To list a few, it involves abstractions, science has limited scope: conclusions arrived at by the scientific method are not final, etc., but these limitations re far outweighed by the usefulness of this method.

However the nature of predictability is difference method from that the physical sciences, where it involves the notion of direct cause and effect. In contrast, sociology and other social sciences make statements on the basis probability, in other words the likelihood that certain things will be found to exists or occur given the presence of other things, example, a sociologist may predict that higher income families may have fewer children. Many of these findings may be useful for example. The sociologist who studies the changing pattern of drug addiction may also for proceed to study how to solve the problem. But as a social scientist his fundamental aim should be to be ethically neutral and arrive at the truth.

1.3 DEFINITION OF SCIENTIFIC METHOD

According to **ENCUOLOPEDIA – BRITANICA**: - in a wide sense any method off investigation by which scientific or other impartial and systematic knowledge is acquired is called a scientific method.

L.L. BERNARD: - science may be defined in terms of its major processes that place within it. These are 1) Testing 2) verification 3) Definition 4) clarification 5) organization 6) prediction and 7) application.

LUND BERG:- the scientific method consists of systematic observation, clarification, and interpretation of data.

1.4 NATURE OF SCIENTIFIC METHOD

The nature of scientific method depends upon the nature and objectives of a particular science.

They are broadly two methods 1. Technical 2. Logical

1.5 BASIC ELEMENTS OF SCIENTIFIC METHOD

The scientific method refers is a procedure of a mode of investigation by which scientific and systematic knowledge:

Procedural Components: observation, hypothesis and verification are the three procedural components. Observation helps to collect data and build hypothesis. A hypothesis is tentative conclusion. It guides collection of data. The third stage in verification of hypothesis. It is done by analytical tools.

Personal Components: To find out the hearts of the problem, it needs imagination analytical ability resourcefulness and skill. Researcher's ability and attitude are more important than the method of approach. Researcher should have an objective scientific and professional qualification and personal quality and interest.

Logical Reasoning Process: The scientist method involves the logical process of reasoning. This reasoning process is used for drawing inference from the finding of a study or for arriving at conclusions.

1.6 LIMITATION OF SCIENTIFIC METHOD

1) It involves abstraction
2) Explanation is never complete. At every stage there are some principles which remained unexplained in social science.
3) The conclusion arrived by scientific method are not found
4) Science have limited scope
5) Formula procedures are fruitless.
6) Scientific judgment is difficult

1.7 FEATURES OF SCIENCE METHOD: it is

1) Empirical:- it is based on observation and reasoning and not on speculation.
2) Theoretical:- It is summaries data precisely giving logical relationship between proposition which explain causal relationship.
3) Cumulative:- generalization theories are corrected, rejected and newly developed theories are build up on one another.
4) Non-ethical:-science does not say whether particular things events phenomena institutions systems structures are good or bad.

5) A system of organized knowledge
6) An objective and impartial
7) A natural and value free
8) A body of reasoning
9) It formulates low and it predict

1.8 AIMS OF SCIENCE

1) The ultimate aim of science is to produce an accumulating body of knowledge
2) Which enables us to understand the world in which we live and its ways.
3) The explanation of situation brings meaning in the description,

What is Research:-

When we observe certain objects or phenomena we are often unaware of our biases we do not question them and so we attribute. Our observations entirely to the objects or phenomena being observed.

Scientific Research:

Science aims to describing explaining and understanding of various objects or phenomena in nature where as research are a special Endeavour, which involves systematic and critical investigation.

Scientific Method:

It is obvious that it would be impossible in comprehension. The nature and content of research without an appreciation of a method.

1.9 CHARACTERISITICS OF SCIENTIFIC METHOD

1. Verification
2. Definiteness
3. Objectivity
4. Generality
5. Helpful in prediction and
6. System or systematized method.
7. Recording
8. Controlling conditions

1.9.1 Verification: - Results of the scientific method are invariably corrected in dependable. They do not differ according to circumstances, place and time. This is not the case with results that we arrive at through non-scientific method. Once conclusion has been drawn as a result of scientific method, it may be said that it is

the result of a particular phenomenon. Through observation, veracity or verification of the fact is possible.

1.9.2 Definiteness: - If a particular conclusion is drawn as a result of scientific study; it is also definite in other words definiteness is as much a part of the scientific method as the verification. Because of definiteness, specificness becomes a part of those conclusions. Any person can judge and check the definiteness of the facts or conclusions arrived at. The results and the philosophical concepts that are drawn through individual concepts cannot be called definite. The conclusions that are arrived at as a result of scientific method become definite because of the study, observation & verification of the data.

1.9.3 Objectivity: - While studying a particular thing, we sometime fall a prey to out subjectivity or to our inner and individual feelings. Such a thing has no place in scientific study. In the scientific method, there is no place for subjectivity. It has no weight to display one's inner and internal feelings. All those things have to be perfectly objective and based on facts and internal conditions. Objectivity only means that the research that has carried on study has to get him detached from the subject matter or the phenomenon that he is studying in fat, objectivity is the most important characteristic of scientific method.

"Wolf "has rightly said: "The first requisite of a sound knowledge is the determination and ability to get the naked facts and not to be influenced by mere appearance of prevalent nations or by one's own wished."

1.9.4 Generality:- The conclusion has been drawn as a result of the scientific study or through scientific method should applied in all the circumstance factor of time and place.

1.9.5 Helpful in prediction:- The conclusion that are drawn as a result of scientific method are helpful in prediction. Generally the conclusions that we see today may change tomorrow. According to circumstances but the conclusions that are drawn as a result of scientific study help us to predict about other things. These conclusions are based on the casual relationship. The conclusions drawn as a result of scientific method is helpful in prediction no doubt but is does not mean that they shall always be invariably correct. But if the factors. On the basis of which those conclusions have been drawn. Get change the prediction based on those conclusions may not be correct. The prediction is based on the assumption that everything remaining same, the conclusion shall be same.

1.9.6 System or systematized method: - In research that is conducted through scientific method, the conclusions are systematic. In every research the study is conducted through a scientific and planned manner for social sciences systems are much required. Unless there is a systematic approach, it shall not be possible to formulate scientific theories.

1.9.7 Recording: - Jotting down complete details as quickly as possible. Since human memory is fallible, all data collected are recorded. Researcher will not depend on the recalled facts but will analyse the problem on the basis of the recorded data. Conclusions based on recalled unrecorded data are not trustworthy.

1.9.8 Controlling conditions: - controlling the variables except one and then attempting to examine what happens when that variable is varied. This is the basic technique in all scientific experimentation allowing one variable to vary while holding all other variables constant. A researcher may be able to control some of these variable but not all. Varying conditions will be responsible for varying behavior of the student. It is however possible for a researcher in social science to work with two or more variable at a time. It is called multivariate analysis. Since the social scientist is not always able to control all the variables he wants his conclusions do not permit him to predict.

1.10 BASIS OF SCIENTIFIC METHOD

1. Reliance of Evidence: since scientific method involves a systematic process. Relevant data are collected through observation and experimentation. The validity and the reliability of data are checked carefully and the data are analyzed thoroughly using appropriate method of analysis
2. Commitment: Objectivity is the part of the scientific method. It means forming a judgment upon facts unbiased by personal impressions. It should be same for all persons.
3. Ethical Neutrality: Scientific method does not say that it is good or bad. Its aims to give true and adequate statements about its object.
4. Generalization: Scientist tries to find out the communality of a series of event scientific aim to discover the uniformity. Discovered uniformity logical class and its observed pattern a descriptive generalization is formulated.

1.11 COMMON MISTAKES IN THE SCIENTIFIC METHOD

This method reduces the influence of the outcome of an experiment. The most fundamental error is to make the hypothesis for an explanation of a phenomenon, without performing experimental test. Another common mistake is to rule out data which do not support hypothesis. For a experiment, there is possibility that the hypothesis correct or incorrect. In that case, there may be a psychological tendency to find something wrong. While data which do agree with those expectation may not be checked as carefully.

1. Quantitatively systematic error is another common mistake in the scientific method. There are many examples of discoveries which were missed by experimenters and there are many examples of alleged new discoveries which later proved systematic error and not accounted by the discoveries.
2. Values related problem it arises from the social context within which research occurs. A researcher's attitudes towards socio-economic issues are influenced by his values.
3. Personal Pre-conception: Personal pre-conceptions of research create not only a distorting effect on the data, but are also highly insidious. Research failed to examination objectivity.
4. Ethical Dilemmas research relation with other aspect of research creates ethical problems. E.g., relation with sponsors, relation with source data, relation with research subject etc.

1.12 DIFFICULTIES IN THE USE OF SCIENTIFIC METHODS

In applicability of scientific methods in social science having some major difficulties. Some of them are following:

- Human behavior is not uniformed and predictable.
- When human behavior is studied any analyses by another human there may be personal problem.
- Psychological nature of human behavior cannot be measurable.

1.13 THEORY AND FACT

The purpose of science is to understand the world in which man lives. When scientists engage in research, it becomes clear that

1. Theory and fact are not diametrically opposed but intricately intertwined.
2. Theory is not speculation and
3. Scientists are much concerned with both theory and fact.

A fact is an empirically verifiable observation. Theory refers to the relationship between facts and the ordering of them in some meaningful way. Without theory, science could yield no predictions. Without prediction there would be no control over the material world. Facts of science are the product of observation that is not random but meaningful theoretically relevant fact and theory are interrelated in many complex ways. The development of science can be considered as a constant interplay between theory and fact.

Theory is a tool of science in five ways:

1. It defines the major orientation of a science by defining the kinds of data which are to be abstracted.
2. It offers to conceptual scheme by which the relevant phenomena re systematized, classified and interrelated.
3. It summarizes facts into (A) empirical generalizations, and (B) systems of generalizations.
4. It predicts facts and
5. It points to gaps in our knowledge.

1. On the other hand facts are also productive of theory: Facts help to initiate theories.
2. They lead to reformulation of existing theory.
3. They cause the rejection of theories which do not fit the facts.
4. They clarify and redefine theory.

Theory and fact are in constant interaction. Developments in one may lead to developments in the other. Theory implicit or explicit is basic to knowledge and even perception. Theory is not a passive element. It plays an active role in the uncovering of facts. Facts have an important role development of theory. Science actually depends upon a continuous stimulation of fact by theory and of theory by facts.

1.14 SUMMARY

The method of scientific research is of recent origin. In ancient days man's behavior was more based on superstitions. Sorcery and totem etc. even very powerful men used to bow down before the corce of totem and superstition. This situation created several problems many of these superstitions had nothing to do with the reality. With the growth of science, this reality came to the knowledge of people and they started taking steps for finding out the reality of life. As a result of scientific research was no doubt present from very beginning, but the scientific approach of study began quite late and along with the development of science. No doubt it had to pass through several stages but those stages were crossed without any difficulty and today we have before us the scientific method of research.

1.15 TECHNICAL TERMS

1 Scientific method
2. Scientific Research
3. Conclusions
4. Variables
5. Observation

1.16 SELF ASSESSMENT QUESTION

1 Discuss the characteristics of Scientific method.
2. Define Scientific Method and discuss the features of scientific method.
3. Describe the basis and difficulties in the use of scientific method.
4. Explain the elements of scientific method?

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LESSON - 2

THEORY, FACTS AND HYPOTHESIS

Objectives

The Objectives of this lesion is to explain the theory, facts and Hypothesis

Structure

2.1 INTRODUCTION

Although the terms theory, fact, and hypothesis are sometimes treated as though they had clear meanings and clear relations with one another, their histories and uses are more complex and diverse than might be expected. A fact is usually thought of as a described state of affairs in which the descriptions are true, but how something becomes a fact has been a major concern of sociologists of scientific knowledge. Hypotheses and theories can also be defined as rooted in what is or can be established as fact, which raises difficult questions.

2.2 DEFINITION

1. According to Bailey has said “Hypothesis is a proposition stated in a testable form; which predicts a predicts a particular relationship between two or more variables.” It is also described as “tentative statement asserting a relationship between certain facts”.
2. According to Blalock, the task of science is not to prove but to disprove and reject the hypothesis. For example, take the following hypothesis: “Probability that the sale of commodity is dependent on multiple causes is greater than the probability that it is caused by one single factor.” This has to be disproved and rejected.

Difference between a proposition, a Hypothesis and a Theory

2.3 A PROPOSITION:

A proposition is a statement about relationships among concepts or variables” Baukey says tgat ut us a generalized statement of a relationship among facts or about one or more facts or phenomena. Consider the following proposition in business administration if

reinforcements follow each other at evenly distributed intervals and everything else is held constant, the resulting habit will increase in strength as a positive growth function of the number of trails. This proposition identifies relationship between the concepts "reinforcements" and habit' it identifies the direction and magnitude of this relationship. A proposition that discusses a single variable is called univariate proposition. A bivariate propositions one that related two variables. A proposition relating more than two variables is called multivariable.

Multivariate propositions are generally written as two or more bivariate propositions. For instance, in the above example, the two bivariate propositions will be

1. The higher the illiteracy among women, poorer will be their self-image, and
2. The lower the self image, the higher will be women's exploitation. Of these two propositions, either both can be rejected or accepted or one can be accepted and other rejected. In social research, most propositions are bivariate.

Just as concepts are the building blocks of propositions. Propositions are the building blocks of theories. Sub-types of propositions include hypothesis, empirical generalizations, postulates and theorems.

2.4 A HYPOTHESIS:

A hypothesis is a proposition that is empirically testable. For example, the proposition non-working women enjoy lower social status than working women" can be empirically verified. Here the variables are woman's work and social status which can be measured.

Bailey has also said: Hypothesis is a proposition stated in a testable form which predicts a particular relationship between two or more variables. It is also described as a tentative statement asserting a relationship between certain facts.

For example, in Sutherland's theory of differential Associations pertaining to the causes of crime, the important proposition given is that crime is a behavior learned in a process of communication with persons in primary groups who define the legal rules unfavorably.

According to blalock the task of science is not to prove but to disprove and reject the hypothesis. For example, take the following hypothesis. Probability that the sale of commodity is dependent on multiple causes is greater than the probability that it is caused by one single factor. This has to be disproved and rejected.

2.5 A THEORY

According to Theodorson and Theodorson: a theory is a set of assumptions. The body of the theory is composed of logically interrelated and empirically verifiable propositions. The propositions of a theory are constantly subject to further empirical testing and revision. Zikmund has described theory as "a coherent set of internal propositions explaining apparent relationships of certain observed phenomena".

The two purposes of theory are understanding and prediction. In most situations, prediction and understanding go hand in hand. To predict phenomena, we must have an explanation of why variables behave as they do. Theories provide the explanations. For example, the Aggression-Frustration Theory is that aggression is a response to frustration. The explanation is that aggression is a learned social behavior and that it is provoked when the individual feels frustrated, he leans that aggression often pays. This learning is not only by one's own experiencing but also by observing others. But merely to say that aggressive responses are learned does not help us predict when such responses will actually occur. Aggressive acts are motivated by a variety of aversive experiences like frustration, pain, insults. Such experiences arouse individuals emotionally, but whether they will act aggressively or not will depend upon what consequences they anticipate. Individuals act aggressively when they feel they will be rewarded.

The propositions that comprise a theory are regarded as scientific laws if they have been sufficiently verified to be widely accepted. Through the process of deduction. A theory provides specific hypotheses for research, and through induction, research data provide generalizations to be incorporated into and modify a theory. The essence of theory is that it attempts to explain a wide variety of empirical phenomena.

According to Black an champion a theory is a set of systematically related propositions specifying causal relationships among variables. The ideas in a theory must conform to the following criteria:

1. They must be logically consistent, i.e., there should be no internal contradictions.
2. They must be interrelated.
3. The propositions should be mutually exclusive.
4. They must be capable of being subjected to empirical scrutiny.

2.6 FACT

A fact is regarded as an empirically verifiable observation and theory refers to the relationship between facts. Facts or empirically verifiable observations could never have produced modern science if they had been gathered at random. Facts initiate theory. They lead to rejection and reformulation of existing theory.

Like facts and values, theory and facts also have a closer relationship. As in case of values, facts are the basic raw material of theory. Kant's famous adage may be rephrased as, 'fact without theory is blind theory without fact is empty'. In fact, there exists a continuous relationship between facts and theory, popularly known as 'theory-data-continuum'. If theory is vital to every scientific advancement facts are the building blocks of every science. Both remain in constant interaction. Development in facts leads to development in theory, and vice versa.

In fact, the researcher perceives the concerned or relevant aspects, properties or relations in an event or activity. Fact, as stated earlier, is a purposeful relevant observation. From the observation of similar facts, he goes to the foundation of concepts. A concept is a shorthand representation of a variety of facts. It is an abstraction formed by generalisation

from particulars. It is a generalised term for a class of objects. As such, it helps in classification and measurement of facts.

As a set of directions, or abstraction of certain properties or relation, it directs the researcher to pick out a particular kind of experience. After having classification of facts on the basis of concepts, the researcher analyses the various categories and discovers interrelation among them. From analysis, he goes to the stage of generalisation – making a general statement applicable to a large number of facts – both observed and unobserved. A good number of interconnected generalisations make up a theory.

A theory is facts assembled, put in an order, and seen in a relevant relationship. After coming to the stage of generalisation, one takes a jump or makes a theoretical thrust and speaks for the similar, but hitherto unobserved, facts and events. In a scientific venture, facts, concepts, generalisation, and theory should be based on empirical experience. When we go upwards from fact to theory, we move from validity to generality. Both rarely go together. As we go higher towards generality, which means speaking for a larger number of facts, we gradually lose validity or closeness to all actual empirical facts. The quantum of validity in factual statements differs in proportion to closeness to empirical facts. Scientific method keeps us close to observation of political facts. Theoretical movement takes us higher to generality of facts, but away from validity of observation.

Theory simply means the putting up of the relevant facts under the umbrella of some relation, property or abstraction. This is done on the basis of actual observation of some facts which enables the researcher to include other unobserved facts. For this, he uses the tools of concepts and generalisations. However, the whole structure has to stand on the foundation stone of empirical observation or validity of facts.

On the basis of validation or validity, theoretical statements can be put at four levels:

1. **Factual statements:** These are based on hundred per cent empirical evidence. Being observable, they are fully reliable.

2. **Probabilistic statements:** There are based on empirical evidence, but are applied on similar objects or events. They are hypothetically applied to all of them, and are accepted as true till proved false. They lack cent percent validity, but mostly are regarded as empirical

3. **Hypothetical statements:** They are based on the interrelation of various variables which become a basis to prove them empirically. They help us in knowing the relationship between the change in one variable and the change in another variable. Lesser the ambiguity in the interrelation of variables, greater precision. The mutual relationship makes hypothetical statements more fruitful and valid.
4. **Theoretical statements:** This is the highest stage of theoretical movement on the road to validity. At this level, all facts, probable and hypothetical statements are woven into a widening relationship. The theoretical structure a t this level is more general and universal than the lower three. However, each higher level lends to lose more and more validity.

To illustrate if a vigilant citizen knows all the members of his ward, his knowledge about the ward can be counted valid up to 100 percent. But his generality at higher level remains

limited to few hundred persons only and validity about the people of his ward is not cent percent. His factual knowledge. If applied to members of other words, would only be probabilistic, with increased generality and reduced validity. If they applies the knowledge of the results of his municipal council to the elections of other local bodies, such an attempt can roughly be called as the use of his hypothetical knowledge.

All these levels of statements or knowledge are somehow related to or based on facts. A structure of knowledge originates from simple factual statements and ends in abstract and general statements. All such statements or generation of knowledge presents 'theory-data-continuum'. At the highest level of knowledge or theory, one is able to generate many new hypotheses, and predict unobserved but probable and important facts of political life. Without a higher and more abstract set of concepts and generalisations, one cannot know much about political facts and processes. A theorist cannot stand without a collection of empirical facts.

In all situations, knowledge of a political theorist is based on observation of facts, and their analysis in terms of scientific method. One has to constantly shuttle from facts to theory and theory to facts. But one may stop at the level of facts, their observation or analysis only. He is a political scientist, and not a theorist. He may even go a little beyond the facts and make some statements. Even this attempt does not amount to a theory. A theory emerges in the form of interrelated concepts and generalisations under a certain scheme. A theorist refers to relationship between facts by ordering them in some meaningful way. Each theory has to go beyond facts and events. Thus, a theorist has necessarily to be a scientist, but the two roles can separately be taken up by two sets of scholars.

However, knowledge of facts can tell a lot about their 'what', 'how', 'when', 'where' etc., but remains empirically unable to speak on its 'why'. The understanding of 'why relates to values. If ultimate values or ideas about them are known or shown, the researcher can scientifically study the lower level or secondary values also. As political facts are deeply involved with facts, a theorist has to know a lot about meaning and implication of various values also.

2.7 DIFFERENCES BETWEEN THEORY AND HYPOTHESIS

Many of them belittle evolution because "it is just a theory." Gravity, on the other hand, must be real because it is a law. The words "theory," "facts," "laws" and "hypothesis" have a very specific meaning in the scientific world that doesn't quite match the ones we use in everyday language. A hypothesis is a tentative explanation of an observation that can be tested. It acts as a starting point for further explanation. Theory, on the other hand, is an explanation of some aspect of the natural world that's well-justified by facts, tested hypotheses, and laws. Let us look at more differences between hypothesis and theory given in a tabular column below.

Theory vs Hypothesis

Theory	Hypothesis
A theory explains a natural phenomenon that is validated through observation and experimentation	A hypothesis is an educated guess based on certain data that acts as a foundation for further investigation
It is based on extensive data	It is based on limited data
A theory is proven and tested scientifically	A hypothesis is not proven scientifically
The results are certain	The results are uncertain
It relies on evidence and verification	It relies on the possibility

From the above differences, we can infer that a hypothesis might change significantly as the testing occurs. A hypothesis can either be right or wrong. When a hypothesis is tested and proved true, it becomes a theory.

2.8 SUMMARY

Hypothesis is a tentative generalization which remains to be tested empirically. its functions is to direct our search for the order among the facts. Theory, fact and hypothesis are to be put each in its place in a systematic way. Behind the accumulated data. A **fact** is an occurrence in the real world. The usual test for a statement of fact is verifiability that is whether it can be demonstrated to correspond to experience. Standard reference works are often used to check facts. Scientific facts are verified by repeatable careful observation or measurement by experiments or other means.

2.9 TECHNICAL TERMS

- Variables
- Hypothesis
- Theories
- Fact
- Factual
- Probabilistic
- Theoretical

2.10 SELF ASSESSMENT QUESSTIONS

1. Define hypothesis? Explain theory of Hypothesis?
2. Describe the facts and hypothesis?
3. Describe the difference between theory and hypothesis?

2.11 References:

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LESSON-3

DIFFERENT TYPES OF RESEARCH

Objectives

The objectives of this lesson are to explain the types, significance and characteristics of Research.

Structure

3.1 INTRODUCTION

According to Rajasekar et. al. (2006), research is a logical and systematic search for new and useful information on a particular topic. It is an investigation of finding solutions to scientific and social problems through objective and systematic analysis. It is a search for knowledge, that is, a discovery of hidden truths. Here knowledge means information about matters. The information might be collected from different sources like experience, human beings, books, journals, nature, etc. A research can lead to new contributions to the existing knowledge. Only through research is it possible to make progress in a field. Research is done with the help of study, experiment, observation, analysis, comparison and reasoning. Research is in fact ubiquitous. More precisely, research seeks predictions of events and explanations, relationships and theories for them.

When you say that you are undertaking a research study to find answers to a question, you are implying that the process:

1. Is being undertaken within a framework of a set of philosophies (research approaches);
2. uses procedures, methods and techniques that have been tested for their validity and reliability;
3. Is designed to be unbiased and objective.

Philosophies mean approaches e.g. qualitative, quantitative and the academic discipline in which you have been trained. Validity means that correct procedures have been applied to find answers to a question. Reliability refers to the quality of a measurement procedure that provides repeatability and accuracy. Unbiased and objective means that you have taken each step in an unbiased manner and drawn each conclusion to the best of your ability and without introducing your own vested interest. (Bias is a deliberate attempt to either conceal or highlight something).

Adherence to the three criteria mentioned above enables the process to be called 'research'. However, the degree to which these criteria are expected to be fulfilled varies from discipline to discipline and so the meaning of 'research' differs from one academic discipline to another. The difference between research and non-research activity is, in the way one finds answers: the process must meet certain requirements to be called research. One can identify these requirements by examining some definitions of research. The word research is composed of two syllables, re and search.

'Re' is a prefix meaning again, anew or over again 'Search' is a verb meaning to examine closely and carefully, to test and try, or to probe. Together they form a noun describing a careful, systematic, patient study and investigation in some field of knowledge, undertaken to establish facts or principles. Research is a structured enquiry that utilizes acceptable scientific methodology to solve problems and create new knowledge that is generally applicable.

Scientific methods consist of systematic observation, classification and interpretation of data. Although we engage in such process in our daily life, the difference between our casual day- to-day generalization and the conclusions usually recognized as scientific method lies in the degree of formality, rigorousness, verifiability and general validity of the latter.

3.2 DEFINITION

Research has been defined in a number of different ways, and while there are similarities, there does not appear to be a single, all-encompassing definition that is embraced by all who engage in it.

1. One definition of research is used by the OECD, "Any creative systematic activity undertaken in order to increase the stock of knowledge, including knowledge of man, culture and society, and the use of this knowledge to devise new applications.
2. Another definition of research is given by John W. Creswell, who states that "research is a process of steps used to collect and analyze information to increase our understanding of a topic or issue". It consists of three steps: pose a question, collect data to answer the question, and present an answer to the question.
3. The Merriam-Webster Online Dictionary defines research in more detail as "studious inquiry or examination; especially : investigation or experimentation aimed at the discovery and interpretation of facts, revision of accepted theories or laws in the light of new facts, or practical application of such new or revised theories or laws

3.3 Significance of social research:

1. It includes scientific and inductive thinking
2. It provides new ideas and insights.
3. It promotes the development of logical habits of thinking and organization.
4. It evaluate existing policies and helps to formulate new policies
5. It solves operational problems such as economy, politics, business and government.
6. It helps to improve the level of living in the society.

3.4 Characteristics of Research:

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

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

• **Rigorous** - you must be scrupulous in ensuring that the procedures followed to find answers to questions are relevant, appropriate and justified. Again, the degree of rigor varies markedly between the physical and social sciences and within the social sciences.

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

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

• **Empirical** - this means that any conclusions drawn are based upon hard evidence gathered from information collected from real life experiences or observations.

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

For a process to be called research, it is imperative that it has the above characteristics.

3.5 TYPES OF RESEARCH

Research can be classified from three perspectives:

1. Application of research study
2. Objectives in undertaking the research
3. Inquiry mode employed

Research Application:

From the point of view of application, there are two broad categories of research:
− Pure research and
− Applied research.

1. **Pure research** involves developing and testing theories and hypotheses that are intellectually challenging to the researcher but may or may not have practical application at the present time or in the future. The knowledge produced through pure research is sought in order to add to the existing body of research methods.

2. **Applied research** is done to solve specific, practical questions; for policy formulation, administration and understanding of a phenomenon. It can be exploratory, but is usually descriptive. It is almost always done on the basis of basic research. Applied research can be carried out by academic or industrial institutions. Often, an academic institution such as a university will have a specific applied research program funded by an industrial partner interested in that program.

3.6 RESEARCH OBJECTIVES

From the viewpoint of objectives, a research can be classified as:
− Descriptive
− Correlation
− Explanatory

− Exploratory

1. **Descriptive research** attempts to describe systematically a situation, problem, phenomenon, service or programme, or provides information about , say, living condition of a community, or describes attitudes towards an issue.
2. **Correlational research** attempts to discover or establish the existence of a relationship/ interdependence between two or more aspects of a situation.
3. **Explanatory research** attempts to clarify why and how there is a relationship between two or more aspects of a situation or phenomenon.
4. **Exploratory research** is undertaken to explore an area where little is known or to investigate the possibilities of undertaking a particular research study (feasibility study/pilot study).

In practice most studies are a combination of the first three categories.

3.7 RESEARCH INQUIRY MODE

From the process adapted the two approaches are:
− Structured approach

− Unstructured approach

1. **Structured approach**: The structured approach to inquiry is usually classified as quantitative research. Here everything that forms the research process- objectives, design, sample, and the questions that you plan to ask of respondents- is predetermined.

It is more appropriate to determine the extent of a problem, issue or phenomenon by quantifying the variation. e.g. how many people have a particular problem? How many people hold a particular attitude?

2. **Unstructured approach**:

The unstructured approach to inquiry is usually classified as qualitative research. This approach allows flexibility in all aspects of the research process. It is more appropriate to explore the nature of a problem, issue or phenomenon without quantifying it.

Main objective is to describe the variation in a phenomenon, situation or attitude. e.g., description of an observed situation, the historical enumeration of events, an account of different opinions different people have about an issue, description of working condition in a particular industry. :

3.8 BASIC RESEARCH

Basic research is an investigation on basic principles and reasons for occurrence of a particular event or process or phenomenon. It is also called theoretical research. Study or investigations of some natural phenomenon or relating to pure science are termed as basic research. Basic researches sometimes may not lead to immediate use or application. It is not

concerned with solving any practical problems of immediate interest. But it is original or basic in character. It provides a systematic and deep insight into a problem and facilitates extraction of scientific and logical explanation and conclusion on it. It helps build new frontiers of knowledge. The outcomes of basic research form the basis for many applied research. Researchers working on applied research have to make use of the outcomes of basic research and explore the utility of them.

Research on improving a theory or a method is also referred as fundamental research. For example, suppose a theory is applicable to a system provided the system satisfies certain specific conditions. Modifying the theory to apply it to a general situation is a basic research.

3.9 APPLIED RESEARCH

In an applied research one solves certain problems employing well known and accepted theories and principles. Most of the experimental research, case studies and interdisciplinary research are essentially applied research. Applied research is helpful for basic research. A research, the outcome of which has immediate application is also termed as applied research. Such a research is of practical use to current activity. For example, researches on social problems have immediate use. Applied research is concerned with actual life research such as research on increasing efficiency of a machine, increasing gain factor of production of a material, pollution control, preparing vaccination for a disease, etc. Obviously, they have immediate potential applications.

3.10 HISTORICAL RESEARCH

The historical method comprises the techniques and guidelines by which historians use historical sources and other evidence to research and then to write history. There are various history guidelines that are commonly used by historians in their work, under the headings of external criticism, internal criticism, and synthesis. This includes lower criticism and sensual criticism. Though items may vary depending on the subject matter and researcher, the following concepts are part of most formal historical research: Identification of origin date

- Evidence of localization
- Recognition of authorship
- Analysis of data
- Identification of integrity
- Attribution of credibility

3.11 OTHER TYPES OF RESEARCH

Other types of research include action research (fact findings to improve the quality of action in the social world), explanatory research (searching explanations for events and phenomena, for example finding answer to the question why are the things like what they are?), exploratory research (getting more information on a topic) and comparative research (obtaining similarities and differences between events, methods, techniques, etc.). Within each research group, there are classifications of other research categories.

3.12 QUANTITATIVE RESEARCH

This involves systematic empirical investigation of quantitative properties and phenomena and their relationships, by asking a narrow question and collecting numerical data to analyze it utilizing statistical methods. The quantitative research designs are experimental, correlation, and survey (or descriptive). Statistics derived from quantitative research can be used to establish the existence of associative or causal relationships between variables. Quantitative research is linked with the philosophical and theoretical stance of positivism.

The quantitative data collection methods rely on random sampling and structured data collection instruments that fit diverse experiences into predetermined response categories. These methods produce results that can be summarized, compared, and generalized to larger populations if the data are collected using proper sampling and data collection strategies. Quantitative research is concerned with testing hypotheses derived from theory or being able to estimate the size of a phenomenon of interest.

If the research question is about people, participants may be randomly assigned to different treatments (this is the only way that a quantitative study can be considered a true experiment). If this is not feasible, the researcher may collect data on participant and situational characteristics to statistically control for their influence on the dependent, or outcome, variable. If the intent is to generalize from the research participants to a larger population, the researcher will employ probability sampling to select participants.

In either qualitative or quantitative research, the researcher(s) may collect primary or secondary data. Primary data is data collected specifically for the research, such as through interviews or questionnaires. Secondary data is data that already exists, such as census data, which can be re-used for the research. It is good ethical research practice to use secondary data wherever possible.

Mixed-method research, i.e. research that includes qualitative and quantitative elements, using both primary and secondary data, is becoming more common. This method has benefits that using one method alone cannot offer. For example, a researcher may choose to conduct a qualitative study and follow it up with a quantitative study to gain additional insights. Big data has brought big impacts on research methods so that now many researchers do not put much effort into data collection; furthermore, methods to analyze easily available huge amounts of data have also been developed.

3.13 QUALITATIVE RESEARCH

This involves understanding human behavior and the reasons that govern such behavior, by asking a broad question, collecting data in the form of words, images, video etc. that is analyzed, and searching for themes. This type of research aims to investigate a question without attempting to quantifiably measure variables or look to potential relationships between variables. It is viewed as more restrictive in testing hypotheses because it can be expensive and time-consuming and typically limited to a single set of research subjects. Qualitative research is often used as a method of exploratory research as a basis for later quantitative research hypotheses. Qualitative research is linked with the philosophical and theoretical stance of social constructions.

3.14 SUMMARY

Debates and controversies have concerned the philosophical basis of sociological research and choice of appropriate social research methods. It aimed at answering a research question by means of a research strategy, a research design and use of methods of data collection and analysis. It also includes research in any facet of life in society.

3.15 TECHNICAL TERMS

1) Pure research
2) Applied research
3) Descriptive research
4) Correctional research
5) Explanatory
6) Exploratory
7) Qualitative
8) Quantitative

3.16 ESELF ASSESSMENT QUESTIONS

1. Define research? Explain the significance of research?
2. Explain the characteristics of social research?
3. Describe the different type of research?

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LESSON: 4

SELECTION OF RESEARCH PROBLEM

OBJECTIVES:

The objectives of this lesson are to explain factors, sources and criteria and consideration in the selection of Research Problem

Structure

4.1 INTRODUCTION

Identifying a research problem is indicating a specific area for answering some research question. If the research is to be conducted in business administration, the area of research could be managerial decision, functioning of trade unions, workers beneficiary schemes, strategies for increasing production, reducing problems of strikes planning for future growth and so on. A person interested in undertaking research in social sciences will be concerned with selecting the problem which interests him, which appears problematic to him, or which he thinks need to be investigated for better understanding of society. Initially his ideas may be vague or he may have a diffused notion of particular aspects of the problem to be analyzed, but by reading more literature on the subject and by thinking more and more on it.

4.2 WHAT IS A RESEARCH PROBLEM?

A research problem in general refers to some difficulty which a researcher experiences in context of either a theoretical or practical situation and wants to obtain a

solution for the same usually we say that a research problem does exist if the following conditions are met with:

1. There must be an individual (or group or an organization). Let us call it I to whom the problem can be attribute. The individual or the organization as the case may be occupies an environment say N which is defined by values of the uncontrolled variables.
2. There must be at least course of action sayC1 and C2 to be pursued. A course of action is defined by one or more values of the controlled variables. For example the number of items purchased at a specified time is said to be one course of action.
3. There must be at least two possible outcomes, say O1and O2 of the course of action of which one should preferable to the other. In other words, this means that there must be at least one outcome that the researcher wants, i.e., an objective.
4. The courses of action available most provide some chance of obtaining the objective, but they cannot provide the same chance, otherwise the choice would not matter.

4.3 OBJECTIVES OF SELECTION OF RESEARCH PROBLEM

1. To understand some basic concepts of research and its methodologies.
2. To identify appropriate research topics.
3. To select and define research problems and its parameters.
4. To prepare a project proposal or to write a research report.

4.4 COMPONENTS IN RESEARCH

In every research, there are four components, each having its own interest in research. These four components are:

1. Researcher (who conducts the study,
2. Research sponsor (who pays for the research),
3. Research participants (who replies to questions), and
4. Research consumer (who uses the findings of the research).

The researcher's interest may be advancement of knowledge, filling up a gap in knowledge, academic curiosity of some observed phenomenon, problem solving, testing a hypothesis, theory construction, getting status and recognition, getting money replication of some previous research and so on. The sponsor's interests may be policy framing, programme evaluation, encouraging academic interests, getting innovative ideas for growth of his concern, solving problem in his establishment, and the like. The participants (workers, students, villagers, slum-dwellers, alcoholics, criminals, women, etc.) interests may be cooperating with the researcher to the extent of finding solution for solving their problems or just understanding society and social phenomena. The research consumer's (entrepreneurs, government, policy planners, etc.) interests may be solving a problem future planning, etc.

4.5 FORMULATING THE RESEARCH PROBLEM

There are two types of research problems, those which relate to states of nature and those which relate to relationship between variables. At the very outset the researcher must single out the problem he want to study, i.e., he must decide the general area of interest or aspect of subject matter that he would like to inquire into. Initially the problem may be stated in a broad general way and then the ambiguities, if any, relating to the problem be resolved.

Then, the feasibility of a particular solution has to be considered before a working formulation of the problem can be set up. The formulation of a general topic into a specific research problem thus constitutes the first step in a scientific enquiry. Essentially two steps are involved in formulating the research problem, understanding the problem thoroughly, and rephrasing the same into meaningful terms from an analytical point of view.

The best way of understanding the problem is to discuss it with one's own colleagues or with those having some expertise in the matter. In an academic institution the researcher can seek the help form a guide who is usually an experienced man and has several research problems in mind. Often, the guide puts forth the problem in general in general terms and it is up to the researcher to narrow it down and phrase the problem in operational terms. In private business units or in governmental organizations, the problem is usually earmarked by the administrative agencies with whom the researcher can discuss as to how the problem originally came about and what considerations are involved in its possible solutions.

4.6 FACTORS INVOLVED IN THE SELECTING OF TOPIC

The important factors to be born in mind while selecting a right problem are:

1. The problem is focused on assessing relationship between two or more concepts or variable.
2. It is stated clearly and unambiguously
3. General problems is converted into several research questions
4. It is possible to collect data pertaining to the problem.
5. If does not represent a moral or ethical position (e.g. instigating staff of competing agency togon strike).

4.7 SOURCE OF THE SELECTION OF TOPIC

1. Field of one's own professional work and specialization, taking up unstudied or unsolved problems. This might coin side the worker's professional choice i.e., industrial with relations, welfare schemes etc.
2. A teacher could come across critical problems in his lectures, seminars and discussions with stimulating students and colleagues pursuing the subjects he is personally handling.
3. Extensive reading will point out gaps in research fields and lead to new openings.
4. Analysis of an area of knowledge in which one is specially interested e.g. criminology, family, etc.,
5. Extension of studies already under way from which put forth new offshoots" like Pasteur's discovery of the principle of immunization of Beverley's insight into the use of radium in the treatment of cancer.

4.8.1 CHARACTERISTIC OF RESEARCH PROBLEM

Any research is a difficult task to achieve and research needs to do a great effort. Selection of research topic is the first step to success.

1. Research topic must be very clear and easy to understand. It should not distract people.
2. If a topic is well defined is the only way to successful research. The topic should not create doubt and double impression.

3. Easy language is a key to success. Use technical words if necessary otherwise focus of simplicity.
4. Research title should be according to the rules of titling. There are different rules of titling, a research must aware before writing a research title.
5. While selecting a research topic current importance of a researcher should also be considered. Topic should not be obsolete and it should have great importance in the current day.

4.8.2 CRITERIA FOR THE SELECTION OF TOPICS:

Significance of the discipline: A problem which the researcher is selecting should have significance to the profession of discipline. A research problem is significant for a discipline when it is directed to develop or refine the body of professional knowledge. The following are some of the criteria to assess the significance to a profession.

1. Originality: every research should be new and unique in itself.
2. Therefore it is the responsibility of the researcher that innovative knowledge is used for selecting a research problem so as to extend the growth of existing body of knowledge in a profession.
3. Feasible: Feasibility is an essential consideration of any research project. A research should be feasible in terms of time availability of subjects, facilities, equipment and money and ethical considerations.
4. Administrative support: Many researches require administrative support. Financial and psychological support is essential to conduct research.
5. Peer support: many research ideas have failed because the researcher did not receive any peer support.
6. Availability of subjects: Sometimes the potential subject may not meet the study criteria or may be unwilling to participate in the study or may be already participating in another study. Therefore the availability of the subject should be well ensuring in advance.
7. Researcher competence: A research problem can only be feasible if it is in accordance with the researcher's competence. A researcher should be capable to handle a given research problem.
8. Ethical soundness: the research problem selected should be cleared by the ethical committee without undue hurdles. A very important topic of research cannot be considered feasible until and unless it is in accordance with the ethical guidelines.
9. Solvable/Researchable: Only a research problem that is solvable is considered to be good. A researcher should minimize the chance of insolvability. This aspect of the problem may pose ambiguity and hence a researcher should ensure the solvability of the problem that is elected.
10. Current: A good research problem must be based on the current problems and needs of the profession. Thus the result generated will be of more use. Furthermore, more number of the professionals will be interested in the research conducted on the current issues of their profession.
11. Interesting: A research problem must be as per the motivation of the researcher and it should be fascinating to the researcher. Thus a research will be conducted with full enthusiasm and not merely for its accomplishment.
12. Clear and unambiguous: The research problem selected should be clear in its ability to reflect or give clues regarding the various aspects of methodology.

13. Empirical and verifiable: The research problem selected to be researched should amenable to scientific enquiry. The research should be verifiable by scientific calculations.
14. Relevant: the research problem chosen to be researched should be relevant to the profession, time need and the competency of the researcher.
15. Systematic: The research problem should be systematic in the sense the researcher should have arrived at the problem statement following relevant selection parameters or criteria.

4.10 FOCUS OF SELECTION

Once the research topic is selected, it become necessary to select specific aspects for analysis. Four such aspects which need attention are units of analysis, variables, anticipated relationships and hypothesis.

1. Selecting units of analysis:
   The cases selected for study by the researchers depend on the theme of study and the objective of research. The units of analysis could be individuals, groups of people, social structures, social system, social positions, office holders, organizations, social relations hips, etc. for example studying the Kargil war widows, the researcher divides to visit those villages and cities in selected states like Punjab, Haryana, Rajasthan and even Nepal from where soldiers are recruits most the military head quarters from where the ex-gratia money is distributed or from where the cases were reported in the media.
2. Selecting variables:
   Variables to be analyzed in a research may vary from case to case because of difference in research questions. Even the research questions may vary from one study to another study on the same theme. Thus explanatory variables have to be identified before undertaking the research the research so that extraneous variables may be ignored/isolated similarly, independent variable in one study may be dependent in other study. In relation to specific independent and dependent variables, the antecedent and intervening variables may also be identified in the research.
3. Selecting anticipated relationship for research:
   After identifying units of analysis and variables in the problem selected for research, it is equally important to select the specific relationships which ae believed to exist among the phenomenon. The research is therefore focused on testing what particular relationships are anticipated. Research cannot be conducted in a haphazard way in which any variable or relationship may be taken for analysis. Depending on the goals of study, it has to be decided in advance which relationships are to be observed ad which ones are to be ignored and how to interpret them.
4. Stating hypothesis:
   After selecting the problem of research and anticipating some relationship between certain variables, direct or inverse, the researcher may start his research work either only with a vague notion of the problem or he may be motivated to follow some specific direction. Some start with formulating and giving statements of a tentative nature regarding the relationship of phenomenon under study with some specific variables. Whether these are scientifically maintainable or not will depend on the data collected. For example, consider the following hypothesis:
   1. Husbands using more negative behavior criticizing, complaining, dominating, irrationally arguing will face frequent conflicts in family.

2. Widows deviating from conservative traditional values and adopting innovative modern values will easily succeed in establishing their self-identity an adjusting in life.
3. Foreign investment will not stimulate more economic growth than domestic investment.
4. Voluntary turnover will be higher among employees who perceive them to be inadequately paid than among employers who perceive them to be adequately paid.
5. There is positive relationship between sale of video games and the presence of younger children in the home.
6. Flexible decision-makers will process less accountable data than those with integrative decision styles.
7. Opinion leaders are more affected than non-leaders by mass media communication sources

Testing of these hypotheses will provide a definite direction to the research.

4.11 FACTORS AFFECTING FORMULATION AND SOLUTION OF THE PROBLEM

The scientific sill reveals itself in the choice of the problem. The formulation of the problem is an artistic gift. The solution of a problem requires technical brilliance, the solution and formulation of the problem involves the following consideration.

1. Practicability:
   The question whether it is practicable to carry out the various steps in research is to be considered before a problem is formulated.
2. Urgency:
   A second consideration is the urgency of the issue. Some problems need more urgent investigation than other.
3. Anticipation:
   The researcher must anticipate the problems needing solution in the immediate future.
4. Resources:
   Another consideration is the availability of research resources.
5. Available information:
   Another consideration is the availability of the information to the researcher.
6. Field of specialization:
   The researcher usually chooses a problem in the field of his specialization.
7. Administrative consideration
   Before a problem is formulated, the researcher must see whether the personnel are available for the administration of the project.
8. Equipment:
   Another type of resources related to mechanical and other equipment for sorting, tabulating, processing etc.
9. Operational Funds:
   Another factor is the working capital necessary for operational purposes.
10. Time, Cost factor:
    The research student should estimate the time and cost at his disposal for carrying out the project before he formulates the problem.

11. Administrative cooperation:
    Administrative cooperation is essential for the successful implementation of any research programme.
12. Readily available Techniques:
    The problem formulated should fit in to the readily available techniques and tools of the research.

4.12 SUMMARY:

We may conclude by saying that the task of defining a research problem, very often, follow a sequential pattern the problem is stated in a general way, the ambiguities are resolved, thinking and rethinking process results in more specific formulation of the problem so that it may be a realistic one in terms of the available data and resources and is also analytically meaningful. All this results in a well defined research problem that is not only meaningful form an operational point of view, but is equally capable to paving the way for the development of working hypothesis and for means of solving the problem itself.

4.13 TECHNICAL TERMS:

I. Selection of research problem.
II. Problem formulation
III. Factors involved
IV. Analysis
V. Variables
VI. Stating hypothesis

4.14 Exercises:

1. What is research problem? Define the main issues which should receive the attention of the researcher in
2. Formulating the research problem.
3. Discuss the factors effecting the formulation and solution of the problem.
4. Explain the characteristics and focus of selection of research problem.

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LESSON - 5

RESEARCH DESIGN - DIFFERENT TYPES OF RESEARCH DESIGN

OBJECTIVES

The objectives of this lesson are to explain Role Types and Characteristics of Research Design.

Structure

5.1 INTRODUCTION

Before examining types of research design it is important to be clear about the role and purpose of research design. We need to understand what research design is and what it is

not. We need to know where design fits into the whole research process from framing a question to finally analyzing and reporting data. .

Research design refers to the overall strategy utilized to carry out research that defines a succinct and logical plan to tackle established research question (s) through the collection, interpretation, analysis and discussion of data.

A good research depends on two aspects of its designing first, identify what one wants to find out i.e., properly posing the problem or properly phrasing the issues to be studied or logical structuring of inquiry and second, determining how to it.

5.2 DEFINITIONS

Design of social research has been defined in the following terms:

1. According to Young: - the design results from controlling general scientific model into varied research procedure.
2. E.A. Suchman : has defined the design to scientific social research as given below: "A research design is not a highly specific plan to be followed without deviation, but rather a series of guide posts to keep one headed in the right direction"
3. Russel Ackoff has defined it as "Design is the process of making decision before a situation arises in which the decision has to be carried out. It is a process of deliberate anticipation directed towards bringing an unexpected situation under control.
4. According to Henry Manheim: research design not only anticipates and specifies the seemingly countless decisions connected with carrying out data collection, processing and analysis but it presents a logical basis for these decisions.
5. Prof. Miller: has defined the planned sequence of the entire process involved in conducting a research study.

5.3 MEANING OF RESEARCH DESIGN:

Design means adopting that type of technique of social research which is not suited for the research and study of the problem. For investigation, study and research of problem, proper material has to be selected and collected. This collection of data determines the study and it has to be done according to design.

The design means drawing an outline of planning or arranging details. It is a process of making decision before the situation arises in; which the decision has to be carried out. Research design is planning a strategy of conducting research it plans as to what is to be observed, how it ;is to be observed, when/where it is to be observed, why it is to be observed, how to record observations, how to analyze/interpret observations and how to generalize. Research design is thus a detailed plan of how the goals of research will be achieved.

5.4 ROLE OF DESIGN AND SOCIAL RESEARCH:-

Design very much depends on the relevant data collected according to the requirement of the problem.

This type of the problem that has been taken up for the study and knowledge of the facts available about the problem.

In spite of it the fact remains that design occupies an important place in the field of social research.

Jahoda and others have defined the role of the design in the following words:

"In the part the nature of the problem ad in part the study of knowledge in a given area will determine type of study which is most appropriate."

This role may be summed up in the following:

1. Definition of the problem and the selection of proper measurements.
2. Decisions to include relevant and exclude irrelevant facts.
3. Diagnostic study

5.5 FUNCTION OF THE RESEARCH DESIGN

1. The Research Design gives focus to the study by providing and operational plan to complete the study within the scheduled time.
2. It provides direction on methodological process are needed to obtain valid accurate and objective results from the study.
3. The Research Design comprises series of decisions involves to test the hypothesis or to answer.

5.6 GOALS OF RESEARCH DESIGN

Black and champion have given three important function of research Design. These are described as under.

1. **It provides blueprint:**
   just as a house builder faces many problems without drawing and plans, i.e., where to place foundation, what materials are required, how many workers are require, how many rooms are to be constructed, how many doors and windows are needed in a room, on which side is the door/window to be given, how big its to be the door/window and so on, similarly a researcher face many problems like what sample is to be taken, what is to be asked, what method of data collection is to be used, and so forth. Research plan minimizes all these problems of the researchers because all decisions are taken before head.
2. **It limits (dictates) Boundaries of research activity.**
   This refers to determining whether only one (or selected) cause out of many causes is to

Be examined only one (or a few selected) hypothesis is to be tested, only attitudes of students of one educational institution are to be studied and so on. Since the objectives are clear ad the structure is also provided, systematic investigation is possible.

3. **It enables investigation to anticipate potential problems:**
   The research studies available literature and learns about new /alternate approaches, e.g., he gets an estimate of personnel requires a investigators, cost, possible measurements of problems and so forth.

5.7 PHASES IN RESEARCH DESIGNING

The research process proceeds in six phases as under:

1. Specifying the problem/topic to be studies
2. Framing research design
3. Planning a sample (probability or non-probability or combination of the two).
4. Collecting the data.

5. Analyzing the data (editing, coding, processing, tabulating).
6. Preparing the report.

5.8 TYPES OF RESEARCH DESIGN

Research design maybe for the convenience of study, categorized under the following heads:

1. Exploratory or formulative Design
2. Historical design
3. Descriptive design
4. Diagnostic design: It gives full information on research topics
5. Experimental Design
6. Analytical Design

The researcher will decide which particular design appropriate for his study. He selects a particular design depending on the research problem. In certain cases, a combination of two or more types of design may be necessary, if the study is complex.

1. **Exploratory or Formulative Design:** Exploratory studies require exploratory design. It is also called formulative Design. In exploratory studies, we discover new ideas and insights. These studies try to identify sound questions, promising concepts and hypothesis; studies of entirely of new filed, which has not yet developed, are called exploratory studies. The exploratory design must be flexible. It has to consider many aspects of problem. In these studies the researcher tries to get familiarity with the phenomenon. Exploratory study is also called an experience survey. It provides information and experience about the practical cases these studies are helpful in the development of the theories.
2. **Survey of literature**: In Exploratory studies, literature may not be available largely. Hence the literature of the related fields is a good source of information. Journals articles and research reports dealing with similar areas are other sources of information.
3. **Descriptive Research Design**: The major goal of a descriptive research is to describe events, phenomena and situations. Since description is made on the basis of scientific observation, it is expected to be more accurate and precise than casual.
   Some examples of descriptive research are: the nature and magnitude of domestic violence against women, the problems and adjustment of war widows, alcoholism among youth, sub-culture of hostlers, exit polls conducted by various organizations describing the voting pattern of electorate and so forth.
4. **Experimental Research Design**: it is a design in which some of the variables being studied a manipulated or which seeks to control conditions within which persons are observed. Here control means holding one factor constant while other are free to vary in the experiment. One variable is manipulated and its effect upon another variable is measured, while other variables which may confound such a relationship are eliminated or controlled.
5. **Analytical Research Design**: Analytical studies require analytical design. Experimental or analytical design is almost the same. If analysis takes place along with experiment it becomes analytical study. Analytical study need not always employ experimental method.

Descriptive studies form a basis for analytical study. In analytical problem, we are interested in the how and why. Analytical studies examine the relationships existing among already described phenomena. Thus descriptive studies form the basis for analytical studies.

The analytical study is basically concerned with the problem of ascertaining causality i.e., to say it answer the question of how and why.

5.9 MAJOR STEPS IN PREPARING OF THE RESEARCH DESIGN

1. Research of earlier literature: reviewing of the literature on the area of research is a preliminary step before attempting to plan the study. It is essential to review all the relevant material connected with the problem chosen.
2. Sources of information to be tapped: The sources of information to be tapped vary with the interest of the researcher and the type of his study. The sources are divided in to documentary and field source.
3. Development of Bibliography: As soon as the consultation of available source is begun the development of bibliography preferably with annotations should be undertaken.
4. Nature of the Study: Whether it is a statistical study case study or a comparative study or an experimental study.
5. Objectives of Study: The objectives of the research study should be compiled in clear-cut terms. The objectives of course differ with the nature of studies and goals to be attained.
6. Socio –cultural context of study: If the problem under the investigation related to human beings then it is necessary to ascertain the socio-cultural behavior pattern of the persons.
7. Geographical areas to be covered: It is essential to determine the geographical area to be covered in connection with the research study.
8. Periods of time to be covered: In the case of historical studies it is necessary to determine the period to be encompassed. So that exploration of the problem will be made easier and clear.
9. The basis of selecting data: it is more economical and efficient to base studies on samples rather than to study the Universe.
10. Techniques of study: in the stage a research design is the determination of suitable techniques for collecting the necessary date.
11. Chapter Scheme: the preparation of a chapter out line in the last step in planning the thesis/assertion and it is a useful first step in writing the rough drafts some of the heading may need to be changed as the investigation progresses.

5.10 IMPORTANT STEPS (CONTAINING IN RESEARCH DESIGN)

1. Where and when the research should be conducted. (Research Setting)
2. What information to be collected.(Qualitative/Quantitative)
3. From whom the information has to be collected(Subjects or respondents)
4. How this respondents should be selected (should be selected sample or study the whole population (sampling Method)}
5. How the information should be collected(Data collection instrument)
6. Which variables need to be studied (Depended/independent variable)
7. How the variables should be measured.
8. How should the information collected he organize and analyse.(Statistical package)
9. What type of statistical method will be employed for analyzing the significance?

5.11 CHARACTERISTICS OF GOOD RESEARCH DESIGN

The advantages of good designing of research can be achieved if more than one method of data collection is kept in mind, though this may increase the cost, time and complexity of the research. However, this is necessary because no one method can be perfect for data collection. Use of more than one method gives confidence to the researcher about reliability in his findings. Conventionally, till now, the researcher about reliability is focused only on two types of variables, dependent and independent. In descriptive research also, relationship between these two types of variables is explain. But now the trend is to deal simultaneously with multiple variables in explanatory research. For example drug abuse among youngsters is now explained in terms of multiple variables like lack of parental control, impact of friends, getting excess pocket money, curiosity etc. it is now believed that explaining dependent variable in terms of only one independent variable will not be logical explanation. It will be inaccurate and incorrect information. Multivariate analysis on the other hand can yield more correct assessment of the phenomenon under study.

5.12 THE PREPARATION OF RESEARCH DESIGN HAS THE FOLLOWING ADVANTAGES

1. Save a lot of researchers time
2. Directs researcher to prepare himself for executing the various activities systematically.
3. Enables resource planning procumbent in right time
4. Ensure project time schedule
5. Instills and builds up confidence in the student.
6. Designing helps in giving useful conclusion (in the form of hypothesis/theories).

5.13 CONCLUSION

These are the important points to be considered in formulating any research design. All these steps are to be put on paper to avoid ambiguity at the later stage. Reliance on the results can be placed only when the research work has been carefully planned from the stat to finish.

5.14 TECHNICAL TERMS

A. Exploratory Design
B. Descriptive Design
C. Analytical Design

5.15 SELF ASSESSMENT QUESTION

1. Define Research Design? And discuss meaning, importance and advantages of Research Design.
2. Discuss the Characteristics of Research Design.
3. Explain the various types of Research Design.

5.16 Reference Books:

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LESSON – 6

HYPOTHESIS

OBJECTIVES

The objectives of this lesson are to explain the meaning, types, and characteristics of hypothesis.

Structure

6.1 INTRODUCTION

Hypothesis is important and tool of scientific research. Hypothesis is the working instruments of theory. Hypothesis can be reduced from theory and form other hypothesis. Hypothesis can be tested and shown to be probably false and they are the powerful tool for the advancement of knowledge because they enable the person to get out of him/her self.

6.2 MEANING

A hypothesis is a tentative generalization the validity of which has gets to be tested. A hypothesis of its initial stage may be an imagined ideas or more guess. A hypothesis is based on accumulated previous knowledge. A hypothesis made in order to find out the correct explanation of phenomenon. Through investigation on the basis of hypothesis facts are observed and collected when by verification. The hypothesis is found to be true a theory is obtained.

6.3 DEFINITIONS

1. George. A. Lumberg: The hypothesis is tentative generalization the validity of which remains to be tested in its most elementary stage the hypothesis may be in hunch guess imaginative ideas which become the basis for action or investigation.
2. Webster: Hypothesis is a preposition condition or principle which is assumed perhaps without believes in order to draw out its logical consequences and by this method to test its accord with facts which are known may be determined.
3. Goode and Hatt: The formulation of deduction however constitutes a hypothesis is verified it becomes part of theoretical construction.

6.4 NATURE OF HYPOTHESIS

A scientific justified hypothesis must meet the following criteria:

1. It must accurately reflect the relevant sociological fact.
2. It must not be in contradiction with approved relevant statements of other scientific disciplines.
3. It must consider the experience of other researchers.

Hypothesis cannot be described as true of false. They can only be relevant or irrelevant to the research topic. For instance, the causes of poverty in a village can be explored in terms of :

a) Low development of agriculture (caused by lack of irrigation, sandy soil, erratic rainfall and use of traditional agricultural implements) causes poverty.
b) Lack of infrastructure (electricity, roads, markets) causes poverty.
c) Barriers in rural development are resource barriers (water, soil, minerals), support barriers (rainfall, irrigation, livestock) and social system barriers (credit, infrastructure, extravagant expenditure and market barriers).

The important hypothesis could be:

1. Rural poverty is positively co-related with availability of and accessibility to credit.
2. Rural poverty is the result of lack of infrastructural facilities.
3. Poverty is associated with extravagant social expenditure.
4. Rural poverty is adversely related to resource barriers (water, soil, minerals).

6.5 FUNCTIONS OF HYPOTHESIS

1. A hypothesis is to adequately explain all the facts connected with the hypothesis.
2. It enables us to direct enquiry along the right lines. It suggests experiments and observations. It helps to collects necessary evidence in order to discover the order of nature.
3. Hypothesis determines the method of verifications as well as the procedure for enquiry. Hypothesis limits the scope of enquiry to a manageable area. Instead of random collection of data it enables us to search only for relevant facts.
4. It leads to the discovery of laws. It explaining of facts and laws and thus seeks to verify knowledge.
5. Hypothesis leads to conclusion which is sometimes significant for the advancement of knowledge. The significance of the object or event can be determined by hypothesis.
6. A valid hypothesis does not go against it traditionally established knowledge.
7. A valid hypothesis suggests an explanation which appear seasonable true in the prepare state of knowledge.

6.6 SOURCES OF HYPOTHESIS

1. General culture: It is not only helps to formulate a hypothesis also to guide its trend. The culture has a great influence upon the thinking process of people and hypothesis may be form to test one or more of ideas.
2. Scientific theories: The theory gives us the basic idea of what has been formed be correct.
3. Analogies: Hypothesis is formed analogies similarity between the phenomenon is observed and hypothesis is formed it whether the respect.

Types of Hypothesis:

There are two types of hypothesis

1. Directional hypothesis is one that stipulates the direction of the expected difference or relationship
2. Non-directional hypothesis does not establish any direction between the expected relationship and differences.

Hypothesis Testing:

The major purpose of hypothesis testing is to chosen between two competing hypothesis about the value of a population parameter, e.g., one hypothesis might claim that the wages of men and women are equal, while the alternative might claim that men make more than women.

Null Hypothesis:

If we are to compare method A with method B about its superiority and if we proceed on the assumption that both methods are equally good then this assumption is termed as the null hypothesis. The null hypothesis is assumed to be true unless there is strong evidence to the contrary. Similar, to how a person is assumed to be innocent until proven guilty. The hypothesis actually to be tested is usually given the symbol Ho.

6.7 CHARACTERISTICS OF GOOD HYPOTHESIS

- Simplicity
- Specific in nature
- Clarity or conceptual clarity
- Brief or brevity
- Related to theory
- Related to technique or method
- Capable of empirical test or experience.

1. Simplicity: A hypothesis should e simple. According to young: The mere insight the researcher has into the problem, the simpler will be his thesis about it. That hypothesis should be based on proper knowledge. If having this knowledge, the researcher shall be able to formulate the hypothesis in a simple manner.

2. Specific in Nature: By simplicity, Hypotheses should neither be too general or vague. It means that it should be specific and quite narrow and up to the point. It should not involve the investigator into unnecessary roaming about discussions.
3. Conceptual clarity: The hypothesis should be clear cut. It means that it should lay down the concept quite clearly and the underlying concept of hypothesis should be in properly of a general nature and universally accepted terms in the scientific world without unnecessary debates and discussions. They help the conceptual clarity.
4. Brief or Brevity: Hypothesis is the curse of the problem it should be brief to make observation possible means that should be stated in scientific terms. This would help for better understanding of the underlying concept and meaning.
5. Related to techniques and method:
6. Related to theory: Hypothesis must be corollary or un continuation with the theory already verified. If it Is there, it will help, lead to coordination and consolidation and ultimately formulation of a broader theory which is helpful in the development of the science. It the theory of hypothesis is related to theory. It can also be put up to test.
7. Capable of empirical test of experiment: the workable hypothesis should be based on the existing experience and capable of empirical test. It having the knowledge of facts, existing technique and the problem about which is making investigation, we shall be able to march ahead towards successful results.

6.8 IMPORTANCE OF HYPOTHESIS

Hypothesis is the basic function of scientific research. it simple brief and clear at scientific research. If simple, brief and clear scientific hypothesis has been formulated there shall be no difficulty for the investigator to go ahead in the field of research. Its utility or importance for social research may be studied under the following heads:

- It provides guidance
- Gives point to enquiry
- Helps in selecting relevant and pertinent facts, and
- Helps in drawing specific conclusions.

1. Guidance: hypothesis helps the investigator in knowing the direction in which he should see it so that he may test the foundation of the hypothesis. If a person is proceeding in the correct direction, he reaches his destination without wasting much of the time. Similarly if an investigator is proceeding in the proper direction, he shall reach proper conclusion and save the botheration of trial and error.
2. Gives necessary lead to enquiry: scientific researcher has to know and proceed specifically on certain definite line to find out hypothesis provides proper point and direction to that investigation.
3. Helps in selecting relevant and pertinent factors: once through hypothesis we are able to get direction and the point, out task become easier, and the researcher is able to eliminate the irrelevant facts and concentrate only on the relevant facts. Through hypothesis he is able to know the pertinent facts P.V. Young has rightly said.

> "The use of hypothesis prevents a blind research and indiscriminate gathering of masses of data which may late prove irrelevant to the problem under study."

4. Helps in Drawing specific conclusion: It hypothesis is rightly drawn and scientifically formulated; it helps the investigator to proceed on the correct line of study. As a result of this progress, he is able to drawn proper conclusions.

This is what GODE & HATT have stated in the following lines:-

"Without hypothesis, the research is unfocussed, random empirical wondering. The results cannot be studied as facts with clear meaning. Hypothesis is a necessary link between theory and investigation which lead to discovery of addition to knowledge.

6.9 THE LEVEL OF SIGNIFICANCE

This is very important concept in the context of hypothesis testing. It is always some percentage (usually 5% which should be chosen with great care thought and reason. In case, we take the significance level at 5% then this implies that Ho will be rejected when the sampling result (i.e., observed evidence has a less than 0.05 probability of occurring if H0 is true.

In other words, the 5%level of significance means that researcher is willing to take as much as a 5% happens to be true. Thus that significance level is the maximum value of the probability of rejecting Ho when it is true and is usually determined in advance before testing the hypothesis.

6.10 QUALITIES OF HYPOTHESIS

- Hypothesis should be clear and precise. If the hypothesis is not clear and precise, the inference drawn on its basis cannot be taken as reliable.
- Hypothesis should be capable of being tested.
- Hypothesis should state relationship between variables, it happens to be relational hypothesis
- Hypothesis should be limited in scope and must be specific.
- Hypothesis should be stated as far as possible in most simple terms, so chat the same is easily understandable by all concerned.
- Hypothesis should be consistent with most known facts i.e., it must be consistent with a substantial body of established facts.
- Hypothesis should be amenable to testing within a reasonable time.
- Hypothesis must explain the facts that gave rise to the need for explanation. This means that by using the hypothesis plus other known and accepted generalization, one should be able to deduce the original problem condition.

6.11 SOURCES OF DERIVING HYPOTHESIS

The following sources have been identified for deriving hypothesis:

Cultural values of society:

American culture, for example, emphasized individualism, mobility, competition and equality, while Indian culture emphasized tradition, collectivism, karma and attachment. Therefore, Indian cultural values enable us to develop and test the following hypothesis.

1) Residential jointness in Indian family has decreased but functional jointness continues to exist.
2) Divorcee is used a last resort by a women to break her marriage
3) Caste is related to voting behavior among Indians.
4) Indian family comprises of not only primary and secondary kin but most often of tertiary and distant kin too.

Past research

Hypothesis is often inspired by past research. For example, a researcher studying the problem of student unrest may use the finding of another study that student having spent two or three years in the college/university take more interest in students problems in the campus that fresher's; or that students with high ability and high social status participate less in students agitations than those who have low ability and low social status. Such hypotheses could be used either to replicate past studies or revise the hypotheses that the alleged correlation does not exist.

Folk wisdom

Sometimes researchers get the idea of a hypothesis from commonly helf lay beliefs, e.g., caste affects individuals behavior, or that geniuses lead unhappy married life, or married women without children are less happy, or that young illiterate married girls are more exploited in joint families, or that being an only child creates barriers in child's development of some personality characteristics and so on. Although social scientists are often accused of stating the obvious, social researchers who test a hypothesis based on what everybody knows is true often find that it is not true after all.

Discussions and conversations

Random observations during discussions and conversations and reflections on life as a person throw light on events and issues.

Personal experience

Very often researchers see evidence of some behavior pattern in their daily lives.

Intuition:

Sometimes the investigators get a feeling from inside that certain phenomena are correlated. The suspected correlation leads the investigator to hypothesis a relationship and conduct a study to see if his\her suspicions are confirmed. For example living in a hostel for a gew years given an idea to the hostler that lack of control leads to deviant behavior. He/she therefore decides to study hostel sub-culture.

Hypothesis can be deducted from theory itself, i.e., theory points out the direction of research. For example, a hypothesis may be deduced from Frustration Aggression Theory that "preventing children from reaching desire goals (frustrations) with result in their aggressive behavior.

Relation between theory and hypothesis;

We cannot clearly demarcate boundaries between theory and hypothesis. Hypothesis is formed at the start of the research. Theory is one of the major sources of hypothesis. We develop propositions and statements from out of the theory. At frist stage of enquiry, a hypothesis is made, which is only a tentative supposition of guess. When a hypothesis is verified and found to be true, it becomes a theory. This theory when it works satisfactorily and is proved, is generally accepted. A science begins and ends in facts. As concrete experience, facts suggest hypothesis. The hypothesis ripens in to a theory.

6.12 SUMMARY

Hypothesis is a tentative generalization which remains to be tested empirical. Its function is to direct our search for the order among the facts. There are three types of hypothesis. 1. It may affirm characteristics of object. Persons and events. 2. It may deal with the association among variables. #. It may assent causal relationship between two variables.

The sources of hypothesis include findings of earlier studies, past experiences, insight, and existing theories. There are four criteria for testing hypothesis i.e., Null hypothesis , defining concepts, definition of concepts, identifying variables, often the hypothesis itself will be a reflection of the theory.

The hypothesis should be related to a body of theory or some theoretical techniques. This, of course, sensible requirement applicable to any problem. The hypothesis should be formulated only after due thought has been given to the method or techniques that can be used to measure the concepts and variables incorporated in the hypothesis.

6.13. TECHNICAL TERMS

I. Hypothesis
II. Null Hypothesis
III. Sociological Facts
IV. Variables
V. Concepts.

6.14. SELF ASSESSMENT QUESTIONS

1. Define Hypothesis? Explain its nature and function of hypothesis?
2. Explain source and importance of Hypothesis?
3. Explain Good characteristics of Hypothesis?
4. Discuss the Qualities of a good Hypothesis?

6.15. REFERENCE BOOKS.

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LESSON-7

SIGNIFICANCE OF SAMPLING IN SOCIAL RESEARCH

OBJECTIVES

The objectives are to understand the importance of sampling, steps in sampling process and sampling and Non sampling error.

Structure

7.1. INTRODUCTION

In research design, population and sampling are two important terms. A population is a group of individuals that share common connections. A sample is a subset of thepopulation. The sample size is the number of individuals in a sample. The more representative the sample of the population, the more confident the researcher can be in the quality of the results.

In social sciences, sampling is defined as the process of choosing a subset of the population that is being studied, in order to gain statistical data on which the research will be based on. It is a way to collect information about a certain demographic without having to analyse and study the entire population. Sampling is a widely used method among social scientists mainly because it is a rather simple, convenient, and cheap research technique.

7.2. SAMPLING

Sampling is the statistical process of selecting a subset (called a “sample”) of a population of interest for purposes of making observations and statistical inferences about that population. Social science research is generally about inferring patterns of behaviors within specific populations. In any study the entire populations cannot be studied because of

feasibility and cost constraints, and hence, representative sample must be selected from the population of interest for observation and analysis. It is extremely important to choose a sample that is truly representative of the population so that the inferences derived from the sample can be generalized back to the population of interest.

Sampling is the procedure a researcher uses to gather people, places, or things to study. Sampling is the process of selecting units (e.g., people, organizations) from a population of interest so that by studying the sample we may fairly generalize our results back to the population from which they were chosen .Sampling is the process of selecting units (e.g., people, organizations) from a population of interest so that by studying the sample we may fairly generalize our results back to the population from which they were chosen. The process of creating a sample that correctly reflects the makeup of the whole population. Researchers usually cannot make direct observations of every individual in the population they are studying. Instead, they collect data from a subset of individuals – a sample – and use those observations to make inferences about the entire population. Ideally, the sample corresponds to the larger population on the characteristic(s) of interest. In that case, the researcher's conclusions from the sample are probably applicable to the entire population. This type of correspondence between the sample and the larger population is most important when a researcher wants to know what proportion of the population has a certain characteristic – like a particular opinion or a demographic feature. Public opinion polls that try to describe the percentage of the population that plans to vote for a particular candidate, for example, require a sample that is highly representative of the population.

Two general approaches to sampling are used in social science research. With probability sampling, all elements (e.g., persons, households) in the population have some opportunity of being included in the sample, and the mathematical probability that any one of them will be selected can be calculated.

With non probability sampling, in contrast, population elements are selected on the basis of their availability (e.g., because they volunteered) or because of the researcher's personal judgment that they are representative.

7.3. IMPORTANCE OF SAMPLING

1. Researchers usually cannot make direct observations of every individual in the population they are studying. So sampling can be helpful.
2. In Sampling– a sample – can be used for observations to make inferences about the entire population. So Sampling is very important in research because it helps researcher to relive burden of over data.
3. Sampling makes research more practical.
4. A good research conclusion is drawn only if there is a good sampling procedure
5. In research terms a sample is a group of people, objects, or items that are taken from a larger population for measurement. The sample should be representative of the population to ensure that we can generalise the findings from the research sample to the population as a whole. To draw conclusions about populations from samples, we must use inferential statistics, to enable us to determine a population's characteristics by directly observing only a portion (or sample) of the population.

There would also be difficulties measuring whole populations because: -

- The large size of many populations
- Inaccessibility of some of the population - Some populations are so difficult to get access to that only a sample can be used. E.g. prisoners, people with severe mental illness, disaster survivors etc. The inaccessibility may be associated with cost or time or just access.
- Destructiveness of the observation- Sometimes the very act of observing the desired characteristic of the product destroys it for the intended use. Good examples of this occur in quality control.
- Accuracy and sampling - A sample may be more accurate than the total study population. A badly identified population can provide less reliable information than a carefully obtained sample.

Sampling is important becauseit allows researchers to:

Save Time

Contacting everyone in a population takes time and invariably, some people will not respond to the first effort at contacting them, meaning researchers have to invest more time for follow-up. Random sampling is much faster than surveying everyone in a population, and obtaining a non-random sample is almost always faster than random sampling. Thus, sampling saves researchers lots of time.

Save Money

The number of people a researcher contacts is directly related to the cost of a study. Sampling saves money by allowing researchers to gather the same answerfrom a sample that they would receive from the population.

The Importance of Knowing Where to Sample

Efficient sampling has a number of benefits for researchers. But just as important as knowing how to sample is knowing where to sample. Some research participants are better suited for the purposes of a project than others. Finding participants that are fit for the purpose of a project is crucial, because it allows researchers to gather high-quality data.

7.4. CONCEPTUAL EXPLANATION OF POPULATION AND SAMPLING

The significance of population and sampling will be better appreciated in a survey type of research. A survey research refers to a process of eliciting data from a target population through questionnaire or interview instrument and subjecting such data to statistical analysis for the purpose of drawing conclusions (Obasi, 2000: 132). Accepting this will mean that the information required can only be gathered from a target or specified population relevant to the purpose and problems raised for the study.

A population is a theoretically specified aggregation of survey elements. A survey population is aggregation of elements from which survey sample is actually selected (NGU, 2005: 166). Asika, (1991: 39) sees a population been made up of all conceivable elements, subjects or observations relating to a particular phenomenon of interest to the researcher.

Elements and subjects refer to those individual items or variables that make up the population. They may be observed and physically counted.

A population may be finite, that is, the size is conceivable and measurable. For instance, women population in the University of Abuja can be counted so as the male population. A population could also be infinite if the elements or subjects cannot be counted. If for instance one is to know the exact number of leaves, trees, grain of sand in the world. This is simply impossible even when the elements are visibly conceivable. However, a population can be finite yet not conceivable.

Social science research by its nature relies on a dynamic population and sometime complex. The dynamism and complexity therefore necessitated the use of sampling to ease the process to a logical finding. Nnamdi (1991) observed that whether a population is finite or infinite, the process of drawing a sample from that population can be arduous, expensive and time consuming. Consequently, sampling is made for the following reasons:

1) Among the elements that make up the population of study, there are similarities and therefore a study of a few of these elements will give the researcher sufficient knowledge of what obtains in the entire population of study.
2) Sometimes it is practically impossible to take a complete and comprehensive study of the population because of the nature and pattern of distribution or dispersion of the elements of the population.
3) Consequently, sampling becomes imperative because it is the only way to estimate the population characteristic in such circumstance.
4) It is obviously cheaper to study a sample than the entire population.
5) Sampling enables researchers to be more thorough and affords him/her better supervision than with a complete coverage of the entire population.
6) Sampling enables to obtain quicker results than does a complete coverage of the population.

7.5 FUNDAMENTAL QUERRIESTO A WELL-STRUCTURED SAMPLING.

a. What is the definition of the population of a study?

For instance, population as male students, female elderly, market women, civil servants, pensioners, politicians, professionals, public etc. The argument here is that the population should be properly identified and defined to include its size, characteristics, and categories to avoid inclusion of non-relevant elements.

b. ***What is the sampling frame?***

By this it means that the researcher should identify his working universe from which the sample is drawn. For instance, it is important to know if the universe is theoretical or conceivable not reachable or a reachable working universe.

c. ***What type of sample should be drawn from the population***?

It is important to know the appropriate sampling method for the nature of population, whether probability or non-probability sampling.

d. ***What are the parameters of interest?*** What does the researcher actually wants to get / obtain from the population. These interests should be identified clearly (Interest as generated/drawn from the research problem, question and hypotheses).

7.5. STEPS IN SAMPLING PROCESS

The sampling process comprises of several steps.

The first step is Identify the population of interest. A population can be identified as all people or items (unit of analysis) with the characteristics that one wishes to study. The unit of analysis may be a person, group, organization, country, object, or any other entity that you wish to draw scientific inferences about. Sometimes the population is obvious. For example, if a manufacturer wants to determine whether finished goods manufactured at a production line meets certain quality requirements or must be scrapped and reworked, then the population consists of the entire set of finished goods manufactured at that production facility.

The second step in the sampling process is to choose a Sampling frame. A sampling frame is the group of people from which you will draw your sample. This is an accessible section of the target population (usually a list with contact information.) from where a sample can be drawn. If the target population is professional employees at work, as accessing all professional employees around the world will not be possible, a more realistic sampling frame will be employee lists of one or two local companies that are willing to participate in the study.

Sampling frames may not entirely be representative of the population at large, and if so, inferences derived by such a sample may not be generalizable to the population. Also it should be noted that the population from which a sample is drawn may not necessarily be the same as the population from which actually want information. For example, if a researcher wants to the success rate of a new “quit smoking” program, then the target population is the universe of smokers who had access to this program, which may be an unknown population. Hence, the researcher may sample patients arriving at a local medical facility for smoking cessation treatment, some of whom may not have had exposure to this particular “quit smoking” program, in which case, the sampling frame does not correspond to the population of interest.

Third step is specifying a Sampling method. There are basically two ways to choose a sample from a sampling frame: randomly or non-randomly. There are benefits to both. Basically, if the sampling frame is approximately the same demographic makeup as the population, then probably sample can be selected randomly, perhaps by flipping a coin or drawing names out of a hat. However sometimes the sampling frame may not really represent the population. In such cases, sample can be selected non-randomly in order to get a demographic makeup that is closer to that of the population.

The last step is choosing a Sample technique. Choosing a sample from the sampling frame using a well-defined sampling technique is the concluding step. Sampling techniques can be grouped into two broad categories: probability (random) sampling and non-probability sampling. Probability sampling is ideal if generalize ability of results is important for the

study, but there may be unique circumstances where non-probability sampling can also be justified.

7.7. SAMPLING AND NON SAMPLING ERROR

A sample is expected to mirror the population from which it comes, however, there is no guarantee that any sample will be precisely representative of the population. Chance may dictate that a disproportionate number of untypical observations will be made.

Sampling error can make a sample unrepresentative of its population. Sampling error comprises the differences between the sample and the population that are due solely to the particular participants that have been selected.
The main cause of sampling error is

- **Chance:** That is the error that occurs just because of bad luck. This may result in untypical choices. Unusual units in a population do exist and there is always a possibility that an abnormally large number of them will be chosen. The main protection against this kind of error is to use a large enough sample.

Non-sampling error (measurement error) - A non-sampling error is an error that results solely from the manner in which the observations are made. It can occur whether the total study population or a sample is being used. It may either be produced by participants in the study or be an innocent by product of the sampling plans and procedures. The simplest example of a non-sampling error is inaccurate measurements due to malfunctioning instruments or poor procedures. These biased observations can be innocent but very devastating to the findings of the study.

In studies observing personal characteristics, unintended errors may result from: -

- The way the response is elicited
- The social desirability of the persons surveyed
- The purpose of the study
- The personal biases of the interviewer

Checks need to be put in place to ensure this type of error is minimal

7.8. SAMPLING BIAS

Sampling bias is a tendency to favour the selection of participants that have particular characteristics. Sampling bias is usually the result of a poor sampling plan. The most notable is the bias of non-response when for some reason some participants have no chance of appearing in the sample e.g. no internet access for completion of an online questionnaire.
There can be two causes of this type of bias.

- The wrong study population were selected
- The study population was all inclusive, but the poor design of the study introduced the bias e.g. onlyone group within the study population agreed to participate in the study

The sampling error may be due to either bias or chance. The chance component (sometimes called random error) exists no matter how carefully the selection procedures are

implemented, and the only way to minimize chance-sampling errors is to select a sufficiently large sample. Sampling bias on the other hand may be minimized by the wise choice of a sampling procedure.

7.9. SAMPLE SIZE

The question of how large a sample should be is a difficult one. Sample size can be determined by various constraints (funding available, the time constraints etc.)
Sample size depends on:

- The type of data analysis to be performed
- The desired precision of the estimates one wishes to achieve
- The kind and number of comparisons that will be made
- The number of variables that have to be examined simultaneously
- How heterogeneous the sampled population is.

Deciding on a sample size for qualitative inquiry can be even more difficult than quantitative because there are no definite rules to be followed. It will depend on what you want to know, the purpose of the inquiry, what is at stake, what will be useful, what will have credibility and what can be done with available time and resources. The size of a sample is determined by a combination of technical issues as well as human and financial considerations.

First, on the technical factors, the size of population, the level of precision (accuracy) desired, the level of variability of the factors (variables) to be estimated, the homogeneity of the population, extent of prior knowledge about the characteristics of the population, among others, are critical determinants. Secondly, the human and financial determinants include cost of research and level of funds available to a research, time consideration and issue of logistics.

Nwana also reported in(Obasi 1999), holds that, if the population is a few hundreds, a 40% or more sample will do; if many hundreds a 20% sample will do; if a few thousand a 10% sample will do; and if several thousand a 5% or fewer samples will do. This means that, the lower the population, the greater the percentage of sample, and when the population is much the percentage of sample becomes lower. A good sample should and must be free from error of representativeness. It should be accurate and precise, should also be exonerated from sample bias.

There are several approaches to determining the sample size and the most popular of these is the one that studies the power of a test of hypothesis. (Power calculation) Therefore to undertake this approach the research must have a hypothesis.
There are number of approaches described in determining the sample size and two of them are as follows:

a. Required sample size, $n = p\,(100\text{-}p)z^2/E^2$, p is the percentage occurrence of a state or condition, E is the percentage maximum error required and Z is the value corresponding to level of confidence required .

b. Required sample size $n = N / (1 + N\,(e)^2)$, N is the population size and e is the level of precision. While the larger the sample the lesser the likelihood that findings will be biased does hold, diminishing returns can quickly set in when samples get over a specific size which need to be balanced against the researcher's resources (Gill et al.,

2010). To put it bluntly, larger sample sizes reduce sampling error but at a decreasing rate.

There are two key factors to this formula (Bartlett et al., 2001). First, there are considerations relating to the estimation of the levels of precision and risk that the researcher is willing to accept: E is the margin of error(the level of precision) or the risk the researcher is willing to accept (for example, the plus or minus figure reported in newspaper poll results). In the social research a 5% margin of error is acceptable. So, for example, if in a survey on job satisfaction 40% of respondents indicated they were dissatisfied would lie between 35% and 45%. The smaller the value of E the greater the sample size required as technically speaking sample error is inversely proportional to the square root of **n**, however, a large sample cannot guarantee precision (Bryman and Bell, 2003).

Z concern the level of confidence that the results revealed by the survey findings are accurate. What this means is the degree to which we can be sure the characteristics of the population have been accurately estimated by the sample survey. Z is the statistical value corresponding to level of confidence required. The key idea behind this is that if a population were to be sampled repeatedly the average value of a variable or question obtained would be equal to the true population value. In management research the typical levels of confidence used are 95 percent (0.05: a Z value equal to 1.96) or 99 percent (0.01: Z=2.57). A 95 percent level of confidence implies that 95 out of 100 samples will have the true population value within the margin of error (E) specified.

The second key component of a sample size formula concerns the estimation of the variance or heterogeneity of the population (P). Management researchers are commonly concerned with determining sample size for issues involving the estimation of population percentages or proportions (Zikmund, 2002). In the formula the variance of a proportion or the percentage occurrence of how a particular question, for example, will be answered is P(100-P). Where, P= the percentage of a sample having a characteristic , for example, the 40 % of the respondents who were dissatisfied with pay, and (100-P) is the percentage (60%) who lack the characteristic or belief. The key issue is how to estimate the value of P before conducting the survey? Bartlett et al. (2001) suggest that researchers should use 50% as an estimate of P, as this will result in the maximization of variance and produce the maximum sample size (Bartlett et al., 2001).

Clearly defining sample, employing the right sampling technique and generating a large sample, in some respects can help to reduce the likelihood of sample bias.

7.10. SUMMARY

Sampling is the procedure a researcher uses to gather people, places, or things to study. Sampling is the process of selecting units (e.g., people, organizations) from a population of interest so that by studying the sample we may fairly generalize our results back to the population from which they were chosen. Sampling is the process of selecting units (e.g., people, organizations) from a population of interest so that by studying the sample we may fairly generalize our results back to the population from which they were chosen. The process of creating a sample that correctly reflects the makeup of the whole population.

Researchers usually cannot make direct observations of every individual in the population they are studying. Instead, they collect data from a subset of individuals – a sample – and use

those observations to make inferences about the entire population. Ideally, the sample corresponds to the larger population on the characteristic(s) of interest. In that case, the researcher's conclusions from the sample are probably applicable to the entire population. This type of correspondence between the sample and the larger population is most important when a researcher wants to know what proportion of the population has a certain characteristic – like a particular opinion or a demographic feature. Public opinion polls that try to describe the percentage of the population that plans to vote for a particular candidate, for example, require a sample that is highly representative of the population. Accurate sampling prevents speculative research outcome. It is only when this technique and research fundamentals are procedurally maintained and followed that valid knowledge can be obtained for true development.

7.11. TECHNICAL TERMS

Sampling, Sampling bias, Sampling Error, Sampling Size

7.12. SELF ASSESSMENT QUESTIONS

1. Explain the importance of sampling in Social work Research
2. Discuss the steps in Sampling Process
3. Write a brief note on Sample Size

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PROF D. SAI SUJATHA

LESSON-8

PROBABILITY AND NON PROBABILITY SAMPLING AND USES

OBJECTIVES

The objectives are to earn about probability and Non probability sampling, uses and the difference between the two.

Structure

8.1 INTROUCTION

In research terms a sample is a group of people, objects, or items that are taken from a larger population for measurement. The sample should be representative of the population to ensure that it can generalise the findings from the research sample to the population as a whole.

To draw conclusions about populations from samples, inferential statistics must be used to enable us to determine a population's characteristics by directly observing only a portion (or sample) of the population. There would also be difficulties measuring the populations like the large size of populations, inaccessibility of some of the population, destructiveness of the observation, sometimes the very act of observing the desired, sample may be more accurate than the total study population.

8.2 TYPES OF SAMPLING

There are two types of sampling methods namely

Probability sampling
Non-Probability sampling.

Each of these methods includes different types of techniques of sampling.

Probability Sampling includes
Simple random sampling
Stratified random sampling
Cluster sampling
Systematic sampling
Multi stage sampling.

Non-Probability Sampling includes
Quota sampling
Snowball sampling
Judgment sampling
Convenience sampling

8.3 PROBABILITY SAMPLING

Probability sampling means that every item in the population has an equal chance of being included in sample. Probability samples are selected in such a way as to be representative of the population. They provide the most valid or credible results because they reflect the characteristics of the population from which they are selected (e.g., residents of a particular community, students at an elementary school, etc.).

Probability sampling is a technique in which every unit in the population has a chance (non-zero probability) of being selected in the sample, and this chance can be accurately determined. Sample statistics thus produced, such as sample mean or standard deviation, are unbiased estimates of population parameters, as long as the sampled units are weighted according to their probability of selection. All probability sampling have two attributes in common: (1) every unit in the population has a known non-zero probability of being sampled, and (2) the sampling procedure involves random selection at some point.

One way to undertake random sampling would be if researcher was to construct a sampling frame first and then used a random number generation computer program to pick a sample from the sampling frame (Zikmund, 2002).

Random sampling occurs when a researcher ensures every member of the population being studied has an equal chance of being selected to participate in the study. Importantly, 'the population being studied' is not necessarily all the inhabitants of a country or a region. Instead, a population can refer to people who share a common quality or characteristic. So, everyone who has purchased a Ford in the last five years can be a population and so can registered voters within a state or college students at an university.

A population is the group that researchers want to understand. In order to understand a population using random sampling, researchers begin by identifying a sampling frame—a list of all the people in the population the researchers want to study. For example, a database of all landline and cell phone numbers in Andhra Pradesh is a sampling frame. Once the researcher has a sampling frame, he or she can randomly select people from the list to participate in the study. However, it is not always practical or even possible to gather a sampling frame. There is not, for example, a master list of all the people who use the internet, have grieved the death of a parent in the last year, or consider themselves fans of Kolkata Knight Riders. Nevertheless, there are very good reasons why researchers may want to study

people in each of these groups. Probability or random sampling has the greatest freedom from bias but may represent the most costly sample in terms of time and Sampling. The most distinguishing element between the probability and the non-probability methods of sampling is the absence of the privilege of having equal chance of being selected in the latter method.

8.4 NON-PROBABILITY SAMPLING

Non-probability sampling is a sampling technique in which some units of the population have zero chance of selection or where the probability of selection cannot be accurately determined. Typically, units are selected based on certain non-random criteria, such as quota or convenience. Because selection is non-random, non-probability sampling does not allow the estimation of sampling errors, and may be subjected to a sampling bias. Therefore, information from a sample cannot be generalized back to the population. As they are not truly representative, non-probability samples are less desirable than probability samples. However, a researcher may not be able to obtain a random or stratified sample, or it may be too expensive. A researcher may not care about generalizing to a larger population. Non-probability samples are limited with regard to generalization. Because they do not truly represent a population, we cannot make valid inferences about the larger group from which they are drawn. Validity can be increased by approximating random selection as much as possible, and making every attempt to avoid introducing bias into sample selection.

Non-probability sampling refers to sampling techniques for which a person's likelihood of being selected for membership in the sample is unknown. Since it is difficult to know the likelihood of selection and to know whether a non-probability sample is truly representative of a larger population. Generalizing to a larger population is not the goal with non-probability samples or qualitative research. However this does not mean that non-probability samples are drawn arbitrarily or without any specific purpose in mind.

The research elements that should be closely followed while drawing a non-probability sample includes first, why a researcher might choose to use a non-probability sample. As they are not truly representative, non-probability samples are less desirable than probability samples. However, a researcher may not be able to obtain a random or stratified sample, or it may be too expensive. A researcher may not care about generalizing to a larger population. Non-probability samples are limited with regard to generalization. Because they do not truly represent a population and cannot make valid inferences about the larger group from which they are drawn. Validity can be increased by approximating random selection as much as possible, and making every attempt to avoid introducing bias into sample selection.

When it isn't possible or practical to gather a random sample, then the researchers often gather a non-random sample. A non-random sample is one in which every member of the population being studied does not have an equal chance of being selected into the study. Because non-random samples do not select participants based on probability, it is often difficult to know how well the sample represents the population of interest. Despite this limitation, a wide range of behavioural science studies conducted within academia, industry and government rely on non-random samples. When researchers use non-random samples, it is common to control for any known sources of sampling bias during data collection. By controlling for possible sources of bias, researchers can maximize the usefulness and generalizability of their data.

Non-random sampling is significantly cheaper than random sampling, because it lowers the cost associated with finding people and collecting data from them. Because all research is conducted on a budget, saving money is important.

Non probability sampling does not use random sampling yet it is often necessary and unavoidable. Their weaknesses could to some extent be mitigated by using knowledge, expertise and studies with different samples. Also, the use of powerful statistics could to a large extent mitigate sample error (sample variability) caused by the use of those subjective techniques (Fagbohungbe, 2009:99).But Nnamdi (1991:45) maintains that Randomness may however occur by chance but it does not really matter whether randomness exists or not in the non-probability sampling process because the population elements are not deliberately given equal chance of being selected. The non-probability is somehow purposive by its nature.

There are certain research situations which make the use of non -probability sampling necessary like if the goal of a survey is to obtain ideas, good insights and experienced critical appraisals, a purposive type of non – probability sampling is suitable. That if the goal is not to estimate population characteristics, and then a non-probability sample is suitable. This is because it has major advantages of convenience and economy. If again, a researcher is interested in particular issue which very few people have knowledge about, a purposive decision has to be taken to include only such knowledgeable people. There are three main types of non –probability samples. They are the accidental or convenient samples, quota samples, and judgment samples.

Non-probability samples ideal some times when starting a big research project. For example, if the researcher conducting survey research and want to administer a draft of the survey to a few people who resemble the folks he/she is interested in studying so they can help work out potential kinks. Non-probability sample can also be used while conducting a pilot study or exploratory research, as it would be a quick way to gather some initial data and help to get a feel of the lay of the land before conducting a more extensive study. From these examples, it can be observed that non-probability samples are useful for setting up, framing, or beginning any type of research, but it isn't just early stage research that relies on and benefits from non-probability sampling techniques. Researchers also use non-probability samples in full-blown research projects. These projects are usually qualitative in nature, where the researcher's goal is in-depth, idiographic understanding rather than more general, homothetic understanding.

8.5 DIFFERENCE BETWEEN PROBABILITY SAMPLING AND NON-PROBABILITY SAMPLING METHODS

	Probability Sampling Methods	**Non-Probability Sampling Methods**
Definition	Probability Sampling is a sampling technique in which samples from a larger population are chosen using a method based on the theory of probability	Non-probability sampling is a sampling technique in which the researcher selects samples based on the researcher's subjective judgment rather than random selection.

Alternatively Known as	Random sampling method.	Non-random sampling method
Population selection	The Population is selected randomly	The Population is selected arbitrarily
Nature	The research is conclusive	The research is exploratory.
Sample	Since there is a method for deciding the sample, the population demographics are conclusively represented.	Since the sampling method is arbitrary, the population demographics representation is almost screwed.
Time taken	Takes longer to conduct since the research design defines the selection parameters before the market research study begins	This type of sampling method is quick since neither the sample or selection criteria of the sample are undefined
Results	This type of sampling is entirely unbiased and hence the results are unbiased too and conclusive	This type of sampling is entirely biased and hence the results are biased too, rendering the research speculative
Hypothesis	In probability sampling, there is an underlying hypothesis before the study begins and the objective of this method is to prove the hypothesis	In non-probability sampling, the hypothesis is derived after conducting the research study

8.6 SUMMARY

Two general approaches to sampling are used in social science research. With probability sampling, all elements (e.g., persons, households) in the population have some opportunity of being included in the sample, and the mathematical probability that any one of them will be selected can be calculated. The probability sampling is the sampling method in which the sample items or subjects are chosen randomly, where every item in the population is given equal and independent chance of being included in the sample. With nonprobability sampling, in contrast, population elements are selected on the basis of their availability (e.g., because they volunteered) or because of the researcher's personal judgment that they are representative.

8.7. TECHNICAL TERMS

Sampling, Random sampling, Non- Random sampling, Population

8.8. SELF ASSESSMENT QUESTIONS

1. Explain Probability sampling and its uses in Social Research
2. Discuss the Non –Probability sampling and its application in research.

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PROF D. SAI SUJATHA

LESSON-9

METHODS OF SAMPLING

OBJECTIVES

The objectives are to study the various probability and Non probability sampling methods, uses and limitations

Structure

9.1 INTRODUCTION

Sampling is a group selected from the target population when the researcher aim to study a large population. This group is considered as the representative of the overall targeted population. The entire set of cases from which researcher sample is drawn in called the population. Since, researchers neither have time nor the resources to analysis the entire population so they apply sampling technique to reduce the number of cases. There are two types of Sampling techniques, Probability Sampling and Non-Probability Sampling.

9.2 PROBABILITY SAMPLING

Probability sampling technique uses randomization to make sure that every element of the population gets an equal chance to be part of the selected sample. It's alternatively known as random sampling. The different methods of Probability Sapling are

Simple Random Sampling
Systematic Random sampling
Stratified Random sampling
Cluster Sampling
Multi stage Random Sampling

9.3 SIMPLE RANDOM SAMPLING

The first statistical sampling method is simple random sampling. In this method, each item in the population has the same probability of being selected as part of the sample as any other item. The term random has a very precise meaning. Each individual in the population of interest has an equal likelihood of selection. This is a very strict meaning, but just can't collect responses on the street and have a random sample.

The assumption of an equal chance of selection means that sources such as a telephone book or voter registration lists are not adequate for providing a random sample of a community. In both these cases there will be a number of residents whose names are not listed. Telephone surveys get around this problem by random-digit dialling -- but that assumes that everyone in the population has a telephone. The key to random selection is that there is no bias involved in the selection of the sample. Any variation between the sample characteristics and the population characteristics is only a matter of chance.

Simple random sample means that every case of the population has an equal probability of inclusion in sample. This technique avails every member variable of the population equal opportunity and an independent chance of being selected. This privilege and opportunity is the most distinguishing feature of this technique. An independent chance of being included means that the selection of one person or element does not affect the chance of another person being included.

The incentive accruable from this technique is its wider applicability, non-assumption of prior knowledge of the population and its freedom from classification error in addition to the simplicity of understanding. It is also observed however that, despite these advantages, random technique is likely to eliminate certain characteristics of the population in sampling. Secondly, there is the existence of large sampling error for the same size than in stratified sampling (Obasi, 1999).

Disadvantages associated with Simple Random Sampling

- A Simple Random sampling is seldom used in practice. It is not usually the most efficient method and can be laborious if done manually.
- A complete frame (a list of all units in the whole population) is needed; In some studies, surveys by personal interviews, the costs of obtaining the sample can be high if the units are geographically widely scattered.

- The standard errors of estimators can be high. In this technique, all possible subsets of a population (more accurately, of a sampling frame) are given an equal probability of being selected.
- Simple random sampling involves randomly selecting respondents from a sampling frame, but with large sampling frames, usually a table of random numbers or a computerized random number generator is used.

This is the simplest of all probability sampling techniques, however, the simplicity is also the strength of this technique. Because the sampling frame is not subdivided or partitioned, the sample is unbiased and the inferences are most generalizable amongst all probability sampling techniques. In short Simple random sampling easily understood, and results are projectable however difficult to construct sampling frame, expensive, lower precision and no assurance of representativeness.

9.4 SYSTEMATIC RANDOM SAMPLING

Systematic sampling is another statistical sampling method. In this method, every **n**th element from the list is selected as the sample, starting with a sample element **n** randomly selected from the first **k** elements. For example, if the population has 1000 elements and a sample size of 100 is needed, then k would be 1000/100 = 10. If number 7 is randomly selected from the first ten elements on the list, the sample would continue down the list selecting the 7th element from each group of ten elements. Care must be taken when using systematic sampling to ensure that the original population list has not been ordered in a way that introduces any non-random factors into the sampling.

Systematic sampling is where every nth case after a random start is selected. For example, if surveying a sample of consumers, every fifth consumer may be selected from your sample. The advantage of this sampling technique is its simplicity. The systematic technique with a random start is more rewarding. In this system, two terms are frequently used in connection with it. The sampling interval is the standard distance between elements selected in the sample. The ratio is the proportion of elements in the population that are selected. Systematic sampling can increase representativeness, easier to implement than simple random sampling.

9.5 STRATIFIED SAMPLING

Stratified sampling is used when representatives from each subgroup within the population need to be represented in the sample. The first step in stratified sampling is to divide the population into subgroups (strata) based on mutually exclusive criteria. Random or systematic samples are then taken from each subgroup. The sampling fraction for each subgroup may be taken in the same proportion as the subgroup has in the population. For example, if the person conducting a customer satisfaction survey selected random customers from each customer type in proportion to the number of customers of that type in the population.

A stratified sample is a mini-reproduction of the population. Before sampling, the population is divided into characteristics of importance for the research. For example, by gender, social class, education level, religion, etc. Then the population is randomly sampled within each category or stratum. If 38% of the population is college-educated, then 38% of the sample is randomly selected from the college-educated population.

Stratified samples are as good as or better than random samples, but they require fairly detailed advance knowledge of the population characteristics, and therefore are more difficult to construct. Stratified sampling is where the population is divided into strata (or subgroups) and a random sample is taken from each subgroup. A subgroup is a natural set of items. Subgroups might be based on size, gender or occupation (to name but a few).

Stratified sampling is often used where there is a great deal of variation within a population. Its purpose is to ensure that every stratum is adequately represented. The stratified technique is most convenient for a heterogeneous population. This technique divides the population into subgroups on the basis of variables significantly correlated with the dependent variables. The adoption of this technique further suggest that, some conditions have to be observed, these include; the awareness of different characteristics of a target population, the conviction that such characteristics may not be adequately represented without classification. The last condition is therefore the need to include the different strata before a reliable generalization can be made. A stratified sampling technique is one that recognizes different groups (or the composite characteristics) of a target population and takes appropriate measure to include them in the sample.

There are two types of stratified sampling, namely: proportional and disproportion stratified sampling. In the former, the representation of each group of the population into the sample is based on their numerical strength in relation to the population, while in the latter; the numerical strength is not strongly taken into consideration. Some strata may be more represented in the sample than other.

This sampling technique is more rewarding when compared to the simple random technique, as the stratified provides high degree of representativeness of the composite population characteristics. With this therefore, the chance of sampling error is considerably minimal. The combination of Random sampling and the stratified type make up a multi stage approach. Stratified samples are as good as or better than random samples, but they require fairly detailed advance knowledge of the population characteristics, and therefore are more difficult to construct. Stratified sampling includes all important sub-population, difficult to select relevant stratification variables, not feasible to stratify on many variables and expensive.

9.6 CLUSTER SAMPLING

The fourth statistical sampling method is called Cluster sampling, also called area or block sampling. In cluster sampling, the population that is being sampled is divided into groups called clusters. Instead of these subgroups being homogeneous based on selected criteria as in stratified sampling, a cluster is as heterogeneous as possible to matching the population. A random sample is then taken from within one or more selected clusters. For example, if an organization has 30 small projects currently under development, an auditor looking for compliance to the coding standard might use cluster sampling to randomly select 4 of those projects as representatives for the audit and then randomly sample code modules for auditing from just those 4 projects. Cluster sampling can tell us a lot about that particular cluster, but unless the clusters are selected randomly and a lot of clusters are sampled, generalizations cannot always be made about the entire population.

Cluster sampling is where the whole population is divided into clusters or groups. Subsequently, a random sample is taken from these clusters, all of which are used in

the final sample. Cluster sampling is advantageous for those researchers whose subjects are fragmented over large geographical areas as it saves time and money (Davis, 2005).

Like the stratified sampling, cluster / area sampling makes use of random sampling to select the sample subjects from each cluster / area, thus it is as effective as a stratified sampling method. There are few steps to be followed in cluster sampling,

1. Identify the population to be sampled, e.g all household Units.
2. Identify the salient characteristics that would enhance representativeness, ethnic groups within the population.
3. Locating the areas where units or subjects with the characteristics cluster and know their respective size (population sub set).
4. Using random selection procedure to select sample units or subjects from each cluster and ensuring that the number of units selected is proportional to the cluster's share of the total population.

Cluster sampling easy to implement, cost-effective, Imprecise, difficult to compute and interpret results. The Cluster or Area sampling technique is used when it is either impossible or impracticable to compile an exhaustive list of all the elements comprising the population study or target population.

9.7 MULTI-STAGE SAMPLING

Multi stage sampling is a process of moving from a broad to a narrow sample, using a step by step process. If, for example, a publisher of an automobile magazine was to conduct a survey, it could simply take a random sample of automobile owners within the entire country population. Obviously, this is both expensive and time consuming. A cheaper alternative would be to use multi-stage sampling. In essence, this would involve dividing the country into a number of geographical regions. Subsequently, some of these regions are chosen at random, and then subdivisions are made, perhaps based on local authority areas. Next, some of these are again chosen at random and then divided into smaller areas, such as towns or cities. The multi stage approach is a concurrent use of the two techniques. This means that the population is first of all classified into different groups, within each stratum; a simple random sampling technique is applied. The main purpose of multi-stage sampling is to select samples which are concentrated in a few geographical regions. Once again, this saves time and money.

9.8 NON PROBABILITY SAMPLING

Non probability sampling is often associated with case study research design and qualitative research. With regards to the latter, case studies tend to focus on small samples and are intended to examine a real life phenomenon, not to make statistical inferences in relation to the wider population . A sample of participants or cases does not need to be representative, or random, but a clear rationale is needed for the inclusion of some cases The multi stage approach is a concurrent use of the two techniques. This means that the population is first of all classified into different groups, within each stratum; a simple random sampling technique is applied or individuals rather than others. There are different types of Non –Sampling methods are:

1. Judgmental Sampling
2. Quota Sampling

3. Purposive Sampling
4. Snowball Sampling
5. Convenience sample

9.9 JUDGMENTAL SAMPLING

An important non-statistical sampling method is judgmental sampling. In judgmental sampling, the person doing the sample uses his/her knowledge or experience to select the items to be sampled. For example, based on experience, an auditor may know which types of items are more apt to have non-conformances or which types of items have had problems in the past or which items are a higher risk to the organization.

9.10 QUOTA SAMPLE

The defining characteristic of a quota sample is that the researcher deliberately sets the proportions of levels or strata within the sample. This is generally done to insure the inclusion of a particular segment of the population. The proportions may or may not differ dramatically from the actual proportion in the population. The researcher sets a quota, independent of population characteristics.Example: A researcher is interested in the attitudes of members of different religions towards the death penalty. In Mizoram a random sample might miss Muslims (because there are not many in that state). To be sure of their inclusion, a researcher could set a quota of 3% Muslim for the sample. However, the sample will no longer be representative of the actual proportions in the population. This may limit generalizing to the state population. But the quota will guarantee that the views of Muslims are represented in the survey.

Quota sampling takes purposive sampling one step further by identifying categories that are important to the study and for which there is likely to be some variation. In this non-probability sampling method, subgroups are created based on each category, the researcher decides how many people to include from each subgroup, and then collects data from that number for each subgroup. Let's consider a study of student satisfaction with on-campus housing. Perhaps there are two types of housing on the campus: apartments that include full kitchens and dormitory rooms where residents do not cook for themselves and instead eat in a cafeteria. The researcher, wish to understand how satisfaction varies across these two types of housing arrangements. If 20 campus residents to be interviewed, then 10 from each housing type will be interviewed. In addition, it is possible that campus housing experiences may vary by gender. If that is that case focus must be on four important subgroups: men who live in apartments, women who live in apartments, men who live in dormitory rooms, and women who live in dormitory rooms. The quota sample must include five people from each of the four subgroups that one should avoid attempting to make statistical generalizations from data collected using quota sampling methods. While quota sampling offers the strength of helping the researcher account for potentially relevant variation across study elements, it would be a mistake to think of this strategy as yielding statistically representative findings.

Quota sampling is a no random sampling technique in which participants are chosen on the basis of predetermined characteristics so that the total sample will have the same distribution of characteristics as the wider population. Here the knowledge of strata of the population (sex, education, religion, age) is used to select member that are representative i.e quota or proportions is assigned to people. The researcher decides ahead of time what aspect

of sampling is alright in exploratory study, particularly where the budget and time is limited. The choices of respondents who represent the diversity in population in the same population are the diversity itself.

9.11 PURPOSIVE SAMPLE

A purposive sample is a non-representative subset of some larger population, and is constructed to serve a very specific need or purpose. A researcher may have a specific group in mind, such as high level business executives. It may not be possible to specify the population -- they would not all be known, and access will be difficult. The researcher will attempt to zero in on the target group, interviewing whoever is available.

To draw a purposive sample, a researcher selects participants from their sampling frame because they have characteristics that the researcher desires. A researcher begins with specific characteristics in mind that they wish to examine and then they seek out research participants who cover that full range of characteristics. For example, if a researcher wants to study mental health supports on the campus, he should be sure to include not only students, but also mental health practitioners and student affairs administrators. He might also select students who currently use mental health supports, those who dropped out of supports, and those who are waiting to receive supports. The 'purposive' part of purposive sampling comes from intentionally selecting specific participants because he know they have characteristics that are needed in the sample, like being an administrator or dropping out of mental health supports.

Note that these are different than inclusion criteria, which are more general requirements a person must possess to be 8 part of the sample. For example, one of the inclusion criteria for a study of the campus' mental health supports might be that participants had to have visited the mental health centre in the past year. Differently, purposive sampling assumes that he knows individuals' characteristics and recruit them based on these criteria. For example, he might recruit X person for his study because they stopped seeking supports this month, or I might recruit Y because they have worked at the centre for many years.

Also, it is important to recognize that purposive sampling requires the researcher to have information about the participants prior to recruitment. In other words, it is needed to 8now their perspectives or experiences before the researcher wants them in the sample. Purposive sampling involves recruiting specific people based on the characteristics and perspectives t8y bring to the sample. To solidify this concept, let's imagine that the researcher is recruiting a focus group. In this case, a purposive sample might gather clinicians, current patients, administrators, staff, and former patients so they can talk as a group. Purposive sampling would seek out people that have each of those attributes.

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Sometimes researchers do find it difficult to elicit responses from respondent, may be out of fear or suspicion of the motive for the research, therefore, to elicit the cooperation of the respondents when suspicions circumstances prevail, a researcher can use the purpose of the research to convince respondent. It also includes a situation whereby an investigator deliberately chooses only those who have relevant view on the issue at hand.

Purposive or judgmental sampling is a strategy in which particular settings persons or events are selected deliberately in order to provide important information that cannot be

obtained from other choices. It is where the researcher includes cases or participants in the sample because they believe that they warrant inclusion. Judgment sampling involves low-cost, convenient, not time-consuming, ideal for exploratory research design, does not allow generalization and subjective

9.12 SNOWBALL SAMPLING

In Snowball sampling, a researcher identifies one or two people they would like to include in their study but then relies on those initial participants to help identify additional study participants. Thus, the researcher's sample builds and becomes larger as the study continues, much as a snowball builds and becomes larger as it rolls through the snow. Snowball sampling is an especially useful strategy when a researcher wishes to study a stigmatized group or behaviour. For example, a researcher interested in studying how people with genital herpes cope with their medical condition would be unlikely to find many participants by posting an ad in the newspaper or by announcing the study at a social gathering. Instead, the researcher might know someone with the condition, interview that person, and ask the person to refer others they may know with the genital herpes to contact him to participate in the study. Having a previous participant assure for the researcher may help new potential participants feel more comfortable about being included in the study.

Snowball sample - so named because one picks up the sample along the way, analogous to a snowball accumulating snow. A snowball sample is achieved by asking a participant to suggest someone else who might be willing or appropriate for the study. Snowball samples are particularly useful in hard-to-track populations, such as truants, drug users, etc.

Snowball sampling is sometimes referred to as chain referral sampling. One research participant refers another, and that person refers another, and that person refers another—thus a chain of potential participants is identified. Aside from being a useful strategy for stigmatized groups, snowball sampling is also useful when the interest group may be difficult to find or the group may be relatively rare.

Snowball sampling is a non random sampling method that uses a few cases to help encourage other cases to take part in the study, thereby increasing sample size. This approach is most applicable in small populations that are difficult to access due to their closed nature, e.g. secret societies and inaccessible profession.

The Snow ball sampling starts with identifying a person who meets the researcher interest upon who the researcher relies to introduce him to other performances with similar characteristics. This is particularly useful where people are not likely to volunteer to strangers, e.g Smugglers, Drug Cartels among others, or seeking confidential information that are not available for consumption. Snowball sampling can estimate rare characteristics and time-consuming.

9.13 CONVENIENCE SAMPLE

Convenience sampling is another non-probability sampling strategy that is employed by both qualitative and quantitative researchers. To draw a convenience sample, a researcher simply collects data from people or other relevant elements that they can access conveniently.

Also known as availability sampling, convenience sampling is the most useful in exploratory research or student projects where probability sampling is too costly or difficult. If you've ever been interviewed by a fellow student for a class project, you have likely been a part of a convenience sample. While convenience samples offer one major benefit—convenience—they do not offer the rigor needed to make conclusions about larger populations.

A convenience sample is a matter of taking what you can get. It is an accidental sample. Although selection may be unguided, it probably is not random, using the correct definition of everyone in the population having an equal chance of being selected. Volunteers would constitute a convenience sample.

Convenience sampling is selecting participants because they are often readily and easily available. Typically, convenience sampling tends to be a favoured sampling technique among students as it is inexpensive and an easy option compared to other sampling techniques . Convenience sampling often helps to overcome many of the limitations associated with research. For example, using friends or family as part of sample is easier than targeting unknown individuals.

9.14. HAPHAZARD SAMPLING

There are also other types of sampling that, while non-statistical (information about the entire population cannot be extrapolated from the sample), may still provide useful information. In haphazard sampling, samples are selected based on convenience but preferably should still be chosen as randomly as possible. For example, the auditor may ask to see a list of all of the source code modules, and then closes his eyes and points at the list to select a module to audit. The auditor could also grab one of the listing binders off the shelf, flip through it and "randomly" stop on a module to audit. The haphazard sampling is usually typically, quicker, and uses smaller sample sizes than other sampling techniques. The main disadvantage of haphazard sampling is that since it is not statistically based, generalizations about the total population should be made with extreme caution.

9.15. SUMMARY

Research process and its importance have taken a centre stage in the field of knowledge development. It is a common phenomenon, in contemporary research world that, researchers only identify the methods of sampling and ignore the techniques. In some cases, the methods and techniques are mistaken for one another. It has therefore become necessary as a matter of urgency, to lay additional emphasis and make it a basic requirement, to understand the major techniques and sampling methods available in the research process. This is to forestall the integrity of research and education. The growing neglect of this aspect of research process will, as it has been, further reduce the quality of research and by extension quality of knowledge. This problem is greatly challenging because it will allow for unfiltered and unproductive knowledge to permeate the human environment.

9.16. TECHNICAL TERMS

Stratified sampling,
Cluster sampling,
Judgement sampling,
Quota sampling

9.17. SELF ASSESSMENT QUESTION

1. Explain different sampling techniques in detail
2. Discuss different Probability Methods
3. Elucidate the various Non-probability Methods

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PROF D. SAI SUJATHA

LESSON - 10

METHODS OF DATA COLLECTION INTERVIEW

OBJECTIVES

- To know the meaning, definition and types of interviews
- To understand the merits, Demerits and limitations of the Interview and also techniques of interviewing method

Structure

10.1 INTRODUCTION

There are many tools that are used by the social scientists in the collection of primary data _questionnaire, schedule case study, interview and so on. All these tools are Independent on one another. The interview is one of the prominent methods of data collection. Each and every method is unique in character and useful to collect the data depending upon research problem. This method provides better chance to collect real facts. It is recognized as the most important method of data collection in Social science research. Interview is not simply a conversation between interviewer and the respondent But more than the conversation, interview consists of gestures, glances, facial expressions, and pauses often reveal delicate feelings. Interviewing, in which a set of questions are asked and the answers are recorded in a standardized.

10.2 MEANING AND DEFINITION OF INTERVIEW

An interview is a means of gathering Information in which one person asks another either in person directly, or indirectly. Interview, is an effective, verbal or nonverbal conversation, initiated for specific objectives.

Definition

1. According to **Pauline V. Young**. "The interview may be a systematic method by which one enters more on less imaginatively into the inner life of another who is generally a comparative stronger to him".
2. **Goode and Hutt** define interview is "Neither reliability nor depth cut be achieve, however, unless. It is dept clearly in mind that interview is fundamentally a process of social interaction".
3. **Heder and Lindman** have defined "Interview consists of dialogue or verbal responses between two persons or between several persons".
4. **Benjamin D. Paul of Stadford** sees "The aims of the interview as gathering and relating two sets of data. A description of the situation as (the researcher) sees it, looking from the outside in, and a description of a situation as he sees it, looking from the inside out".

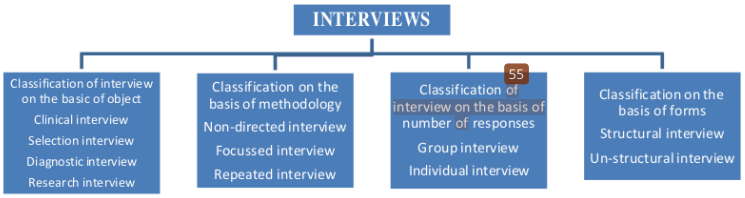
10.3 OBJECTIVES OF THE INTERVIEW

The following are the important objectives of the interview method.

1. Collecting information from face to face contact of stranger as well as well know person. In this method the investigator gets the outer and inner life of persons and groups.
2. Interview is the important method for acquiring the qualitative facts.
3. Interview method is very useful in the formation of new hypothesis to conduct the further research.
4. With interview method, the researcher is able to collect more and more information as additional.

10.4 TYPES OF INTERVIEWS

The interviews can be classified with the following categories.



1. Classification of interview on the basis of objects

a. **Clinical interview:** The main object of this interview is to make an attempt to know the causes for certain abnormalities. Once the reasons have been ascertained, the solution is sought.
b. **Selection interview:** In this method, the respondents will be selected on the basis of their qualities and traits of the relevant field.
c. **Diagnostic interview:** This type of interview is to find out the serious causes of some social events or proble
d. **Research interview:** In this a comprehensive study is made of the problems so that the causes will be found out in detail. Solution can be drawn for the problem.

2. Classification on the basis of methodology:

a. Non-directive interview; in this type, of interview is also known as un-controlled or unguided or unstructured interview. In this type, the interviewer does not follow a system or list of pre-determined questions.. It is more flexible and "open ended. The investigator puts more general questions to the respondents, allows them to answer freely, and follows up on their comments. The respondent is encouraged to exhibit and express his knowledge and views.

b. Focussed interview: - This is a semi structured interview where the researcher attempts to focus the discussion on the about effects of a give experience to which the respondents have been exposed. It proceeds on the basis of interview guide which outlines the major fields of enquiry and hypothesis which locate the information to be collected in the interview. It is focussed on the subjective experiences which include attitudes and emotional responses regarding the specific concrete situations under the study. The limitation in this interview is more time consuming and non- standardized. It requires lot of care in preparation.

c. Repeated interview: This type of interview is considered very useful in attempts to trace the specific development of social or psychological process. In other words, the progressive actions or attitudes which determine a give behaviour pattern or social situation. The information collected through the repeated interview lends them to quantitative interpretation since it is consistent and specific and they aim at realistic details which can be differentiated, tabulated and ultimately measures. This technique is expensive in time, energy and money but it offers the merits of studying the progressive actions and events as they actually occur.

3. Classification on the basis of number of responses:

a. Group interview: When a group of persons are interviewed for ascertained their views or collecting information from them, it is called as a group interview. Usually this technique is carried out in groups.
b. Individual interview: When the interview is conformed to individual or individual informant is known as individual interview. In this method, we collect data from individuals.

4. Classification on the basis of forms:

a. Structured interview: This is known as formal interview. In which the form is deals determined or planned. In this type everything is written about the material to be collected. The investigator has only to carry out the instructions. The researcher has no liberty to express his views and any other extra instructions. This is a

standardized interview because the format is structured and objectivity is more reliable and dependable.

b. Unstructured interview: This is also called as informal interview. In which the interview has full freedom to use his language or the words that he likes. There is no binding in regarding to the objectivities or the methodology. Reliability of the information collected through this method is ascertained. Since there is no binding on it, the researcher is free to ask questions and respondents are free to give responses.

10.5 TECHNIQUES OF INTERVIEW METHOD:

Interview method is a complete one. It is not a process involving research steps. The following are the main techniques to be followed for the success of the interview.

1. **Preparatory Thinking:** The interviewing requires some pre planning and preparation. Before the interview takes place, it is necessary to think over the interview properly. . This would involve thinking in detail about the subject of the interview, the questions to the put to the interviewee, the shape of the questions to be put etc .The interviewer should contact the respondent with the letter of authority so that he is able to establish his credentials. He needs also to choose a suitable time and place in order to be recognising as soon as he gives his name.

2. **Developing rapport:** Unless a proper rapport is established with the respondent the interview cannot be conducted successfully. The interviewer should start the interview in scientific accurate and pleasing manner. He should also they to warm up respondent and also they to make him feel at home. The interview should be quiet receptive and should not show any of his attitudes about the problem.. The other thing that he has to do is to convince the respondent that what he tells shall be kept in confidence. Without the cooperation of the respondent, the interview cannot be held successfully however at might have been planned.

3. **Careful listening:** Ability to listen with proper understanding, respect and curiosity in the gateway to communication.. When a respondent feels that he will not meet with interpretations, denial. Harassments and other contradictions, he is not likely to resists and with hold information. Mere listening is not sufficient. The researcher or interviewer must steadily reflect as the significance of the account given from the stand point of 1 fact, 2 feeling tones I impact of the account of the respondent. Thus, the quite listener must be at the same time an analytic listener.

4. Guiding the respondent;; sometimes, the respondent has to be encouraged while interview is going on so that he continues to give data. Where the respondent feels that he is telling is of interest to the interviewer he goes on giving necessary information. The investigator has to seek advice, take down notes from what the respondent is telling is very valuable.-

5. **Recording the interview:** It is essential to record responses as they take place. It the note taking is done after the interview, some relevant data many be lost. Nothing should be made in the schedule under respective question. It should be complete and verification, she responses should not be summarized. How can complete recording

be made with and interacting the free flow of conversation electronic transcription through devices like tape record can achieve this. It has both merits and demerits. Some respondent may object to or fear "going on record". Consequently the risk of lower response rate will rise especially for sensitive issues.

6. **Closing the interview:** After the interview is over take leave off the respondent thanking him with a friendly guide. In the case of a qualitative interview of longer duration, select the occasion for departure more carefully. Assembling the papers for putting there in the folder at the time of asking the final question sets the stage for a find hand shake, a thank you and a good bye.

10.6 ADVANTAGES OF INTERVIEW:

The interview method is not a separate and indifferent tool in social research. It is supplementary to other techniques. The following are the information must a interview method.

1. The interview method is to study the events, social attitudes and behaviours.
2. This method helps to study about the circumstances. The feelings, emotions and sentiments can properly be studied only when we know the circumstances and the factors, when they actually occurred.
3. Interview method helps to study the abstract and invisible factors.
4. This method studied the past, present events.
5. This method helps to collect the reliable information the data that are collected with the help of interview method also deals with the emotions, sentiments and the feeling.
6. This method can be used to obtain information from almost all types of persons including illiterate persons.

10.7 DISADVANTAGES OF THE INTERVIEW:

1. Many demerits of this method arise due to the incapacity of the interviewer.
2. Possibilities for bias and prejudices developed knowingly or unknowingly by the interviewer may completely mislead the results of interview.
3. Interview consists of more than just asking and answering a set of questions from an interview schedule and the other items of the interview are much harder to standardise. Sometimes other is possibilities to get inadequate answers
4. This method depends on memory. It is not possible for the interviewer to record things immediately. The reason is, if the researcher started recording in the schedule attention of the respondent may be diverted and the expected assures may not be possible. So the recording has to be done after the interviewer. The interviewer before he puts the data collected has to keep it in memory.
5. The interview method has a lot of elements of subjective, the subjectivity and the individual feeling make the collected data doubtful.

6. In this method there is no check up on the respondents. He explains thesis and interviewer has to listen to them and even make record of them. Every detail is not useful there and ever makes record of then. Every detail is not useful to study.

10.8 INTERVIEW PROBLEMS

In personal interviewing, the investigator must deal with two major problems, inadequate response, non response and interviewer" bias.

Inadequate response:

Kahn and cannel distinguish five principal symptoms of inadequate response.

They are:

- Partial responses, is which the respondent gives a relevant but in complete answers.
- Inaccurate response, when the reply is biased or distorted
- Non – response, when the respondent remains silent or refuses to answer the question.
- irrelevant response in which the respondent "s answer is not relevant to the question asked and
- Verbalised response problem, which arises on account of respondent's failure to understand a question or lake of information necessary for answering it

Interviewers bias

The interview is an important cause of response bias. He may resort to cheating by "cooking up data without actually interviewing. The interviewees can influence the responses by in appropriate suggestions, word emphasis tone of voice and question rephrasing.

His own expectations and attitudes about what a particular category of respondents may say or think may bias the data. Another source of response of the interviewer's characteristics (education, social status may also bias his answer. Another source of response bias arise from interviewer's perception of the situation, if he regards the assignment as impossible or sees the results of the survey as possible threats to personal interest to feelings he is likely to introduce.

Nonresponsive:

Non-response refers to failure to obtain responses from some sample respondents. There are many sources of non- response, non availability, refusal, in capacity and inaccessibility.

10.9 SUMMARY

There are many tools that are used by the social scientists in the collection of data. Interview method is one of the prominent method of data collection .Interview involves conversation with an object and it is not a mere exchange of information. Interview may be classified on the basis of object, methodology, number of responses and forms. The interview is not a separate and independent tool in social exploration. It is supplementary to other tools. The interview is highly flexible method in the hands of efficient investigators. It is very

useful get data from illiterates. It helps to collect the reliable information. Inadequate response, non-response and interviewer's bias are the main demerits of interview method.

10.10 TECHNICAL TERMS

Interview,
Focussed interview,
repeated interview,
research interview,
group interview

10.11 SELF ASSESSMENT QUESTIONS

1. Define interview Explain its characteristics?
2. Describe the types of interview?
3. Write about the merits and demerits of interview method?
4. Briefly explain the importance of interview method in sociological research?
5. What are the problems encountered in interview?
6. Bring out the importance of interview method in social research?
7. Explain the objectives of interview?

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PROF G.V. RAMANA

Lesson – 11

QUESTIONNAIRE

OBJECTIVES

The main purpose of this lesson is to explain different types of questionnaire and their importance in social science research. By the end of this lesson you will be able to:

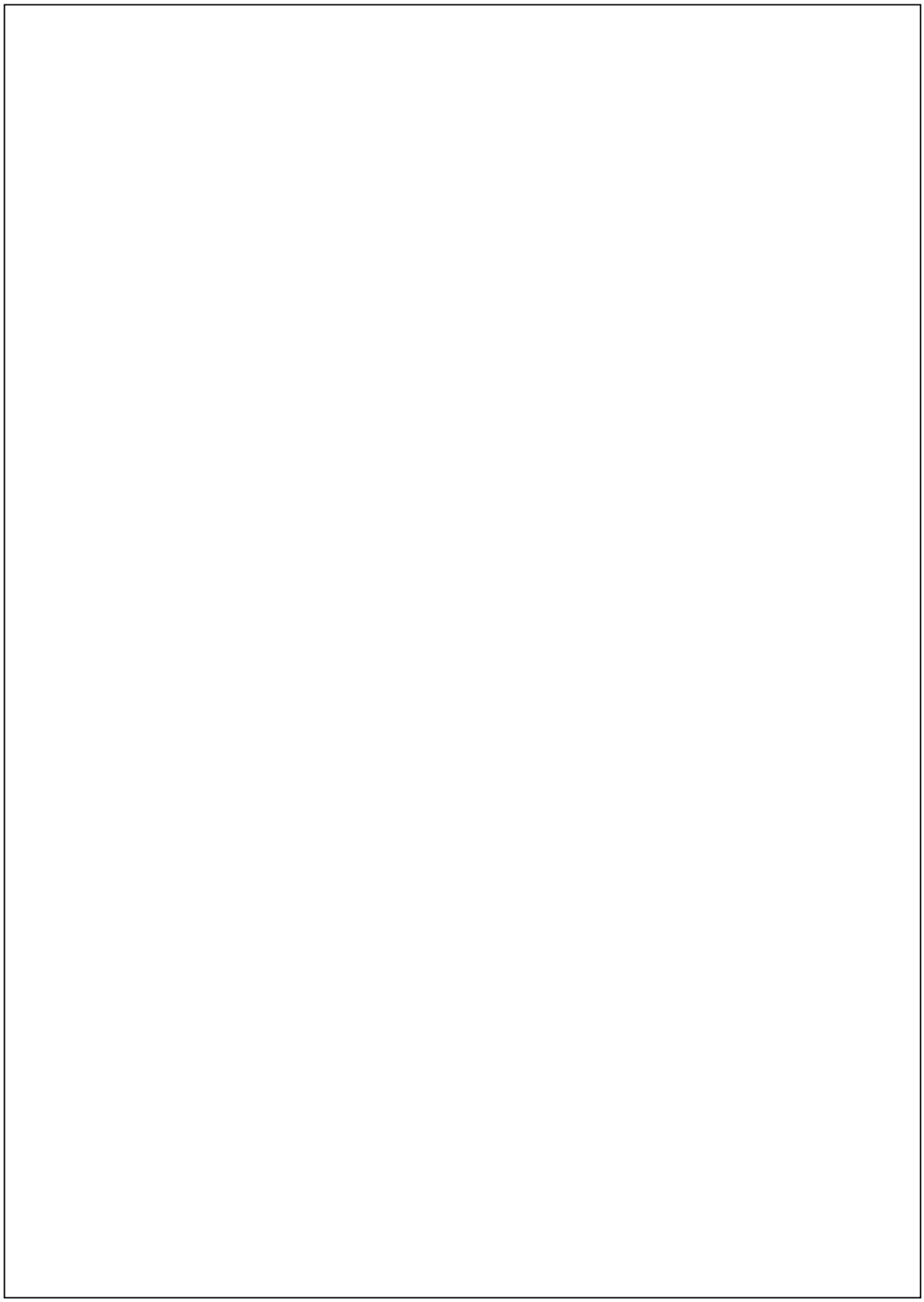
- Define questionnaire
- Explain types of questionnaires
- Discuss the importance of questionnaires
- Distinguish between schedule and questionnaire.

Structure

11.1 INTRODUCTION

Questionnaire method is one of the important methods in data collection. It is widely used in social research. It is a reliable tool for getting information from large, diverse varied and scattered social groups. It is very useful in specific studies of social environment. It is also used in combination other techniques and tools.

The questionnaire is a method/tool is based on the questions. This method of data collection is quiet familiar. To collect the data from large number of respondents the questionnaire is very essential. A questionnaire consists of a number of questions printed or typed in a definite order on a form or set of forms. Questionnaire is considered as the heart of a social research. A properly constructed questionnaire certainly helps to gather the relevant data according to the objectives of a concerned research. Hence it should be very carefully constructed. If the questionnaire is not properly set up the particularly research will not bring any fruitful result.



11.2 MEANING AND DEFINITION OF QUESTIONNAIRE

The word "questionnaire 'refers to a device for securing answer to questions using a form which the respondent fills in himself.

Definitions

1. According to **Pauline V. Young** questionnaire, is "a tool which is used by the social scientists as a supplementary tool in studying the measurable social phenomena".
2. **Goode and Hatt** define questionnaire as "a device for securing answers to questions by using a form which the respondent fills in himself"
3. **George Lundberg** explains Questionnaire as "a set of stimuli to which ever illiterate people are exposed in order to observe their himself" verbal behavior under these stimuli".
4. **Bogardus** defines a questionnaire as "a list of questions to a number of persons for them to answer. It secures standardized results that can be tabulated and treated statistically".
5. According to **H.sin pao Yang**, "In its simplest form the questionnaire consists a schedule of questions sent by mail to persons in a list or in a survey sample"
6. Wallace and Wallace," A questionnaire is a means of gathering information by having the respondents fill in answers to printed questions.'

With the help of the above mentioned definitions and brief introduction we can understand, what the role of a questionnaire is in social research.

Subject Matter

A good questionnaire should consist of certain characteristics. To be successful, questionnaire should be comparatively short and simple i.e., the size of the questionnaire should be kept to the minimum. Questions should precede logical sequence moving easy to more difficult questions. Personal and intimate questions should be left to the end. Technical terms and vague interpretation should be avoided in a questionnaire. Questions may be dichotomous (yes or no answers), multiple choice or open ended.

11.3 TYPES OF QUESTIONNAIRE

Pauline V. Young has classified the questionnaire into two types as structured questionnaire and unstructured questionnaire. George A. Lundberg has given better classification, he classified questionnaire as 1) questionnaire of fact, which required certain information of facts from the respondents without any reference to his opinion or attitude them and 2) questionnaire of opinion and attitude in which the informant's opinion, attitude or preference regarding some issues is required. Let us discuss Pauline V. Young's classification briefly.

Structured Questionnaire

The structured questionnaire poses definite and preordained questions. This questionnaire is prepared in advance before going to collect the data from the respondent.

These questionnaires cannot be altered while collecting the data. When-ever the researcher feels the necessity of additional information on some topic he has to note it down on other paper.

This can be again categorized into two types i.e., closed from and open-end questionnaire

Closed form questionnaire:- A closed form questionnaire is one in which questions are set in such a manner that it leaves only a few alternative answers. The respondent left with only a few choices to answer. It again is of two types in one, only two choices like yes-no, arc given and in another few arc given from which the respondent has to choose.

Open-end questionnaire:- In which the respondent has full choice of using his own style and distinction of language, expression, length and perception. The respondent is not restricted in his answers to the questions and his answers may be free and spontaneous. Open-end questionnaire is used mainly for intensive studies. Though the open-end questionnaire provides ample freedom to the respondent it creates problems in analysis of the data collected by such questionnaire especially in classification of answers.

1. Unstructured Questionnaire

The unstructured questionnaire contains a set of questions which are not structured in advance and which may be adjusted according to the need at the time of collecting the data. It gives sufficient scope for a variety of answers. The unstructured questionnaire is mainly used in conducting interviews. Apart from the above two types of questionnaires a pictorial questionnaire is also used for the collection of data, which is used mainly in collecting the data from the children.

11.4 IMPORTANT FEATURES FOR GOOD QUESTIONNAIRE:

Questionnaire is an important tool for data collection. It is relatively better than other methods. It has been said that no survey can be better without questionnaire. So, from the practical point of view constructing questionnaire is an important task for an investigator.. Special care must be taken from the initial stage to construct a questionnaire. Discussion on the questionnaire must begin at the start of the planning stages and will not end until the pilot surveys a completed.

1. There are number of principles guiding questions designs and some pitfalls to beware. Further, for every conceivable question there are
2. Several possible and theoretically acceptable forms in choosing between them
3. Knowledge of the survey population
4. Subject matter
5. Common sense
6. Past experience and
7. Pilot work, are present as the researcher's tools.

Clarity: The first step in framing a questionnaire is clarity which means the problem to be tackled by the survey and hence to decide on what questions to ask.

Length of the questionnaire: Length of a questionnaire should be limited. This is a qualitative expression. The important consideration is that the questionnaire covers the subject and that the techniques used are those which will meet the demands of the study.

Arrangement or ordering of questions: The researcher has to take lot of care to array the questions logically for obtaining the reliable information.

Questions should be analytical in nature: The questions should focus on the main aspects of the problem. It implies that the questions which are included in the questionnaire should be analytical in nature.

Language of the questionnaire: Effectively worded questions are very important in a questionnaire.

Emotional questions may not be included: Certain emotional questions may injure the personal feelings of the respondents. The questions should be included in a questionnaire within the objectives and scope of the study. The purpose of the research is important than asking emotional questions which may lead the study in unintended direction.

11.5 ADVANTAGES OF QUESTIONNAIRE

1 .Low Cost

The questionnaire is cheaper than other methods of collection data. By this method the cost of conducting research is sufficiently low. The researcher has to spend more than the cost of printing of questionnaires, postage and follow-ups, in other methods.

2. Larger Coverage

Under this method a much large sample may be drawn and people dispersed over very vast area can be contacted without any extra cost. And the survey can be conducted quickly.

3. Fast rate of progress

The surveys can be conducted quickly through questionnaires. It does not take much time to mail the questionnaires to the respondents. Replies may be received in a much smaller time than other methods.

3. Repetitive information

Questionnaire method has also been found to be more useful, where information has to be gathered at regular intervals. In case of schedule method the cost of such repetitive information would become costlier.

4. Greater Validity

The questionnaire ensures validity as the respondents are not required to indicate their names on the questionnaires. They feel free to express their views and opinions. Especially answers to the questions regarding personal information and respondents feels free in giving answers to such questions without embracement and with accuracy, as they do not face the interviewer who is a stranger. Thus the answers given in the questionnaire are considered more valid.

11.6 DISADVANTAGES OF QUESTIONNAIRE

1 Data is not reliable

The information gathered through questionnaire cannot be said to be very must reliable especially when the information to be obtained concerns private information such as income, sexual behavior, abnormal activities, the questionnaire will not be able to get information people refrain from recording such information.

2. Incomplete entries

Most of the questionnaire is very poorly filled. As the objective of the survey involves a good deal of explaining, where the respondent is asked difficult question or where deep investigation is necessary, me often find the questionnaires being left without answering all the questions.

3. Poor response

If a high response rate is required, the questionnaire will not be successful. A large nu8mber of cases have to dropped out due to poor response, thus causing a bias in the sample. The questionnaire is adequate in case where only the rate of response could be very low.

4. Manipulation

In case of schedule the investigator is in contact with the respondent face to face but in the case of questionnaire the investigator is not present before the respondent. In cases of some personal questions such as income and standard of living the respondent may not give accurate or reliable information. He may give wrong or manipulated answers.

Other disadvantages like where a respondent's level of knowledge is to be obtained, the questionnaire may not be fighting method. The questionnaire is not suitable method in situations where spontaneous answers are wanted. The questionnaire does not facilitate free use of combining other methods of data collection with it. Some of the disadvantages of the questionnaire can be overcome by combining it with interviewing method.

11.7 DISTINCTION BETWEEN SCHEDULE AND QUESTIONNAIRES

Questionnaires are mailed to the respondent where as schedules are carried by only if he is able to understand the language in which it is written and he is supposed to be a literate. This difficulty can be overcome in case of schedule since the researcher he takes the schedules and the respondent" response is accordingly taken. A questionnaire is filled by the respondent himself where as the schedule is filled by the investigator.

11.8 SUMMARY

The questionnaire is another method of collection of primary data. This method involves sending questionnaires to the respondents with a request to complete them and return them by post. The distinctive feature of the mail survey is that the questionnaire is self-administered by the respondents themselves and the responses are recorded by them, and not by the investigator as in the case of personal interview method. There are some alternative methods of distributing questionnaires to the respondents. They are (1) personal delivery, (2) Attaching questionnaire to a product (3) advertising questionnaire in a newspaper or a

magazine, and (4) new stand insets. The response rate in mail surveys is generally very low, more so in developing countries like India. Certain techniques have to be adopted to increase the response rate. They are less costly than personal interviews, as cost of mailing is the same throughout the country, irrespective of distances. They can cover extensive geographical areas. Mailing is useful in contacting person. The respondents can complete the questionnaires at their conveniences

Mail surveys, being more impersonal, provide more anonymity than personal interviews. The scope for mail surveys is very limited in a country like India where the percentage of literacy is very low.

11.9 TECHNICAL TERMS

Questionnaire,
Structured questionnaire,
Unstructured questionnaire,
Open end questionnaire,
Closed end questionnaire

11. 10 Questions

1. Bring out the meaning and definitions of questionnaire method?
2. Discuss the various types of questionnaires?
3. Describe the various cautions to be taken while preparing the questionnaire?
4. Discuss the advantages and disadvantages of questionnaire method?
5. Distinguish between schedule and questionnaire?

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PROF G.V. RAMANA

LESSON – 12

OBSERVATION

OBJECTIVES

This lesson mainly aims of explain the observation method. In the end of this lesson you will be able to

-Know the meaning, definition, process, and types of observation
- Understands the advantages, disadvantages and limitations of observation.

Structure

12.1 INTRODUCTION

Many methods are being employed by the social researchers to obtain the data depending on the nature of their research problem. Observation is one of such methods. Observation implies a 'systematic viewing in connection with the consideration of seen phenomena'. In day-to-day life a common man observes many things like in the incidents which are happenings in and around him. In case of time, he may not recollect or ignores many such things, because he does not observe them intentionally.

But to a social researcher observation is entirely different. He gives importance to social processes, social trends, cross section of life processes, continuities of personal experiences etc. by his observation. For example, in his field visit to a factory, he is able to observe, the workers' behavior, their nature of work, their interaction etc. Because his study dictates him what is to be observed and what not to be observed. In another example, when the post graduate students of sociology visiting a factory for observation, all the students won't observe same thing. A few students may take conscious note of social behavior, of the workers, few others may concentrate on welfare measures which are provided for the workers and some others give importance to the formal and informal groups among the working class.

Observation is a primary as well as a classic method of scientific enquiry. It is an oldest method also. The accumulated knowledge of scientists is built upon centuries of systematic observation, much of it about the phenomena in their surroundings.

Observation method is suitable for investigating the problem which the social scientist is interested. It must be appropriate to the populations and samples the researcher wishes to study and it should be reasonably reliable and objective.

Observation is a scientific tool too because it serves in a systematically planned and formulated research purpose and controls validity and reliability. The researcher is able to get the information by the way of his own direct observation without asking from the respondent. For example, in a study relating to child labor in informal sector, the researcher himself can observe the nature of work done by the children instead of asking them.

Subject Matter of Observation

Observation is an important method of data collection. The studies based upon interview schedules and questionnaires revealed that the questions contained premises which implied simple conclusions. The researcher is able to get the reply like 'Yes' or 'No' by using the schedules and questionnaires. But through the observation method he can get cause and effect of the happenings in social phenomena; because observation is a direct method, it is a scientific observation and it helps to go for an in-depth analysis.

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12.2 MEANING AND DEFINITIONS OF OBSERVATION.

Meaning of Observation:

- Observation is a simple and systematic method of data collection, in which, the information is the sought by way of researcher's own direct observation without any contact with the respondent. .
- Observation implies the use of the eyes rather than of the ears and the voice.
- The required information is received directly rather than through the reports of others.
- Observation is a basic method of getting information about the world around us.

Definitions of Observation:

1. The concise **Oxford Dictionary** defines observation is "an accurate watching and noting of phenomena as they occur in nature with regard to cause and effect or mutual relations
2. **Pauline V. Young** defines observation is a "deliberate study through the eye may be used as one of the methods for scrutinizing collective behavior and complex social institutions as well as the separate units composing of totality".
3. According to **Jahoda, Deutsch and Cook**, observation "is not only one of the most pervasive activities of daily life and it is a primary tool of scientific enquiry
4. **P.G.Gisbert** - Observation consists in the application of our mind and its cognitive powers to the phenomena which we are studying."
5. **Wallace and Wallace**-"In an observational study, the researcher actually witnesses social behavior in its natural setting'.

Much social behavior can be observed without too much difficulty and people quite often enjoy talking and telling other people about their interests, so the social researcher can often interview people too. To watch and to listen are two important activities for a social researcher studying social phenomena as it really happens. When these two concepts. 1. Watching and 2. Listening come together it is known as observation.

12.3 PROCESS OF OBSERVATION

The use of observation method requires proper planning:

1. The investigator should carefully examine the relevance of observation method to the data needs of the selected study.
2. The researcher must identify the specific investigative questions which call for use of observation method. These determine the data to be collected.
3. The researcher must decide the observation content, viz., specific conditions, events and activities that have to be observed for the required data..
4. For each variable chosen, the operational definition should be specified.
5. The observation setting, the subjects to be observed, the timing and mode of observation, recording, procedure, recording instruments to be used, and other details of the task should be determined.
6. Observers should be selected and trained. The persons to be selected must have sufficient concentration powers, strong memory power and unobtrusive nature. Selected persons should be imparted both theoretical and practical training.

12.4 Types of Observation:

The two factors "Participation" and "Control" are being exercised in varying degrees in observation. As the basis of these two factors there are four types of observation methods are widely used in obtaining the data.

1. Uncontrolled observation.
2. Controlled observation.
3. Participant observation.
4. Non-participant observation.

1. **Un-controlled observation:**

This observation is also known as simple observation and un-aided observation. In this method the observation is done in the natural surroundings and the researcher will not have any planning about what to observe. He does not examine the problem, but he is an active participant in the factors and the conditions that are responsible for the problem. ".

This is a simple observation method, under this method the researcher is able to become a part of a group upon which he is studying, because of his acquired knowledge through first method. This method has few limitations also. The findings which are arrived are probably not very reliable. There is likelihood of the prejudices and the bias influencing

the observation. No attempt is made to use precision instruments. The major aim of this type of observation is to get a spontaneous and imposed picture of life and persons.

Sometimes this observation could be described as 'pure' observation in that the researcher does not participate in any way in the social interaction under observation and also does absolutely nothing to control to setting or the behavior of the people observed. It is sometimes referred to as 'non-interventionist observation'.

In social bird watching it is very important that the people studied are not aware that they are being studied or that anyone is setting up a particular environment for them to behave in. Bird-Watching has been used by many researchers to study children's behavior. It can also be used to study people in their public leisure activities like foot ball matches or in public houses. The great advantage is that no external stimuli are applied to the subjects of the observation. All their actions and the situations they are in are absolutely normal.

2. **Controlled Observation:**

Controlled observation is generally carried on according to definite prearranged plans which may include considerable experimental procedure. This is a systematic observation which is based on logic and reasoning and keep the observation free from bias and prejudices. In its ideal form this observation is carried out in an environment which may or may not be a natural one, unknown to the actors.

One technique which certainly creates a controlled environment is where laboratory or quasi-laboratory conditions are set up. In some cases, people are invited into a laboratory and may be given tasks to carry out which may or may not be quiet what they seem to be. In the controlled observation, the researcher exercises control over the phenomena as well as observation. In order to carry out controlled observation certain devices are to be used so that this type of observation may be successfully used.

a. **Observational Schedule**: This is an objective recording device which makes possible accumulation of large quantities of concrete details. It is a standardizing device by which uniform and verifiable details can be obtained by several researchers. In filling out this schedule the researcher has to keep in mind the frequency of varieties of activities of the group which in observed..

The construction of observational schedule involves many procedural problems. . The schedule must be so devised as to provide an optimum of verifiable, quantifiable data and to avoid selective bias and misinterpretation of observed behavior. The units of observation must be simple, minute and meticulously worded, if they are to lend themselves to precise and uniform recording by several observers at different times.

b. **Mechanic Appliances**: Mechanical appliances and devices such as use of photo films, tape recorders etc. make the observation objective and more scientific. They help the researcher to correct the faults.

3. **Participant observation:**

Participant observation is a kind of uncontrolled observation. The term 'participant observation' is commonly used to describe rather different sorts of research methods.

Participant observation usually refers to "a situation where the observer becomes as near as may be a member of the group being studied and participates in their normal activities". The term was originally used by Hader and Lindeman to refer to work done in industrial consultation committees where some members of the committee were trained to observe in detail what happened at meetings and were then questioned afterwards by research workers- rather like an intelligence officer might question the crew of an aircraft after a raid. But the term has also been used to refer to the work done by anthropologists who have lived with tribes they have studied.

Perhaps the easiest way to consider the range of behavior under the umbrella term 'participant observation' is to separate the words 'observer' and 'participant' and think for possibilities a complete observer, an observer as participant, a participant as an observer and a complete participant. The 'complete observer' is really a bird-watcher by another name and as such has already been dealt with. The observer but has been accepted, temporarily, by the group and allowed temporary membership to enable him to carry out the research. Perhaps the classic case of this sort was William Foot Whyte's study street corner society where he became a Quasi-gang member but never lost, his status of researcher. Very often social anthropologists who study primitive tribes live with them for a period of time using this role. The people of the tribe or village agree to them participating in their lives to some extent but there is no pretense that the researcher should become a member of the village or tribe. A great advantage of this particular type of participant observation is that the researchers are in the group or community and can quiet openly ask as many questions as they feel necessary. The limitation is that the people under observation may well feel rather actually that they are being observed and may react against the observers, act unnaturally and perhaps even lie.

The next step, that of being 'participant as an observer' requires observers to adopt roles which enable them to become a member of a group and yet to be able to. ask questions without fully disclosing their roles as researchers. This is a position which requires the researcher to adopt a false role, for example, pretending to be a management trainee with a firm. This role would allow the researcher to be inquisitive and to ask questions without the members of the group knowing the true nature of the work the researcher was doing.

The extreme form of participant observation is known as 'complete participant'-is in fact, typified by the spy, who is believed by members of the group to be a genuine member of that group and is not known to be an observer at all. This extreme role can be used to try to understand extreme situations.

12.5 ADVANTAGES OF PARTICIPANT OBSERVATION:

a. **Data on various aspects of life**: Through this method the observer comes in contact with almost all the members of the group and thereby acquires information about various aspects of life. Such a collection of information is not possible either through questionnaire or interview schedule.

b. **Direct contact:** The observer comes in direct contact with the members of the group of respondents. This helps him to acquire direct information of the life and observe the natural behavior of the members of the group. Since he has become a member of that group, the other members do not think that their behavior is being observed.

c. **Understand community values**: The information that is acquired through this method reflects all the aspects of the community life. The observer or the researcher is able to appreciate the activities of the group because, due to his living with them, is able to understand the values and background of their life. The knowledge that is acquired through this method reflects the reality of that life.

d. **Unbiased picture of the life of the community**: The observer's task is to place himself in the best position for getting a complete and unbiased picture of the life of the community. With this method the observer joints in the daily life of the group or organization he is studying. He watches what happens to the members of the community, and they behave and he also engages in conversation with them to find out their reactions to, and interpretations of the events that have occurred. He studies the life of the community as a whole, the relationship between its members and its activities and institutions.

e. **Accurate information**: With the bigger and less naturally restricted community, the extent of participation is largely a matter of choice. If the observer can become so accepted as part of the community that its members are unaware of being observed, he will naturally get more authentic information because the respondents are less self-conscious of his presence.

12.6 DISADVANTAGES OF PARTICIPANT OBSERVATION

a. **Study of limited area only**: Under this method the observer can participate in the activities of a smaller group only. If he concentrates an extensive group or area for participation, he shall be restricted on account of various types of limitations.

b. **Longer time required**: The observer, under this method, has to stay in the study area for a longer period. Until he convinced himself he must observe the problem. So, through this method it is not possible to have a quick observation.

c. **Funds required**: When the observer becomes a part of the community in which he is observing, he has to shoulder the responsibilities of the membership of that group along with the responsibility that he has to shoulder as an observer and as a member of his original group. Then he has to spend greater time on observation. All these things require more resources.

d. **Individual technique**: The participant observation method p[illegible]ly depends on the skills and personality of the observer who involves in it. Once the observer becomes member of the group there is every likelihood of becoming emotionally involved into the affairs of that group. As he has become familiar in many activities. Because of his familiarity, he may develop liking of many of the activities, and many principles of the group, thus his attitude as an objective observer is lost. Because of the status and influence of participation as a human being he might also become involved in group rivalries or quarrels among the members of the group.

e. **Non-participant observation:** This is a natural method of observation. Under this method the observer is present in the group, but he does not participate in their

activities. However, this is not a participant observation method in one basic respect. In participant observation method the observer participates in the group activities while in non- participant method, he does not participate in the activities but only maintains his status of an observer. He is able to remain impartial. Because of this status, he is in a position to command respect and co-operation from all the members of the group. In case of participation, he sometimes gets in to quarrels and rivalries of the group and there by does not receive co-operation of all. Since he is able to maintain the status of a stranger, he can observe things, silently. This is a useful method in social research, because it helps the researcher to collect information in an objective manner. In participant observation method, while the observer does not have to put questions but in this method, he can collect the necessary data by asking questions.

In this method, the observer can maintain his status as a researcher. The reason is that the observer does not become an active participant in the group activities due to this he gives commands and respects as well as co-operation from the members of the group whose study is undertaking. In certain situations, he can also get more information because the members of the group think that he is their well-wisher and he is in a position to help them to remove their weakness.

12.7 LIMITATIONS OF OBSERVATION

Observation cannot be used indiscriminately for all purposes. It has its own limitations.

1. Observations of no use, studying past events or activities. One has to depend upon documents or narrations people for studying such things.
2. Observation is not suitable for studying and attitudes. However, an observation of related behavior affords a good clue to the attitudes E.g., and observations of the seating pattern of high caste and class persons in a general meeting in a village may be useful for forming an index of attitude.
3. Observation poses difficulties in obtaining a representative sample. For interviewing and mailing methods, the selection of a random sampling can be rapidly ensured. But observing people of all types does not make the samples random one.
4. Observation cannot be used as and when the researcher finds a convenient to use it. He has to wait for the eve n to occur. For example, an observation of folk dance of a tribal community is possible, only when it is performed.
5. A major limitation of this method is that the observer normally must be at the scene of the event when it takes place. Yet it may not be possible to predict where and when the event will occur, e.g., road accident, communal clash.
6. Observation is slow and expensive process, requiring human observe and/or costly surveillance equipment.

12.8 SUMMARY

Observation means viewing or seeing. Observation may be defined as a systematic viewing of a specific phenomenon with particular purpose of gathering information for a specific study. Observation is one of the most efficient methods of collecting reliable data

about the social behavior of man though has its own limitations. Observation may be divided in various ways depending upon the researcher's role. It may be classified into, participant, non participant, controlled and uncontrolled observation. The effectiveness of the observation method depends to a greater extent on the capacity of the observer.

12.9 TECHNICAL TERMS

Participant observation,
Non- participant observation,
controlled observation and
uncontrolled observation.

12. 10 SELF ASSESSMENT QUESTIONS

1. Give its meaning and definitions of observation method.
2. Discuss the process of observation
3. Explain the types of observation
4. Describe the merits and demerits of observation.
5. Explain the limitations of observation

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PROF G.V. RAMANA

LESSON: 13

MEASURES OF CENTRAL TENDENCY

OBJECTIVES

We have looked at three different measures of central tendency and we now consider them in the light of the various information they give about sets of data. By examining the advantages and limitations of each of the three measures, we may know what information they give.

Structure

13.1 INTRODUCTION

In this lesson we consider statistical measures which can be used to describe the characteristics of a set of data. The interesting thing is in a single value that serves as a representative value of the overall data. There are three of such measures are the mean, the mode, and the median. These three measures reflect numerical values in the centre of a set of data and are therefore called measures of central tendency.

13.2 THE MEAN

The mean of a set of numbers $x_1, \ldots, x_n$ is denoted by $\bar{x}$, and is defined by the equation

[S1] $\bar{x} = \frac{1}{n}(x_1 + x_2 + x_3 + \ldots + x_n) = \frac{1}{n}\sum_{i=1}^{n} x_i$

It can be seen from [S1], that:

[S2] $n\bar{x} = x_1 + x_2 + x_3 + \ldots + x_n$.

Example 13.1

Find the mean of the numbers 2, 4 , 7, 8, 11, 12.

Solution

The mean $= \frac{2+4+7+8+11+1}{6} = \frac{44}{6} = 7\frac{1}{3}$.

Example 13.2

The set of numbers x^2, 3, $3x$- 4, 7, 9, where x is a positive integer, has a mean of 5. Find the value of x.

Solution The value of x is given by the equation

$$\frac{1}{5}(x^2 + 3 + 3x - 4 + 7 + 9) = 5$$

$$x^2 + 3x + 15 = 25$$

$$x^2 + 3x - 10 = 0$$

$$(x+5)(x-2) = 0$$

$$x = -5 \text{ or } x = 2.$$

Since x is a positive integer, we reject the negative root. Hence $x = 2$.

Example 13.3

The maximum load that a lift can take is 1 000 kg. If 5 men with a mean weight of 61 kg and 12 women with a mean weight of 52 kg take the lift, will their total weight exceed the maximum load?

Solution

The total weight of the 5 men and the 12 women is (see [S2])

$5 \times 61 \text{ kg} + 12 \times 52 \text{ kg} = 929 \text{ kg}$.

This total weight is less than 1 000 kg and so does not exceed the maximum load the lift can take. The mean of a frequency distribution If the numbers x_1, x_2, x_3,…,x_k occur with frequencies $f_1 f_2$, f_3,..., f_k, respectively, then their mean is given by

$$\frac{f_1x_1 + f_2x_2 + f_3x_3 + \ldots + f_kx_k}{f_1 + f_2 + f_3 + \ldots + f_k} = \frac{\Sigma f_i X_i}{\Sigma f_i} \quad \ldots\ldots 2.3.1$$

Example 13.4

Table 13.1 shows the body masses of 50 men. Find the mean body mass.

Table 13.1: Body masses of 50 men

Mass (Kg)	59	60	61	62	63
Frequency	3	9	23	11	4

Solution

The calculation can be arranged as shown in Table 13.2.

Table 13.2: Work table for calculating the mean

Mass (x)	Frequency(f)	fx
59	3	177
60	9	540
61	23	1403
62	11	682
63	4	252
	$\sum f = 50$	$\sum fx = 3054$

$$\bar{x} = \frac{\sum fx}{\sum f} = \frac{3054}{50} = 61.08.$$

The mean body mass is 61.08 kg.

13.2.1 Assumed mean method

The amount of computation involved in using Equation (2.3.1) can be reduced by using the following result:

If M is any guessed mean or assumed mean (which may be any number) and if $d_i = x_i - m$ ($i = 1,2,\ldots,k$), then Equation (2.3.1) becomes

$$\bar{x} = m + \frac{\sum f_i d_i}{\sum f_i} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (2.3.2)$$

This method is called "finding the mean by the assumed mean method". The following example illustrates an application of the assumed mean method.

Example 13.5

Solve Example 13.3 by using a suitable assumed mean

Solution

We choose 61 (the number with the highest frequency) as the assumed mean. The solution can be arranged as shown in Table 1.3.

Table 13.3: Calculations for Example 1.5

Mass (x)	Frequency (f)	D = x – 61	Fd
59	3	-2	-6
60	9	-1	-9
61	23	0	0
62	11	1	11
63	4	2	8
	$\sum f = 50$		$\sum Fd = 19 - 15 = 4$

$\bar{x} = (61 + \frac{1}{50}\sum \square\square) = (61 + \frac{1}{50}\sum \square\square) = 60.08kg.$ *as before.*

It should be noted that the assumed mean can be any real number. However, the amount of computation can be reduced further if we take the number with the highest frequency as the assumed mean.

13.2.2 The mean of a grouped frequency distribution:

Equations (2.3.1) and (2.3.2) are valid for grouped frequency distributions if we interpret x_i as the class mark of a class interval and f_i the corresponding class frequency. In the following example, we apply Equation (2.3.1) to find the mean of a grouped frequency distribution.

Example 13.6

Table 13.4 shows the distribution of the marks scored by 60 students in a Physics examination. Find the mean mark.

Table 13.4: Marks scored in a Physics examination

Mark %	60-64	65-69	70-74	75-79	80-84
Number of students	2	15	25	14	4

Solution

The solution can be arranged as shown in Table 13.5, on the next page.

Table 13.5: Calculations for Example 1.6

Marks	Class mark(x)	Frequency (f)	Fx
60-64	62	2	124
65-69	67	15	1005
70-74	72	24	1800
75-79	77	14	1078
80-84	82	4	328
		$\sum f = 50$	$\sum fx = 4335$

$$\bar{x} = \frac{\sum fx}{\sum f} = \frac{4335}{60} = 72.25$$

The mean mark is 72.25 %.

If all the class intervals of a grouped frequency distribution have equal size c, then, Equation (2.3.2) takes the form

$$\bar{x} = m + c\frac{\sum f_i u_i}{\sum f_i}, \quad 2.3.3$$

where $u_i = \frac{x_i - m}{c}$ (i= 1, 2,....., k,)

This is called the "***coding***" method for computing the mean. It is a very short method and should always be used for finding the mean of a grouped frequency distribution ***with equal class widths***.

Example 13.7

Use the coding method to solve Example 13.6

Solution

The width of each class interval is 5 and so c = 5. We take M = 72, the class mark with the highest frequency. The calculations can be arranged as shown in Table 1.6

$$\bar{x} = 72 + 5 \times \frac{3}{60} = 72 + \frac{1}{4} = 72.25.$$

Table 13.6: Calculations for Example 13.7

Marks	Class mark(x)	Frequency (f)	$u = \frac{x - 72}{5}$	*Fu*
60-64	62	2	*-2*	*-4*
65-69	67	15	*-1*	*-15*
70-74	72	24	*0*	*0*
75-79	77	14	*1*	*14*
80-84	82	4	*2*	*8*
		$\sum f = 60$		$\sum fx = 22\text{-}19 = 3$

13.2.3 Remarks

In calculating the mean of a grouped frequency distribution, we assume that all values within a class interval are coincident with the class mark of that class interval. The fact that this is not usually the case means that the mean calculated from a grouped data is likely to differ from the mean of the original (ungrouped) data. As already pointed out on page 29, this error, brought about by grouping, can be minimized by choosing class intervals such that class marks coincide with actually observed data.

1.3 THE MEDIAN

The median of a set of data is defined as the ***middle value when the data is arranged in order of magnitude***. If there are no ties, half of the observations will be smaller than the median, and half of the observations will be larger than the median. For a set of N observations $x_1, x_2, \ldots, x_n$ arranged in order of magnitude, there are two cases:

[S_3] If N is odd, then the median is given by

$$\text{Median} = \text{the } \tfrac{1}{2}(N+1)^{\text{th}} \text{ ordered observation}$$

[S_4] If N is even, then the median is given by

$$\text{median} = \tfrac{1}{2}\ \{\text{the } (\tfrac{1}{2}N)^{\text{th}} \text{ ordered observation} + \text{the } (\tfrac{1}{2}N+1)^{\text{th}} \text{ ordered observation}\}$$

Example 13.8

Find the median of each of the following sets of numbers.
(a) 12, 15, 22, 17, 20, 26, 22, 26, 12
(b) 4, 7, 9, 10, 5, 1, 3, 4, 12, 10

Solution

(a) Arranging the data in an increasing order of magnitude, we obtain
12, 12, 15, 17, 20, 22, 22, 26, 26.

Here, N (= 9) is odd, and so (see [S_3])
Median = the $\frac{1}{2}(9+1)^{\text{th}}$ ordered observation = the 5^{th} ordered observation = 20.
Notice that ***if a number is repeated, we still count it the number of times it appears when we calculate the median***.

(b) Arranging the data in an increasing order of magnitude, we obtain
1, 3, 4, 4, 5, 7, 9, 10, 10, 12.

Here, N(=10) is an even number and so (see [S_4])
median = $\frac{1}{2}$ {the 5^{th} ordered observation + the 6^{th} ordered observation} = $\frac{1}{2}(5+7) = 6$
Notice that, in each case, the median divides the distribution into two equal parts, with 50% of the observations greater than it and the other 50% less than it.

Example 13.9

The following are the ages (in years) of 30 children at a birthday party. Find the median age of the 30 children:

4, 3, 5, 8, 4, 6, 7, 8, 6, 4, 5, 6, 7, 5, 7,
6, 6, 5, 4, 4, 4, 3, 5, 6, 8, 7, 3, 6, 5, 8.

Solution In order to find the median of the data, we first prepare a frequency table for the data. This method is recommended when we have a large number of observations. Table 2.32 gives a frequency table of the data.

Table 13.7: Ages, in years, of children at a birthday party

Age (x)	Tally	Frequency (f)
3	///	3
4	~~////~~ /	6
5	~~////~~ /	6
6	~~////~~ //	7
7	////	4
8	////	4

The total number of observations is 30, an even number, so the median is given by (see [S_4])

median = $\frac{1}{2}$ {the 15th ordered observation + the 16th ordered observation}

Now, the sum of the first 3 frequencies is 15, while the sum of the first four frequencies is 22. Hence, the 15*th* and 16*th* ordered observations are 5 and 6, respectively. Therefore,

median = $\frac{1}{2}$ (5 + 6) = 5.5.

The median age is 5.5 years.

Example 13.10

The monthly salaries of five employees of a certain firm are given as: Rs2500, Rs3900, Rs3200, Rs9200, Rs3700.

Find (a) the mean monthly salary, (b) the median monthly salary. Which of these two measures is more typical of the salaries of the five employees? Give reasons.

Solution

(a) The mean monthly salary is Rs $\{\frac{1}{5}(2500 + 3900 + 3200 + 9200 + 3700)\} = 3860$

(b) We first arrange the salaries in order of magnitude. This gives:

Rs 2500, 3200, 3700, 3900, 9200

Since there is an odd number of observations, the middle value, Rs3700, is the median monthly salary.

In this example, the mean salary gives a false picture since it is greater than the salaries of 4 of the 5 employees. The median salary is, however, "close" to the salaries of most of the employees. It is therefore more representative of the data than the mean salary. (Notice that the median salary is not affected by the ***extreme value***, Rs9200, while the mean salary is affected by it.)

13.3.1 The median of a grouped frequency distribution

The exact value of the median of a grouped data cannot be obtained because the actual values of a grouped data are not known. For a grouped frequency distribution, the median is in the class interval which contains the $(\frac{1}{2}N)^{th}$ ordered observation, where N is the total number of observations. This class interval is called the ***median class***. The median of a grouped frequency distribution can be estimated by either of the following two methods:

(i) Linear interpolation method for estimating the median

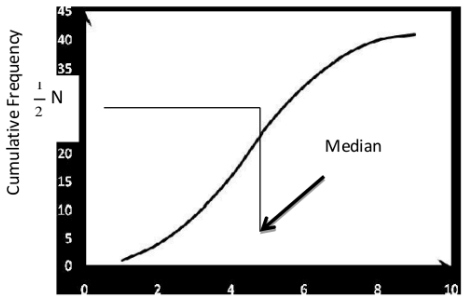
The median of a grouped frequency distribution can be estimated by linear interpolation. We assume that the observations are evenly spread through the median class. The median can then be computed by using the following formula:

[S5] Median = $L + (\frac{\frac{1}{2}N - F}{fm})c$,

N = total number of observations,
L = lower class boundary of the median class,
F = sum of all frequencies below L,
fm = frequency of the median class,
= class width of the median class.
An application of this formula is given in Example 2.21.

(ii) Estimation of the median from a cumulative frequency curve

The median of a grouped frequency distribution can be estimated from a cumulative frequency curve. A horizontal line is drawn from the point $\frac{1}{2}$ N on the vertical axis to meet the cumulative frequency curve. From the point of intersection, a vertical line is dropped to the horizontal axis. The value on the horizontal axis is equal to the median, as shown is Fig. 13.1. An application of this method is given in Example 1.11.



N total frequency

Fig. 13.1: *Estimation of the median*

It should be noted that in determining the median of a grouped frequency distribution by these two methods, we assume that the original data, ungrouped, are evenly spread in the median class. The fact that this is not usually the case means that the value obtained is likely to differ from that obtained by using the original data.

Example 13.11

Table 13.8, on the given the distribution of the heights of 60 students in a Senior High school. Find the median height of the students and explain the significance of the result.

Table 13.8: Heights of students

Height (cm)	145 – 149	150 – 154	155 – 159	160 – 164	165 – 169	170 – 174
Number of students	3	9	16	18	10	4

Solution

We give two methods for solving the problem.

First method

Here, we estimate the median by linear interpolation. We first determine the median class. Now, $N = \sum = 60$ Therefore the median is the $(\frac{1}{2} \times 60 = 30)^{th}$ ordered observation. The sum of the first three class frequencies is 28 while the sum of the first four class frequencies is 46. The median class is therefore the fourth class interval with class boundaries 159.5 and 164.5. Thus, (see[S5]) $L = 159.5$, $c = 164.5 - 159.5 = 5$, $f_m = 18$, and $F = 28$. The median height is therefore equal to

$$159.5 + (\frac{\frac{1}{2} \times 60 - 28}{18}) \times 5 \text{ cm} = (159.5 + \frac{1}{18} \times 5) \text{ cm} = 160.1 \text{ cm}.$$

This means that 50% of the students are less than 160.1 cm tall and the other 50% are more than 160.1 cm tall.

Second method

Here, we estimate the median from a cumulative frequency curve. We first prepare the cumulative frequency table for the data in Table 13.8. This is given in Table 13.9.

Table 13.9: Cumulative frequency table of the data in Table 13.8

Height (cm) less then	Cumulative frequency
144.5	0
149.5	3
154.5	12
159.5	28
164.5	46
169.5	56
174.5	60

Fig. 13.2 shows the cumulative frequency curve for the data.

To estimate the median height, we draw a horizontal line from the point $(\frac{1}{2} \times 60 = 30)$ on the vertical axis to meet the cumulative frequency curve. From the point of intersection, a vertical line is dropped to the horizontal axis, meeting it at the point 160 cm. The median height of the students is therefore 160 cm.

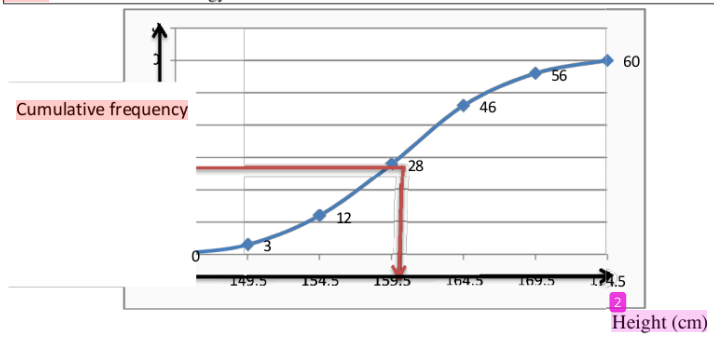


Fig. 13.2: Cumulative frequency curve of the data in Table 13.8

13.4 THE MODE

The mode of a set of data is the value which occurs with the greatest frequency. ***The mode is therefore the most common value*.**

Example 13.12

(a) The mode of 1, 2, 2, 2, 3 is 2.
(b) The modes of 2, 3, 4, 4, 5, 5 are 4 and 5.
(c) The mode does not exist when every observation has the same frequency. For example, the following sets of data have no modes:
(i) 3, 6, 8, 9; (ii) 4, 4, 4, 7, 7, 7, 9, 9, 9.
It can be seen that the mode of a distribution may not exist, and even if it exists, it may not be unique.

Example 13.13

20 patients selected at random had their blood groups determined. The results are given in Table 13.10.

Table 13.10: Blood groups of 20 patients

Blood group	A	B	AB	O
Number of Patients	2	4	6	8

The blood group with the highest frequency is *O*. The mode of the data is therefore blood group *O*. We can say that most of the patients selected have blood group *O*.

Notice that the mean and the median cannot be applied to the data in Example 1.13. This is because the variable "blood group" cannot take numerical values. However, it can be seen from Examples 1.12 and 1.13, that ***the mode can be used to describe both quantitative and qualitative data*.**

13.4.1 The mode of a grouped frequency distribution

For a grouped frequency distribution, the class interval with the highest frequency is called the ***modal class***.

Fig. 13.3 shows a histogram for a grouped frequency distribution. The modal class is the class interval which corresponds to rectangle *ABCD*. An estimate of the mode of the distribution is the abscissa of the point of intersection of the segments $\overline{AC}$ and $\overline{BD}$ in Fig. 13.3.

Example 13.14

Table 13.11 gives the distribution of the marks scored by 20 students in a Mathematics quiz.

Table 13.11: Marks scored by students

Marks	1-5	6-10	11-15	16-20	21-25
Frequency	3	4	7	2	4

Construct a histogram for the data and use it to estimate the mode of the data.

Solution

Fig. 13.4 shows a histogram for the data. To estimate the mode of the data from Fig. 13.4, we determine the abscissa of the point of intersection of the line segments $\overline{AC}$ and $\overline{BD}$. This gives the estimated modal mark as 12.5.

Fig. 13.4: Histogram of the data in Table 13.11

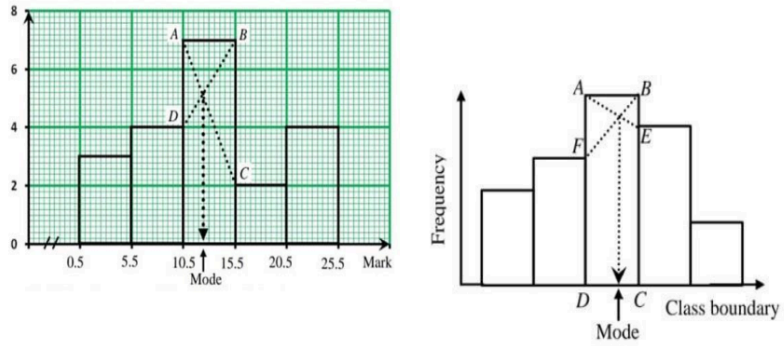
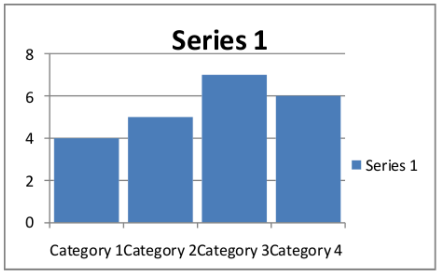


Fig. 13.3: A histogram, showing how to estimate the mode



13.5 OVERVIEW OF MEASURES OF CENTRAL TENDENCY

Measures of central tendency describe the centre of the data, in terms of a typical observation.

- The ***mean*** is the sum of the observations divided by the sample size. It is the centre of gravity of the data.
- The ***median*** divides the ordered data set into two parts of equal numbers of observations. Half below and half above that point.
- The lower quarter of the observations fall below the ***lower quartile***, and the upper quarter fall above the ***upper quartile***. These are the 25th and 75th percentiles. The median is the 50th percentile. The quartiles and median split the data into four equal parts. They are less affected than the mean by outliers or extreme skew.
- The ***mode*** is the most commonly occurring value. It is valid for any type of data, though usually used with categorical data or discrete variables taking relatively few values

13.6 CONCLUSION

The mean is unique for any set of quantitative data. That is, there is one and only one mean for a given set of quantitative data. The formula for calculating the mean uses numerical values for the observations. So the mean is appropriate only for quantitative data. It is not sensible to compute the mean of observations on a nominal scale. For instance, categorical variable such as religion, measured with categories such as (Hindu, Muslim, Christian, Other), the mean religion does not make sense, even though these levels may sometimes be coded by numbers for convenience. Similarly, we cannot find the mean of observations on an ordinal rating, such as excellent, good, fair, and poor, unless we assign numbers such as 4, 3, 2, 1 to the ordered levels, treating it as quantitative. Its main characteristic and virtue is that in its calculation, every value in the data is used. To this extent, the mean may be regarded as more representative than the other two. Since it is the result of arithmetic processes, it can be used for further calculation. For example, knowing the mean and the total frequency of a set of data, their product gives the sum of all the observations in the data.

It is unique; that is, like the mean, there is one and only one median for a given set of data. The median cannot be found for nominal data, the median, like the mean, is appropriate for

quantitative data since it requires only ordered observations to compute it, it is also valid for ordinal-scale data. Because of its definition, the median is especially useful in describing data that naturally fall into rank order, such as grades, and salaries. It is preferred to the mean as a measure of central tendency if the distribution is skewed its main defect is that, in its calculation, every value of the data is not used.

The mode is not unique. That is, there can be more than one mode for a given set of data. Distributions with a single mode are referred to as ***unimodal***. Distributions with two modes are referred to as ***bimodal***. Distributions may have several modes, in which case they are referred to as ***multimodal***. The mode of a set of data may not exist; it is not affected by outliers it is mostly used by manufacturers since it gives a better idea of what particular size of a product to manufacture in excess of the others. For instance, a shoemaker is more interested in the modal size of the shoes he manufactures than the mean or the median size.

13.7 TECHNICAL TERMS

- **Assumed Mean**
- **The mean of a grouped frequency distribution**
- **The Mean**
- **The Median**
- **The Mode**

13.8 SELF ASSESSMENT QUESTIONS

1. Find the mean of the following data

x	0	1	2	3	4	5
f	2	3	5	8	7	3

2. Using a suitable assumed mean, find the mean of the following data.

x	152	156	160	164	168	172	176	180
f	3	6	10	20	30	20	8	3

3. The following table gives the distribution of the lengths of 40 iron rods. Using a suitable assumed mean, find the mean length of the iron rods.

Length(CM)	190	195	200	205	210	215	220
Frequency	3	5	7	10	6	7	2

4. The following table gives the distribution of the marks scored by 40 students in a Physics examination. Calculate, using the assumed mean method, the mean mark

5.

Marks (%)	20-29	30-39	40-9	50-59	60-69	70-79	80-89
Frequency	1	3	10	12	7	4	3

6. The following table gives the distribution of the ages of 40 patients who attended a clinic on a certain day. Calculate, using the assumed mean method, the mean age of the patients

Age (Years)	21-25	26-30	31-35	36-40	41-45	46-50
Frequency	2	5	10	12	8	3

7. The following table gives the distribution of the number of eggs laid by a chicken each day in 15 days. Find the median number of eggs

Number of eggs (x)	0	1	2	3	4
Number of days (F)	1	2	4	5	3

8. The following table gives the ages of 40 patients who attended a certain clinic on a given day. Calculate the median age.

9.

Age (Years)	10-14	15-19	20-24	25-29	30-34	35-39	40-44
Frequency	1	2	6	14	13	3	1

13.9 REFERENCE BOOKS

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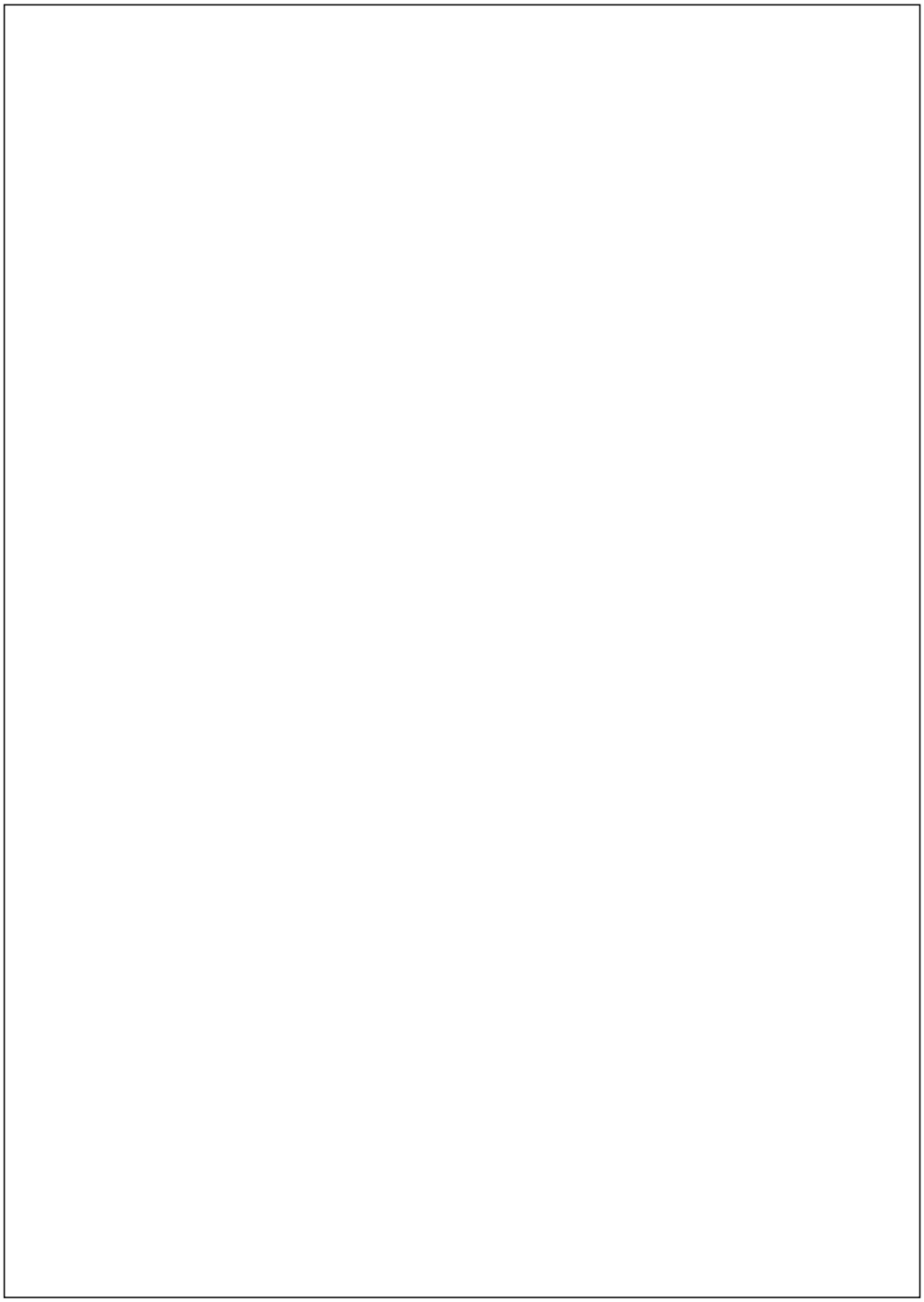
LESSON 14

USE OF STATISTICS IN SOCIAL RESEARCH

OBJECTIVES

The objective of the present lesson is to know the use of statistics in social research.

Structure



14 .1 INTRODUCTION

Social statistics is the field of statistical science that deals with the study of social phenomena and in particular human behaviour in a social environment. Such phenomena are any kind of human activities, including activities of groups of people like households, societies and nations and their impacts on culture, education, social, economic and other areas. Generally, we can say that social statistics deal with the application of statistical methodology in areas like survey methodology, official statistics, sociology, psychology, political science, criminology, public policy, marketing research, demography, education, economics and others.

Due to the nature of social sciences it is common to study indicators that cannot be measured directly. Moreover, data that is unobservable, informal, illegal or "too personal" are often studied in this area. For example, a social researcher may be interested on the data (answers) of the question "Do you participate in illegal gambling?".Other similar questions may be asking, for example, about the sexual behaviour of a respondent, possible addictions etc.

14.2 SOCIAL RESEARCH DEFINITION

Social Research could be a method utilized by social scientists and researchers to find out about people and societies so they will design products/services that cater to varied needs of the people. Different socio-economic groups belonging to different parts of a county think differently. Various aspects of human behaviour want to be addressed to know their thoughts and feedback about the social world, which able to be done using Social Research. Any topic can trigger social research – new feature, new market trend or an upgrade in old technology.

Social Research is conducted by following a systematic plan of action which incorporates qualitative and quantitative observation methods.

- Qualitative methods rely on direct communication with members of a market, observation, text analysis. The results of this method are focused more on being accurate instead of generalizing to the whole population.

- Quantitative methods use statistical analysis techniques to evaluate data collected via surveys, polls or questionnaires.

Social Research contains elements of both these methods to investigate a variety of social occurrences like an investigation of historical sites, census of the country, detailed analysis of research conducted to know reasons for increased reports of molestation within the country etc.

A survey to observe happiness during a respondent population is one among the foremost widely used applications of social research. The happiness survey template could use by researchers an organizations to measure how happy a respondent is and also the things which will be done to extend happiness in that respondent.

14.3 TYPES OF SOCIAL RESEARCH

There are four main varieties of Social Research: Qualitative and Quantitative Research, Primary and Secondary Research.

14.3.1. Qualitative Research:

Qualitative Research is defined as a technique to gather data via open-ended and conversational discussions; there are five main qualitative research methods- ethnographic research, focus groups, one-on-one online interview, content analysis and case study research. Usually, participants aren't taken out of their ecosystem for qualitative data collection of information in real-time which helps in building trust. Researchers depend upon multiple methods to collect qualitative data for complex issues.

14.3.2. Quantitative Research:

Quantitative Research is a particularly informative source of data collection conducted via mediums like as surveys, polls, and questionnaires. The gathered data are often analysed to conclude numerical or statistical results. There are four distinct quantitative research methods: survey research, correlational research, causal-comparative research and experimental research. This research is administrated out on a sample that's representative of the target market usually using close-ended questions and data is presented in tables, charts, graphs etc.

For example, A survey are often conducted to know Climate change awareness among the overall population. Such a survey will give in-depth information about people's discernment about climate change and also the behaviours that impact positive behaviour. Such a questionnaire will enable the researcher to know what's really must be done to create more knowledge among the general public.

14.3.3. Primary Research:

Primary Research is conducted by the researchers themselves. There is an inventory of questions that a researcher intends to ask which required to be customized consistent with the target market. These questions are sent to the respondents via surveys, polls or questionnaires in order that analysing them becomes convenient for the researcher. Since data is collected first-hand, it's highly accurate consistent with the need of research.

For example: There are tens of thousands of deaths and injuries associate with gun violence within the US. We keep hearing about people carrying weapons attacking general public within the news. There is quite debate within the American public on understand if possession of guns is that the cause to the present. Institutions associate with public health or governmental organizations are completing studies to seek outthe cause. A lot of policies also are influenced by the opinion of the overall population and regulation policies are not any different. Hence a regulation questionnaire are often administered to collect data to know what people believe gun violence, regulation, factors and effects of possession of firearms. Such a survey can help these institutions to form valid reforms on the idea of the data collection.

14.3.4. Secondary Research:

Secondary Research is a method where information has been already gathered by research organizations or marketers. Newspapers, online communities, reports, audio-visual evidence etc. fall under the category of secondary data. After identifying the subject of research and research sources, a researcher can collect existing information available from the noted sources. They can then combine all the knowledge to match and analyze it to derive conclusions.

14.4 SOCIAL RESEARCH METHODS

14.4.1 Surveys:

A survey is conducted by sending a group of pre-decided inquiries to a sample of people from a target market. This will cause a set of data and feedback from individuals that belong to varied backgrounds, ethnicities, age groups etc. Surveys are often conducted via online and offline mediums. Due to the development in technological mediums and their reach, online mediums have flourished and there's a rise within the number of individuals counting on online survey software to conduct regular surveys and polls.

There are various sorts of social research surveys: Longitudinal, Cross-sectional, Correlational Research. Longitudinal and Cross-sectional social research surveys are observational methods while Correlational may be a non-experimental research method. Longitudinal social research surveys are conducted with an equivalent sample over a course of your time while Cross-sectional surveys are conducted with different samples.

For example: it's been observed in recent times, that there's a rise within the number of divorces, or failed relationships. The number of couples visiting marriage counsellors or psychiatrists is increasing. Sometimes it gets tricky to know what the cause for a relationship falling apart is a screening process to know an summary of the connection are often a simple method. A marriage counsellor can use a relationship survey to know the chemistry during a relationship, the factors that influence the health of a relationship, the challenges faced during a relationship and expectations in a relationship. Such a survey can be very useful to deduce various findings in a patient and treatment can be done accordingly.

Another example for the utilization of surveys are often to collect information on the notice of disasters and disaster management programs. A lot of institutions just like the UN or the local disaster management team attempt to keep their communities prepared for disasters. Possessing knowledge about this is often crucial in disaster prone areas and may be a good sort of knowledge which will help everyone. In such a case, a survey can enable these institutions to know what the areas which will be promoted more are and what regions need what quite training. Hence a disaster management survey are often conducted to know public's knowledge about the impact of disasters on communities, and therefore the measures they undertake to reply to disasters and how can the risk be reduced.

14.4.2. Experiments:

An experimental research is conducted by researchers to watch the change in one variable on another, i.e. to establish the cause and effects of a variable. In experiments, there's a theory which must be proved or disproved by careful observation and analysis. An efficient experiment are going to be successful in building a cause-effect relationship while proving, rejecting or disproving a theory. Laboratory and field experiments are preferred by researchers.

14.4.3. Interviews:

The technique of garnering opinions and feedback by asking selected questions face-to-face, via telephone or online mediums is named interview research. There are

formal and informal interviews – formal interviews are those which are organized by the researcher with structured open-ended and closed-ended questions and format while informal interviews are those which are more of conv ations with the participants and are extremely flexible to gather the maximum amount information as possible.

Examples of interviews in social research are sociological studies that are conducted to know how religious people are to this effect, a Church survey are often employed by a pastor or priest to know from the laity the explanations they attend Church and if it meets their spiritual needs.

14.4.4. Observation:

In observational research, a researcher is predicted to be involved within the lifestyle of all the participants to know their routine, their decision-making skills, their capability to handle pressure and their overall likes and dislikes. These factors and recorded and careful observations are made to make a decision factors like whether a change in law will impact their lifestyle or whether a replacement feature will be accepted by individuals.

14.5 WHAT IS SOCIAL STATISTICS?

Social statistics is the use of statistics to examine human behaviour and social environments. Social statistics data is information about particular event.

14.6 ABOUT STATISTICS

Statistics are numbers, summaries of patterns and can also be probabilities. Statistical analysis can include the planning and collection of data, its interpretation and presentation. Social statistics and quantitative data analysis are key tools for understanding society and social change. We can try to capture people's attitudes and map patterns in behaviour and circumstances using numbers and also describe how people and populations change.

14.7 DATA

Data can be numerical values or text, sounds or images, memories or perceptions. Often the concept of data suggests information that has been through some quite of processing and having a structure. However, many samples ofnew sorts of data have very different and sometimes unstructured formats; as an example, many of tweets or thousands of PDFs of public documents. Huge quantities of data on people, organisations and social groups are collected every day, across the globe. As social statisticians, it's our role to analyse and make awareness of the large volumes and sources of data using hypothesis-driven social research.

14.8 UNDERSTANDING SOCIETY

Social statistics are a way of investigating and testing research questions and policy impacts across different areas of people's lives. These monitoring help our understanding of society, research questions include:

- How are populations growing?

- Are wealthy people happier?
- Is society becoming more tolerant of diversity?
- How do people cope with financial hardship?
- Do people with higher qualifications earn more?
- Does volunteering increase your sense of wellbeing?

Social statistics are a way of investigating and testing research questions and policy impacts across different areas of people's lives.

14.9 SOCIAL STATISTICS IN THE REAL WORLD

The analyses is differences among social groups and countries covering such issues as housing, health, education, conditions of work and employment.
It pays special attention to the study of conditions of special population groups, including children, the elderly, the unemployed, and people with disabilities.

14.10 COMPARE THE FACTS

Social statistics are also used to match data from before and after a policy intervention.
For example, we need statistics to calculate poverty within the first place and that we then may want to gauge the impact and costs of a policy providing economical support to families living in poverty.

14.11 PATTERNS AND RELATIONS

Statistical analysis techniques could use to explore patterns and underlying relationships in data sets, such as:

- in relation to people's responses to multiple questions in a survey;
- to take account of aspects of people's circumstances such as the unemployment rates of where they live; or
- the educational standards of the class and/or school they are studying in;
- Change can also be measured through longitudinal surveys where people are interviewed at different points during their lives.

Statistical testing and modelling techniques could use to generalise from small samples to larger populations, for example:

- predicting the outcome of an election;
- Attitudes towards the economy in a country.

Probability tests could use to identify the key factor(s) related to a specific outcome or behaviour. For example, are older people more likely to be worried about being a victim of crime than younger people once you have taken account of their family status, education, job and therefore the sort of area they live in?

14.12 STATISTICS AND EMPLOYABILITY

Skills in analysing data and using statistics are vital across the research areas of population change, health, family life, the economy, well-being, education, employment, law and criminal justice, housing and civic participation.
Even if you're primarily using qualitative data, skills in understanding the larger picture can add to the explanatory power of your empirical research.
For example, a study of long-term unemployment based around qualitative interviews can be strengthened by a quantitative summary of the patterns and duration of unemployment at the local, national land international level and the way patterns have changed over time.

14.13 IMPORTANCE OF STATISTICS IN SOCIAL SCIENCES & RESEARCH

Statistics are mathematical science involving the gathering, interpretation, measurement, enumerations or estimation analysis, and presentation of natural or social phenomena, through application of varied tools and technique the raw data becomes meaningful and generates the information's for deciding purpose. It is the systematic setting of data and information give away their inner relation between the items.

Statistics plays an impotent role in every fields of human being activity and has important role in determining the prevailing position of per capita income, unemployment increasing, population growth rate, housing, schooling medical facilities etc. in a country, by which the decision making and development plans of the government becomes concentric. Now statistics holds a central position in almost every field of research like Industry, Commerce, Trade, Physics, Chemistry, Economics, Mathematics, Biology, Botany, Psychology, Astronomy, management of decision making etc.

Statistics for Social Research introduces the primary statistical concepts of data description, sampling estimation, inference, and association/correlation during a simple and readable style. Using a simple step-by-step procedure, it takes readers through the appliance of those concepts to solid problems with a full explanation of the issues involved. For SPSS users, these examples are reworked with an entire guide to the commands required and a simplification of the output that's generated. To help the reader, disks with all the info necessary to get the results and replicate the procedures described within the book are available in both Macintosh and PC formats. Statistics for Social Research could use as a stand-alone introduction to statistics or in conjunction with the SPSS package.

14.14 SUMMARY

Through this lesson, we have tries to discuss about the role and Importance of Statistics in various sociological and applied fields with their limitations also discusses the integration and co-ordination of statistical tools with the computer technology, which makes the calculation and interpretation data in very efficient and effective manner. Computer technology has becomes as lifeline of statistical tools/software's.

Statistical methods have played a very important role in social sciences. In every applied research effort statistical techniques are compulsory to reach a non-questionable conclusion. We strongly believe that advanced statistical methods can be employed heavily in this area. It seems that researchers rely more on classical statistical methods although they could benefit from the use of newer and advanced techniques.

14.15. TECHNICAL TERMS

1. Statistical tools and techniques,
2. Social Sciences and research,
3. Computer application
4. What is Social Statistics
5. Importance of Statistics in Social Sciences & Research
6. Types of Social Research

14.16 SELF ASSESSMENT QUESTIONS

1. Explain the Social Research Methods?
2. Write the Social Research Definition and Types of Social Research?
3. What is Social Statistics?
4. Social statistics in the real world?

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LESSON – 15

RESEARCH REPORT WRITING

OBJECTIVES

The objective of the present lesson is to know the Definition, Nature, Research Report Writing, Features of a Research Report and etc

Structure

15.1 INTRODUCTION

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

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

15.2 REPORT

Social research is like a long journey on the path of finding a new knowledge. The last stage begins with the precise formulation of the problems to the investigated. After that the collection of data is started. The classification of data is succeeded by classification and the processing of data. Once generalization have been drawn and formulated the report has to be prepared. It contains the statement of the procedure adopted. The research report starts with the statement of the issue on which the study was focused. The report contains description of different stages of the survey and the conclusions arrived at. In fact, it is the statement and description of significant facts that are necessary for understanding the generalizations drawn.

15.3 DEFINITION OF RESEARCH REPORT

Research is the systematic investigations into study of a natural phenomena or materials or sources or existing condition of the society in order to identify facts or to get additional information and derive new conclusions. It is a production process, which needs a number of inputs to produce new knowledge and application of new and existing knowledge to generate technology that ultimately may generate economic prosperity of a nation. Simply, a research paper/report is a systematic write up on the findings of the study including methodologies, discussion, conclusions etc. following a definite style. The research report writers in making the report good qualitative should remember the saying 'Try to express, not to impress'. More elaborately and precisely, a report or systematic write up on the findings of a research study including an abstract/executive summary/summary, introduction (Background with literature review, justification, objectives etc.) methodology/materials and methods (including statistical design, if any), results and discussion, conclusions and recommendations, references etc. following a definite style or format may be called a Research Report

15.4. FEATURES OF A RESEARCH REPORT

How do you recognize a research report when you see one? Here are some of the basic features that define a research report.

- It is a detailed presentation of research processes and findings, and it usually includes tables and graphs.
- It is written in a formal language.
- A research report is usually written in the third person.
- It is informative and based on first-hand verifiable information.
- It is formally structured with headings, sections, and bullet points.
- It always includes recommendations for future actions.

15.5 NATURE OF RESEARCH

15.5.1 Qualitative Research Report

This is the type of report written for qualitative research. It outlines the methods, processes, and findings of a qualitative method of systematic investigation. In educational research, a qualitative research report provides an opportunity for one to apply his or her knowledge and develop skills in planning and executing qualitative research projects.

A qualitative research report is usually descriptive in nature. Hence, in addition to presenting details of the research process, you must also create a descriptive narrative of the information.

15.5.2 Quantitative Research Report

A quantitative research report is a type of research report that is written for quantitative research. Quantitative research is a type of systematic investigation that pays attention to numerical or statistical values in a bid to find answers to research questions.
In this type of research report, the researcher presents quantitative data to support the research process and findings. Unlike a qualitative research report that is mainly descriptive, a quantitative research report works with numbers; that is, it is numerical in nature.

15.6 Purpose of the report:

The report is the description of what has been done during the period of study or research. Its purpose is to convey to interested persons the whole result of study in sufficient detail and to arrange as to enable each reader to comprehend the data and to determine himself the validity of the conclusions. The purpose of the report may be studied under the following heads:

15.6.1 Dissemination:

Like all forms of knowledge, the purpose of the research is to disseminate among it the people, the knowledge that has been acquired through study of a problem or research.
It presents the conclusions for the information and knowledge:
The purpose of report is to disseminate the knowledge. The submission of report is therefore important from the point of view of the utility to the society as well

15.6.2 To check the validity of the generation:

Unless the report is submitted, it shall not be possible to check the validity and the authenticity of the generalization. On the basis of the report, it is possible to test whether the generalizations are practical and real and the data can be rechecked.

15.6.3 To encourage others to carry on the same or allied problems:

The report guides future research a part from guiding them with encouragement to carry on research on the same or allied problems.

15.7 Contents of a report:

Report or study of research has to contain certain things. The subject matter or the report may be classified and studied under the following heads:-

15.7.1 Table of Contents

This is like a compass that makes it easier for readers to navigate the research report.

15.7.2 Abstract:

The entire objectives along with the overview that highlights all important aspects of research are to be included in a summary which is a couple of paragraphs in length. All the multiple components of the research are explained in brief under the report abstract. It should be interesting enough to capture all the key elements of the report.
An abstract is always brief; typically 100-150 words and goes straight to the point. The focus of your research abstract should be the 5Ws and 1H format – What, Where, Why, When, Who and How.

15.7.3 Introduction:

The introductory part of the report shout contains introduction and description of the agency, personnel and other aspects of the research. This part should contain a description of the following.

- Purpose of the study
- Sponsoring agency personals

- Statement of the problem with which the study is concerned.
- The research procedure, the study design, the nature of the sample and the data collection techniques.

15.7.4 Literature Review

A literature review is a written survey of existing knowledge in the field of study. In other words, it is the section where you provide an overview and analysis of different research works that are relevant to your systematic investigation.

It highlights existing research knowledge and areas needing further investigation, which your research has sought to fill. At this stage, you can also hint at your research hypothesis and its possible implications for the existing body of knowledge in your field of study.

15.7.5 Analysis and inferences:

This is the most important aspect of the report that contains the analysis of the data collected and the inferences drawn from the data. The inferences are based upon logic and statistics. It means that proofs, whether numerical or logical must be given in support of the theory or the generalization that has been drawn. It is the report that goes to laymen and the general readers.

15.7.6 Extent of the success achieved:

The report must explain as to what extent the success has been achieved. It has to be remembered that the report of the social research is not the report of study conducted about some natural physical phenomena. The result of the social research, in spite of all the precautions cannot be said to be 100% valid and accurate.

15.7.7 Statistical diagrammatic and graphic presentation of the data:

In order to convince the readers in regard to the basic of the look inferences, statistical data have to been given. The readers want to look at the results at a glance. This thing can be possible only when data collected have been presented with the help of diagrams graphs etc. The method of statistical analysis should also be employed.

15.7.8 Results

A bare statement of the findings is not enough; usually the reader is interested in their implications for the general understanding.

15.7.9 Appendices and footnotes:

Questionnaire, schedule and other forms of statements are given in the report as appendices. The statements of the original documents are also given as appendices.
Food-notes, more or less serve the same purpose as the appendices. Foot-notes are used as reference-guides or brief explanations of the points discussed. They would make the report complex and destroy the very lucidity or clarity of the report.

15.7.10 Suggestions:

The investigator has to give suggestions. These suggestions are generally given either at the end of the report or at the end of each chapter. Social research is undertaken with some objectives with general the solution of certain problems.
Suggestions should be practical and based on logic reasoning and fact and be comprehensive and exhaustive and should rule out the difficulties that are likely to arise in their implementation.

15.8 Difficulties or problems in writing a Report

Report writing is not an easy task. The basic qualities of a good research report are accuracy and clarity. For this purpose the writer should avoid unclear and pompous sentences. The generalization should be properly worded and communicated. The problems that are based by the writer of the report may be studied under the following heads:

15.8.1 The problems of communication:

The problem of communication is the basic problem of Reporting-writing. The findings of the study or research are the technical knowledge or a technical matter. It is not easy for laymen to follow them. He has therefore, to take precaution in regard to the following.
Technical terms should be properly explained.

- Neither too simple nor too difficult expression
- Level of knowledge and subject – matter.
- Language and drafting
- Style
- Command over the language.

15.8.2 The problem of objectivity:

In social research objectivity is a guiding factor. The presentation of the data collected should be very objective. It means that the report should be free from prejudices and bias and should have no place or exaggeration. In social sciences, the researcher has totake extra precautions for maintaining objectivity.

15.9 CHARACTERISTICS OF A GOOD REPORT

The report has to possess certain characteristics and qualities, while serving its purpose, be also recognized as a good report. A good report is to possess the following characteristics.

15.9.1 Attractiveness:

The report of study or survey should be attractive. It means that it should be neatly typed or printed on good and suitable paper. It should contain diagrams, graphs and other sketches. The title cover should be attractive and it possible contains some picture or drawing that shall give the idea of the subject-matter of study.

15.9.2 Balanced language:

The language presents a difficult problem for the writer of the report. The report should be balanced and simple. Technical terms should be used but they should not be so

used as to make the report terse and difficult. The language of the report should be standard, technical, beautiful, and simple and quite be filling the subject described.

15.9.3 No repetition of facts:

The report should be free from the repetition of facts. The repetition of facts, a part from adding to the bulk of report also makes the reader bored. It also makes unnecessary reading.

15.9.4 Statement of scientific facts:

It is necessary that the facts that are mentioned in the report should be scientific. They should not be imaginary and utopian. It should not appear that the data are concocted or imaginary.

15.9.5 Practicability:

The data that are maintained in the report should only not only be free from concoction but should also be practical and practicable. The suggestions that are given in the report should also be practical.

15.9.6 Description of the difficulties and the short comings:

A good report always mentions the difficulties and the problems that were faced during the collection of the data. If the difficulties and the short comings of the study are concealed, the future researcher shall not be able to overcome them and they shall also not be able to make correct findings.

15.10 PRECAUTIONS IN WRITING A REPORT

Writing of the report is conditioned by various factors. While writing the report should take certain precautions are enumerated below:

15.10.1 No haste:

While writing the report, the investigator should be in haste. A person, who is not restive and not prepared to think and write things in a balanced manner, is likely to spoil the report.

Language and the presentation should be according to the level of the knowledge of the readers: Language of the report and its method of presentation should be suitable to the level of intelligence and knowledge of the readers. If it is no so; it shall spoil the whole purpose.

15.10.2 Presentation of the data should be logical, well arranged and coherent:

The data should be presented in the report in a very coherent manner. If the presentation is not logical and properly ordered, there is very likelihood of the report becoming useless.

15.10.3 Use of tables, diagrams, graphs, charts, short notes etc:-

While writing the report diagrams, graphs, tables, sketches, maps etc, should be used for making the report quite attractive.

Foot-notes and short-notes as and when required should be given; these are helpful in giving the references

.

15.11 BIBLIOGRAPHY:

The report must contain a bibliography. The bibliography should contain not only the names of the books but also the names of the author, publisher and its edition. While quoting references, the number of pages should also be given.

If the report is prepared keeping all these precautions is in view there is every likelihood of its becoming useful for proper study. Such report enables the reader to comprehend that data and to determine for himself the validity of the conclusions.

15.12 SUMMARY

Always remember that a research report is just as important as the actual systematic investigation because it plays a vital role in communicating research findings to everyone else. This is why you must take care to create a concise document summarizing the process of conducting any research.

In this article, we've outlined essential tips to help you create a research report. When writing your report, you should always have the research at the back of your mind, as this would set the tone for the document.

15.13 TECHNICAL TERMS

- Literature Review
- Definition,
- Features of a Research Report
- **Nature of Research**
- **Qualitative Research Report**
- **Quantitative Research Report**
- Purpose of the report

15.14 SELF ASSESSMENT QUESTIONS

1. Write an essay on Research Report Definition, Features of a Research Report, Nature of Research?
2. Write Contents of research report?
3. Explain the Difficulties or problems in writing a Report?
4. Discuss the Characteristics of a Good research Report and taking Precautions in writing a Report?

15.15 REFERENCE BOOKS

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LESSON - 16

COEFFICIENT OF CORRELATION AND RANK CORRELATION

OBJECTIVES

The objective of this lesson is to introduce the techniques of correlation.

Structure

16.1 INTRODUCTION

The statistical method so far discussed in this analysis of one variable or one statistical series only. But as a matter of fact, in real situation, there may be two or more statistical series be found which can be inter related to each other, e.g. change in price of a product affect the quantity demanded. Increase in level of employment results in increase in output. So, to study the relationship of two variables, a technique called correlation analysis used.

Correlation is used to describe the linear relationship between two continuous variables (e.g., height and weight). In general, correlation tends to be used when there is no indentified response variables it measures the strength qualitatively and direction of the linear relationship between two or more variable.

Correlation quantifies the extent to which two quantitation variables, x and y go together.

16.2 DEFINITION AND MEANING

Whenever two measurements for the same individual can be paired for all the individuals in group, the degree of relationship between the paired scores is called correlation. A coefficient of correlation is a single number that tells us to what extent two variables or things are related and to what extent variation in one variable go with variations with the other.

An increase in one phenomenon is accompanied by a similar or opposite change in the other phenomenon. Such relationship is technically called correlation. Correlation means that between two series or groups of data there exists a casual connection. Correlation is said to be established when a change in one series is followed by change in the other series.

Correlation in two sets of data need not always be the result of mutual interdependence. Changes in one set of data may be cause of changes in the other ser (of Data) and there may be cause and effect relationship between the two sets. But it is also equality possible that the changes in the two sets of data are the effects of some third factors, which affects both these sets of data.

Correlation does not imply causation, when we find that two variables are strongly correlated with one another, it is tempting to presume that one factor causes the other. Just because two factors occur together does not mean that one cause the other.

16.3 PROPERTIES OF CORRELATION:

I. A correlation can range in value between -1 and 1. i.e., $-1 \leq r \leq 1$

II. r is a dimensionless quantity; i.e., ris independent of the units of measurement of x and y

III. if the correlation is greater than 0, then as x increase y increases and the two variables are said to be positively correlated.

IV. An r=1 is perfect positive correlation. It the correlation is less than 0, then as x increase y decreases and the two variables are said to be negatively correlation. An r=-1 is perfect negative correlation.

V. If the correlation is 0 then there is no linear relationship between x and y. the two variables are said to the uncorrelated.

VI. The correlation is 0 when the covariance of x and y is 0.

VII. The correlation is a measure of the strength of the linear trend relative to the variability of the data around that trend. Thus it is dependent both on the magnitude of the trend and the magnitude of the variability in the data.

16.4 TYPES OF CORRELATION

1. Positive correlation: if the weight of an individual increase in proportion to increase in his height, the relation between this increase of height and weight is called as positive correlation.
2. Negative correlation: it is just the opposite of positive correlation. It the weight of an individual does not increase in proportion to increase in his height or if the weight of an individual decrease with an increase in height, then it is said to be negative correlation, also ranges from 0 to -1, -1 is perfect negative correlation.
3. Zero correlation: the correlation is a correlation showing so relationship or a correlation having a correlation coefficient of zero.

16.5 IMPORTANCE OF CORRELATION

Correlation is very important in the field of psychology and education as measure of relationship between test scores and other measure of performance. With the help of correlation, it is possible to have a correct idea of the working capacity of a person. With the help of it, it is also possible to have knowledge of the various qualities of an individual. After finding the correlation between two qualities or different qualities of an individual. It is also possible to provide his vocational guidance to a student in selection of his subject of study; correlation is also helpful and necessary.

16.6 MERITS OF CORRELATION ANALYSIS

The merits of correlation analysis are as follow

1. It is very simple method of studying correlation between two variables
2. Just a glance at the diagram is enough to know if the values of the variables bear may correlation or not.
3. It also indicates whether the relation is positive and negative

16.7 DEMERITS OF CORRELATION

1. A scattered diagram does not measure the precise extent of correlation
2. It gives only an approximate idea of the relationship
3. It is not a quantitative measure of the relationship between the variables. It is only a qualitative expression of the quantitative change.

16.8 POSITIVE AND NEGATIVE CORRELATION

Correlation between different variables may either be positive or negative. These are discussed below

Positive correlation:- when two variable move in the same direction, that is when one increase the other also increase and when decreases the other also decreases, such a relation is called positive correlation

Negative Correlation:- When two variables change in different direction, it is called negative correlation. Relationship between price and demand.

16.9 LINEAR AND NON-LINEAR CORRELATION

Correlation may be linear or non-linear. When two variables change in a constant proportion. It is called linear correlation and when two variables do not change in any constant proportion, it is said to be on-linear correlation.

It the two sets data with a food proportion to each other are plotted on a graph paper, their relationship will be indicated by a straight line. A non-linear relationship does not form a straight line.

16.10 SIMPLE AND MULTIPLE CORRELATION

Simple correlation implies the study of relationship between two variables only. e.g., the relationship between price and demand for the relationship between money supply and price level.

On the other hand, when the relationship among three or more than three variables is studied simultaneously, is called multiple correlations. In case of such correlation the entire set of dependent and independent variables is simultaneously studies e.g., effects of rainfall, manure, water, on per hectare productivity of wheat are studied taking onto account all the related aspects.

16.11 DEGREE OF CORRELATION

Degree of correlation refers to the coefficient of correlation.
They can be following degree of positive and negative correlation.

1. Perfect correlation: - When two variables change in the same proportion it is called perfect correlation it may be two kinds.
   i. Perfect Positive correlation is perfectly positive when proportional change in two variables is in the same direction. Inthis case, coefficient of correlation is positive (+1) .
   ii. Perfect Negative correlation is perfectly negative when proportional change in two variables is in the opposite direction in this case, coefficient of correlation is negative (-1)
2. Absence of correlation: if there is no relation between two series or variable, that is change in one has no effect on the change in other, then those series or variables lack any correlation between them.
3. Limited degree of correlation. Between perfect correlation and absence of correlation there is a situation of limited degree of correlation. In real life, one mostly finds limited degree of correlation.

16.12 GUIDELINES

A Correlation must be as a rule is judged with regard to-

- The nature of variables under study
- The statistical significance of the coefficient
- The degree of reliability of the tests used

- The purpose for which r has been computed and
- The extent of variability of the group

Karl Pearson's co-efficient of correlation:-

Karl Pearson's correlation coefficient (r) is the most common measure association of variables scaled on and interval level. These measures give important not to ranks of pairs but to magnitudes of observation. Thus suppose two variable incomes and education interval measured, the mostly common used measure of strengths relationship will be the Pearson correlation coefficient (r). This measure can also because as a test of significance by testing the null hypothesis that the value of (r) in the population is zero. it r is substantially different from zero. Then the null hypothesis can be rejected and we can conclude that the two variables are not independent are related at a statistically significant level.

Like gamma (G), 'r' also varies from -1 (perfect negative relationship through 0 No relationship) to +1 (perfect positive relationship)

The formulation for calculating the correlation coefficient for two variable X and Y is:

16.13 SPEARMAN'S RANK CORRELATION CO-EFFICIENT

This method was developed to calculate the co-efficient of correlation of qualitative variable mean those statistical series in which variables under consideration are not capable of quantitative measurement. Examples of such statistical series would be data with qualitative characteristic such as honesty, beauty, character morality etc. In these situation Karl Pearson's coefficient of correlation cannot be used as Co-efficient of Rank correlation when Rank are Equal. Some, two or more items in a series may have equal ranks. In such situations, averages of the two ranks (say 7.5 of the ranks 7 and 8 is accorded to each values we may also use on alternate formula for calculation of the co-efficient rank correlation in such situation.

16.14 MERITS OF RANK CORRELATION

a) This method is very convenient when the series give only order of preference and not the actual values of the variable
b) Ran k correlation is superior method of analysis to case of qualitative distribution such as those relating to virtue, wisdom etc.
c) It is an easier method than the Pearson's method of correlation.

16.15 DEMERITS OF RANK CORRELATION

a) Rank correlation method cannot be used in case of group frequency distribution
b) It can handle only a limited number of observation is is generally not used when the number of observations exceeds 20.

Some specific uses of correlation

1. Prediction: the co-efficient of correlation is used quite profitably in prediction. In a number of ways it is used to predict success on will achieve in his life.
2. Determining validity: The coefficient of correlation is used in determining validity. A tests width values can be obtained through correlation

16.16 SIGNIFICANCE OF RANK CORRELATION

1. The study of correlation shows the direction and the magnitude of relationship between variables. This study helps in formation of various laws and concept in economic theory.
2. The study also helps to establish a cause effect relationship between different variables.
3. Correlation analysis facilitates taking business decisions.
4. Correlation analysis also helps policy formulation. It the government finds a negative correlation between tax rate and tax collection. It should pursue the policy of low tax rate as this would lead to high tax collection

16.17 SUMMARY

The coefficient of correlation was introduced by Karl Person and is often referred to as product-moment correlation. Coefficient of correlation refers to the numerical measure that indicates the relationship between two variables. Positive correlation means that one variable tends to increase together with another variable. Negative correlation means that one variable decreases as the other one increases. The strength of a correlation is measured using value between -1 and +1. A score of zero means that there is no relationship correlation does not imply causation.

16.18 TECHNCIAL TERMS

1. Inferential Statistics
2. Correlation Coefficient
3. Correlation
4. Rank correlation.

16.19 SELF ASSESSMENT QUESTIONS

1. Define Correlation? Explain importance and the terms positive correlation and negative correlation?
2. Explain significance and merit and demerits of Rank correlation.

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