CENTRE FOR DISTANCE AND ONLINE EDUCATION
TEZPUR UNIVERSITY

MASTER OF ARTS

SOCIOLOGY

BLOCK II

Vision

To grow to be a leading centre for human resource development through distance, open and universal learning system.

Mission

To provide quality higher education at door step through barrierless, flexible and open learning mode in conformity with national priority and societal need.

Objective

- To offer degree, diploma, certificate level programme of study through distance learning in various emerging subjects across the disciplines.

- To offer job oriented and vocational programmes in flexible terms in the line of the national and regional level demand of manpower.

- To offer various programmes under lifelong learning contributing to the local and regional level requirements and as per the need of the society at large.

- To undertake various research and academic activities for furtherance of distance education in the region.

- To contribute to conserve and promote cultural heritage, literature, traditional knowledge and environment conducting short programmes, workshops, seminars and research in interdisciplinary field.

MSO-102: RESEARCH METHODOLOGY

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BLOCK II

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MODULE III: QUALITATIVE RESEARCH

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BLOCK INTRODUCTION

This Block comprises of Modules **III** and **IV** of MSO 401: Research Methodology. **Module III** focuses on qualitative research. **Unit 6** covers ethnography. The unit explores the meaning of ethnography both as a method and methodology. The learner will get a clear understanding of the process, analysis, interpretation and presentation of ethnographic data. **Unit 7** will help the learners to understand case studies. Along with the historical background and evolution of case study, the unit explores how to conduct a case study, focusing on the selection of cases and the analysis of data. **Unit 8** deals with qualitative methods. **Unit 9,** on the other hand, discusses qualitative data analysis.

Module IV is dedicated to research design and quantitative approaches. **Unit 10** explores quantitative research design while **Unit 11** explores quantitative methods. **Unit 12** introduces the learner to sampling techniques. The learner will have an idea of the meaning of sampling, the process involved in sampling and the types of sampling techniques adopted. **Unit 13** deals with quantitative data analysis. On the other hand, **Unit 14** deals with report writing. The learner will get an insight into the structure of a report and the steps involved in writing a report.

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MODULE III: QUALITATIVE RESEARCH

UNIT 6: ETHNOGRAPHY

UNIT STRUCTURE

6.1 INTRODUCTION

In this unit, we shall learn and discuss ethnography. Before proceeding on, let us understand what ethnography is. Ethnography is the in-depth study of the culture of a community. The word ethnography can be broken down into two words "ethno" and "graphy" where the former word means people and the latter is derived from the word 'graphos' means writing. It is a qualitative approach/way which is mainly derived from anthropology. But it has been borrowed to sociology, cultural studies and other social science disciplines as well.

It is important to distinguish between ethnography and ethnology. Ethnology is a term more widely used in Europe. It covers the comparative

study of cultures in general and is known as cultural anthropology in America whereas social anthropology in Britain.

With the pioneering work of British anthropologist Bronislaw Malinowski in the Trobriand Islands of Melanesia as well as the work of Margaret Mead, it is believed by modern anthropologists that ethnography was established as a professional field.

6.2 OBJECTIVES

By the end of the unit, you will be able to:

- Explain the meaning of ethnography and explore its history;
- Analyse ethnography both as a method and methodology;
- Explore how research is done through ethnography by discussing the process, analysis, interpretation and presentation of ethnographic data.

6.3 THE HISTORY OF ETHNOGRAPHY

Ethnography in a formal way began only in the 20th century. As mentioned above, the works of Malinowski, Mead are considered important in this regard. Some other anthropologists to be mentioned are Boas, Brown and Evans-Pritchard. It is important to notice that most were British or worked in Britain. This can be explained by the fact that social anthropology and British colonialism were closely associated. The origins of social anthropology lie in the needs of the British Empire to understand the cultures and groups it was seeking to rule. These anthropologists initiated an approach which applied immersion and observation techniques to study industrial groups and cultures. Another important origin of ethnographic research can be owed to the Chicago School which used observation techniques to explore growing cities like Chicago which underwent rapid urbanisation and industrialisation. The work of Robert Park in the same is crucial as he applied participant observation and in-depth field research in studying Chicago city. From this, we can understand that while social

anthropology called this approach ethnography, sociologists tended to call it participant observation or field research.

CHECK YOUR PROGRESS

1. What is ethnography?

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2. How is participant observation important in ethnography?

6.4: ETHNOGRAPHY AS METHOD AND METHODOLOGY

The philosophy of social research can be defined as the study of the theories of knowledge which make particular research methods valid. The different techniques or procedural rules exist within a broader philosophical-cum-theoretical framework. This can be together called 'methodology'. Through this methodology, both ontological (based on the question of being) and epistemological (based on the question of knowledge) assumptions are made.

There are two models of social research. Whereas the first is based on natural science, the other is humanistic in nature. A positivist approach will fall under the natural science research whereas interactionist/constructivist approach would fall under humanistic research. The former would involve the use of methods like questionnaire, surveys, experiments and would have data that is hard (mostly quantified and numerated) and the latter would have qualitative methods like in-depth interview, personal

documentation, field notes, participant observation etc along with soft data (interpretive, qualitative, based on natural language).

Ethnography involves long stays in the area of study/field, say for a year or more. Ethnographers need to learn the local language or dialect as well as participate as much as possible in the daily life of the concerned people. However, although s/he participates by living with the community, there is the need to maintain what we call the 'observer's objective detachment'.

That means, the researcher should not let her/his subjective beliefs, attitudes or opinions affect the research outcome. Or else, there will be subjective bias and a failure of what Weber calls as 'value-free' research. All this entail that the principal methodological justification for ethnography comes from naturalism and the humanistic model of social research. We can also refer to it as humanistic type of ethnography. Practising research through ethnography is mainly about giving the 'insiders' account'. The concept of 'thick description' as given by Clifford Geertz is also important here. Although it was introduced by Geertz, it was popularised by Norman Denzin in sociology. A big part of the methodological process of ethnography is the description of phenomena from the natives' point of view.

Stop and Read

Contributions of W.F Whyte to Participant Observation

William Foote Whyte was a sociologist mainly known for his ethnographic study in urban sociology. *Street Corner Society* was his pioneering work. He conducted participant observation in an Italian community in Boston in the late 1930s upon receiving a fellowship from Harvard University. Whyte lived in the North End of Boston which was mostly inhabited by first- and second-generation immigrants from Italy. He came from a well-to-do family

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and therefore, considered the neighbourhood a slum and wanted to learn more about its "lower class" society. Thus, he lived in that district for three and a half years.

CHECK YOUR PROGRESS
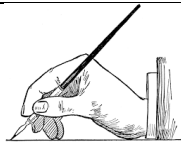
1. What is Weber's value-free research?

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2. What is thick description?

6.5 RESEARCH THROUGH ETHNOGRAPHY: PROCESS, ANALYSIS, INTERPRETATION AND PRESENTATION OF ETHNOGRAPHIC DATA

Ethnography should be seen as a process because after all, it is a series of procedural steps that produce the end result. It involves a series of actions to produce naturalistic study of some socio-behavioural and meaningful aspects. There is flexibility in conducting the ethnographic process although there is also the need of maintaining the process, with lots of research ethic to be followed.

Like every other research process/approach/method, ethnography also has its own research design. Ethnographic research design has some basic considerations:

a) Outline of the study including aims and objectives

b) Deciding the field site

c) Resources available like money and time which are indispensable to any research

d) Methods of data collection (ethnographic study applies multiple methods)

e) Deciding on the roles of the researcher/field worker

f) The form of analysis to be applied

As ethnography is not a particular method but a definite style of research that intends to understand a community/group in detail, observation is crucial to data collection as mentioned in the previous section. There is the use of 'triangulation' method so that the range of data and vantage points can be wide. The use of participant observation is mainly to gather data from the people in their natural setting of daily life. Talking to them as well as watching and observing helps in discovering many ideas about their everyday life in order to add social meaning. However, the researcher's own process of self-reflection, his/her own opinions and attitudes form a part of the data. In other words, their 'autobiographical experiences' in the field are as crucial as other data collected. In such a context, the skills of the researcher are important such that s/he must balance the insider-outsider perspectives.

Another important method is interviewing. The interview is a face-to-face process between the researcher and the respondent in ethnography. Here, an interview schedule/guide is used which has mostly open-ended questions, although there can also be close-ended questions. The highly structured schedules are related to formal interviews and the looser form with unstructured ones. There are also semi-structured interviews which have a combination of both close-ended and open-ended questions.

Another important aspect is that all ethnographic research involves case study. Ethnographic case studies are conducted by exploring a case or many cases naturally as they present themselves in the field. However there is a weakness here, i.e., as ethnographers take small samples, they produce findings that cannot be generalised. Also, it is a time consuming process to collect rich, immersive data.

Now let us know the basic nature of ethnographic data. This data basically come in the form of extracts of natural languages. Also, they are very personal to the researcher. By this, it is meant that the ethnographer directly participates in it and is heavily involved in it. Although they are particular and limited in scope to one area, they can be generalised. Lastly, they are also voluminous in scale.

Coming to analysis, it can be defined as the process of bringing order to the collected data. This order is brought by arranging the data into patterns, categories and descriptive units. Data analysis is simultaneous with data collection in ethnography as it is more of a process than an end result. There are three sub-processes in data analysis:

   a) Data reduction, i.e., selecting units of data from the total universe of data
   b) Data display (assembling the information in some format)
   c) Conclusion drawing (interpretation of the findings)

Most ethnographers would suggest that analysis begins before data collection and for most, it usually begins when the field notes are read and typed before the next visit to the field. These are called the analytic field notes which should be kept separate from data themselves. The analysis on the field is more about detailed study with every minute observation noted. On the other hand, the one done after data collection is more about developing general codes and categories. Two things are important in the analysis part. They are:

a) The original questions that were generated in the planning stage and prompted the research in the first place.

b) The insights about analysis that occurred during data collection.

As far as the interpretation goes, it is the process by which social science researchers including ethnographers attach meaning to the data. Interpretation is all about the ethnographer's own insights and how much detailed he is in his observation and analysis. It is not a mechanical process but requires a lot of imagination as well. An ethnographer needs to do the following things when interpreting the findings:

a) S/he needs to check their interpretations with members to ensure people in the field find them truthful.

b) As people may develop a practice of deception (they may not say the truth), ethnographers keep/adopt a critical attitude towards what members say in developing this interpretation.

c) In interpretation, there is a lot of cross-questioning and finding alternative explanations as the material collected is rich enough for multiple analytical points. The ethnographer also needs to keep the methods s/he used in such periods of interpretation.

d) The ethnographer also needs to engage in self-reflexivity.

Now, let us discuss about the presentation of ethnographic data. The most important point her is that writing up the results should not be restricted to the end of the research process but should be an ongoing procedure. Many scholars suggest that ethnographers even begin to write before entering the field. However, those writings are not the finished texts but form a base for analysis and interpretation. It is said that the ethnographic text is a battle site. There are layers involved in presenting the data. Narratives or case studies are main. An ethnographer, therefore, has to keep writing and rewriting before her/his thoughts become clear in her/his words. Two questions become very important:

a) What to write—certain subthemes are necessary. They are context (history, environment, setting etc), number of participants and key people involved, activities undertaken, schedules, arrangement of data temporally (chronologically), significant events as well as members' perspectives and meanings.

b) How to write— Writing should have easy language and should be accessible to readers. It is always necessary to engage the readers and develop interests in them. Descriptions should be vivid and elaborate. Narrative style should be focused on. But writing does not start all of a sudden. There must be proper planning. There can be three stages: developing a statement of purpose, writing a detailed outline or sequence for the account and also determining the basic story to be told. Proper editing and correction is important.

Stop and Read

Malinowski's Contributions

Malinowski is known as the Father of Ethnography. He carried out his ethnographic field studies at Mailu Island and then, more famously, in the Trobriand Islands. There, he propounded the concept of Kula Ring among the Trobriand Islanders. Also known as the Kula exchange, it is a ceremonial exchange system. In his path-breaking work *Argonauts of the Western Pacific* (1922), Malinowski has directly confronted the question, "why would men risk life and limb to travel across huge expanses of dangerous ocean to give away what appear to be worthless trinkets?" For this, he carefully traced the network of exchanges of bracelets and necklaces across the Trobriand Islands and established that they were part of a system of exchange (the Kula ring). This exchange system was clearly linked to political authority. He was influenced by the ideas on gift and exchange given by Marcel Mauss.

CHECK YOUR PROGRESS

1. What are the three sub-processes of data analysis?

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2. What is the role of interpretation in ethnography?

6.6 MERITS AND DEMERITS OF ETHNOGRAPHY

Ethnography offers several advantages. They are:

a) First, ethnographies can account for the complexity of group behaviours, reveal interrelationships among several dimensions of group interactions, and provide context for behaviours.

b) They can reveal in-depth qualities of group experience. They can also help determine future questions and types of follow-up research.

c) By expanding the range of knowledge and understanding of the world, researchers often can understand why behaviours occur rather than just noting the occurrence.

d) Ethnography enables the investigation of complex issues.

e) Ethnographies are well suited to study complex cultural, societal interactions, unpredictable situations, and relationships that are too complex and difficult for quantitative methods, such as surveys and statistical analysis of numerical data.

f) As in participant observation, interviews etc, an ethnographer takes carefully structured and detailed notes, ethnography is a powerful way to explore and reveal the many detailed elements of group interaction, what is referred to as "thick description."

g) Ethnographic studies act as an empathising voice of the communities, allowing the marginal and unheard groups to be heard and their story can be told.

However, in spite of all the merits, there are certain demerits as well. They are:

a) Ethnography is time-consuming, costly as well as requires a well-trained researcher.

b) It takes time to build trust with informants to acquire genuine narratives.

c) Bias on the part of the researcher can affect both the design of the study and the collection and interpretation of data.

d) Too little data may lead to false assumptions about behaviour patterns, while large quantities of data may not be processed effectively

CHECK YOUR PROGRESS
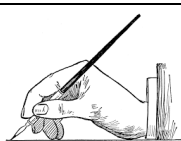
1. What are the main demerits of ethnography?

6.7 SUMMIMG UP

We can sum up the discussion into the following points:

- The word ethnography can be broken down into two words "ethno" and "graphy" where the former word means people and the latter is derived from the word 'graphos' means writing.

- The origins of social anthropology lie in the needs of the British Empire to understand the cultures and groups it was seeking to rule. These anthropologists initiated an approach which applied immersion and observation techniques to study industrial groups and cultures.

- Another important origin of ethnographic research can be owed to the Chicago School which used observation techniques to explore growing cities like Chicago which underwent rapid urbanisation and industrialisation.

- There is the need to maintain what we call the observer's objective detachment in ethnography. That means the researcher should not let her/his subjective beliefs, attitudes or opinions affect the research outcome. Or else, there will be subjective bias and failure of what Weber calls as 'value-free' research.

- Ethnographic research design has some basic considerations:

  a) Outline of the study including aims and objectives
  b) Deciding the field site
  c) Resources available like money and time which are indispensable to any research
  d) Methods of data collection (ethnographic study applies multiple methods)
  e) Deciding on the roles of the researcher/field worker
  f) The form of analysis to be applied

- Ethnographic case studies are conducted by exploring a case or many cases naturally as they present themselves in the field.
- Coming to analysis, it can be defined as the process of bringing order to the collected data. This order is brought by arranging the data into patterns, categories and descriptive units.
- The most important point is, writing up the results should not be restricted to the end of the research process but should be an ongoing procedure.
- Ethnography offers several advantages like it accounts for the complexity of group behaviours, reveal interrelationships among several dimensions of group interactions, and provide context for behaviours. However, it is time-consuming, costly as well as requires a well-trained researcher. It also takes time to build trust with informants to acquire genuine narratives.

6.8 QUESTIONS

1. Critically examine the significance of the researcher in ethnographic research.

2. Do you think ethnographic field study is time consuming? Explain.

3. Describe the process of interview in ethnography.

4. How far do you think ethnographic research is relevant today in the context of quantitative research gaining popularity? Discuss.

6.9 RECOMMENDED READINGS AND REFERENCES

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UNIT 7: CASE STUDIES

UNIT STRUCTURE

7.1 Introduction: Definition and Idea

7.2 Objectives

7.3 Historical Background and Evolution of Case Study

7.4 Phenomena, Cases and Methodological Point of Departure

7.5 Selection of Cases and Conducting a Case Study

7.6 Enriching Case Study data and Conducting Analysis

7.7 Summing up

7.8 Questions

7.9 Recommended Readings and References.

7.1 INTRODUCTION

A case study is a research method/approach mostly practised in social science disciplines like sociology, psychology and anthropology. Although there is no one definition of it, it can be defined in simple terms as an intensive study about a person, a group of people or a unit. In other words, a case is always a case of something. Besides being intensive, it is also a method of systematic investigation whether of a single individual, group, community or any other social setting. As it is an intensive method, the data gathered is in-depth and detailed. Another important point to remember about this method is that it examines/ investigates complex real-life phenomena in the natural setting to increase/elevate their understanding.

A case study is not only a method but also the output of the method. This method leads to further in-depth cases as an outcome of it. The approach is often broad but the researched output can be compartmentalised into thematic issues. A case study can also be referred to as a research strategy as well as an empirical inquiry. There can be single or multiple case studies. A case study can include quantitative evidence and it relies on multiple sources of evidence.

7.2 OBJECTIVES

By the end of the unit, you will be able to:

- Analyse the historical background and evolution of case study;
- Explore the phenomena, cases as well the methodological point of departure;
- Analyse the selection of cases and how to conduct a case study;
- Explain how to enrich case study data and analysis.

7.3 HISTORICAL BACKGROUND AND EVOLUTION OF CASE STUDY

The growth and development of many sciences such as health, clinical psychotherapy and law went hand in hand with the study of cases. Description and attempts to explain the peculiarities of a case precede or these may be a part of steps towards generalisation. Orientation on cases can be observed in fields that developed later on such as political science and organisational studies. To speak of inspiration, the traditional study of a village or local setting in cultural anthropology is one to give birth to in-depth analysis. For example, Cora Du Bois's *The People of Alore* and Robert Redfield's *Tepoztlan: A Mexican Village*.

Another important source is the Chicago School where Whyte's *Street Corner Society* is a prime example. In political science, historical roots include a strong tradition building on case studies. Later on, this tradition

was replaced with the coming of the dominance of the methodology of the behavioural sciences. There are debates between proponents of the case study method, comparative method and correlative method. The idea of studying a case is very significant in clinical psychology as well as personality psychology. The recent trend of case study research is seen in areas like policy fields like social work, market study etc. In these fields, the case study method is a central strategy.

An interesting point to note is that case study research in the past was more inclined to qualitative, exploratory research but now the attention is slowly shifting to applied research.

Frederic Le Play is considered to have introduced the case study method into social science. Herbert Spencer was the first to use case materials in his ethnographic studies. In the field of psychology, Dr William Healy, a psychiatrist was among the first to adopt the case study method in his work on juvenile delinquents.

CHECK YOUR PROGRESS

1. Who introduced case study method into social sciences?

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2. How is case study method important in clinical psychology?

7.4 PHENOMENA, CASES AND METHODOLOGICAL POINT OF DEPARTURE

As a case study is an intensive mode of research, it examines phenomena as diverse as individual health histories, riots, strikes, election campaigns, organisations, social practices, communities etc. A case study is impossible without considering the idea of phenomena as phenomena are the main aspect of every case study research. Cases are always bounded in time and context and they always give an intensive reflection. A phenomenon may involve one or many actors (s)/organisations etc. Depending on the phenomenon of interest, the actors involved in a case may be located on the micro-level (personal and interpersonal relations) and meso (organisational, institutional) level or even in the macro-level (large communities, nation-states).

The micro-level would include clinical research such as description, diagnosis and monitoring the treatment of individual patients, historical research such as biographies, people in shops etc. Meso level would include one actor like an organisation and also more than one actor like cooperations or networks such as between schools. The macro-level would include a local social system such as a street or a village and also there might be a combination of micro and meso-level actors like the process of socialisation in new groups.

Now coming to the methodological point of departure, there is a majority view in methodology to split the scientific method and case study method. For science, labels such as quantitative and hypothetico-deductive method are used and the use of qualitative with holistic is common in a case study. But it is also necessary to emphasise a common methodological core for case studies and other types of research because case studies are an all-encompassing product that applies a wide range of methods.

CHECK YOUR PROGRESS

1. What are phenomena in case study research?

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2. What is the need to emphasise methodological core for case studies?

7.5 SELECTION OF CASES AND CONDUCTING A CASE STUDY

Like in all research methods, the case study also demands a proper demarcation of the domain under study. The domain would include a set of cases. Finding cases take a lot of time and our conclusions should be valid. It is always better to demarcate the domain and then select the cases

accordingly. Now, as far as the question of how to select cases is concerned, three questions are important:

- How to find cases in research practice?
- How many cases to select?
- What criteria to be used for selection?

To answer the first question, we would have to say that finding cases is very difficult as finding them takes a lot of time. Just as sampling is difficult in different extensive research, selecting cases is also challenging. There can be many ways of finding cases. First, in reputation samples, key persons and authorities in the field provide information or possible informants and the researcher composes a frame of all the possible cases with their help. Second, there can also be the use of snowball sampling where finding one case can lead to a long list of cases. Third, open applications via mass media can also be used where cases can be found from advertising in newspapers etc. Regarding the second question, it is always better to have more cases because the idea is that the more cases one studies, the better the chances to separate the general (relevant) from the specific (irrelevant) features of the case. As far as the third question is concerned, selection can be based on purely personal or professional needs.

Now let us come to the question of conducting a case study. The first foundation of the case study is the subject and relevance. In a case study, the effort is to isolate a small study group, one individual case or one particular population.

In the design of a case study, it is important to plan and design how you are going to address the study and make sure that all collected data is relevant. Unlike a scientific report, there is no strict set of rules so the most important part is making sure that the study is focused and concise; otherwise, you will end up having to wade through a lot of irrelevant information.

With a case study, it is important to be passive in your research because one who conducts a case study is more of an observer than an experimenter. Thus, the use of a questionnaire or survey is irrelevant. Even in a multi-subject case, each case must be treated individually and then cross case conclusions can be drawn.

Stop and Read

Composing the Case-Study Report

Case study reports are extensively descriptive. There should be a balanced combination of description and analysis. The report also includes the researcher's theoretical positions and how those theories lead to guiding research questions. It also includes the participants' backgrounds etc. As case studies are exploratory in nature, most end up with implications of further study. There is a constant process of generating ideas.

According to Merriam, there are several suggestions for alternative data presentations. Like, preparing specialised condensations for groups, replacing narrative sections with a series of answers to open-ended questions, prepare analytical summaries with supporting data, presenting data with unique colourful graphics etc.

CHECK YOUR PROGRESS

1. What are the main concerns for selecting cases?

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2. Why is it important to be passive in research?

7.6 TYPES OF CASE STUDIES AND CONDUCTING ANALYSIS

There are several types of case study. The following are the important ones among them:

1) Illustrative Case Studies: These are primarily descriptive studies. They typically utilize one or two instances of an event to show what a situation is like. They serve primarily to make the unfamiliar familiar and to give readers a common language about the topic in question.

2) Exploratory Case Studies: These are condensed case studies which are performed before implementing a large scale investigation. They basically help identify questions and select types of measurement before the main investigation. The primary drawback of this type of study is that initial findings may seem so convincing that they are released quite prematurely as a conclusion.

3) Cumulative Case Studies: These serve to aggregate information from several sites collected at different times. They collect past studies which will allow more generalisation without additional cost or time expense.

4) Critical Instance Case Studies: These examine one or more sites either to examine a situation of interest or to challenge a highly generalised assertion.

Now coming to analysis, case analysis is more about opinion formation than reliance on statistics. Hence it is more about an exploratory study with

no compulsions of being right or wrong. The main idea in the analysis is to construct a narrative around the particular case. For this, the data has to be arranged in a detailed and systematic manner for proper meaning-making follow up. While formulating the narrative, it is also important to keep things concise and interesting. Also, it is important to keep in mind that case study analysis should mainly focus on tracking trends of the progress of the case. As the researcher maintains a handy notebook while conducting the case study, those notes must be referred back to for constant analysis.

One also needs to keep in mind that it is always better to write the case study in an easy-to-understand and swift narrative language. This will ensure that even those people who are not familiar with the case will find it interesting to read.

CHECK YOUR PROGRESS

1. What are the different types of case studies?

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2. How are case research data analysed?

7.7 SUMMING UP

We can sum up the discussion into the following points:

- Case study research can be defined in simple terms as an intensive study about a person, a group of people or a unit. In other words, a case is always a case of something. Besides being intensive, it is also a method of systematic investigation whether of a single individual, group, community or any other social setting

- Frederic Le Play is considered to have introduced the case study method into social science. Herbert Spencer was the first to use case materials in his ethnographic studies. In the field of psychology, Dr William Healy, a psychiatrist was among the first to adopt the case study method in his work on juvenile delinquents.

- A case study is impossible without considering the idea of phenomena as phenomena are the main aspect of every case study research.

- Cases are always bounded in time and context and they always give an intensive reflection.

- Like in all research methods, the case study also demands a proper demarcation of the domain under study. The domain would include a set of cases. Finding cases take a lot of time and our conclusions should be valid. It is always better to demarcate the domain and then select the cases accordingly

- There are cases like Illustrative, Exploratory, Cumulative and Critical cases.

- Case analysis is more about opinion formation than reliance on statistics. Hence it is more about an exploratory study with no compulsions of being right or wrong. The main idea in the analysis is to construct a narrative around the particular cases.

7.8 QUESTIONS

1. Discuss the significance of case study in social research.

2. How is the case study method/research different from other qualitative research approaches?

3. Explain in detail the issues and concerns to be kept in mind while conducting a case study research.

4. Think and discuss the merits and demerits of case study research.

7.9 RECOMMENDED READINGS AND REFERENCES

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Young, P.V. (2014). *Scientific Social Surveys and Research*. PHI Learning Private Limited, New Delhi.

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UNIT 8: QUALITATIVE METHODS

UNIT STRUCTURE

8.1 Introduction

8.2 Objectives

8.3 Characteristics of Qualitative Research and Methods

8.4 In-depth Interview as a Qualitative Method

8.5 Focus Group Discussion as a Qualitative Method

8.6 Participant Observation as a Qualitative Method

8.7 Case Study as a Qualitative Method

8.8 Summing Up

8.9 Questions

8.10 Recommended Readings and References

8.1 INTRODUCTION

The word qualitative implies an emphasis on the qualities of different entities or phenomena. It also emphasises on processes and meanings. It does not measure issues/situations in terms of quantity, amount, intensity, or frequency. Qualitative researchers stress the socially constructed nature of reality. Also, they focus on the intimate relationship between the researcher and what is studied. They also consider the situational constraints that shape enquiry. Such a research is characterised by subjective understanding. In contrast, quantitative studies emphasize the measurement and analysis of causal relationships between variables.

8.2 OBJECTIVES

By the end of the unit, you will be able to:

- Explain the characteristics of qualitative research and methods;
- Discuss interview as a qualitative method;
- Analyse focus-group discussion as a qualitative method;
- Explain participant observation as a qualitative method;
- Explain the method of case study.

8.3 CHARACTERISTICS OF QUALITATIVE RESEARCH AND METHODS

Now let us come to some of the key elements that define qualitative research by which you can also understand the nature of its methods, investigation and focus. These are as follows:

1) In terms of the research design, the qualitative research is naturalistic so it involves methods that can best take out in-depth data from natural settings like an in-depth interview. Such enquiry is spontaneous and also no-manipulative. Also, as a qualitative study is emergent, i.e., open-ended and flexible, the researcher avoids rigidity.

2) Regarding the collection of data, qualitative research involves collecting data of thick description. So methods like a case study or focus group discussion are useful. Participant observation is also a useful method.

3) As far as personal experience is concerned, the researcher has direct contact with and gets close to the people, situation, and phenomenon under investigation. The researcher's personal experiences and insights are an important part of the inquiry and critical to understanding the phenomenon. Hence, field notes, observation etc are important methods to ensure it.

4) In terms of analysis, such research focuses on details of the data to discover important patterns and themes.

8.4 IN-DEPTH INTERVIEW AS A QUALITATIVE METHOD

An in-depth interview is defined as a qualitative technique where intensive interviews are conducted. In such interviews, there are smaller numbers of respondents so that a particular respondent's perspectives are explored intensively. It can also be mentioned as a loosely structured interview which permits freedom for both the interviewer and interviewee when required. When survey interviews are considered to have a rigid structure with their questions formulated and asked in sequential order, in-depth qualitative interviews are considered flexible.

Usually, the in-depth interviews differ from formal conversations to informal conversations. Based on this process, in-depth interviews are characterized into three types, they are:

1. Structured
2. Semi-structured
3. Unstructured

In-depth interviews have different roles. An in-depth interview explores the various boundaries of a problem like obtaining the context of any problem and managing the research process as they assist the interpretation of results from other quantitative methods and surveys. They also have certain features. For example, they are a blend of flexibility with structure. Also, they are interactive in type.

During the interview, the interviewer puts forward certain questions positively and attractively so that the respondent is encouraged to participate. Also, new knowledge and thoughts are developed in some instances during the interview process.

There are very few steps involved in conducting an in-depth interview. They are:

1) Locating the required respondents and reflecting on the objectives of the research concerned.

2) Writing down an in-depth interview guide which involves the questions associated with the interview.

3) Conducting an in-depth interview and finally would be about analysing the data.

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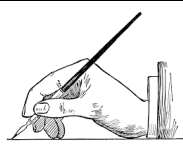
1. Write the characteristics of in-depth interview method.

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2. What are the types of in-depth interviews?

8.5 FOCUS GROUP DISCUSSION AS A QUALITATIVE METHOD

Focus Group Discussion (FGD) is one of the most popular qualitative research methods. It is a discussion guided by the moderator as par the prepared interview guidelines. The survey is carried out in several groups of 8 to 12 persons. The optimal duration of a group discussion is around two hours normally. The warm atmosphere created during an interview and encouraged by the moderator allows disclosing participants' habits, convictions, opinions, preferences, tastes, associations, etc. Focus group discussions are carried out with recording and observing equipment; discussion is recorded simultaneously.

Focus group discussions should be used when you need to understand an issue at a deeper level based on opinions and perspectives. They help add meaning and understanding to existing knowledge or getting at the "why" and "how" of a topic. It is also important to make sure that the participants have provided informed consent verbally or ideally on a written form.

As a moderator, it is important to ensure that all participants are comfortable and engaged with the discussion and that their opinions are being heard. The following techniques are helpful:

- S/he should remain neutral to ensure that everyone feels comfortable expressing their opinion.
- S/he should build proper rapport with the participants so that they feel comfortable and at ease.
- S/he should paraphrase or summarize long, unclear comments by participants. This shows participants that the moderator is actively listening as well as helping the former to ensure s/he has understood the participant's statement.

It is important to realize that there are several limitations to FGDs:

1) First, since FGD data is qualitative, it cannot necessarily be generalizable to the population. This is because qualitative data is often context-specific.
2) Second, facilitators must ensure that their bias is not evident. Otherwise, it will veer the trajectory of the conversation. They must also be active in ensuring that active participants do not overpower subdued participants during the discussion.

Stop and Read

Before conducting an FGD, it is important to take time to carefully plan your questions. The following should be kept in mind:

- Keep the number of questions reasonable, short, simple and clear so that the participants do not get confused.

- Make sure that questions are worded in a way that cannot be answered with a simple "Yes" or "No" answer. Using words like "Why" and "How" will help elicit better responses from participants.

There should be three types of questions in a focus group discussion:

Probe questions: These introduce participants to the discussion topic and make them feel more comfortable sharing their opinion with the group.

Follow-up questions: These questions delve further into the discussion topic and the participants' opinions.

Exit question: These questions check to ensure that you didn't miss anything.

CHECK YOUR PROGRESS

1. What is the role of the moderator in conducting an FGD?

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2. What are the limitations of FGD method?

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3. What do you think are the positive sides of FGD method?

8.6: PARTICIPANT OBSERVATION AS A QUALITATIVE METHOD

Participant observation for many years has been a hallmark of both anthropological and sociological studies. Qualitative methods of data collection, such as interviewing, observation, and document analysis, have been included under the umbrella term of "ethnographic methods" in recent years. Participant observation is considered an essential method in anthropological studies, especially in ethnographic studies, and has been used as a data collection method for over a century.

Participant observation is a beginning step in ethnographic studies. It helps the researcher get the feel for how things are organized and prioritized, how people interrelate, and what are the cultural vantage points. Also, they get exposed to the community's culture in-depth thereby easing facilitation of the research process. Participant observation aims at empowering the local community or its representatives.

The goal of participant observation is to gain a deep understanding and familiarity with a certain group of individuals, their values, beliefs, and way of life. Often the group in focus is a subculture of a greater society, like a religious, occupational, or particular community group. To conduct participant observation, the researcher often lives within the group, becomes a part of it, and lives as a group member for an extended period, allowing them access to the intimate details and goings-on of the group and their community. Here, everything can be a part of the data. In participant observation, the researcher plays the dual role of being a subjective participant as well as an objective observer. In other words, the knowledge gained through personal involvement with the research subjects should be

utilised by the researcher to gain further access to the group that is being studied. At the same time, the researcher needs to be objective in her/his observation, without letting emotions and feelings influence the observations and findings.

Malinowski is often credited with developing participant observation as a qualitative method. He also introduced the related method of recording the information in chronologically organised field notes. It is important to note here that observations cannot be considered data unless they are recorded in some manner for further analysis.

Stop and Read

The participant observation method was pioneered by anthropologists Bronislaw Malinowski and Franz Boas but was adopted as a primary research method by many sociologists affiliated with the Chicago School of Sociology in the early twentieth century. Today, participant observation, or ethnography, is a primary research method practised by qualitative sociologists around the world.

CHECK YOUR PROGRESS

1. Who introduced participant observation method?
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2. What are the different aspects of participant observation method?

8.7 CASE STUDY AS A QUALITATIVE METHOD

The case study method of data collection is a broad and exhaustive technique by which a group/community/phenomenon etc is studied and analysed. We also refer to it in terms of a case history. Burgess has often used the term "the social microscope" for the case study method. On the other hand, Pauline V. Young describes a case study in terms of it being a comprehensive study of a social unit— be that unit a person, a group, a social institution, a district or a community.

In brief, we can say that the case study method is a form of qualitative analysis where careful, intense and complete observation of an individual or a situation or an institution is done. Efforts are made to study every aspect of the concerning unit in minute details and then from case data, generalisations and inferences are drawn. There might be further follow-ups, for example, if it is a medical case study then there might be further suggestions of diagnosis, etc.

The important characteristics of the case study method are as under:

1) Under this method, the researcher can take one single social unit or more of such units for his study purpose as well as a situation to study the same comprehensively.

2) There is an intensive study of the same and hence it extends over a long period.

3) In respect of the case study method, an attempt is also made to know the mutual inter-relationship of causal factors as well.

4) Under this method, the behaviour pattern of the concerning unit is studied directly and not by an indirect approach.

There are certain major phases involved in a case study. These are as follows:

1. Recognition and determination of the status of the phenomenon to be investigated or the unit of attention.

2. Collection of data, historical facts as well as the examination of the given phenomenon.

3. Identification of causal factors as a basis for remedial or developmental treatment.

4. Application of remedial measures i.e., treatment and therapy in a phase called casework.

5. Finally, there is a follow-up programme to determine the effectiveness of the treatment applied.

Case study method has several advantages and disadvantages. They are as follows:

Advantages:

1. Being an exhaustive study of a social unit, the case study method enables us to understand fully the behaviour pattern of the concerned unit.

2. Through a case study, a researcher can obtain a real and enlightened record of personal experience.

3. This method enables the researcher to trace out the natural history of the social unit.

4. It helps in formulating relevant hypotheses along with the data which may help test them. Case studies, thus, enable the generalised knowledge to get richer and richer.

5. Information collected under the case study method helps a lot to the researcher in the task of constructing the appropriate questionnaire or schedule for the said task requires a thorough knowledge of the concerning universe.

Disadvantages:

There are limitations as well. These are:

1. It is often not considered as significant scientific data since they do not provide knowledge of the impersonal, universal, non-ethical, non-practical, repetitive aspects of phenomena due to the presence of subjective dimension.

2. The danger of false generalisation is always there.

3. It is time-consuming and an expensive method.

4. Case study method can be used only in a limited sphere. It is not possible to use it in case of a big society. Sampling is also not possible under a case study method.

5. The response of the investigator is an important limitation of the case study method. He often thinks that he has full knowledge of the unit and can himself answer about it.

Stop and Read

The case study method is a widely used systematic field research technique in sociology these days. The credit for introducing this method to the field of social investigation goes to Frederic Le Play who used it as a handmaiden to statistics in his studies of family budgets. Herbert Spencer was the first to use case material in his comparative study of different cultures. Dr William Healy resorted to this method in his study of juvenile delinquency and considered it as a better method over and above the mere use of statistical data. Similarly, anthropologists, historians, novelists and dramatists have used this method concerning problems about their areas of interests.

CHECK YOUR PROGRESS

1. Write the merits and demerits of case study method.

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8.8 SUMMING UP

- In terms of the research design, the qualitative research is naturalistic so it involves methods that can best take out in-depth data from natural settings like an in-depth interview.

- Regarding the collection of data, qualitative research involves collecting data of thick description.

- As far as personal experience is concerned, the researcher has direct contact with and gets close to the people, situation, and phenomenon under investigation.

- In terms of analysis, such research focuses on details of the data to discover important patterns and themes.

- An in-depth interview is defined as a qualitative technique where intensive-individual interviews are conducted. In such interviews, there are smaller numbers of respondents so that a particular respondent's perspectives are explored intensively.

- Focus group discussion is one of the most popular qualitative research methods. It is a discussion guided by the moderator as par the prepared interview guidelines. The survey is carried out in several groups of 8 to 10 persons.

- Participant observation is considered a principal method in anthropological studies, especially in ethnographic studies, and has been used as a data collection method for over a century. This research method was pioneered by anthropologists Bronislaw Malinowski and Franz Boas but was adopted as a primary research method by many sociologists affiliated with the Chicago School of Sociology in the early twentieth century.

- The case study method of data collection is a broad and exhaustive technique by which a group/community/phenomenon etc is studied and analysed. We also refer to it in terms of a case history. Burgess has often used the term "the social microscope" for the case study method.

8.9 QUESTIONS

1. What according to you is the most efficient qualitative research method? Justify.
2. Do you think that case study method is a costly method? Explain.
3. How should a researcher conduct participant observation method?
4. How far is the focus group discussion method impactful?

8.10 RECOMMENDED READINGS AND REFERENCES

Henderson, D. (2007). Rationality and Rationalist Approaches in Social Sciences. In Turner, S. and Outwaite, W., editors, *Handbook of Social Science Methodology*. Sage Publications, UK.

Young, P.V. (1966). *Scientific Social Surveys and Research*. PHI Learning Private Limited, Delhi.

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UNIT 9: QUALITATIVE DATA ANALYSIS

UNIT STRUCTURE

9.1 Introduction

9.2 Objectives

9.3 Theory and Data Analysis

    9.3.1 Discovering Patterns

9.4 Grounded Theory Method

9.5 Qualitative Data Processing

9.7 Summing Up

9.8 Questions

9.9 Recommended Readings and References

9.1 INTRODUCTION

By now we have already covered many aspects of qualitative research in the previous units. In this unit, we are going to discuss the analytical part of qualitative research. Qualitative research in social sciences enables a researcher to observe social actors in their social set up and allows a room for interaction with them on their terms and conditions. Theory building is significant in social sciences. But question is, how do we proceed with it? Well, fieldwork may be regarded as the answer to this 'how'. A researcher has open access to numerous information but everything that a researcher observes may not help her in the process of theorizing. In this regard, however important the experience may be for a sociologist or an anthropologist, for a researcher her ability to tackle the ethical issues in due course of research work is central to the process of theory building. Though it is tough to assure a hundred per cent ethically grounded research work in

social sciences yet research ethics are given serious weightage across social sciences. With the violation of research ethics, despite the completion of the work, the researcher will not be able to find the exact answer to her research question. Also, in such a situation, the research work done will be spurious.

9.2 OBJECTIVES

By the end of this unit, you will be able to:

- Analyse the interrelation between theory and data analysis;
- Explain key terms like coding and other related concepts;
- Examine observations in a non-numerical way.

9.3 THEORY AND DATA ANALYSIS

Qualitative research methods involve a continuous interplay between data collection and theory. In terms of quantitative research, by following a particular rigid set up a researcher may ignore the interplay between theory and data, which is a rare case in the case of qualitative research. This is because quantitative data has its own formulae and techniques to filter the collected data but in terms of qualitative data, it is important for a researcher to maintain the originality of the collected data. Any modification of the qualitative data may result in the violation of the research ethics and thereby effect the overall research work. Precisely, it will not be wrong to say that in qualitative research there is a close interrelation between data collection, analysis and theory.

9.3.1 Discovering Patterns

John Lofland and his colleagues forwarded six unique ways of looking for patterns in a particular research topic. Let us now understand these six unique ways by using the example of domestic violence in a certain locality:

1. **Frequencies:** How often do female foeticides occur among families in the locality under study? (It is the responsibility of the researcher to understand the underlying difference between the frequency and what people are revealing to the researcher.)
2. **Magnitudes:** What are the levels of abuse? How brutal are they?
3. **Structures:** What the various types of violence: physical, mental, sexual?
4. **Processes:** Is there a particular way of this violence i.e. does it start with mental, physical and then sexual violence or does the order of elements vary?
5. **Causes:** What are the causes of domestic violence? Is this process common amongst all the classes or is it specific to some religious or ethnic group?
6. **Consequences:** How does domestic violence affect the victims, both in the short and long term? In what ways does it change the behaviour pattern of the victims?

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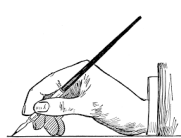
1. Write the six unique ways of discovering a pattern in a research topic?

In order to find the why and how the research is, a researcher will then look for patterns across several observations which represented different cases

under study. This is called cross-case analysis. There are two strategies for cross-case analysis:

1. *Variable-oriented analysis* which may be defined as something that teaches one to take into consideration various types of variables to reach a particular result or conclusion. For example, if we are trying to find an answer to the question as to how many students are attending a seminar on gender issues organised in an Engineering College then it will be necessary to take into account the following factors before reaching at a conclusion, viz. gender, socio-economic status, parental expectations, peer support and decision to attend the seminar. Thus, we would also be able to determine whether men or women are more interested in gender-oriented talks in the Engineering College. The focus of the analysis here shall base on the interrelation between the variables mentioned above. Here the sole aim is to provide an in-depth analysis of the case by using relatively few variables. Another example here may be of the voting behaviour of the citizens which a pollster tries to analyse on the basis of various considerations.

2. *Case-oriented analysis* aims to understand a particular case or several cases by looking closely at the details of each. For example, in the study of the citizens' voting behaviour, the pollster doesn't necessarily give a generalised conclusion rather he tries to investigate the citizens closely by studying the variables which played a pivotal role in voting for a particular party or a politician.

An in-depth analysis and minute observations help a researcher to formulate something important and relevant based on data which are termed facts after various stages of observation and analysis. The researcher may look into all the possible variables which directly or indirectly may have an impact upon the whole research process and the conclusion.

9.4 GROUNDED THEORY METHOD

Grounded Theory Method (GTM) is an inductive approach to research introduced by Barney Glaser and Anselm Strauss in which theories are generated solely from an examination of data rather than being derived deductively. The grounded theory, developed by the sociologists Barney Glaser and Anselm Strauss, has evolved as a method, with the cofounders taking it in slightly different directions. In addition to the fundamental, inductive tenet of constructing a theory from data, GTM employs the constant comparative method. This method as Glaser and Strauss originally described has involved four stages. The following are the four stages:

1. *Comparing incidents applicable to each category*: This process is similar to the process of conceptualization.

2. *Integrating categories and their properties*: Here the researcher begins to note the relationship among concepts

3. *Delimiting the theory*: Eventually, as the patterns of relationships among concepts become clearer, the researcher can ignore some of the concepts that were initially noted but are evidently irrelevant to the inquiry. By this process, the complexities attached are removed and the theory becomes simpler.

4. *Writing theory*: Finally, the researcher needs to convey his findings to others in terms of words and writings. By this process of communicating the researcher's idea to the readers eventually modifies and helps improve his own grasp on it. The writing stage in GTM is regarded as part of the research process.

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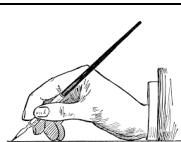
1. Who has introduced the Grounded Theory Method?

9.5 QUALITATIVE DATA PROCESSING

This section presents some ideas on coding qualitative data, writing memos, and mapping concepts graphically.

*Coding***:** During the process of data collection a researcher gathers a huge amount of data in the form of textual material. For example, data collected via interviews, participant observation, content analysis and various other methods of qualitative research. The question is how a researcher will manage and organise these textual materials. This is where the role of coding comes in social research. Coding may be defined as the transformation of observations into different categories and classifications, assigning a number or a symbol to each item of information or section of a statement, to enable a qualitative analysis to be carried out subsequently.

Content analysis is another term which is closely associated with the concept of coding. Today, content analysis has a long history of use in communication, journalism, sociology, psychology and business, and during the last few decades, its use has shown steady growth. The aim of data analysis is the discovery of patterns among the data, patterns that point to the theoretical understanding of social life. What are the *rules* for determining which category a given recording unit should be placed in? This is a crucial part of the coding scheme. A naïve coder who simply applies the rules should get the outcome the theorist/ researcher intended. Good coding categories should have the following attributes: exhaustive, mutually exclusive, derived from a single classification principle, independent, adequate to answer the questions asked of the data. Smith and Davies argue that coding does not constitute the totality of data analysis, but it is a method to organise the data so that underlying messages portrayed by the data may become clearer to the researcher.

Presenting the data in an interactive way and with constant interrogation with "who", "what" "when", "where" and "why" provides smoothness in the analysis of the collected data. The process and operations by which collected data are broken down into smaller units, conceptualised and later

organised together may be defined as coding. On the other hand, an explanatory and closely knitted framework which minutely examine the empirical reality of the accumulated data is defined as grounded theory. This examination process precisely involves three important types of coding. These are discussed below.

Open Coding: The minute examination of the collected data by naming and categorising the phenomena. Here the observations are set apart and then analysed by naming them as per the need of the researcher. Suppose, in a university if we conduct a survey to find out as to how many students read the newspaper then we may ask questions like "Who reads?" What does it represent?" "Which language is preferred by most?", etc. If we see individuals reading English newspaper more than any other language then we might again end up asking numerous questions thereby making the whole process of coding more ambiguous. So in order to avoid such ambiguity, we may start grouping our concepts as per the demand of the study. For instance, the grouping may include categories like "reading", "preferring a particular language in majority", "the geographical location of the university", "who are reading newspapers regularly" These will help a researcher to reach at a conclusion by understanding these acts as strategies to accumulate information about various incidents around the globe. These are the ways in which open coding may be carried out. It is important to not lose focus on the goals of coding while in the process of understanding a phenomenon. The conclusion of open coding may precisely present the following, *list of codes and categories* alongside the text; *code notes* which narrate the content of the codes; and *memos* which includes the observations and thoughts of the researcher.

Axial Coding: The step following the open coding is known as the axial coding. In this stage, the job of the researcher is to refine and differentiate the categories generated in the previous stage i.e. open coding. Herein, those categories are taken into consideration which helps further in the research process. Axial coding aims at identifying the core concepts in the

research process. Axial coding involves a regrouping of the data, in which the researcher uses the open code categories and looks for more-analytic concepts (Babbie, 2001). Thus, in this stage, the most relevant and reliable questions are selected from the developed codes and the related code notes. A coding paradigm suggested by Strauss and Corbin has been presented below:

A	Causal Condition
B	Phenomenon
C	Context
D	Intervening Condition
E	Action/Interaction Strategies
F	Consequences

Table 1.1: Coding Paradigm as per Strauss and Corbin.

Selective Coding: The last kind of coding is known as selective coding. Identifying the central code of the research process is done in this process. In Grounded Theory Method, this analysis builds on the results of open coding and axial coding to pick out the central and the most prominent concept that integrates the other concepts that have been picked out in the body of a text.

The coding procedure is an inductive one. In this process of coding the interpretative calibre of the researcher plays a significant role. It is because in this whole process of coding the researcher takes control of the process. He directs the study by interpreting the content and this is where he uses his skills of coding, categorising, abstracting, etc. to provide a shape to the data he collected through various means and ways.

1. What is coding in social research?

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2. What are the different types of coding?

9.6 SUMMING UP

From the above discussion, it is now clear that qualitative analysis comprises of the non-numerical examination and interpretations of observations by the researcher. It is the non-numerical assessment of observations made through participant observation, content analysis, in-depth interviews, and other qualitative research techniques. Qualitative analysis has its own logic and techniques, some of which are enhanced by special computer programs. Links between theory and social research is a vital one and therefore it is necessary to understand the usefulness of procedures in pursuing the theoretical aims. This process involves a continuous interplay of theory and analysis. Also, a continuous attempt is seen in the analysis of qualitative data to find out possible changes over the period of time and possible causal links between the variables.

Moreover, maintaining research ethics is a major challenge in qualitative data analyses. This is a challenging task because the subjects under study become familiar to the researcher many a time wherein, if not always, at times biases affect the outcome of the research work. Maintaining an objective attitude in the study of a subject is necessary to study an incident in its real situation. Studying a situation or an incident in its real environment allows a researcher to find out its real cause-effect relationship. But any alteration to the real situation caused by the

researcher to control the outcome because of an emotional attachment with the subject may result in a spurious result thereby making the whole research effort dubious. Maintenance of research ethics solely depends upon the researcher. Since society serves as the laboratory to a social scientist, thus it is the duty of the researcher to remain faithful to the process of research so that his research work will have some positive contributions toward the betterment of society.

9.7 QUESTIONS

1. Illustrate with examples Qualitative data processing and its analyses.
2. Define Coding. Illustrate the various types of coding with suitable examples.
3. What do you understand by research ethics? Why is it important in carrying out a research work?
4. Define theory. What do you understand by Grounded Theory Method (GTM)?

9.8 RECOMMENDED READINGS AND REFERENCES

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MODULE IV: RESEARCH DESIGN AND QUANTITATIVE APPROACHES

UNIT 10: QUANTITATIVE RESEARCH DESIGN

UNIT STRUCTURE

10.1 INTRODUCTION

When we wish to study a particular phenomenon or a situation, it is important that we have a proper plan for carrying out the study. This plan or strategy is what we basically call as the research design. With the help of this research design, it is possible to start the study or investigation of the various factors associated in a systematic manner. A research design guides us before we proceed to collect information and make an analysis of it.

Quantitative research design is different from the qualitative research design and in this unit, we are going to cover the quantitative research design.

10.2 OBJECTIVES

After going through this unit you will be able to:

- Describe quantitative research design;
- Explain quantitative research process;
- Analyse experimental and non-experimental research design;

10.3 RESEARCH DESIGN

A research design is a basic plan that guides the data collection and analysis of the research. It provides the framework that specifies the type of information to be collected, its sources and collection procedure. Research design can be said to be a systematic plan that is followed to study a scientific problem. The design of a study defines the study types and sub-type, research questions, hypotheses, independent and dependent variables and if applicable the data collection methods and the statistical analysis plan is also laid out. A research design indeed can be the framework that is created to seek answers to research questions. Social research needs a design or a structure before data collection or analysis can commence. A research design is not simply a work plan. The function of a research design is to ensure that the evidence obtained enables us to answer the initial question as unambiguously as possible. Obtaining relevant evidence entails specifying the type of evidence needed to answer the research question, to test a theory, to evaluate a programme or to accurately describe some phenomena. Research design is of two types namely (i) exploratory research design consisting of qualitative research and (ii) conclusive research design consisting of the quantitative research. This unit will specifically focus on quantitative research design.

10.3.1 Quantitative Research Design

Quantitative research design is generally used to investigate a particular topic or activity through the measurement of variables in quantifiable terms or that can be measured. The method of quantitative research relies on the collection and analysis of numerical data to describe, explain, predict or control variables and phenomena of interest. Seen from a quantitative perspective, conclusions derived from the phenomena of the world will and cannot be regarded as meaningful if they are not verified through means of direct observation and measurement. It is also believed in the context of quantitative research that the world consists of facts that can only be found out by observation and measurement. In quantitative research, the researchers seek to describe current situations and establish a relationship between variables and also at times attempt to explain the causal relationship between the variables. In quantitative research processes, there lies little flexibility in terms of the strategies and techniques used. A belief is held among the quantitative research aspirants that nothing should be left to chance, and thus, no aspect of the research is allowed to arise during the process of research as it commonly happens in case of qualitative research. A major aim of quantitative research rests in the fact that the researcher is to remain as objective as possible.

Stop and Read

Objectivity seeks to establish law-like generalizations which can be applied to the same phenomenon in a different context while **subjectivity** is based on personal perspectives and interpretations.

10.3.2 Features of Quantitative Research

More insight into the features of quantitative research will help in understanding its principles and essence in detail. Firstly, literature review in quantitative research provides background information for the study, it

serves to inform about the methodologies, instrumentation and analytical techniques to be carried out in the quantitative study. Second, the purpose of quantitative study remains narrow and specific with its focus only on a handful of measurable variables. Also, the data collection instruments, procedures and sampling strategies typically do not change once the study begins as it believes that in this manner the objectivity of research is maintained and enhanced at the same time. Thirdly, sampling strategies in quantitative research tend to focus on the random selection of participants because generalization of the result is considered a key aspect. Data is collected from a large number of individuals in the studies keeping in track the generalization of results. Fourthly, the techniques for data analysis and interpretation are completely statistical in nature and the focus remains on the application of existing indices (e.g., calculating an average score); formulae (e.g., formulae for calculating a standard deviation) and the statistical tests that are consistent regardless of a particular topic or the variables being studied. Lastly, the reporting of results after research always is to occur in a standard, fixed format and the results are to be reported and shown in an extremely objective and unbiased manner without having to get subjected to the biases of the researcher if any.

CHECK YOUR PROGRESS

1. What is a research design?

----

2. Write two features of quantitative research.

10.4 QUANTITATIVE RESEARCH PROCESS

A sequence of order is maintained when quantitative research is carried out. One step is completed before the next step is to begin. After the completion of data collection, the analysis of data starts by interpretation of results. Firstly, it is required to identify a research problem that will be studied. The purpose of the selected study will subsequently guide the choices and decisions about the methodology to be employed in the study. Identification of the research problem means the sense of awareness of a prevalent social problem, a social phenomenon or a concept that is regarded worth studying. Next, it is the duty of the researcher to ensure that research questions and hypothesis are stated clearly as these will guide through the later part of the research. Inability to do so at the beginning of the study may lead to problems, that is a misalignment between the research questions and necessary data or between the collected data and proposed analytical techniques.

Reviewing literature forms an important part in quantitative research. It helps one to learn through a great deal of literature on work already done. Learning through what others have done previously can help in conforming decisions regarding research designs, sampling, instrumentation, data collection procedures and data analysis. Once the work of collecting related literature is done and reviewed in detail, it can help the researcher in combining the different works for a favourable outcome. From the literature review, therefore, a research plan can then be developed. The plan includes strategies for selecting a sample of participants, appropriate research design based on the nature of research questions or hypotheses, and strategies for data collection and data analysis. Lastly, conclusions can be drawn directly from the interpretation of results from the statistical analysis and the final step in conducting the quantitative research study is to prepare the final research report. This report summarises all aspects of the study conducted with proper steps.

10.4.1 Approaches in Quantitative Research

Quantitative research studies can be conducted in several ways. Common approaches to quantitative research are of two categories namely non-experimental research design and experimental research design. Non-experimental research design signifies a group of techniques used to conduct quantitative research where there is no manipulation done to any variable in the study. Thus, variables are measured in the way as they occur naturally. There are three types of non-experimental research design namely descriptive research, correlative research and casual comparative research. On the other hand, experimental research design comprises of the group of techniques where the researcher establishes different treatment or conditions and then proceeds to study the effects on the participants. Experimental research design is of different types namely, pre-experimental research design, quasi-experimental research design, true experimental research design and single-subject research design.

10.4.2 Non-Experimental Research Design

As said before, a few research falls under the category of non-experimental research design. Firstly, we have the descriptive research whose purpose lies in describing and interpretation of the current status of individuals, settings, conditions or events. The researcher in the descriptive research simply studies the phenomenon of interest as it exists naturally; no attempt is made to manipulate the individuals, conditions or events under study. Descriptive research has two types namely observational research and survey research. Quantitative observational studies typically focus on a particular aspect of behaviour that can be quantified. On the other hand, survey research is used to describe the characteristics of a group or population.

Secondly, there is correlative research which helps to discover and then possibly measure the relationship between two or more variables. Types of correlational studies are- (a) explanatory correlational studies that help to

comprehend and describe certain related events, conditions and behaviours and (b) predictive correlational studies that predict future conditions and behaviours in one variable from what we presently know of another variable.

Thirdly, there is casual comparative research which is used when the researcher is interested in exploring the reasons behind existing differences between two or more groups. Data are collected to try to determine why one group tend to be different from another group. This research design is also known as ex-post-facto or after the fact design. The reason for this is that the study first observes a difference that exists within a group of people, for example, and then looks back in time to determine possible conditions that might have resulted in this observed difference.

CHECK YOUR PROGRESS
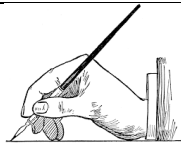
1. Fill up the gap: Correlative research helps to discover and then possibly measure relationship between ……….. variables.

10.4.3 Experimental Research Design

In this research design, a group of researchers establish different treatments or conditions and then study their effects on the participants. It is because of the ability to manipulate the treatment conditions and control for many extraneous factors that experimental studies are the most conclusive of all research designs. Some components are essential to the experimental research design. Firstly, a sample of participants who are randomly selected and/or are randomly assigned to any experimental groups and control

groups which are more appropriately referred to as the comparison groups. Secondly, an independent variable which in experimental studies can be referred to as the treatment variable, the casual variable or the experimental variable can be selectively applied to the experimental group. Thirdly, a dependent variable which in experimental studies can be referred to as the criterion variable, effect variable to the post-test variable can be measured identically for all groups in the study. There are also two classes of experimental research design, namely single variable designs and factorial designs. While single variable designs are those that involve only one manipulated independent variable, the factorial designs refer to those which involve two or more independent variables, at least one of which is manipulated.

10.4.3.1 Categories of Experimental Research Design

Experimental research design has different types. The first type is called the pre-experimental research design. In it, either a single group of participants or multiple groups are observed after some intervention or treatment presumed to cause change. Although some basic steps used in experiments are followed, pre-experimental designs either fail to include a pre-test, a control or comparison group or both. Also, no randomization procedures are used to control for extraneous variables. They are considered "pre", indicating preparatory or prerequisite to true experimental designs. Pre-experimental research expresses the simplest form of research designs.

The second type of experimental research is the quasi-experimental research that comes closest to true experiments. In this experiment, there is no random assignment of the participants to the groups, which weakens the ability to control for extraneous influences. Random assignment to groups is the aspect of experimental research design that ensures that the groups that are compared are relatively similar. Quasi-experiments are most likely

to be conducted in field settings in which random assignment is difficult or impossible.

The third type of experimental research design is the true experimental research which is sometimes used to refer to any randomized experiment. The term true experiment is used for all studies with at least one independent variable that is experimentally manipulated and with at least one dependent or outcome variable. The word true has been interpreted to mean there are a limited number of correct experimental methods. The distinguishing feature of true experimental design is the units of the study-be they the individuals, animals, clinics or institutions are randomly assigned to different treatment conditions.

The fourth type is the single-subject experimental research design which is typically used to study and promote a change in behaviour as exhibited by an individual. This is also a type that makes a repeated assessment of a particular phenomenon (often a behaviour) over time and is generally used to evaluate interventions.

CHECK YOUR PROGRESS

1. What are the different types of experimental research design?

10.5 LIMITATIONS OF QUANTITATIVE RESEARCH

Quantitative research focuses on objectivity and is especially appropriate when there is the possibility of collecting quantifiable measures of variables and inferences from samples of a population. The analysis of numerical data is performed through statistical procedures, often using software such as SPSS, R or Strata. But this research method is also not free from limitations. Quantitative researchers collect a much narrower and sometimes superficial dataset. The results in this research are limited as they provide numerical descriptions rather than detailed narratives and there are no elaborate accounts of human perception. Moreover, the researchers often carry the researches in an unnatural and artificial environment so that a level of control can be applied to the exercise. And thus, the level of control might not normally be in place in the real world yielding laboratory results as opposed to real-world results.

10.6 SUMMING UP

- Research design can be said to be a systematic plan that is followed to study a scientific problem.
- The method of quantitative research relies on the collection and analysis of numerical data to describe, explain, predict or control variables and phenomena of interest.

- literature review in quantitative research provides background information for the study, it serves to inform about the methodologies, instrumentation and analytical techniques to be carried on in the quantitative study.

- A common approach to quantitative research is of two categories namely non-experimental research design and experimental research design.

- In an experimental research design, a group of researcher establishes different treatments or conditions and then studies their effects on the participants.

- Pre-experimental research design is that where either a single group of participants or multiple groups are observed after some intervention or treatment presumed to cause change.

- Non-experimental research design signifies a group of techniques used to conduct quantitative research where there is no manipulation done to any variable in the study.

Glossary:

Aspirant: having ambitions to achieve something

Extraneous: irrelevant or unrelated to the subject being dealt with

Unambiguous: not open to more than one interpretation

Manipulative: exercising unfair control or influence over a person or a situation

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10.7 QUESTIONS

A. **Short type question:**

1. Briefly explain research design.
2. What is a quantitative research design?

B. **Essay type question:**

1. Explain in detail experimental research design.

2. Explain about non-experimental research design. State the limitations of quantitative research.

10.8 RECOMMENDED READINGS AND REFERENCES

Creswell, J.W. (2009). *Research Designs: Qualitative, Quantitative and Mixed Methods.* Sage Publications, London.

Yin, R. K. (1989). *Case Study Research: Design and methods.* Sage Publications, London.

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UNIT 11: QUANTITATIVE METHODS

UNIT STRUCTURE

11.1 Introduction

11.2 Objective

11.3 Advantages and Disadvantages of Quantitative Research

11.4 Univariate Analysis

    11.4.1 Mean

    11.4.2 Median

    11.4.3 Mode

11.5 Dispersion

11.6 Bivariate Analysis

11.7 Multivariate Analysis

11.8 Summing Up

11.9 Questions

11.10 Recommended Readings and References

11.1 INTRODUCTION

In this Unit, we will discuss the various types of quantitative methods. In unit 9, you have seen the use of techniques and rationale to examine the qualitative data collected by the researchers. In this Unit, we will highlight the quantification of or numerical conversion of data collected by employing various techniques and methods.

Quantification is central to this Unit. The process by which data are converted into numerical format is knowns as *quantification of data*. This is done to make the data a machine-readable one- a form which the computers can manipulate. This chapter shall make you familiar with the

various logical techniques and ways by employing which this conversion, i.e. *the numerical conversion of data* can be done.

The chronology of understanding this Unit is as follows- first, we will deal with the **univariate analysis** (which deals with one single variable); then we shall talk about the **bivariate analysis** (deals with two variables); thirdly, we shall introduce the **multivariate analysis** (analysis of variegated variables simultaneously); fourthly, **sociological diagnostics** will be introduced and finally, the ethics which are followed in the process of quantification of data by the researcher.

11.2 OBJECTIVES

By the end of this unit, you will be able to:

- Explain the difference between Qualitative data and Quantitative data along with their usages as per the demand of the study;
- Describe the use of software like the SPSS (Statistical Package for the Social Sciences) in social science research;
- Analyse the major goals and importance of quantitative data.

11.3 ADVANTAGES AND DISADVANTAGES OF QUANTITATIVE RESEARCH

There are several advantages of quantitative data analysis. *Firstly*, employing quantitative data or statistical data analysis in research work helps in saving time and resources. *Secondly*, the use of scientific methods for data collection and analysis make generalization possible with this type of approach. *Thirdly*, another benefit of using this research approach is that it helps in reproducing data. Since the research approach basically relies on hypothesis testing, the researcher need not do intelligent guesswork, rather he would follow clear guidelines and objectives. Because of its clear objective, this tool can be used in a general way and therefore it can be repeated with the hope and desire to get a similar outcome.

Along with advantages, quantitative data analysis also has certain disadvantages. *Firstly,* the application of a quantitative approach by the researcher makes it difficult to capture the in-depth picture of the subject under study. The researcher fails to establish and appreciate the work of the individuals in whose cooperation he is conducting the study. *Secondly*, in research, quality and quantity are both important. These two can never be ignored while describing a phenomenon. There actually exists a very less room to contribute to the study by the participants. The researcher in this kind of research is in the command of the whole process. He is bound to follow the path of research in a static and in a directed way, i.e. he frames a research question and hypothesis, conducts a literature review along with the collection of data, and then filters the data before summarising the outcome. *Thirdly*, another disadvantage of quantitative data is that it is pre-determined and everything is structured, therefore it becomes an obstacle in the way of critical and innovative thinking.

CHECK YOUR PROGRESS

1. Write two advantages of quantitative research.

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2. Write two disadvantages of quantitative research.

11.4 UNIVARIATE ANALYSIS

Univariate analysis is the simplest form of quantitative analysis. It depends upon a single variable to describe a particular subject under study. For example, to understand the sex ratio of a university, we would categorise the subject as male and female. Herein, the sex of the subject has been taken as a single defining variable. Univariate analysis may be defined as the analysis of a single variable, for the purpose of description. Examples of univariate analysis are as follows frequency distribution, averages, measures of dispersion, etc.

In the univariate analysis, the frequency distribution is an important concept among various other concepts. According to the Oxford Dictionary of Sociology, "Frequency distributions from a survey data set are usually the first output from the clean and edited data-set, showing the response total for each possible reply to each question in the questionnaire". Graphic representation is central to frequency distribution, i.e. data can be represented with the use of pie-chart, histogram etc. Thus, frequency distribution means the observation of the number of times variegated qualities of a variable are noted in a sample.

This allows us to introduce you to the concept of central tendency which will further include the concepts of mean, median and mode. These will be elaborated with the use of examples for a better understanding.

11.4.1 Mean

Central tendency is a statistical measure that determines a single value that accurately describes the centre of the distribution and represents the entire distribution of scores. The goal of central tendency is to identify the single value that is the best representative for the entire set of data. The arithmetic average may be defined as the *mean*. It is the most familiar measure of central tendency. The method which is involved in the calculation of mean is quite simple. Mean is the only central tendency which uses all the information available amongst the other central tendencies. Mean may be

calculated in various ways, in terms of continuous and discrete data series. The values of variables are multiplied by their respective frequencies and the product so obtained is added together in terms of a discrete data series. The total value is then divided by the total number of items which in case of discrete series is equal to the total number of frequencies. Mean can be calculated by a simple formula mentioned below:

$$\bar{x} = \sum fX \div N$$

Here,

$\bar{x}$ = denotes "mean"

f = mean the "frequency"

$\sum fX$ = means the sum total of "fX"

N = denotes the number of individuals under consideration

X cases	f (frequency)	fX
10	12	$10 \times 12 = 120$
15	14	$15 \times 14 = 210$
20	8	$20 \times 8 = 160$
25	10	$25 \times 10 = 250$
30	6	$30 \times 6 = 180$
	N= 50 (after adding the frequency)	$\sum fX = 920$

Table 1. Calculation of Mean in case of "discrete series"

Now, putting the aforementioned values in the formulae:

$$\bar{x} = \sum fX \div N$$

x̄ = 920 ÷ 50

x̄ = 18.4

Therefore, for the above series the value of "x̄" is 18.4

In the next problem, we will see how "mean" is calculated in case of "continuous series" using the same formulae:

Class Interval (CI)	Frequency (f)	Mid-Point (X)	fX
10-20	5	(10+20) ÷ 2= 15	75
20-30	7	(20+30) ÷2 = 25	175
30-40	3	(30+40) ÷2=35	105
40-50	4	(40+50) ÷2=45	180
50-60	2	(50+60) ÷2=55	110
60-70	5	(60+70) ÷2=65	325
70-80	6	(70+80) ÷2=75	450
80-90	8	(80+90) ÷2=85	680
90-100	3	(90+100) ÷2=95	285
100-110	7	(100+110) ÷2=105	735
	N= 50		$\sum$fX = 3120

Table 2. Calculation of Mean in case of "continuous series"

$$\left[\bar{x} = \sum fX \div N \right]$$

x̄ = 3120 ÷ 50

x̄ = 62.4

Therefore, here the value of "x̄" (mean) for the continuous series is 62.4

Mean may be calculated by employing a short method. The formula to solve mean by using the short method is:

S.No.	Ci	f	X	(X- Am) = x	(x÷Ci)= X_1	fX_1
1	110-120	6	(110+120)÷2=115	115-155= -40	-40÷10=-4	6×(-4)= -24
2	120-130	5	125	125- 155= -30	-30÷10= -3	-15
3	130-140	1	135	135- 155= -20	-20÷10= -2	-2
4	140-150	3	145	145- 165= -10	-10÷10= -1	-3
5	150-160	9	155	155- 155=0	0	0
6	160-170	4	165	165- 155=10	10÷10=1	4
7	170-180	8	175	175- 155=20	20÷10=2	16
8	180-190	5	185	185- 155=30	30÷10=3	15
9	190-200	4	195	195- 155=40	40÷10=4	16
10	200-210	2	205	205- 155=50	50÷10=5	10
		N= 47				$\sum fX_1$= 17

Table 3. Calculation of Mean by using the short method

The highlighted column (S. No. 5) indicates the *assumed mean* the middle point of the series i.e. 155. Putting the numbers in the formula we will find the value of "x̄" (The mean)

$C = \sum fx_1 \div N$ ----------------   (a)

x̄ = Am + Ci   ----------------   (b) ("Am" is the "Assumed Mean" here, in other words the mid-point of the series)

Now, after establishing the values in the table and by following equation (a) we shall find the value of "C"

$C = \sum fx_1 \div N$

$C = 17 \div 47$

$C = 0.362$

Also, by multiplying the value of C by the difference between the "Ci" (which is 10 i.e. the difference between 110-120) we will get,

$C \times i = ?$ (Now after putting the values we shall get the value for "Ci")

$0.362 \times 10 = 3.62$

Now, to find the value of "$\bar{x}$" we shall use equation (b) in the following manner:
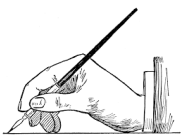
$\bar{x} = Am + Ci$

$\bar{x} = 155 + 3.62$

$\bar{x} = 158.62$

Therefore, the value for "$\bar{x}$" is 158.62

The use of mean is research is needed when the study requires a measure of central tendency which forms the basis of other statistical data. The mean is obtained by computing the sum, or total, for the entire set of scores, then dividing this sum by the number of scores.

CHECK YOUR PROGRESS

1. What is Mean?

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2. Write down the formulae to find the value of mean by using the short method.

11.4.2 Median

Median is another simple measure of central tendency. Median may be defined as the size of the middle item when the items are systematically arranged in their order of magnitude. If the scores in a distribution are listed in order from smallest to largest, the median is defined as the midpoint of the list. Calculation of the median requires scores that can be accommodated in rank order (smallest to largest) and are calculated on an ordinal, interval, or ratio scale. The basic assumption of median is that measurements increase by regular order and total measurement above the middle item is the same as total measurement below it. Median may be calculated by employing the following formulae:

Median $= lm + N/2 - f \div (fm) \times \breve{\imath} \ldots\ldots\ldots\ldots\ldots\ldots\ldots$ (a)

In the above formula,

lm = Lower limit of class media

N = total frequency

f= cumulative frequency preceding then class median

fm= frequency of the class median

$\breve{\imath}$= class interval

Now by solving a problem it will be easier to understand as to how the median is applied as a quantitative method.

Class Interval (ĭ)	Frequency (f)	Cumulative frequency (cf)
110- 130	15	15
130- 150	30	(15+30=45)
150- 170	60	(45+60=105)
170- 190	95	(105+95=200)
190- 210	82	(200+ 82=282)
210- 230	75	(282+ 75=357)
230- 250	23	(357+23=380)
	N= 380	

Table 4. Calculation of Median

We know,

Median = lm + N/2 – f ÷ (fm) × ĭ ……………………… (a)

N/2 =380/2 = 190

After finding the value for N/2 (which is 190) we in the series found the following values (the highlighted column in the series)

fm= 95

f= 105

ĭ = 20 (refers to *class interval*)

Now, putting the values in (a), we will get,

Median = 170 + (190-105 ÷ 95) × 20

Median = 170 + (85 ÷ 95) × 20

Median = 170 + (0.894 × 20)

Median = 170 + 17.88

Median = 187.88

Therefore, the median for the aforementioned series is 187.88

Median is not influenced by the size of the extreme items. It depends upon the values lying immediately on either side of it. The median is not complicated to calculate if the correct method is employed. Median doesn't take into account the size of all the values. And in the case of the field investigations and study, this may prove to be the more convenient method to employ.

CHECK YOUR PROGRESS

1. How is median derived?

----

2. What is the formula for median?

11.4.3 Mode

The mode is defined as the most frequently occurring category or score in the distribution. In a frequency distribution graph, the mode is the category or score corresponding to the peak or high point of the distribution. The mode can be determined for data measured on any scale of measurement: nominal, ordinal, interval, or ratio. The primary value of the mode is that it is the only measure of central tendency that can be used for data measured on a nominal scale. In addition, the mode often is used as a supplemental

measure of central tendency that is reported along with the mean or the median. The mode may be calculated by using the following formula:

Mode $= l + f_1 - f_0 \div 2f_1 - f_0 - f_2 \times \breve{\imath}$

Here, in the above formulae,

l= represents lower limit of the modal class

f_1= represents the frequency of the modal class

f_0= represents the frequency of the class preceding the modal class

f_2= represents the frequency of the class succeeding the modal class

$\breve{\imath}$= represents class interval

Let us now understand, as to how the mode is calculated by using the aforementioned formulae.

Class Interval (i)	Frequency (f)
30-35	4
35-40	5
40-45	11
45-50	17
50-55	13
55-60	5
60-65	3

Table 4. Calculation of Mode

In the above table, by following the definition of mode we found the following values:

l= 45, f_1= 17, f_0= 11, f_2= 13, i= 5

Mode $= l + f_1 - f_0 \div 2f_1 - f_0 - f_2 \times \breve{\imath}$

Mode $= 45 + 17 - 11 \div 2 \times 17 - 13 \times 5$

Mode = 45 + 6 ÷ 10 × 5
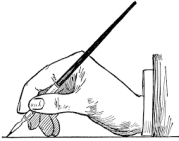
Mode = 45 + 3

Mode = 48

Therefore, the required mode for the above data series is 48.

Like median, mode is positive average and is not affected by extreme items. Because the mean, the median, and the mode are all measuring central tendency, the three measures are often systematically related to each other. As a part of the central tendency, we have a few other concepts which will be further defined along with its formula.

CHECK YOUR PROGRESS

1. Define mode.

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2. What is the formula for mode?

11.5 DISPERSION

Dispersion refers to the way values are distributed around some central value, such as an average. The range is a simple example of dispersion. Thus, we may say that the mean age of a group is 20.4, and the range is from 10 to 35. A more sophisticated measure of dispersion is the standard deviation. Standard deviation is considered the most prominent measure of dispersion and is by far the most popular because it is used in so many statistical operations. The formula for standard deviation is:

- Long method formula:

$\bar{X} = \sum fx \div N$ (mean) ………………………. (i)

$\sigma = \sqrt{\sum f (x - \bar{x}) \div N}$ ………………………. (ii)

- Short method formula:

$C = \sum fx_1 \div N$

$(C)^2 = (\sum fx_1 \div N)^2$ ………………………. (i)

$S = i\sqrt{\sum fx_1 \div N - C^2}$ ………………………. (ii)

Depending upon the data set the application of the aforementioned formula can be done. As we discussed the steps in relation to mean, median and mode similarly there are similar steps are attached to it.

11.6 BIVARIATE ANALYSIS

An analysis of two variables simultaneously is known as bivariate analysis. To be more precise, the analysis of two variables simultaneously, for the purpose of determining the empirical relationship between them is what we mean by bivariate analysis. For example, the tabulation of data to represent variegated percentages and the calculation of correlation coefficient etc. Bivariate analysis focuses on the variables and their empirical relationships. What we saw in the univariate type is, in that analysis, we define the subject whereas here we try to analyse the relationship between the variables. The two measurements will be called X and Y. Since X and Y are obtained for each observation, the data for one observation is the pair (X, Y). Bivariate data can be stored in a table with two columns:

	X	Y
Observation 1	2	1
Observation 2	4	8
Observation 3	6	2
Observation 4	8	7
Observation 5	1	5
Observation 6	3	4
Observation 7	7	3
Observation 8	9	8
Observation 9	5	1
Observation 10	1	9

In the aforementioned table following may be represented:

- Height (X) and weight (Y) are measured for each individual in a sample
- Temperature (X) and rainfall (Y) are measured on a given day at a set of weather stations etc.

This was an imaginary table to make you understand as to how there is a relationship is established between two variables. In the aforementioned table, variables carry two types of data establishing a valid relationship.

Following are the steps involved in the construction of an explanatory bivariate table:

- The cases are divided into groups according to the attributes of the independent variable
- Each of these sub-groups is then described in terms of attributes of the dependent variable
- The table finally is read by comparing the independent variable subgroups with each other in terms of a given attribute of the dependent variable.

11.7 MULTIVARIATE ANALYSIS

The analysis of the simultaneous relationships among several variables is known as multivariate analysis. It involves analysing various variables including, for example, age, sex, and social class on the basis of economic standard, etc. Here, age, sex, and social status etc. are examples of multivariate analysis. An analysis of statistical technique that analyses the relationship between more than two variables which replicates the effect of more than one variable on one variable is known as multivariate analysis. This type of analysis helps an organisation in decision making for the future. Multivariate analytical techniques are applicable in the field of industries, Government sector, Universities and Research centres. Multivariate techniques make possible to conduct theoretically significant research and to evaluate the effects naturally occurring parametric variation in the manner in which usually they occur.

Multivariate analysis may be classified into two types:

- Dependence technique
- Interdependence technique

11.8 SUMMING UP

Measures of central tendency basically are used to summarise the data. It specifies a single most representative value to describe the data set. *Arithmetic mean* is the most commonly used average. It is simple to calculate and is based on all the observations. But it is unduly affected by the presence of extreme items. *Median* is a better summary for such data. *Mode* is generally used to describe the qualitative data. Median and mode can be easily computed graphically. In case of open-ended distribution, they can also be easily computed. Thus, it is important to select an appropriate average depending upon the purpose of analysis and the nature of the distribution. Quantitative methods emphasize on objective measurements and the statistical, mathematical, or numerical analysis of data collected through polls, questionnaires, and surveys, or by

manipulating pre-existing statistical data using computational calculations to find out a particular research outcome. There are various flaws and advantages of using quantitative data in research work. Just because it has some flaws it cannot be merely rejected. It solely depends upon the researcher, as per their demand of study they may either employ the qualitative or quantitative methods of data collection and analysis.

11.9 QUESTIONS

1. What is meant by quantitative methods? Discuss with examples.
2. What do you understand by measures of dispersion?
3. Define mean. What is the formula used to find mean?
4. Define median. How is the median calculated?
5. Define mode.
6. What are the various advantages and disadvantages associated with quantitative methods? Discuss its importance in social science research.
7. What is bivariate and multivariate analysis? Mention two differences between the two.

11.10 RECOMMENDED READINGS AND REFERENCES

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UNIT 12: SAMPLING TECHNIQUES

UNIT STRUCTURE

12.1 Introduction

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12.1 INTRODUCTION

In research, when we choose a particular issue to study, it is not possible to study the entire population associated with the specific issue. We, therefore, study a representative population from the entire population. This is commonly called as sampling. With the help of sampling, information can be acquired about the larger population which is not possible to cover. There are many steps in the process of sampling which need to be carefully carried out in the course of the research. In this unit, the readers can have an idea of the meaning of sampling, the process involved in sampling and the types of sampling techniques adopted.

12.2 OBJECTIVES

After going through this unit, you will be able to:

- Describe sampling as a process;
- Explain the sampling techniques;
- Analyse sampling and non-sampling error.

12.3 INTRODUCTION TO SAMPLING

Sampling is a method for collecting information and drawing inferences about a larger population or universe, from the analysis of only part thereof, the sample. The term population means all members that meet a set of specifications or a specific criterion. Sample means a representative part or a single item from a larger whole or group especially when presented for studying, investigation or shown as evidence of quality. Censuses of the population are an expensive way of monitoring social and economic change and are carried out frequently. Sampling allows surveys of the complete population of a country, or sub-sections of it, to be carried out far more cheaply and frequently, and with resources devoted to improving the depth and quality of the information collected, in contrast with the shallow information obtainable from censuses. It is known that we cannot study the entire population because of feasibility and cost constraints, and hence, we must select a representative sample from the population of interest for observation and analysis. Therefore, 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. Improper and biased sampling becomes the primary reason for often divergent and erroneous inferences.

12.3.1 Sampling Process

Sampling process comprises of different steps and stages. The first stage is defining the target population. A population can be defined 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 the researcher wish to draw scientific inferences about. For example, if we wish to identify the drivers of academic learning in high school, the target population among students, teachers and parents will be the students as we are interested to know about their performance.

The second step in the sampling process is to choose a sampling frame. This is an accessible section of the target population from where a sample can be drawn. For example, if the target population is professional employees at work, as it is not possible to access all professional employees around the globe, a more viable and realistic sampling frame will be employee list of one or two local companies that will be willing to participate in the proposed study. It is also to be noted that the sampling frame may not be entirely representative of the population at large, and if so, inferences derived from such a sample may not be generalizable to the population. The next step is specifying the sampling unit which is a basic unit that contains a single element or a group of elements of the population to be sampled.

Another step consists of the selection of the sampling method which outlines the way in which sample units are to be selected. The choice of the sampling method is actually being influenced by the objectives of the nature of the problem to be investigated. Determination of sample size is another part of the sampling process. The sample size is required to choose the required data from a number of units. There is the designated sample size which is the number of sample units selected for contact or data collection. There is another sample size known as the final sample size which is the number of completed interviews or units for which data are actually collected.

12.3.2 Conditions and Size of Sample

A good sample is said to fulfil certain conditions that can enable the samples to be used properly. **Representativeness** is one such condition. When sampling method is used by the researcher, the basic assumption is that sample so selected out of the population is the best representative of the population under study. Thus, good samples are those which accurately represent the population. **Accuracy** is, therefore, another condition of a sample. Accuracy is defined as the degree to which bias is absent from the sample. An accurate (unbiased) sample is one which exactly represents the population. It is free from any influence that causes any difference between the sample value and population value. **Size** constitute another condition to be fulfilled by a sample.

A good sample must be adequate in size and reliable. The sample size should be such that the inferences drawn from the sample are accurate to a given level of confidence to represent the entire population under study. The size of the sample also depends upon a number of factors. The first factor is **homogeneity or heterogeneity** of the universe. It is to be noted that the selection of the sample depends on the nature of the universe. If the nature of the universe is homogenous then it is said that a small sample will represent the behaviour of the entire universe. This will lead to select a small sample size rather than a large one. On the other hand, if the universe is heterogeneous in nature, then samples are to be chosen as from each heterogeneous unit.

The second factor is the **number of classes** proposed for the study. That is if a large number of class intervals is to be made then the sample size has to

be large because it has to represent the entire universe. In the case of the small sample, there is the possibility of the sample being not inclusive.

The third factor constitutes the **nature of the study**. The size of the sample is said to depend on the nature of the study undertaken. For an intensive study which may continue for a longer time, large samples are to be taken. Similarly, in the case of general studies, a large number of respondents may be appropriate one but if the study happens to be technical in nature then the selection of a large number of respondents may cause difficulty while gathering information.
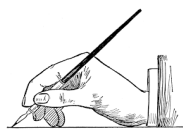
12.4 SAMPLING TECHNIQUES

Researchers use two kinds of sampling technique for a study. One is called the probability sampling and the other is a non-probability sampling. Probability sampling means that every item in the population has an equal chance of being included in the sample. One way to undertake random sampling would be if the researcher wants to conduct a sampling frame first and then use a random number generation computer program to pick a sample from the sampling frame. Probability or random sampling has the greatest freedom from bias but may represent mostly sample in terms of time and energy for a given level of sampling error. On the other hand, non-probability sampling is often associated with case study research design and qualitative research. With regard 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 case does not need to be representative or random, but a clear rationale is needed for the inclusion of some cases or individuals rather than the others.

Stop and Read

It was in reality not until 1920 that the field of applied sampling began systematically to develop and much of the growth was in the agricultural sector rather than social research.

12.4.1 Types of Probability sampling

Probability sampling has many types under its frame which can be used in a variety of study as felt suitable by the researcher. The first type is **simple random sampling** which means that every case of the population has an equal probability of inclusion in the sample. But there are also disadvantages in using a simple random sampling. This is because, in it, a complete frame or a list of all units in the population is needed. Also, in some studies, such as surveys by personal interviews, the costs of obtaining sample can be high if the units are geographically widely scattered. In addition to it, the standard of estimators can be high.

The second type of probability sampling is called **systematic sampling** where every nth case, after a random start, is selected. For example, if a survey of consumers of any specific product is done, then every fifth consumer may be selected from the sample. The simplicity of this sampling makes it usable.

The third type is the **stratified random sampling** where the population is divided into strata (or a subgroup) and a random sample is taken from each

group. A subgroup is a natural set of items. Subgroups may be based on size, gender, occupation, etc. Stratified sampling is often used where there is a great deal of variation within a population. Its purpose is that it ensures that every stratum is adequately represented.

The fourth type is the **cluster sampling** 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 beneficial for those researchers whose subjects are fragmented over a large geographical area as it saves time and money.

The fifth type of probability sampling is **multi-stage sampling** which is a process of moving from a broad to a narrow sample by applying a step by step process.

CHECK YOUR PROGRESS

1. Fill up the gaps:

a. Non-probability sampling is often associated with case study research design and ……………… research.

b. ………………………. is beneficial for those researchers whose subjects are fragmented over large geographical area.

12.4.2 Types of Non-Probability Sampling

Non-probability sample too has many types under it. The first type is the **quota sampling** which is a non-random sampling technique in which participants are chosen on the basis of pre-determined characteristics so that the total sample will have the same distribution of characteristics as the wider population.

The second type is **snowball sampling** which is again 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 can be most applicable in small populations that are difficult to assess due to their closed nature.

The third type is **convenience sampling** that selects participants because they are often readily and easily available. This sampling technique appears as a convenient sampling technique among students as it is inexpensive and is an easy option compared to other sampling techniques. This sampling often helps to overcome many of the limitations associated with research.

The fourth type is **purposive or judgmental sampling.** This sampling is a strategy in which particular setting, persons or events are selected deliberately in order to provide important information that cannot be obtained from other choices. It is the sampling where the researcher includes cases or participants in the sample because they believe they warrant inclusion.

12.5 SAMPLING ERROR

The principal aim of any sampling procedure is to obtain a sample which, subject to limitations of size, will reproduce the characteristics of the population being studied, especially those of immediate interest, as closely as possible. In practice, two types of error may arise from any sampling procedure: first, sampling biases may arise in the way the selection is carried out; and second, random sampling error may arise in the sample obtained due to chance differences between the members of the population included or excluded from the sample. Total sampling error in the sample issued for interviewing consists of these two taken together. The key difference between the two is that random sampling error decreases as the sample size is increased, whereas sampling bias is not eliminated or reduced in that way; it is a constant characteristic unless steps are taken to improve the quality of sample selection. An important source of sampling

bias is a sampling frame which does not, in fact, cover all of the intended population.

12.5.1 Non-Sampling Error

The other main cause of unrepresentative samples is non-sampling error. This type of error can occur both in the case of a census or a sample. Like sampling error, non-sampling error may either be produced by participants in the statistical study or be a by-product of the sampling plans and procedures. A non-sampling error can be said to be the error which results solely from the manner in which the observations are made. The simplest example of non-sampling error is inaccurate measurements due to malfunctioning instruments or poor procedures.

Non-sampling errors can occur at every stage of planning and execution of survey or census. It occurs at the planning stage, fieldwork stage as well as at the tabulation and computation stage. The main sources of non-sampling errors are lack of proper specification of the domain of study and scope of the investigation, incomplete coverage of the population or sample, faulty definition, defective methods of data collection and tabulation errors.

CHECK YOUR PROGRESS

1. What is non-sampling error?

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2. Fill up the gap: Random sampling error …………… as the sample size is increased.

12.5.2 Limitations of Sampling

Sampling is, no doubt, an important step in research yet it is not free form limitations. The serious drawback of the sampling method is that it involves biased selection and thereby leads us to draw erroneous conclusions. Prejudice arises when the method of sampling is problematic and faulty. The difficulties in selecting a truly representative sample produce reliable and accurate results only when they are representative of the whole group. Selection of a truly representative sample is difficult when the phenomena under study are of a complex nature. Use of sampling method requires adequate subject-specific knowledge in sampling technique. Sampling involves statistical and calculation of probable error. When the researcher lacks specialized knowledge in sampling, serious mistakes might be committed which may lead to misleading results.

12.6 SUMMING UP

- Sampling is a method for collecting information and drawing inferences about a larger population or universe, from the analysis of only part thereof, the sample.
- Sample means a representative part or a single item from a larger whole or group especially when presented for studying, investigation or shown as evidence of quality.
- A good sample is said to fulfil certain conditions that can enable the samples to be used properly. Representativeness and accuracy are the conditions.
- The size of a sample also depends upon several factors. The first factor is homogeneity or heterogeneity of the universe. The second factor is the number of classes proposed for the study.
- Researchers use two sampling techniques for a study. One is called the probability sampling and the other is non-probability sampling.
- Simple random sampling means that every case of the population has an equal probability of inclusion in the sample.

- Stratified random sampling is where the population is divided into strata and a random sample is taken from each stratum.

- Purposive or judgmental sampling is a non-probability sampling which is a strategy where particular setting, persons or events are selected deliberately to provide important information that cannot be obtained from other choices.

12.10 QUESTIONS

A. **Short type question (Answer within 150-200 words)**

1. Briefly explain the meaning of sampling.
2. What is a sampling process?

B. **Essay type question (Answer within 300-400 words)**

1. Explain in detail about probability sampling.
2. Explain about non-probability sampling.

12.8 RECOMMENDED READINGS AND REFERENCES

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UNIT 13: QUANTITATIVE DATA ANALYSIS

UNIT STRUCTURE

13.1 Introduction

13.2 Objectives

13.3 Analysis- Meaning and Types

    13.3.1 Descriptive Statistics

    13.3.2 Inferential Statistics

13.4 Bivariate Analysis

13.5 Multivariate Analysis

    13.5.1 Multiple Correlation

    13.5.2 Path Analysis

    13.5.3 Factor Analysis

13.6 Quantitative Data and Computer Software

13.7 Summing Up

13.8 Questions

13.9 Recommended Readings and References

13.1 INTRODUCTION

In Unit 9, we tried to analyse qualitative data and the various techniques which are employed in the whole process of data collection. In this unit, we shall focus on the quantitative data analysis, meaning we will explore the variegated techniques and ways by which data are collected and converted into numerical form and further, how these data are depicted statistically by using various diagrams and other suitable postulates. Unit 9 has made you

familiar with various techniques and methods of qualitative data analysis, therefore in this unit, we shall focus more on the meanings of terms and terminologies used in the process of data analysis. Hypothesis in social sciences has been defined as a testable or verifiable statement. A researcher at the end of a study may want to check the validity and reliability of the hypothesis he formed in terms of whether it should be accepted/rejected or whether it establishes a true relationship between the two variables or not. Therefore, in order to test these issues, quantitative data require proper statistical tools.

13.2 OBJECTIVES

By the end of this Unit, you will be able to:

- Discuss the various methods employed in quantitative data analysis;
- Analyse the suitability of the various methods as per the demand of the study;
- Distinguish between quantitative and qualitative data analysis.

13.3 ANALYSIS- MEANING AND TYPES

Quantitative data analysis involves various analytical techniques which primarily makes the thin line of difference between the various qualitative methods and quantitative methods distinct and clear. The utilisation of the processes solely depends upon the researcher, yet the demand for the study is important too. As per suitability various methods and techniques are employed in the data collection process. We have already discussed those in Unit 9 yet to make you clear about the concepts we shall look at the definitions and its types in this unit as well. You are already familiar with various concepts and techniques, viz. univariate analysis, measures of dispersion, bivariate analysis and multivariate analysis. Herein, we shall introduce a few more concepts to make you clear about its usage in a research.

The first type of analysis is the univariate analysis. Univariate analysis has been defined in the previous chapter so now the focus shall be laid on how univariate analysis is divided into various types further. The univariate analysis further may be divided into two different types, i.e. *descriptive statistics and inferential statistics.*

13.3.1 Descriptive Statistics

This type involves various other methods which were earlier mentioned in Unit 9. Descriptive statistics involves measures of central tendency (i.e. mean, median and mode) and measures of dispersion (range, variance and standard deviation). If the measure of each item in a series is known then by adding the measures together and by dividing the measures by the total number of items the arithmetic mean can be derived. For example, if 4 students A, B, C and D scored 78, 65, 88 and 76 respectively then to find the mean we need to add the scores together and divide it by the total number of students. For the aforementioned series of marks the mean would be:

M= (A+B+C+D) ÷ TOTAL NUMBER OF STUDENTS

M= (78+65+88+76) ÷ 4

M= 307 ÷ 4

M= 76.75

Therefore, the arithmetic mean for the aforementioned series of marks would be 76.75

As we have discussed in unit 9, the formula for mean is represented as follows:

$$\bar{x} = \sum fX \div N$$

In the above formula,

$\bar{x}$ = arithmetic mean

f = the "frequency"

∑fX = the sum total of "fX"

N = the number of object under consideration

After mean, we have another concept named median. ***Median*** is the size of the middle item when the items are arranged in their order of magnitude. Pauline V. Young (2010) says, "The concept of median should not be considered as a genuine median but rather as the value of the mid-item or mid case". The concepts of median should not be reserved for simple arrays rather it should be kept reserved for distribution of frequency. In that case, the researcher would be able to define median as that point of the scale of variable which divides the series into two equal parts. Formula to find the median is as follows:

Median = lm + N/2 − f ÷ (fm) × ĭ

In the above formula,

lm = Lower limit of class media

N = total frequency

f = cumulative frequency preceding the class median

fm = frequency of the class median

ĭ = class interval

Mode is the size of the measurement that occurs most frequently. For example, in the series 11, 13, 15, 34, 56, 56, 56, 78, 56, 56, 78, 74, 22, 45, 56, the mode is 56. It is because 56 is the only number which occurs repeatedly in the series than any other number. Mode, therefore, is that point on the scale of the variable where the frequency is the highest. Also, it is to be noted that, distributions with one mode are referred to as *unimodal*. Those distributions which consist of two modes are defined as *bimodal* and those with three are *trimodal* and more than three are defined

as *multimodal*. There are several methods of discovering mode in a series or in a frequency distribution table. *Firstly*, inspectional or crude mode, this method involves inspection. Herein by inspection, the modal class is ascertained. *Secondly,* the mode may be discovered by the interpolation method. This involves the process which at first selects the modal class and then the location of the exact mode is determined. Formula to locate mode is:

Mode = l+ $f_1 - f_0 \div 2f_1 - f_0 - f_2 \times ĭ$

Here, in the above formulae,

l = lower limit of the modal class

f_1 = the frequency of the modal class

f_0 = the frequency of the class preceding the modal class

f_2 = the frequency of the class succeeding the modal class

ĭ = class interval

Apart from these, descriptive statistics include the following methods: Range, Variance and Standard Deviation.

Range in descriptive statistics may be defined as the difference between the maximum and minimum value in a data set. Larger range usually (not always) depicts a large deviation in the values of the data set. For example: In the following data set 15, 25, 35, 45, 55, 65, 75, 85, 95, 105 and 115 the range will be the value derived after subtracting the lowest value from the highest value i.e. 115-15= 100

Variance, on the other hand, is defined as the measure as to how a data point differs from the mean. The larger the variance is, the more the scores deviate, on average, away from the mean.

Standard deviation is the third type of descriptive statistics. The standard deviation is a measure of the amount of variation or dispersion of a set of

values. A low standard deviation indicates that the values tend to be close to the mean of the set, while a high standard deviation indicates that the values are spread out over a wider range. Standard deviation may be calculated by using the following two formulae:

The formula for standard deviation is:

- Long method formula:

$\bar{X} = \sum fx \div N$ (mean) ………………………. (i)

$\sigma = \sqrt{\sum f (x - \bar{x}) \div N}$ ………………………. (ii)
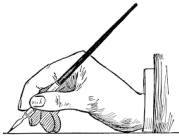
- Short method formula:

$C = \sum fx_1 \div N$

$(C)^2 = (\sum fx_1 \div N)^2$ ………………………. (i)

$S = i\sqrt{\sum fx_1 \div N - C^2}$ ………………………. (ii)

CHECK YOUR PROGRESS

1. Define range, variance and standard deviation

13.3.2 Inferential Statistics

This includes the following categories "Z" test, "T" test and Chi-square test.

A statistical test to determine whether two population means are varying when the variances are known and the sample size is large is known as the "Z" test. Herein, hypothesis testing is involved by the researcher through this method. Following are the criteria which are needed to be followed for conducting the "Z" test:

- The population is normal and finite/infinite (also may not be normal)
- Sample size large or small
- Population variance is known/unknown

"T" test is a type of inferential statistic used to determine if there is a significant difference between the means of two groups, which may be related in certain features. "T" test is used as a hypothesis testing tool, which allows testing of an assumption applicable to a population. Following are the criteria which are needed to be followed for conducting the "T" test:

- Samples happen to be small
- Presumed to have been drawn from the same population
- Population variations are unknown but are supposed as equal

Chi-square is used to determine the extent to which the actual (or observed) values in a particular contingency table deviate from the values that would have been expected if the two variables are not related to one another. The larger the difference between the actual value and those expected, assuming no relationship (null hypothesis), the larger the value of chi-square and the more likely that the relationship exists in the population. A chi-square test is a statistical hypothesis test in which the sampling distribution of the test statistics is a chi-squared distribution when the null hypothesis is believed

to be true. A chi-squared test is a test in which the sampling distribution (if the null hypothesis is true) can be made to estimate a chi-squared distribution as intimately as desired by making the sample size large enough. The chi-squared distribution is a theoretical or mathematical distribution which has wide applicability in statistical work. The term 'chi-square' (pronounced with a hard 'ch') is used because the Greek letter χ is used to define this distribution. It will be seen that the elements on which this distribution n is based are squared so that the symbol $\chi 2$ is used to denote the distribution.

13.4 BIVARIATE ANALYSIS

As you have seen in unit 9, the meaning of bivariate analysis is that analysis which involves the analysis of two variables simultaneously, for the purpose of determining the empirical relationship between them. The analysis of two variables simultaneously, for the purpose of determining the empirical relationship between them, is what we mean by bivariate analysis. For example, the tabulation of data to represent variegated percentages and the calculation of correlation coefficient etc. Bivariate analysis focuses on the variables and their empirical relationships. What we saw in the univariate type is, in that analysis, we define the subject whereas here we try to analyse the relationship between the variables.

13.5 MULTIVARIATE ANALYSIS

The analysis of the simultaneous relationships among several variables may be defined as the multivariate analysis. It gives increased precisions to prediction problem; offers greater control of intervening variables (holding more variables constant); and furnishes guiding principles in the development of attitude scales, rating scales, and criterion measures. Some of the most important multivariate techniques include the following:

multiple correlation and regression analysis; path analysis; factor analysis etc.

13.5.1 Multiple Correlation

Multiple correlations is used to find out if two variables are related to one another and to what degree they are related. It is mostly used to test the null hypothesis which state whether there is any relationship between the two variables. With no relation between the two variables, the correlation would be assumed as zero. A number of correlation coefficients are available and it solely depends upon the study as to which one will be applicable to what kind of study as per the requirement of the study. For example, Pearson's Product Moment Correlation Coefficient and Spearman Rank Correlation Coefficient.

13.5.2 Path Analysis

Path analysis is nothing but an extension of multiple regression analysis. It provides estimates of the magnitude and significance of hypothesised causal connections between sets of variables. Path analysis was developed as a method of decomposing correlations into different elements for interpretation of effects (e.g. how sustainable development may benefit the future generations?).

13.5.3 Factor Analysis

A statistical procedure which is used to uncover relationships among many variables is known as the factor analysis. This allows numerous interrelated variables to be condensed into fewer dimensions, called factors. The purpose of factor analysis is to discover simple patterns in the pattern of relationships among the variables. Thus, if the researcher's data contains many variables, he or she can use factor analysis to reduce the number of variables. Factor analysis groups variables with similar characteristics together. With factor analysis, the researcher can produce a small number of factors from a large number of variables which is capable of explaining

the observed variance in the larger number of variables. The reduced factors can also be used for further analysis.

CHECK YOUR PROGRESS
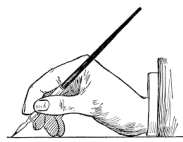
1. What is multiple correlation?

13.6 QUANTITATIVE DATA AND COMPUTER SOFTWARE

Most quantitative data analyses today are conducted with computers in which data are stored electronically rather than in the form of cards, paper tapes, and the like. A computer can go beyond simple counting and sorting to performing intricate computations and provide a sophisticated presentation of results (Babbie, 2001). Data analysis software programs that are currently available are able to examine several variables simultaneously and can compute a variety of statistics. The two most common data analysis software programs are SPSS (Statistical Package for the Social Science) and SAS (Statistical Analysis System).

CHECK YOUR PROGRESS
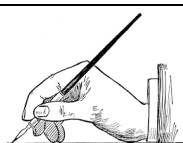
1. Write the full form of SPSS.

13.7 SUMMING UP

In this unit, we have covered data processing and data entry in quantitative research, elementary data analysis and data presentation, searching for relationships. We have also explored causation and multivariate analysis and manifestations of causes in the context of quantitative research. Multivariate analysis is conceptualised and the impact of computers in quantitative data analysis has also been highlighted. By now, you have understood that quantitative methods emphasize objective measurements and the statistical, mathematical, or numerical analysis of data collected through polls, questionnaires, and surveys, or by manipulating pre-existing statistical data using computational calculations to find out a particular research outcome.

13.8 QUESTIONS

1. What is quantitative data analysis?
2. What are the various quantitative methods?
3. What is meant by measures of central tendency?
4. Differentiate between descriptive statistical analysis and inferential statistical analysis.

13.9 RECOMMENDED READINGS AND REFERENCES

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UNIT 14: REPORT WRITING

UNIT STRUCTURE

14.1 Introduction

14.2 Objectives

14.3 Definition of Research Report

      13.3.1 Reasons for Report Writing

      13.3.2 Types of Reports

14.4 Stages in Preparing a Research Report

      14.4.1 Planning Phase

      14.4.2 Writing Phase

14.5 Structure and Component of Report

      14.5.1 The Introductory

      14.5.2 The Main

      14.5.3 The End

14.6 Summing Up

14.7 Questions

14.8 Recommended Readings and References

14.1 INTRODUCTION

The writing up of a report is an essential element in research. After any study or investigation, the last step lies in the preparation of the research report. Without the research report, the study will not reach the audience and the public from which they can learn and propose further study. A study will be accepted as beneficial and valid when the report will be made available to the audience. The writing of a report consists of various steps which are required to be followed in order to give a proper frame to the report. Writing a research report involves both art and science. It should be properly written without error and a systematic approach should be followed to prepare a research report. In this unit, the readers will have an idea about the steps involved in writing a report and the reasons for the necessity of a report.

14.2 OBJECTIVES

After going through this unit you will be able to:

- Explain the meaning of a research report;
- Describe the types of report and the various stages in it;
- Analyse the structure of a report.

14.3 DEFINITION OF RESEARCH REPORT

Research is the systematic investigation into the study of phenomena or materials or sources or existing condition of society in order to identify facts or to get the additional information and derive new conclusions. After research of a particular area of study, it is important to prepare a research report. Irrespective of the quality of the research undertaken, much of the acceptance of the results depends on the way as they are communicated to the relevant audiences. This act of communication is called the report writing. A report is simply a statement or description of the study that has already occurred and been completed. It is the culmination of the research findings to a specific audience to accomplish the given purpose. This presentation can be given in a written or an oral form or using both forms.
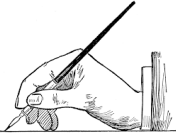
The objective of a research report is to convey readers the problems investigated, the method used to solve the problem, results of the investigation and conclusion inferred from the result. It is to report what has been done, why it is done, the outcome of the doing and the researcher's conclusion. Every research/study is judged for its adequacy, quality and validity, on the basis of four such documents- the research proposal, research summary, research abstract and the research report. The research report is the main document on the basis of which the contribution of the research is judged.

14.3.1 Reasons for Report Writing

A researcher while writing a report must be clear about certain aspects like the reason and purpose, the content of the report, the primary readership and their expectations from the report. Before the researcher actually proceeds to write the research report, the impacts/benefits of the result should be clear. The reason, purpose and scope of the report are sometimes pre-determined by the organization sponsoring the research or by the researcher. Thus, the purpose of the report and scope of the report form an important dimension of a report. Scope of the report includes clarity on what needs to go on the report as well as some guidelines on the format and extent of analysis. The concern for maintaining academic rigour and value influences the content of the report.

The researcher's goal is towards dissemination of the findings of the research through the report to some perceived audience or readers. Therefore, the significance of the results documented in the report should be of value to them. The audience can be classified as academic/specialized or wider/non-academic. If the report is intended for a largely non-academic audience, the tone and language and style are to be prepared in a simpler way so that it can be comprehended easily. The presentation and content of a report can thus be structured to indicate the main points of decision, presentation of facts and information, and shaping future action to be easily understood and usable for the readers. A good research report must be able to add some supplement to knowledge and help the readers find the right and necessary information within the report. It should also be able to cater to at least some of the preferences of the intended audience and be able to arrive at the usability of the audience by designing the report format in a systematic manner. There are some errors that need to be avoided while writing a research report. For example, excessive jargons, verbosity, grammatical errors, absence of reasoning, absence of sequence, absence of reference are to be avoided.

CHECK YOUR PROGRESS

1. What is the objective of a research report?

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2. What are are some errors that need to be avoided while writing a research report?

14.3.2 Types of Reports

Reports can be classified into various types based on the purpose of research, the funding or sponsoring organization and the area of work. Reports can be documented only by information which can be very short and concise, for example, budgeting report. Case studies and analysis can be another type of report writing widely used at universities for project documentation. A report for an organization's internal audience can be in an informal format. This report can use informational conversational tone if it addresses issues such as absenteeism, work plans and processes.

For a semi-formal report, such as employee policy, a manual or a task report, the language used can be informal but can have a formalized structure. Another type of report is a formal report with detailed structure and format for research, analysis and some inferences. A report can be distinguished from other forms of mainstream/traditional academic research such as the discussion paper, working paper and journal article. For example, the main difference between a report and an essay or academic research narrative is that the essay format can be at the discretion

of the author which is not the case with the report. The report has a formal structure approved by the institution of the funding agency and therefore has to be followed as per the guidelines provided.

It is to be noted that writing a report involves the following stages:

a. The terms of reference have to be clarified,
b. The work or the study has to be planned properly,
c. The collection of data and information is the next step which is an important task,
d. The next step lies in organizing and structuring the collected information,
e. Then the first draft is to be written, and
f. Lastly, the final proof checking and re-drafting of the report are to be carried out.

14.4 STAGES IN PREPARING A RESEARCH REPORT

The stages of preparing a research report are divided into two parts-planning and writing. The planning phase can be divided into three stages namely clarifying the objective of the research, doing the research and organizing the content. The writing stage has been divided into the analysis stage, drafting and proofreading stage. Each stage will be explained below.

14.4.1 Planning Phase

The clarification of the objective of the report is considered the first stage of the planning phase. The specific instructions and guidelines issued by sponsors or organizations for writing the report are to be fully understood and internalized by the researcher and the team. The planning stage is again followed by the actual data collection and the research stage. This forms the backbone of the report as the quality of any report specifically depends on the quality of data collected and put for analysis. If a study fails to acquire quality data will obviously end up in generating faulty results.

The next step followed is the organization of the content. It is the responsibility of the researcher to review the notes made and group them under various heads. The researcher at this stage should keep only the relevant content for objectives and must put aside all the irrelevant contents. It is necessary that the order of the content be logical and has a sequence. The researcher should be able to paraphrase the ideas into proper words and also avoid any practice of copying from another source.

14.4.2 Writing Phase

The writing phase has three components as said before. They are analysis, drafting and proofreading. Analysis and writing of the collected data begin with a simple description of the data gathered and is examined critically for the evidence for research findings. The next step, which is the drafting the report, requires a simple style without using unnecessary words and uncalled details. However, in the content, technical terms are to be used appropriately and proper reference should be made to tables, graphs and illustrations. The final stage is the phase of proof-reading which is regarded as the most important. As it requires utmost care, attention and accuracy. It is needed to check the flow of the report and whether the brief provided at the beginning is being followed. The language, syntax, spellings, all of which are enabled by the word processing software as computers are used. The numbers assigned to tables, graphs and illustrations are to be checked along with the references cited. The contents page, layout, page numbers and captions are required to be checked properly.

CHECK YOUR PROGRESS
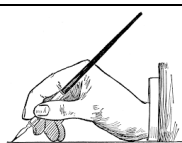
1. Fill up the gap: The final stage in writing a research report is the phase of ……………….

14.5 STRUCTURE AND COMPONENT OF REPORT

The structure of a report helps the readers in moving through the document easily. It helps organizing the collected data. The structure of the report consists of three components, namely- the Introductory, i.e. the beginning section, the Main, i.e. the explanatory middle and the End, i.e. the appendixes and references. These three components are discussed in the sections below.

14.5.1 The Introductory

The introduction provides a background for the research being presented in the report. Arrangement of the sub-sections and the sequence depends on the length and scope of the research. A lengthy report will require more structuring and sequence. The introduction section comprises the following sub-sections: title page, copyright, contents list, list of illustrations, list of tables, forward, preface, acknowledgements, list of abbreviations and the summary.

The title page should include a full title of the report, the names and affiliation of the author(s), sponsors or to whom the report is to be submitted, the name and address of the publisher and also the date of publication. Other details like ISBN if there is any and Copyright (inside the page) can be included in the later pages. The content list is very important as it helps the reader to identify the main sections of the report. Hence the preparation of the contents list requires careful planning. List of illustrations at the beginning are numbered to the particular chapter to help the reader. A forward or a preface can be used to draw a potential reader into the major theme of the report. This can be written by the author/s, including interesting details of the report or the rationale behind the report in the preface. The acknowledgement section is the place where the author/s can express thanks and gratitude to all the people, organization and anyone who had been vital in contributing to his/her/their research area. The abbreviations that are mentioned in the report should be identified and

explained in a section prior to the main section primarily to help the reader. The summary is an important part of the report which should provide the readers with details like aims and objectives of the report, a brief methodological overview, key findings and conclusions and also a set of recommendations that arise from the research.

14.5.2 The Main

A report's main content contains parts of the introduction and the main body of the report. The introduction should set the context and engage the reader to understand the background of the research. This can include details like who commissioned the report and why and for what reasons. Some important terms of reference, resources which were available for the author to prepare the report and sources of information and how they have been obtained can be mentioned. The structure of the report and the sub-sections are organized as per the research plan. The introductory part of the report is significant for reasons like it introduces the reader to the basic theme, context and agenda of the research and it builds up a platform for the development of a detailed explanation of concepts, variables and subject matter in rest of the report.

The main body is the central part of the report. The authors usually structure the body into various parts for the convenience of reading and to analytically present the theoretical orientation, if any, and the various modules available for analysis. The main body of the report follows the predetermined structure and is made clearer by the hierarchy of headings and sub-headings, with numberings. The structure sometimes is dependent on the funding organization's specifications or directives, if any, to convey the required message within this hierarchy of headings. The stylistic tools make it convenient for the readers to identify and assess information within the content. After presenting the existing modules and a review of the literature available and relevant to the report, the report presents its data and the findings as per the funding organization's requirements. Also, keeping in view the differences of approaches, it is customary to begin with

the general aspects of the findings like the socio-economic background of the respondents and end with critical observation and analysis. The effort is also needed to explain the reasons and factors responsible for a specific issue or topic to be researched.

14.5.3 The End

The last section includes appendices, references and suggestions required for further readings. Appendices should be included at the end of the report document and they are actually in different forms. They should be included if they are thought to be of value and help the reader understand the main text better, with detail that goes beyond the main content of the report. The next step here is the index which allows readers to look at keywords and allow them to get to the depth of the theme or topics otherwise hidden in the main content. This is a tough task if done manually. There is also software available to enable the author/s to compile index with a few commands including cross-referencing.

14.6 SUMMING UP

- A report is simply a statement or description of the study that has already occurred and been completed. It is the presentation of the research findings to a specific audience to accomplish the given purpose.
- A researcher writing a report must be clear about certain aspects like the reason and purpose, the content of the report, the primary readership and their expectations from the report, the impacts/benefits of the result before s/he actually proceeds to write the research report.
- A good research report must be able to add some supplement to knowledge.

- Reports can be classified into various types based on the purpose of research, the funding or sponsoring organization and the area of work.
- The clarification of the objective of the report is considered the first stage of the planning phase.
- The writing phase has three components: analysis, drafting and proofreading.
- The introduction section of a report comprises the following sub-sections: the title page, copyright, contents list, list of illustrations, list of tables, forward, preface, acknowledgements, list of abbreviations and summary.
- The main body of the report follows the predetermined structure and is made clearer by the hierarchy of headings and sub-headings, with numberings.

Glossary:

- **Accuracy:** the quality or state of being correct
- **Comprehend:** to understand
- **Culmination:** the highest point of something especially attained after a long time
- **Discretion:** the freedom to decide what should be done at a particular time
- **Jargon:** special words or expression used by professionals or groups that are difficult for others to understand
- **Verbosity:** the fact or quality of using more words than needed

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14.7 QUESTIONS

C. **Short type question (Answer within 150-200 words)**

3. Explain the meaning of a research report.

4. What are the reasons for writing a report?

D. **Essay type question (Answer within 300-400 words)**

3. Explain the stages in preparing a research report.

4. Explain the structure and component of a report.

14.8 RECOMMENDED READINGS AND REFERENCES

Babbie, E. (2001). *The Basics of Social Research*. S. Chand (G/L) & Company Limited.

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