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Paper XIII

Research Methods in Social Science

Contents:

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Block I: Scientific Social Research and Theory

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Block II: Planning For Research: Hypothesis, Research Design, Sampling, Data Collection, Data Processing, Data Analysis and Data Interpretation

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Paper Introduction

Research Methods in Social Science

The paper XIII 'Research Methods in Social Science' is an attempt to discuss the application of Scientific Methods in the Social Science Research. Research simply seeks the answer of certain questions which have not been answered so far and the answer depends upon human efforts. Unlike the natural sciences as a branch of social science the results of a research in Political Science cannot claim universality and there is limited scope for using scientific techniques like controlled laboratory method. But in the recent years many tools and techniques are introduced to make the social science research more scientific. Now, improved research procedures, through refinement and extension of knowledge, become the prime goal of social science research. Here in this paper we are going to discuss some important aspects of social science research. The paper also covers the planning procedures of social science research. In this paper we shall discuss the various tools and techniques that are used in the collection of available data and interpretation of such data. Hence, the paper covers almost all the important aspects of social science research and their problems. The paper consists of two blocks, i.e.

Block I: Scientific Social Research and Theory

Block II: Planning For Research: Hypothesis, Research Design, Sampling, Data Collection, Data Processing, Data Analysis and Data Interpretation

Now let us have a look at the contents of each block.

Block I, consists of two units, viz.

Unit I: Scientific Social Research and Theory

In this unit an attempt is made to define social science. The field of study of social science is concerned with society and human behaviours. The term social science is generally used to refer to a plurality of fields outside the natural sciences. These include: anthropology, archaeology, criminology, economics, education, linguistics, political science and international relations, sociology, geography, history, law, and psychology. In this unit an attempt is made to find out the meaning, aims and characteristics of scientific social research along with the research procedures followed in the social science research.

Unit II: Application of Science in Social Research

This unit is designed to find out the ways through which we can provide a scientific outlook to social science research. It is well known that in a social science research we cannot use all those methods which are used in the research of natural sciences. But it does not mean that social science research does not have scientific character. Now it is seen that social scientists use similar methods and tools for understanding society. This unit will help you to find out those means and techniques through which we can provide a scientific outlook to the social science research.

Block II consists of three units, viz.

Unit I: Planning For Research: Hypothesis and Research Design

In this unit an attempt is made to provide a basic concept of research design and formulation of hypothesis. Both the concepts occupy an important position in research activities. Research design simply refers to the plan or strategy of shaping the research and hypothesis refers to the tentative solution of the research problem. Thus this unit will focus upon the various stages that research goes through.

Unit II: Sampling and Data Collection

Unit II of this block will introduce us with sampling process and collection of available data. The sampling makes the research finding economical and accurate. It needs mention here that the research design is based on sampling and data helps the researchers to provide practical adaptability of his/her research. Collection of data and sampling is essential in any kind of research to provide a solid foundation for it. Thus this unit will help you to undertake research activities.

Unit III: Data Processing, Data Analysis and Data Interpretation

After collection of relevant data, data analysis and interpretation start. Without interpretation and analysis of data it is not possible to produce accurate and relevant information. To make the research valid and relevant it needs proper analysis of collected data. In this unit an attempt is made to familiarize you with the ways through which data is analyzed and interpreted.

Thus the paper will introduce you with necessary aspects of social science research

BLOCK I

Scientific Social Research and Theory

Unit I : Scientific Social Research and Theory

Unit II : Application of Science in Social Research

Unit I

Scientific Social Research and Theory

Contents:

1.1 Introduction

We all live in societies and different societies face different problems. Scientific social research helps us in studying and analyzing social problems in a scientific way. Since the social sciences deal with human beings, it is difficult to draw accurate conclusions in social sciences. However, scientific social research by adopting scientific methods and techniques helps us to draw conclusions regarding the occurrence of various events in the society and solve societal problems.

This unit is an attempt to introduce you to the meaning and characteristics of scientific social research as a whole. It will also give you a brief idea about empiricism and normativism. From this unit you will also get an idea about types and steps of scientific social research. Moreover, in this unit an attempt is made to discuss the role of theory in social science research.

1.2 Objectives

Scientific social research helps in drawing scientific and precise conclusions after studying social events and phenomena. After reading this unit you will be able to:

- *discuss* the meaning of scientific social research
- *trace* the difference between empiricism and normativism
- *list* the characteristics of scientific social research
- *examine* the aims of scientific social research
- *discuss* the types and steps in scientific social research
- *elaborate* the role of theory in scientific social research

1.3 Meaning of Scientific Social Research

Before dealing with scientific social research it is necessary to have some idea about research. Webster's International Dictionary has defined research as a 'careful and critical enquiry or examination in seeking facts or principles, diligent investigation in order to ascertain something.' Thus, research carefully and critically examines the facts or principles to ascertain something. Scientific social research systematically and critically studies social problems and events and bring out new facts or theories as well as solutions relating to those problems.

Young defines social research as 'the systematic method of discovering the new facts or verifying the old facts, their sequences, inter-relationships, casual explanations and the natural laws which govern them.'

According to Redman and Morey, 'social research is systematized effort to gain new knowledge'.

Prof. Clifford Moody is of the view that social research 'comprises defining and redefining problems; formulating hypotheses or suggested solutions ; collecting organizing and evaluating data, making deductions and making conclusions ; and at last carefully testing the conclusions to determine whether they fit the formulated hypothesis.' Again, Royce A. Singleton and Bruce C. Straits are of the view that 'scientific social research consists of the process of formulating and seeking answers to questions about the social world' (*Approaches to Social Research*, 1991:1).

From the above definitions, it can be understood that scientific social research aims at broadening the horizon of human knowledge about the problems of the society by studying the problems systematically. Thus, scientific social research emphasizes developing and adopting scientific methods to study social problems. The scope of scientific social research includes social life, social action, social behaviour, social relations, social groups and social structures. Scientific research is thus characterized by objectivity and systematization which lead to accuracy.

However, you should remember here that though scientific social research studies the problem scientifically and systematically, it is difficult to get accurate result or ultimate truth as it is difficult to come to a universal conclusion in social science which deals with human behaviour. Therefore, we can say that the scientific social research does not aim at finding the ultimate truths but helps in understanding and classifying the behaviours of the individuals in the society.

There are certain presuppositions behind the carrying out of social science research. One such pre-supposition is that social events are results of certain causes or factors. Another pre-supposition is that social events are not disorganized. They usually follow some order. Another presupposition is that human behaviour always follows certain laws and patterns. It is also presupposed that in all events and phenomena it is possible to pick up some representative or sample units since there are certain commonalities among the units. Thus a social science researcher proceeds in his research taking into consideration these presuppositions.

STOP TO CONSIDER :

Difficulties in Social Science Research

You have already came to know that social problems are complex and the study of human behaviour in such complex situations is more difficult. Though certain methods are used to study social problems scientifically, many obstacles still remain in social science research. These obstacles are as follows:

(a) For a proper research good investigator is required. However, it is very difficult to find good investigator in social science research. A good investigator should be free from biases and prejudices. He should be ready to face all obstacles

that come in the way of his research. He must do his job with full devotion. However, it has been observed that sometimes the investigators are reluctant to go to the field for primary data collection. Moreover, they are not always free from prejudices and values which affect their investigation to a large extent.

(b) Collecting the required information for carrying out the research is another problem in social science research. Social science research deals with human behaviour. The individuals from whom data is to be collected may not co-operate with the researcher. They may not like to share their opinion on the researched topic. Moreover, they may not also give their time to the researcher and open up before the investigator and can give false information.

(c) Another significant problem found in social science research is the problem of analyzing data. Data collected from the field needs to be properly analysed to draw any conclusion. Sometimes data is analysed according to the convenience of the researcher. In such cases, the biased views and prejudices of the researcher affect the study.

(d) Difficulties in framing the questionnaire is another problem. If the questionnaire is not properly framed there may be communication gap between the researcher and the people interviewed. Sometimes, researcher in social science research also faces difficulty when the questionnaire is not structured with a view of interpretation and analysis of data.

(e) Generalizing the research findings or situations is another problem faced in social science research. The investigator tends to generalize the situations. However, there are differences in the behaviour of the people, their habits and environment. Hence, generalization is not always possible.

1.4 Empiricism Vs Normativism

The terms normativism and empiricism are opposed to each other. The major difference between the two lies in the fact that while normative study implies conclusion, scientific study draws conclusion. According to Horton and Hunt, while the scientific method proceeds from evidence to conclusion, the normative method starts with a conclusion and searches for evidence to support it. The scientific method of inquiry involves various steps of research like defining or stating a problem, collecting and analyzing data and drawing conclusion. In section 1.8 of this unit we shall discuss these steps in detail. On the other hand, the normative research raises the issue in such a way that the conclusion is implied. Evidence is gathered only to support the

conclusion in normative research. In social research, normativism plays an important role. It has been found that in many cases normativism is applied by the researchers as they begin their study with a conclusion and then look for evidences. It needs mention here that results drawn from scientific research are more accurate than the results drawn from normative studies. However, all normative researches are not invalid.

Again, closely linked with empiricism and normativism are two terms i.e, objectivity and subjectivity. Objectivity means something which is free from preconceived notions and biased ideas and values. On the other hand, subjectivity is loaded with values, prejudices and biases. Since, social sciences deal with human society and human behaviour, there is every possibility of the researcher being guided by subjectivity. Moreover, various phenomena studied in social sciences like traditions, customs, values etc are subjective in nature. Hence, social science researches tend to be normative. However, despite all complexities certain scientific techniques and methods have been evolved for using in social sciences. With the help of these methods it is possible to carry out empirical researches in social sciences too.

SAQ :

Can Empiricism and Normativism go together in social science research? Give reasons in favour of your answer. (60 words)

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1.5 Characteristics of Scientific Social Research

Scientific social research has various characteristic features. This type of research helps the researchers in drawing almost accurate conclusions. Before dealing with the characteristics of scientific social research let us have a look at the characteristics of scientific research. According to Horton and Hunt following are the main characteristics of scientific methods.

- *Verifiable evidence*: The facts and evidences can be seen and checked.
- *Accuracy*: Scientific research aims at accuracy. Hence, it tries to describe things as they are without any subjectivity.
- *Precision*: Scientific research is characterized by precision which means that it aims at giving exact idea or exact number or measurement. It thus avoids vague meaning or abstract ideas.
- *Systematization*: Scientific research aims at finding all the relevant data or collecting data in a systematic and organized way. Such systematic method helps in drawing reliable conclusion.
- *Objectivity*: Objectivity stands against subjectivity. Thus it means being free from all biases and vested interests. In scientific research, objectivity implies that the observer or the researcher is free from all biases and the observation is unaffected by the observer's values, beliefs and preferences to the extent possible and he is able to see and accept facts as they are, not as he might wish them to be. While observing facts, collecting data and drawing conclusions, the researcher should not be guided by his emotions, prejudices, values and needs.
- *Recording*: Another important characteristic of scientific research is recording the complete details as quickly as possible. It is because there is every possibility that the observer may forget some of the facts after sometime. The researcher will draw the conclusion on the basis of recorded data and not recalled facts.
- *Controlling conditions*: In physical sciences it is possible to control variables. For example, a researcher in physical science controls certain variables like heat, light, air-pressure, time-interval etc. However, in social science it is not possible for the researcher to control all variables as he wishes.
- *Training investigators*: For scientific social research, it is important to impart training to investigators so that they can collect the necessary data for the research. Such training also help them in using proper methods of data collection as well as interpretation of the data.

Besides the above mentioned characteristics of scientific research there are some other characteristic features. They are as follows:

- Scientific research is based on observation and reasoning.
- It is based on theory. It establishes logical relationship between data and propositions.
- It builds new theories resting upon the old ones, sometimes modifying the old and sometime rejecting the old ones.

The above mentioned characteristics of scientific research are applicable to social science research too. However, it needs mention here that the nature of social science is different from physical sciences or natural sciences. For example, in pure or natural sciences observing the phenomena in the laboratory is possible. It is also possible to control the laboratory situation. However, in social sciences such controlled laboratory study is not possible. As we have mentioned earlier, social sciences mainly deal with human beings and their behaviour in the society. We all know that the behaviour, habits, values, attitudes of different individuals are different. Behaviour of individuals differs from society to society. Moreover, behaviour of an individual changes with time and situations. For example, if you look at different individuals you meet everyday you will find that all of them have different attitudes, outlooks and behaviours. Even within a family you will find that the members of the family have different characteristics and behave differently. Again, a person behaves differently in different situations. His behaviour as a student will be different from his behaviour as an employee. The same person will behave differently when he is going for picnic with his friends. Hence, it is a difficult task for the researcher to draw conclusions regarding human behaviour in social science research. Therefore, efforts have been made to adopt scientific methods and techniques so that conclusions drawn from the studies can come near accuracy.

Thus, we can say that through systematic and scientific study even in social sciences some conclusions can be drawn. Moreover, it is also believed that in spite of all differences in human behaviour, there is some social order and pattern which means that some predictions in human behaviour are possible. Hence, with the adoption of scientific methods and above mentioned characteristics of scientific research near accurate results can be found in scientific social research.

Check Your Progress :

1. What do you mean by scientific social research?

2. What is empiricism? Distinguish between empiricism and normativism.

3. Discuss briefly the main characteristics of scientific social research.

1.6 Aims of Social Research

Scientific social research widens the horizon of knowledge regarding the functioning of the society. We all are aware of the fact that in the present time all societies face different types of problems. Scientific social research helps the individuals to analyse and examine the social events and phenomena systematically. Thus, social science research helps in finding out the social reality and simplifies the complex social phenomena. The major aims of scientific social research are as follows:

- To understand the functioning of the society
- To understand the behaviour of the individuals as the members of the society.
- To study the social problems and their consequences. Moreover, it tries to find out the solutions to those social problems.
- Scientific social research aims at developing theories.

Becker and Sarantakos have categorized the goals of social science research under following heads:

- Understanding the society is the general goal of scientific social research.
- Theoretical goal includes verification, falsification, modification and discovery of a theory.
- Solution of the social problems is considered as the pragmatic goal.
- Development of social policy, evaluation of programmes, planning of reconstruction, empowerment and liberation are the political goals.
- To educate and create awareness among the people is the educational goal of the social science research.

It is also observed that sometimes research is carried out for improvement of personal academic status of the researcher and increase the quantum of research of various institutions. Social science research is also carried out with the aim of social planning. Moreover, the goal of this type of research is to find out the similarities and differences in various social and cultural spheres. It helps in explaining the reason behind differences in human behaviours. By increasing the knowledge of society and various social phenomena it is easy to exert control over social phenomena.

Another important aim of social science research is to provide solutions/ remedies to social problems. A good research can suggest structural remedies to social problems and thereby bring changes in the social environment. After getting the findings of the research through legislative measures, welfare means can be adopted for the betterment of the society. One chief aim of social science research is to make predictions and set goals for the future of the society. Through analyzing the past and present data, social science research helps in predicting the future of the society.

STOP TO CONSIDER :

Qualities of a Good Researcher in Social Science Research

A good researcher should possess certain qualities. Without these qualities conclusions of the research may be a biased one. Qualities of a good researcher are as follows –

- A good researcher should be truthful.
- He should be free from biases and prejudices while collecting the relevant data.
- He should have the capacity to collect detail and in-depth information from the people.
- He should not be satisfied with the approximate result but should search for accuracy and precise statement.
- He should have the ability to analyse the collected data without any bias or prejudices. All human beings have certain prejudices or pre-conceived notions. But a good researcher should not allow these prejudices to affect his studies or investigation.
- He should be an alert person. He should know how to read between the lines. That means he should understand what is said, what is unsaid and what is implied.

- Another important quality of a researcher is that he should not easily get discouraged. A researcher may face various difficulties during his research. He may face adverse situations while collecting data from the field. Moreover, he may not be acquainted with the situation, climate and culture of the area of data collection. The respondents may not co-operate with him. But, in spite of the adversities, he should not get discouraged and loose his moral courage to face all situations for accomplishing his task.

1.7 Types of Scientific Social Research

The social science research aims at exploring, describing and explaining the social events and phenomena. The types of social research depend upon these goals of social research.

(a) Exploratory Research: This type of research tries to explore phenomena which are not studied earlier or little information on them is available. Exploratory research is usually qualitative research and it helps in hypothesis testing and theory-building. Hence, in this research, it is assumed that the researcher has little or no knowledge about the problem and situation under study or the structure of the group studying. This type of research helps in studying various social phenomena like deficiencies in educational system, corruption, police atrocities and problems associated with rural poverty etc.

(b) Descriptive Social Research: Descriptive social research as the name suggests describes social institutions, social events, social systems, social structures etc. In this type of research after observing the phenomena the researcher describes the events. Census in India can be cited as an example of descriptive research. The census data tries to provide an accurate description of different characteristics of the different communities of the population of different states. Again, you must have watched pre-poll and post-poll analysis of the elections in TV. Here also you find that such analysis tries to describe the voting pattern of the electorate.

(c) Explanatory or Causal Research: This type of research tries to explain the causes of social phenomena. For example, while studying the problem of insurgency or youth unrest, explanatory research aims at finding out the causes of such problems. Hence, we can say that this

type of research aims at establishing a relationship between variables. Thus, explanatory research tries to find out the relationship between women education and the emergence of nuclear families in the society.

The social science research can be divided into the following types:

- *Pure Research*: This type of research aims at knowing more about phenomena without concerning for practical use. It also aims at developing and testing hypotheses and theories. Thus, pure research is guided by the motivation or desire of the researcher to widen the horizon of knowledge. The researcher carrying out pure research gets the intellectual satisfaction by increasing knowledge through studying the problems systematically and critically. However, such research indirectly helps in identifying the social problems and finding their solutions.
- *Applied Research*: This type of research is concerned with search for ways of using scientific knowledge for solving practical problems. Hence, it studies and analyses social and real-life problems. This type of research is called applied research since it helps in framing programmes and policies based on the theories and principles of pure research. Hence, we can say that unlike the researcher doing pure research, a researcher opting for applied research usually tries to solve the societal problems through his studies. The applied research therefore, contributes towards the improvement of situations in the society. It needs mention here that since this type of research is generally conducted on large-scale basis, it is expensive. Hence, such research is conducted with the support of some financing agencies like government, World Bank, UNICEF, UGC, ICSSR etc.
- *Quantitative Research*: It employs quantitative measurement and the use of statistical analysis. For example this method can be used to find out the percentage of working women in nuclear families. This type of research adopts sampling method and follows proper research design.
- *Qualitative Research*: This type of research is non-quantitative. It describes the phenomena as experienced by different groups, communities and individuals.
- *Comparative Research*: Comparative research tries to find out the similarities and dissimilarities between different units or communities and

social groups. For example, comparing the marriage system between the Assamese and the Bengalis, food habits of tribal and non-tribal communities, life-style of rural and urban people.

- *Longitudinal Research*: This type of research is involved in studying a phenomenon over a long period of time. For example, spread of malaria in a village of Assam for 2-3 decades.

1.8 Steps in Scientific Social Research

Scientific social research involves various steps. Let us have a look at the following diagram to know the different steps in scientific research.

Stop to Consider

Steps in Scientific Research

Definition of the problem

Review of literature

Hypotheses

Preparing design of research

Data collection, processing, analysis and interpretation

Determining whether hypothesis is true or false

Description/Inference

Conclusion of the study

Placing the report before wider academic community

As stated in the above diagram, scientific social research usually follows those steps. Hence we can say that –

- The first step in social research is defining the problem. Here researcher finds out the problem of study. Relating the topic of research to the broader social environment he defines the problem and clearly states the objectives of his study.
- Then the problem is examined in relation to the existing theories and related studies made earlier. The researcher reviews the literature relating to the problem of study and examines the previous findings. Thus, he enhances his knowledge about the problem of his research and proceeds further. It also strengthens his theoretical knowledge on that particular topic.
- In the third step, hypothesis is formulated establishing relationship between two variables based on previously accepted theoretical principles. The hypothesis formulated before carrying out the research gives direction to the researcher in proceeding in his study.
- In the fourth step, research design is formulated which determines the method and procedure to be used for collecting data. There are various methods and techniques of data collection. We shall deal with those techniques and methods in the succeeding units. Depending on the problem of study methods and techniques of data collection are adopted.
- The next step is data collection, processing analysis and interpretation using the methods depending upon the study. However, it may be necessary to adopt new methods to meet some unforeseen difficulties. After collecting the data it is classified, tabulated and compared for analyzing the data which helps in drawing conclusions.
- Analysis of data is followed by hypothesis testing. In this step it becomes clear whether hypothesis formulated before the study is true or false.
- Next step is giving the description of the whole study.
- Description of the study is followed by drawing conclusions from the study. It provides a summary and the findings of the study. By using

inductive forces/ methods predictions are also made in this step. Thus, in this step attempt is made to provide solutions to the problems taken for the study.

- In the last step, the findings of the research is placed before a wide group of people. It shows how the research has enriched our knowledge, its significance and also the practical application of the study.

1.9 Role of Theory in Scientific Social Research

Theory plays an important role in scientific social research. Theory precisely and concisely summarizes what is already known about the subject to be studied. According to Goode and Hatt, 'if theory summarises fatcs and states a general uniformity beyond the immediate observations, it also becomes a prediction of the future.' Moreover, theory clearly brings out as to what is expected out of the research and the way in which a researcher should move. Theory is applied by the researcher while formulating the hypotheses. He may generate theory in the course of the research. Moreover, there is a close relationship between the theoretical aspect and data gathering aspect of scientific research. Thus, theory is closely associated with data collection. Theory also plays important role since it finds gaps of/in study and the areas needed to be explored. The relationship between research and theory can be seen in three different aspects:

- Focusing on criteria that determine whether the given propositions constitute theory
- Making theoretical constructs operational i.e, putting statements into operation
- Testing theory.

As mentioned earlier, a theory usually interacts with facts. Therefore it is stated that theory is not merely a passive element. It plays an active role in uncovering facts. Again, new facts redefine the existing theories and replace these by new ones. These also throw new lights on the existing concepts

and present new theoretical problems. According to Goode and Hatt, 'the concepts that have been accepted as simple and obvious turn out to be elusive, vague and ill-defined when fit them to the facts……facts are much richer, more precise and definite than concept or theory.' Thus, there is a close relationship between facts and theory as they provide stimulus to the redefinition and classification of theory and even re-formulation of theory on the one hand and discovery of new facts on the other.

Check Your Progress :

1. Write a note on the aims and goals of scientific social research.
2. Discuss the types of social science research. Distinguish between pure research and applied research.
3. What are the major steps in scientific social research? Discuss briefly.
4. Examine the role of theory in scientific social research.

1.10 Summing Up

After going through this unit, you are in a position to define scientific social research. Now, it is clear to you that social science research is different from the research in natural or pure sciences since the first mainly deals with human society and human behaviour. However, efforts are being made to make social science research scientific by adopting various methods and techniques. Again, this unit has discussed normativism as well as empiricism which have given you a fair idea about how empiricism is different from normativism and their relationship with social sciences. Reading of this unit has helped you in learning the main characteristics as well as the aims of scientific social research. Besides, you have also got the idea of different types of social science research. Scientific social science research follows various steps. From the discussions in the unit you have learnt those steps of social science research. Lastly, the unit has helped you in understanding the relationship between theory and social science research.

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Unit II

Application of Science in Social Research

Contents

2.1 Introduction

Social science research basically deals with the problems of the society and therefore it studies human behaviour and human conduct. In this type of research, there is every possibility that the researcher is influenced by his biases and prejudices. Value plays important role in society. However, to make the study scientific it is necessary to obtain objectivity in the study. For that reason, various methods of social science research have been evolved.

This unit makes an attempt to discuss the role of value in social science research. It also discusses the problems in the way of achieving objectivity in social science research. Lastly, this unit gives you an idea about various methods for studying social problems scientifically.

2.2 Objectives

We have already learnt the nature of social science from the previous unit. As we know it is difficult to get accurate results in social science research since it deals with human behaviour and different problems faced by human beings in the society. Therefore, attempts have been made to remove the

difficulties faced by social science researchers by adopting certain scientific methods. After reading this unit you will be able to:

- *examine* the role of value in social science research
- *discuss* the role of objectivity in social science research
- *analyse* the methods of scientific research

2.3 Role of Value in Scientific Social Research

Before discussing the role of value in social science research you must have a clear idea about the meaning of value in social science research. You must have come across this term many times in your life. We often use the terms like value education, moral value, economic value etc. The term 'value' does not have a concrete meaning. It is an abstract generalised principle of behaviour expressed in concrete form in social norms to which the members of a group feel strong commitment (Ahuja.p: 48).

Thus, value stands for certain principles in the society which give direction to the individuals to behave as a member of the society. Values are also related to what is 'good' or 'bad' in the society. Hence, values are based on the norms of the society. From this perspective, it can be said that values are normative and varies from society to society depending upon the norms of the society.

Scientific research aims at presenting the findings without any bias and prejudices. In social science research value plays an important role since it deals with human society and human behaviour. There is every possibility that while doing research the researcher may get influenced by his prejudices and biases. Many scientific methods and techniques have been evolved to make social research scientific and value-free. According to Weber, if a researcher separates his daily life from his professional life, he can be free from biases and his research will be value free. Manheim (1977) on the other hand believes that 'value-free research is a desirable goal towards which social scientist can strive without any necessary expectation of actually attaining it. This becomes possible when the social scientist remains careful in choosing the problem of research and states what he finds, i.e, follows data wherever they lead, regardless of how much the conclusions may please or displease him or the research consumer.'

2.4 Objectivity in Scientific Social Research

We have discussed in the previous section the role of value in social science research. It is already known to us that in comparison to natural sciences, it is difficult to obtain objectivity in social science research. It is because of the fact that in social science research human behaviour and attitudes are studied and it is difficult to detach individuals from personal views, conceptions, beliefs and their emotional attachments. Moreover, a researcher as a human being is influenced by the social, political, economic conditions and environments around him. Therefore, his attitude and approach can influence his study too.

Hence, we can say that it is difficult to achieve objectivity in social science research. Let us now discuss the reasons for those difficulties.

- *Emotional Values*: Social research studies social problems. As we know society is comprised of human beings who are often guided by emotional values. These emotional values are mainly shaped by cultural factors which are deeprooted. Therefore, it is difficult to detach both the researcher and respondents from their emotional values and biases.
- *Absence of Uniformity*: In natural sciences the subject of study behaves uniformly in the same environment. However, that uniformity is difficult to find in social science. Human behaviour varies from individual to individual. Therefore, even in a similar environment, different individuals may behave differently.
- *Complex Problems*: The problems dealt with by social sciences are complex societal problems. Most of the times, quantification is very difficult as there is no method to measure social beliefs, institutions and values. Thus, because of its qualitative nature, it becomes difficult to obtain objectivity in social science research.
- *Self-Interest*: As already mentioned, research in social sciences is carried on by individuals having some prejudices and values. While opting for a particular subject of study, the researcher is guided by self-interests. So, in certain situations when the results of the research do not suit the interest of the researcher, there is every possibility that he may make some changes or manipulate the data to get the desired result. Again, the respondents may also be hesitant to give proper and true information to the researcher because of their self-interests. Thus,

self-interest of the researcher as well as the respondents may stand as an obstacle in the way of achieving objectivity in social science research.

- *Hurried Research*: Social science research deals with complex and complicated problems of the society. Moreover, some problems continue for a longer period of time. For example, a social movement may continue for decades and therefore to study that movement and draw a conclusion a researcher may need time. However, he cannot continue study for an indefinite period. In fact, he has to complete his study within a stipulated period. Therefore, the researcher is always in a hurry to finish his work and may miss certain important phases of the topic of study. In such a scenario, while drawing conclusion, there is every possibility that the researcher is guided by his intuitions and prejudices which again make it difficult to achieve objectivity.

- *Social and Moral Values*: The researcher as human being follows certain social norms and moral code of conduct. The social and moral values which are imbibed in him by his surrounding environment and family always guide his behaviour in the society. Therefore, it is difficult for the researcher to detach himself from these values to obtain objectivity and neutrality in research. Again, it is difficult for the researcher to refute the socially established values as well as moral code of conduct. Hence, when a researcher finds that his results are contradicting his values he may twist his research findings. Thus, these values stand as a barrier in the way of objectivity.

- *External Pressures and Vested Interests*: The researcher as a member of the society maintains different relationships. He may belong to different groups and communities at the same time. Sometimes it is difficult for him to refute the values of some influential persons of those groups even if they contradict his research findings. Moreover, some people with vested interests do not want any change in the society. Therefore, they discourage the findings that go against the established norms or disturb the status quo. These people having vested interests want that all research findings should meet their needs and requirements. Sometimes, the researcher may also be pressurised not to make public his findings or to manipulate the findings. Such direct or indirect external pressures also stand in the way of objectivity.

- *Customs and Prevalent Notions*: Every society has its own customs and all members of the society follow them. Violating those customs implies going against the society. For that reason, it is difficult for a researcher to violate those well-established customs. Again, like customs, there are certain prevalent notions accepted by the larger society. People following/obeying those customs and prevalent notions conform to the norms of the society. Here also, the researcher faces various problems and oppositions from different quarters if he goes against those notions. As a result, social science research tends towards adopting subjectivity instead of objectivity.

- *Prejudices and Bias*: The prejudices and biases of the researcher as a social being stand in the way of obtaining objectivity in social science research. These prejudices and biases are developed in him with the passage of time. In case of quantitative study, these biases and prejudices do not play important role. But, as social science researches very often adopt qualitative approach, here prejudices and biases of the researchers play important role.

Thus, the factors discussed above stand in the way of achieving objectivity in social science research.

SAQ :

Do you think a social science researcher can be free from emotional values, prejudices and biases? Discuss. (60 words)

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2.5 Methods of Scientific Social Research

We have already discussed in the previous unit that it is difficult to draw accurate conclusion and make generalization in social science research. It is because of the fact that social science research deals with human society replete with complex social problems and complicated human behaviour.

However, efforts have been made to make the study of social sciences scientific by evolving certain methods that help in generalizations. It must be remembered here that all these methods have their merits as well as demerits. Therefore, sometimes more than one method is applied in a study to get proper data and draw almost accurate conclusions. Now in this section let us discuss the methods of scientific social research.

- *Qualitative Method*: Most of the times in social science research it becomes necessary to adopt qualitative approach. In social science research both primary and secondary data are collected and analyzed. Then conclusions are drawn and generalizations are made on the basis of factual data. However, in social science research observation method is applied. Hence, besides collecting data with the help of questionnaire and schedule, the observation of the researcher also plays an important role in social science research. Again, mere quantification of the collected data will not lead to conclusion as in social science research, quantification and analysis of collected data may not present the real picture. Therefore, the researcher uses qualitative approach to fill the gaps in the collected data too. However, this method has some serious problems. Adoption of qualitative method may make the research subjective. The researcher while observing the phenomena may be guided by his biases and prejudices. Hence, his analysis adopting qualitative method may not be proper.

- *Quantitative Method*: This method mainly takes into account the quantitative data. Therefore it is also known as statistical method. In this method, only the data which can be quantified is collected. This method is widely used since it helps in studying social problems scientifically. Bogardus is of the view that nothing else is important but mathematics applied to human facts. Statistical tool is used both in data collection as well as tabulation of data. Adoption of quantitative method helps in obtaining objectivity in social science research. If necessary and relevant data is collected and analysed properly, almost accurate conclusions can be drawn. However, this method also suffers from limitations. Its main drawback is that it does not take into account quality of the units studied. Many social problems need to be studied with the help of qualitative approach too. These problems cannot be studied by quantitative methods. Many criticize the method as it deals with numbers only and not with causes.

STOP TO CONSIDER :

Some Other Methods of Social Science Research

- *Field Study Method*: In this method, the researcher goes to the field to investigate the problem. He contacts the people and visits the area to gather first hand knowledge of the problem he has taken up for study. Through the method of observation he collects first hand information from the field. The researcher gets the actual picture when he goes to the field. Therefore, this method helps in drawing accurate conclusions. However, the major difficulty in this method is that very few researchers want to go to the field and collect data. Many times, in studying social problems like riots and communal violence, it is difficult for the researcher to go to the field and collect data even if the researcher is willing to go to the field. Thus, field work becomes difficult when the field is not conducive for work. Moreover, the researchers may have to face various problems to carry out field investigation in unhygienic condition, deserts or jungles. They may even face various threats from different groups while collecting first hand information if the subject of study contradicts their interests.
- *Library Method:* This method was earlier considered as secondary method of research. With the help of this method the researcher gets an idea about the researches done earlier on that subject. It further gives suggestions and directions to the researcher about the work to be done on that very subject. Moreover, this method also helps in formulating theoretical framework on the basis of available theories which can either be refuted or accepted. The major drawback associated with this method is that it cannot suggest new area of study. It simply gives information about the existing studies and hence the researcher can analyses and interprete the already studied subjects only.

- *Experimental Method*: This method helps in studying the subject in a controlled situation. We are aware of the fact that since social sciences deal with the problems of society and human behaviour, it is difficult to use experimental method in social science research. This method is widely used in natural science where experiments can be conducted in laboratory too keeping the subject of study under control. But, in case of social science research the researcher cannot control the human conduct and behaviour. However, in certain cases experiments are carried out in social science research too. A researcher may take up a subject that is the result of a particular situation and study that which is not possible otherwise. Therefore, in limited number of cases this method is applied in social science research too. Since study is done in a particular situation,

this type of research can give proper idea of that situation and make the study scientific.

- *Survey Method*: This method is one of the widely used methods in social science research. In this method, the researcher goes to the field to conduct a survey relating to his subject of study. On the basis of survey to collect the necessary data from the field, the researcher can draw conclusions. As opposed to experimental method, in this method the situation of study need not be controlled. Therefore, it is easier to adopt survey method to the study of the social problems and phenomena in social science research.

- *Case*-Study Method: In this method usually one case study is undertaken for study. The aim of the researcher opting for this method is to make a comprehensive and indepth study of the problem in all its entirety. According to Young the 'case study method may be defined as an all-inclusive and intensive study of an individual in which the investigator brings to bear all his skill and methods, or as a systematic gathering of enough information about a person to pursue one to understand how he or she functions as a unit of society'. With the help of this method a particular case or social problem can be studied scientifically. However, this method too has certain limitations. The major drawback of this method is that it is difficult to collect some information from the case under study if the information sough for is confidential in nature. The respondent may not feel comfortable to share certain information if he thinks that it may cause problems for him in near future. If the information collected about the case is not correct then the whole study becomes futile.

- *Questionnaire Method*: For studying social problems, the method of questionnaire is widely adopted by the researchers. In this method, a questionnaire having a set of questions is prepared by the researcher asking for information regarding the subject of research. Hence, the questionnaire is prepared in such a way that all aspects of the problem under study are covered in the questionnaire. These questionnaires are sent to respondents who are expected to fill them up. However, this method is also not free from defects. Sometimes questions in the questionnaire may be put in an ambiguous way which creates confusions for the respondents. Secondly, if the respondents do not take the

questionnaire seriously, proper information cannot be obtained. Moreover, it may take more time than expected as the respondents may delay in answering the questionnaire. Nevertheless it must be remembered that the questionnaire method is widely adopted in social science research.

- *Schedule Method*: In this method, like questionnaire method, a set of questions are prepared seeking information regarding the subject of study. This method is also one of the widely adopted methods. The basic difference between questionnaire method and schedule method is that while in the case of the former method, the researcher/investigator sends the questionnaire to the respondents and it is filled up in his absence; in schedule method, the researcher/investigator himself is present in collecting the data from the respondents and personally makes the entries. The major drawback associated with this method of research is that the biases and prejudices of the researcher may influence him in filling up the questionnaire. In such situation, the research tends to be more subjective and losses its objectivity.

- *Interview Method*: In this method the researcher personally interviews the respondents seeking information on the subject of research. Hence the data collected with the help of this method is believed to be reliable and valid. Since the researcher himself is present in the interview it is possible for him to ask some probing questions and observe the situation and the mood of the respondent while replying to those questions. F. W. Kerlinger is of the opinion that the interview method is perhaps the most ubiquitous method of obtaining information from the people'. On the other hand Goode and Hatt are of the view that interviewing has become important in contemporary research because of reassessment of qualitative research. Thus, this method gives the opportunity to the researcher to observe the situation and verify the facts while taking the interview itself. It helps him in drawing proper conclusion. However, the drawback of this method is that if the researcher cannot establish rapport with the respondent it is difficult for him to collect the required information. Sometimes, the respondent may not take the researcher in confidence and may be hesitant to give correct information. Again, the respondent may not have time to sit for an interview and therefore he may prefer to send the answers in writing. This also creates problems for the researcher adopting interview method.

- *Empirical Method*: In empirical method, social problem is studied with reference to facts and efforts. Hence, efforts are made to find out the factual social order. In this method emphasis is put on the proper formulation of the problem of study as well as the hypotheses. Since, in this method empirical data is collected from the field, the investigator observes the phenomena or event either by direct or indirect participation. The researcher goes to the field and collects the data by adopting observation or interview or schedule method. Thus, the subject of study is empirically investigated in this method.

- *Evolutionary Method:* This method systematically studies the history of the problem undertaken for study. It also takes into account the background factors. This method is based on the presumption that origin of different social events is more or less similar and therefore it is possible to study these events in a systematic manner. Whatever changes are there they take place because of the situations and circumstances. Therefore, under similar circumstances differences may disappear. This method also assumes that if evolution of institutions can be systematically studied many social problems can be successfully analysed and solution can be found.

- *Comparative Method:* This method makes an attempt to compare growth, evolution, functioning as well as the problems of similar institutions of different societies as well as within the same society. After such comparison it becomes possible to find out the differences in the institutions and causes for the emergence of those differences. With the help of this type of method one gets the picture why same institution contributed to the growth of social institutions in one area whereas it failed in other parts of the country. Comparative method is adopted in social research to identify the problems of different societies and the extent to which these are conducive to the growth of certain institutions or not.

- *Analytical Method:* Durkheim and Simmel first applied this method for studying social problems. While adopting this method it is presumed that certain ideals exist in the society and the duty of the researcher is to strengthen the presumption and disprove that. While studying the social problem, the researcher also studies the cause and effects of social events. This method is criticized on the ground that the social ideals are not uniform throughout the society and vary from society to society. Therefore, for the similar problems two researchers may find two different

sets of causes and effects in different societies. Moreover, it is not easy to analyse the cause and effect relationship of every social problem because of their complexities. Again, it is difficult to isolate social causes and effects apart from political, economic or cultural effects since one factor is closely related to the other.

- *Sample Method:* Sampling method is widely used in social science research. Sampling method makes research easier for the researcher as it allows the researcher to take a smaller unit of the whole population. This method reduces the time and cost of research.
- *Verstehen Method:* This method tries to understand real meaning behind each information provided to the researcher. This method is based on the assumption that in society, our actions have some underlying implications or hidden meanings and objectives. Unless these are properly and reasonably followed and understood it is difficult to arrive at correct conclusions. Therefore, it is believed that through this method social problems can be properly analysed. However, it is not always possible to know the motive behind the actions of the individuals. Therefore, all social problems cannot be studied with the help of this method.
- *Inter-disciplinary Research Method:* In the present time it is observed that it is difficult to study a social problem isolating it from other areas. Hence, no study is all- exclusive. There are close connections among different problems of the society. For a meaningful research it is necessary to have a comprehensive approach to the problem combining different disciplines together.

Check Your Progress

1. Discuss briefly the role of values in scientific social research.
2. What is objectivity? Discuss the factors that stand in the way of obtaining objectivity.
3. Discuss critically different methods of scientific social research.
4. What is qualitative method? How is it different from quantitative method?
5. Discuss the importance of questionnaire, schedule, case- study and analytical method in scientific social research.

2.6 Summing Up

After reading this unit you are now in a position to discuss the role of value in social research. For a scientific study, it is essential to obtain objectivity in the research. However, since social research discusses complex social problems and the researcher himself is a social being influenced and guided by the social customs and norms, it is difficult to obtain objectivity in this type of research. From this unit you have learnt the obstacles in the way of obtaining objectivity. Lastly, from this unit you have got a fair idea about various methods of social research which help in conducting the research scientifically.

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BLOCK II

Planning For Research: Hypothesis, Research Design, Sampling, Data Collection, Data Processing, Data Analysis and Data Interpretation

Unit I : Planning For Research: Hypothesis and Research Design

Unit II : Sampling and Data Collection

Unit III : Data Processing, Data Analysis and Data Interpretation

Unit 1

Planning For Research: Hypothesis and Research Design

Contents

1.1 Introduction

The research plan is generally framed in the early stage of the research. It is important as it explains the 'what' and 'how' of the research. There are certain important elements of a good research plan. These include important definitions, a literature review, conceptual frameworks, the research questions, hypothesis, research design etc. Hypothesis is a proposal to accept something as true. Research design implies drawing an outline before conducting actual research.

Here in this unit, we are going to discuss the meaning and definitions of hypothesis along with its characteristics and sources. This unit also deals

with the functions and types of hypothesis. Hypothesis mainly helps in guiding the researcher by establishing a tentative relationship between variables. Here an attempt is made to discuss the plan for research design along with its functions and phases, and research design for various types of research.

1.2 Objectives

Hypothesis and research design are important parts of a research plan. Hypothesis guides the researcher to chalk out the research design. After reading this unit you will be able to

- *discuss* the meaning of hypothesis and research design
- *analyse* the functions of hypothesis and research design
- *explain* the various types of hypotheses
- *discuss* the procedure of hypothesis testing
- *explain* the features of good research design
- *describe* the major phases in research design
- *analyse* designs for different types of research

1.3 Meaning and Definitions of Hypothesis

In social research, the investigators start with some assumptions and presumptions. The consequent study may prove or disapprove these assumptions. The assumption about the relation between variables is called hypothesis. It is a tentative explanation of research problem. It also helps the researcher to guess the research outcome and develop a general idea about the research problem before starting the research. It has already been mentioned above that hypothesis is a proposal to accept something as true. It may prove to be correct or incorrect. Hypothesis is always tentative. For example, if there is a price hike, we suppose that the merchants are hoarding the article. Hence, we can say that we formulate hypothesis in every sphere of life though we are not aware of it. Webster Dictionary defines hypothesis as a tentative assumption made in order to draw out and test its logical or empirical consequences. Now let us discuss some definitions of hypothesis-

- Theodorson and Theodorson- A hypothesis is a tentative statement asserting a relationship between certain facts.
- Kerlinger- Hypothesis is a conjectural statement of the relationship between two or more variables.
- Black and Champion- Hypothesis is a tentative statement about something, the validity of which is usually unknown.
- Rummel and Balline- Hypothesis is a statement capable of being tested and thereby verified or rejected.
- Good and Scates- A hypothesis is a shrewd guess or inference that is formulated and provisionally adopted to explain observed facts or conditions and to guide in further investigation.

From the above definitions, it can be said that hypothesis should be specific and precise. There should not be any contradictory statement in a hypothesis. Hypothesis can never be constructed or formulated in the form of a question. It can be formed either in descriptive or in relational form. Again, the correct or incorrectness of the hypothesis must be empirically testable. The hypothesis should describe one issue only. In simple words, hypothesis implies the testing of a stated relationship. In this context we can cite the examples of some of the hypotheses. These are-

- Hostelers use more alcohol than non- hostelers.
- Suicide rates vary inversely with social integration.
- Economic instability hampers development of an establishment.
- Aggression is caused due to frustration.
- Group study increases higher division achievement.

1.3.1 Characteristic of Hypothesis

You have already learnt that hypothesis is an assumption which states a relationship between variables. In the previous section we have discussed the meaning of hypothesis. Now in this section, let us discuss the various characteristics of hypothesis. These are as follows-

1. Clarity and precision are the first characteristic of a good hypothesis. The conclusion drawn from a hypothesis which is not clear and precise cannot be taken as reliable.

2. Testability is another characteristic of a good hypothesis. To make a hypothesis testable, the researcher may conduct a prior study.
3. A relational hypothesis always needs to state a relationship between variables.
4. A good hypothesis must be limited in scope. It must also be specific in nature so that it can be tested easily. The hypothesis should not be vague and general.
5. Simplicity is another feature of a good hypothesis. Hypothesis should be stated in simple terms so that everybody can understand it. The terms which are used in hypothesis must be commonly accepted terms. It should not be the creation of the researcher. Even if the researcher uses new terms in the hypothesis, the meaning and definition of these new terms should be made clear. But you should remember that there is no relation between simplicity and significance of hypothesis.
6. A good hypothesis generally does not go against established facts. It is consistent with the most known facts so that the judges accept it as being the most likely.
7. Time factor also plays an important role in formulating hypothesis. A hypothesis cannot be called a good hypothesis if it requires lifetime to be tested. The important feature of a good hypothesis is that it must be tested within a reasonable time period.
8. A good hypothesis must not be absurd. It shall be conceivable.

STOP TO CONSIDER :

Origin of the Formulation of Hypothesis

There are various factors responsible for the identification of hypothesis. The factors include changes in socio economic relation, human behavior, values and attitudes. Hypothesis mostly incorporates past knowledge and therefore it is not a new creation.

The origin of hypothesis generally depends on the imagination of the investigator. But in some cases it may develop due to meticulous work of the investigator. There are three foundations of forming hypothesis-

- investigator's knowledge
- painstaking work
- both

1.3.2 Sources of Hypothesis

It has already been mentioned above that hypothesis is an assumption. Hypothesis prevents a blind research and saves time. There are various sources which help in formulating a hypothesis. These sources may vary from personal experience to cultural values. Let us now discuss the sources of hypothesis in brief-

1. *Cultural Values of Society*- The cultural values also helps in formulating hypothesis. To elaborate we can cite the example of a comparative assessment of Indian and American culture. The American culture promotes the value of individualism, mobility, competition and equality. On the other hand, the Indian culture gives more emphasis on the value of collectivism and traditionalism. Therefore, it is possible to form a hypothesis like- in India, unlike America, divorce is used as the last resort by a woman as dissolution of marriage is considered to be against the traditional value of Indian society.

2. *Past Research*- Past research also inspires hypothesis. For instance, if a researcher wants to study something about student unrest, he or she may take help of previous research experiences. If the previous research experience has proved that students with high ability and social status do not take part in student agitation, he or she may further develop the hypothesis on the basis of these fats.

3. *Discussion and Conversation*- Observation during the time of discussion or casual conversation helps in throwing light on various issues and events and in formulating hypothesis.

4. *Personal Experience*- The daily life of the researcher also provides some evidence of behaviour pattern and is helpful while formulating hypothesis. Sometimes, the researcher inducts a hypothesis by enumerating simple facts. They take common experiences or their personal experience to start the investigation and to formulate the hypothesis. In this context, we can take these examples. When water is heated in an open container, it evaporates. Again, if one observes a large number of scarlet flowers which do not have fragrance, he or she may formulate the hypothesis that 'scarlet flowers are devoid of fragrances'.

5. *Intuition*- Sometime the researcher may get an inner feeling about the interrelation of various phenomena. This suspicion influences him to formulate the hypothesis. The researcher finally conducts the study to see whether his/ her suspicion are correct or not. For example, a person living in a hostel develop the feeling that if there is not enough control, it may lead to deviant behaviour. Therefore he formulates the hypothesis 'lack of control leads to deviant behaviour and studies hostel sub culture.

6. *Analogy*- In some cases, analogy also influences hypothesis formulation. For example, the similarity between earth and Mars may lead to the hypothesis that mars also may be inhabited. '

7. *Method of Experiment*- In cases where two phenomena are confirmed in number of instances, we formulate a hypothesis that there must be some relation between these two phenomena. In this context we can cite one example. After witnessing a large number of instances where the female anopheles mosquitoes bite healthy persons belonging to different age group, profession, places and they suffer from malaria; we may formulate the hypothesis that the female anopheles carries malaria bacilli.

8. *Method of Concomitant Variation*- This is another source of hypothesis. When we find that there are two phenomena which vary constantly while other factors remaining the same, we draw a hypothesis that there must be some causal connection between these two variables. For instance, if we see that greater number of wine shop in a locality leads to greater number of crimes, we may form a hypothesis explaining the relationship between drunkenness and criminality.

9. *Methods of Residue*- In this method, when the major part of a complex phenomenon is explained by a known cause we establish a relationship between the residues.

Check Your Progress :

1. What do you mean by hypothesis?
2. What are the characteristics of good hypothesis?
3. Discuss 'personal experiences' as a source of hypothesis?

1.4 Functions of Hypothesis

Hypothesis helps in knowing the scope of the study. It is useful in determining the nature of data to be collected. More stress is laid on formulating the hypothesis rather than testing it.

According to Sarantakos, there are three most important functions of a hypothesis. These are as follows-

1. It directs the structure and operation of research and thereby guides the social research.
2. Research questions are temporarily answered by a hypothesis.
3. It facilitates statistical analysis of variables in the context of hypothesis testing.

Some other functions of hypothesis can be listed as follows-

1. Hypothesis leads to theory or they are derived from theory. Therefore it acts as an important tool of scientific enquiry or research. Hypothesis expresses a relationship which guides the researcher in conducting enquiry. It also tells the researcher the types of data need to be collected and the procedure of analyzing the data.
2. It is not possible to test the questions. Therefore hypothesis is required so that the relationship between two variables can be tested.
3. In some cases hypothesis leads to establishment of new theories.

1.5 Types of Hypothesis

You have already learnt that hypothesis states a relationship between variables. It is a predictive statement capable of being tested. There are various types of hypothesis. These are as follows-

- Working hypothesis- It is the preliminary assumption of the researcher about the research topic, particularly when sufficient information is not available to establish a hypothesis, and it is also used as a step towards formulating the final research hypothesis. The main function of a working hypothesis includes designing the final research plan; placing the research problem in its right context and reducing the research topic to an acceptable size. It acts as a basis for further research. For example, a researcher in the field of business

administration may initially formulate a working hypothesis like 'assuring bonus increases the sale of a commodity'. But later on, after collecting some preliminary data on the topic, the researcher may formulate a research hypothesis like 'assuring lucrative bonus increases the sale of a commodity'.

- Scientific hypothesis- When the hypothesis is derived from sufficient theoretical and empirical data it is called scientific hypothesis.
- Alternative hypothesis- In alternative hypothesis there is a set of two hypotheses i. e. research hypothesis and null hypothesis. Here acceptance of null hypothesis implies the rejection of alternative hypothesis and vice versa.
- Research hypothesis- When the researcher proposes some social facts believing it to be true without referring to its particular attributes it is called research hypothesis. Research hypothesis may be derived from theories. Again it can also lead to development of new theories.
- Null hypothesis- Null hypothesis implies a hypothesis of no relationship. It is the reverse of research hypothesis. Null hypothesis do not exists in reality. It is used only to test research hypotheses.
- Statistical hypothesis- When the researcher seeks to support or refute something about statistical population, then the statement/ observation of the researcher is known as statistical hypothesis. Here to make the decisions, the things are reduced to numerical quantities and decisions are made.

SAQ :

Do you think scientific hypothesis is better than working hypothesis? Give reasons. (50 words)

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1.6 Procedure for Hypothesis Testing

The validity of a fact or knowledge determines its acceptability. Testing of hypothesis simply refers to scrutiny of the hypotheses to know if they are

supported or rejected by the collected data. You should remember here that there are two types of error in hypothesis testing. Error I is the rejection of hypothesis which should have been accepted and error II refers to the acceptance of hypothesis which should have been rejected.

The following procedure must be followed for hypothesis testing–

1. *Making a Formal Statement*- The hypothesis should be clearly stated. There should be a formal statement of null hypothesis as well as alternative hypothesis.
2. *Significance Level*- The researcher has to select a significance level which is usually 5% level or 1% level.
3. *Distribution to Use*- In the next step the researcher needs to decide the appropriate distribution to be used.
4. *Selecting Random Sample*- The next step is drawing a sample to furnish empirical data.
5. *Calculation of Probability*- one has to calculate the probability in the next step. It calculates that the sample results would diverge widely.
6. *Comparing the Probability*- It is the last stage of hypothesis testing. In this stage probability is compared with the specified significance level.

After going through the procedures of hypothesis testing, you should remember here that a hypothesis is never proved. It is merely sustained or rejected.

Now let us discuss another part of research plan i.e. research design.

Check Your Progress :

1. Explain the functions of hypothesis.
2. Write a short note on null and alternative hypothesis.
3. What is the difference between type I and type II error?

1.7 Meaning of Research Design

Research design stands for drawing an outline for conducting or carrying out the actual research before proceeding in research. Hence research design

means the planning that a researcher does before conducting the research regarding what is to be observed, how it is to be observed and recorded, how to analyze and interpret the observations and lastly to make conclusions. Therefore, defective research design leads to wrong conclusions.

According to Henry Manheim (1977), research design not only anticipates and specifies the seemingly countless decisions connected with carrying out data collection, processing and analysis but it also presents a logical basis for these decisions.

Martin Blumer (1974) is of the view that research design is the specification of the problem, conceptual definitions, derivations of hypotheses to test, and defining of population to be studied. On the other hand, William Zikmund (1988) has defined research design as a master plan specifying the methods and procedures for collecting and analyzing the needed information.

According to F. N. Kerlinger, design helps the investigator obtain answers to the questions of research and also helps him to control the experimental, extraneous and error variances of the particular research problem under study.

In a nutshell it can be said that research design refers to the procedures for the collection of data and its analysis. It helps the researcher to find the answers to the research questions objectively and economically.

1.8 Functions of Research Design

As we have already learnt, the research design is planned before carrying out the actual research and its main function is to provide direction to research. According to Black and Champion (1976), three important functions of research design are as follows:

- Research design functions as a blueprint for the research. It provides the direction to the researcher to proceed further. By addressing the problems the researcher may face in different phases of research it makes the research easier for him. Thus research design suggests direction for observation.
- It restricts the boundaries of research activities. Research design gives direction to research and consequently defines the boundaries of research by specifying the subject of study. By formulating the research

design the researcher gets the idea about what is to be examined and what hypotheses is to be tested etc. Thus, it helps in the systematic investigation as well as study.

- The researcher can anticipate the problem he may face in carrying out the research beforehand by formulating the research design. It helps him in estimating the number of investigators for research, cost and time of research etc.
- Since the phases in research design follow a logical sequence, it prepares the researcher for the successive stages.

From the above discussion, it is clear to us that a research design gives directions and sets goals for the researchers. Thus it helps the researcher to conduct the study in systematic and organized way. It helps in the co-ordination of different phases of research. Moreover, it saves time and money as it provides direction to use the resources in a very effective and systematic way. Thus we find that a research design has the following advantages or merits –

- Research design helps in conducting the research in a scientific way in the right direction as it gives precise guidelines to the researcher.
- Since the researcher can proceed in a systematic way with the help of a research design, it reduces inaccuracies and saves both time and money.
- Research design helps in drawing almost accurate conclusions by adopting proper methods and techniques of data collection.

Because of the above mentioned advantages of research design, a researcher frames it before conducting the research.

1.9 Features of Good Research Design

We have already learnt that research design helps the researcher in following the right direction. However, it needs mention that a research design is more successful if it incorporates more than one method of data collection. This type of research may increase the cost and time of research, but helps in drawing accurate conclusions. This is because no single method is perfect by itself and therefore, adoption of more than one method may help in collecting reliable data. Therefore, for preparing a good research design, the researcher should take into consideration the following points—

(a) The researcher should have the clear idea about the time required for data collection. Moreover, a good research design should also give direction to the researcher whether data need to be collected at one time or there has to be time gap between various stages of data collection.

(b) The researcher should be aware of different research situations like individuals, groups, communities, organizations etc. This helps the researcher to know about the inter-relationships between different situations and whether they need to be compared with each other or not. As a result of such awareness, the researcher can prepare a good research design.

(c) Moreover, a researcher should have a fair idea whether the study involves the change or not. Sometimes, the topic of study may undergo some changes because of changing scenario. In that case the research design should be prepared in such a way that it can provide the necessary direction to the researcher whether he/she needs to take up the study before the changes were made or after that.

(d) While preparing the research design the researcher should have a clear idea whether the research involves any comparison or not. If the study involves comparisons, then data is to be collected from two different situations and then it is to be designed in a different way.

(e) While framing the research design the researcher should take into consideration whether the research is descriptive, explanatory, and pure or applied. The research design varies depending on the type of research.

So, here we can say that for preparing a good research design a researcher has to take into consideration the above mentioned criteria.

SAQ :

How far research design can help in obtaining objectivity in social science research? Discuss. (60 words)

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1.10 Major Phases in Research Design

Research design helps in carrying out the research systematically. For systematic study of the problem a researcher divides his study in different phases while formulating the research design. Let us discuss the major phases or steps in research design in this section.

- *Specifying the problem to be studied*: first the researcher has to identify the problem to be studied on the basis of interest. The problem has to be defined by the researcher.
- *Stating the objectives*: the researcher has to state the objectives of the research in the second phase. The objectives of the research depend on the type of research. Objectives help the researcher to collect necessary information.
- *Specifying concepts and variables*: the concepts used in the research and the variables have to be specified in this step. For example, in a study made on youth unrest and violence, various concepts like youth, violence, unrest are to be defined and then different variables like, family background, education, peer groups etc concerning that problem have to be identified.
- *Framing hypotheses*: hypotheses give research the required direction and make the objectives of the study clear. Formulation of hypotheses which establishes a relationship between two variables helps the researcher to collect required data for the study. Therefore, while preparing the research design, the researcher frames the hypotheses for the study too. In the later sections of this unit we shall discuss about hypotheses in detail.
- *Sampling*: sampling suggests the researcher whom to study and how many to study. Most of the time it is not possible to study the whole universe because of many constraints. Therefore, sampling is done by the researcher considering the total population and level of significance.
- *Collection of data*: research design clearly specifies the methods and procedures for collecting data. Selections of those methods depend upon the goal of research as well as nature of variables.

Thus, depending on the study, the researcher may adopt survey method, questionnaire or schedule method, experimental method or content analysis. The primary data may be collected through the methods of questionnaire, schedule, observation or interview and sometimes by using two or more methods simultaneously. On the other hand, the secondary data may be collected from government records, newspapers, journals, books etc. We shall discuss these methods in detail in the successive units.

- *Analyzing the data and report writing*: it includes editing, coding, processing and tabulating the collected data. After collecting data the researcher has to edit the data to separate the unnecessary and irrelevant data from the relevant data. Then coding is done which helps in categorization and tabulation. Data required for quantitative and qualitative analysis is processed. Then data is analysed to test the hypotheses and draw conclusions. At last a report of the study is prepared.

STOP TO CONSIDER :

Pilot Study

A pilot study may be defined as a rehearsal of the main study. It is done at small-scale level to test the methods and techniques of data collection as well as the organizational problems relating to the whole study. The chief purposes of pilot study as pointed out by Sarantakos (1998) and Oppenheim (1992) are –

- To estimate the cost and duration of the main study and test the effectiveness of its organization
- To test the suitability of research methods and research tools
- To examine the adequacy of the sampling frame
- To have an estimate of the level of response
- To determine the homogeneity of survey population
- To make the researcher/investigators aware of the research environment
- To examine the respondents' response to the data collection methods.

A pilot study is designed taking into consideration various factors like availability of resources, nature of the study, type of methodology, nature of population, size of sample etc. Usually, the pilot studies are employed in quantitative studies and not in qualitative studies.

1.11 Design for Different Types of Research

It has been mentioned already that the research design varies with the type of study or the nature of research. There are certain differences in designing qualitative and quantitative research. The major differences are —

(a) In the quantitative research, the problem is very precise while in the qualitative research it is loosely structured.

(b) In the quantitative research hypotheses are framed before the study while in qualitative they are framed during the study.

(c) In the quantitative research sampling is planned before data collection, while in the qualitative research it is done during data collection.

(d) In the quantitative research all types of measurement scales are employed but in the qualitative research only nominal scales are applied.

Moreover, designs for descriptive, explanatory and exploratory researches are also different. Let us now examine the designs for descriptive, explanatory and exploratory researches.

- Descriptive research usually describes the events, phenomena and situations on the basis of scientific observations. If in descriptive research, the data is collected in a single situation within a single time period, it is known as one-cell design. If data is collected in single situation in two periods, it is known as longitudinal design or two-cells design. If the study covers three times it is called three-cells design. Again, if the study is made in two situations and in two times it is known as four-cell design.

- Explanatory research is known as causal research as it finds out the causes behind some events or phenomenon. In explanatory research different types of designs can be adopted like two-cell design, four-cell design and matching design etc.

- Exploratory research is carried out when there is absence of sufficient information about the subject of study. Exploratory research can be qualitative too. Therefore, design has to be formulated taking into consideration the type of study.

Manheim (1977) and Black and Champion (1976) have pointed out the following types of research design.

(a) *Survey Research Design*: survey research design has been defined as the 'procedure for gathering information about a large number of people by collecting information from few of them' (Black and Champion 1976). Survey research is concerned with four goals of research, viz, description, exploration, explanation and experimentation. Usually, the importance of survey research design depends on sampling. Hence we can say that it mainly depends on the number of people chosen for the study, their representative character and reliability of information given by them. Survey research design is adopted for advantages like low cost, possibility of accurate generalizations, flexibility in data collection, exploring new facts and verifying theories.

(b) *Case study design*: this design allows the researcher to study individual cases taking longer period of time and applying a number of methods of data collection. This design contains these steps—— *firstly*, an overview of the whole case-study project that includes the aim of study, the case to be studied, characteristics of the units to be studied etc. *Secondly*, field procedure that includes choosing the case or cases for the study, getting access to the units of study, selecting communication pattern etc. *Thirdly*, preparing questions that are to be dealt with by the study. *Fourthly*, determining elements like style, format etc.

(c) *Experimental research design*: in this design some of the variables are studied in controlled conditions. Therefore, the design for experimental research consists of two types of groups i). control group, which is not exposed to experimental variable and ii). Group which is exposed to experimental variable.

Check Your Progress :

1. What do you mean by research design? Discuss the major functions of research design.
2. Examine the features of good research design.
3. Discuss briefly the major phases of research design.
4. Examine the research designs of different types of research.

1.12 Summing Up

After reading this unit now you are in a position to understand the meaning of hypothesis and research design. Hypothesis implies a possibility, a supposition or an assumption. Research design implies chalking out the research plan. This unit has also helped you in analyzing the functions and types of hypothesis and research design. While hypothesis gives a general idea about the problem before starting the research, research design guides the researcher to conduct the study in systematic and organized way. The various types of hypothesis include working hypothesis, scientific hypothesis, alternative hypothesis, research hypothesis, null hypothesis and statistical hypothesis. This unit also helped you in understanding the procedure of hypothesis testing. You are now in a position to explain the features of good research design, major phases in research design and designs for different types of research like descriptive, explanatory, exploratory etc.

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Unit 2

Sampling and Data Collection

Contents

2.1 Introduction

In the previous unit you have learnt the various types of research design. Sampling and data collection is an important part of research. A sample is a subset of population which is selected to estimate the behaviour and characteristics of the population. Sample represents its parent population. In the sampling process the researcher draws a sample from a larger population and when the result is produced it is generalized for that larger population. These samples are used in gathering relevant data. Data

collection refers to the process of collecting information necessary for research.

Here in this unit we shall discuss the sampling procedure as well as types of sampling designing i. e. probability sampling and non- probability sampling. While probability sampling is representative in nature, non- probability sampling is non- representative in character. We shall also discuss the techniques of data collection. While conducting research data is collected from the selected samples and here our attempt is to discuss the techniques of data collection which include questionnaire, schedule, interview, observation, case study and content analysis.

2.2 Objectives

It has already been mentioned that sampling and data collection are two of the most important part of research design. After reading this unit, you will be able to

- *understand* the meaning of sampling
- *describe* the types of sampling
- *discuss* the meaning of data collection
- *explain* the various techniques of data collection

2.3 Meaning of Sampling

In the sampling process, a small part of a large bulk is taken to represent the whole. For example while buying a packet of rice, a small quantity of rice is taken and on the basis of this sample, the buyer confirms the quality of the product. In a research survey, when the population to be surveyed is too large and is not easily accessible, the researcher opts for a sample. A sample is a portion of population drawn from the larger population having the same characteristic of the population from which it is drawn. Manheim describes a sample as a part of the population which is studied in order to make inference about the whole population. According to Gay (2003) sampling is a process in which number of individuals are selected for a study in such a way that the larger group from which these individuals are selected is represented by them.

You should learn here that sample design refers to the absolute plan for obtaining a sample from the given population. Sample design is the technique which is used by the researcher to select items for the sample. Sampling design assumes that though the social phenomena are different and complex in nature, yet they share some common characteristics which make sampling possible. Some steps are followed in sampling design. These are as follows-

1. ***Outlining the Universe***- The first step is to delineate the set of objects to be studied. The objects or the universe may be finite or infinite. The finite objects are certain. For example the number of workers in a factory, number of dealers of a company etc. The infinite objects are uncertain in nature. For example. stars in the sky, TV viewers etc.
2. ***Defining Sample Units***- It is the second step and here the researcher needs to identify the sampling unit of the universe which may be based on geographical basis like state, village etc. Again, it may be a construction unit like, house, flat etc. or a social unit like family, club, school etc.
3. ***Sampling Frame***- After defining sampling units, the researcher prepares a source list covering all the samples in the sampling frame. It contains the name of all items of a universe. But it has to be finite universe.
4. ***Size of Sample***- Fixing the number of sample to be drawn from the universe is another important step in sampling design. The size may be 10% or 20% of the universe. The sample size should be neither too large nor too small but optimum which can fulfill the requirements of efficiency, representativeness, reliability and flexibleness.
5. ***Cost Consciousness***- While drawing the sample size from the universe, the researcher must take into account the budgetary constraints.

STOP TO CONSIDER :

Purpose and Principles of Sampling

According to Sarantakos, there are some purposes and principles of sampling. The purposes and principles of sampling are-

1. When the population to be studied is too large and scattered it is not possible to study the whole population.

2. As sample deals with a small number of population, generally it offers a high degree of accuracy.

3. Sampling helps in achieving valid and comparable results within a short span of time.

4. Small numbers of investigators are required in sampling process.

5. It is cost effective because a small population is involved.

6. The researcher should adopt a systematic and objective manner in choosing the sample units.

7. The researcher should clearly define the sample units.

8. The sample units must be independent of each other.

9. All through the study the researcher must use the same units of sample.

10. The researcher should select the samples on the basis of sound criteria. He/she should avoid errors, bias and distortions.

2.3.1 Key Terms in Sampling

In order to understand the process of sampling, we need to understand some key concepts related to this process. These are as follows-

1. ***Universe or Population***- The sum total of all the units needs to be studied is called universe or population.
2. ***Sample***- It is the portion of total population and represents the characteristics of the universe.
3. ***Sampling Element***- Sampling element refers to each unit from the population about which information is collected.
4. ***Sampling Unit***- Sampling units are taken from samples. It may either be a single member or collection of members subject to data analysis.
5. ***Sampling Frame***- Sampling frame is the complete list of all units/elements from which the sample is drawn. For example. The list of students of all classes in a college.
6. ***Target Population***- Target population is one to which the researcher would like to generalize his results. Here the criteria for inclusion of

cases are determined. For example. In a village all the population may not be voters. Some may be below 18 years, some may not be registered as voters and some may be mentally challenged. In this case, the target population would be the registered voters only. Geographic boundary and a distinctive timeframe are the two most important characteristics that define target population.

7. ***Sampling Trait-*** The basis on which the researcher takes out the sample from the total universe is known as sampling trait. The sampling trait may be either qualitative or quantitative. For example. Age, gender, residence etc.

8. ***Sampling Fraction-*** The proportion of the total population which needs to be included in the sample is known as sampling fraction. If from the total universe of 2200 women, the researcher selects 300 women as sample than the sampling fraction will be one seventh of the total universe.

9. ***Sample Estimate-*** It is an estimate from a sample value of what the value would be in the total population from which the sample is drawn. For example. In a college of 1200 students a sample of 300 students is drawn. The average age of students in this sample is 19.1 years. In the total population it would be 19.6 years.

10. ***Biased Sample-*** When in a sample, some elements are represented widely than the other elements it is called biased sample. Here some members are less likely to be included.

11. ***Parameters-*** Parameters are the characteristics of a population.

12. ***Sampling Error-*** The difference between the total population value and the sampling value is known as sampling error. The sampling error tends to be greater when the sample is smaller. On the opposite, the sampling error is less when the sample is large.

Check Your Progress :

1. What are the steps followed in sampling design?
2. What do you mean by sampling trait?
3. Define sampling error.

2.4 Types of Sampling

You have already learnt that sample designing process is a process through which samples are drawn from universe for research. There are two main factors which influence the process of determining the types of sample design. These are- the element selection technique basis and representation basis. In element selection basis there may be two types of sampling- unrestricted sampling and restricted sampling. Unrestricted sampling refers to the process of drawing sample elements individually from the population at large. All the other types come under restricted sampling. In representation basis sampling method can be broadly divided into two categories viz. probability sampling and non- probability sampling. While probability sampling is random sampling, non – probability sampling is related to non- random sampling. Now let us discuss probability and non- probability sampling-

2.4.1 Probability Sampling

In a sampling where every unit of the population has the probability of being selected for the sample is known as probability sampling. In this type, the apprehension of human bias in picking units from population is completely eliminated. It needs mention here that the probability sampling is mostly used in social science research or business research where large representative sample is needed. There are certain conditions which need to be fulfilled in case of a probability sample. These are- complete lists of subjects to be studied is available, size of the universe must be known, desired sample size must be specified and each element must have an equal chance of being selected. The following are the various forms of probability sampling:

1. *Simple Random Sampling*- In this type of sampling, each unit has an equal chance of being chosen. Moreover, the selection of any unit does not affect the selection of other units. In this type of sampling, the sample units are selected through various methods which include lottery method, random numbers method etc. In the lottery method, firstly the list of the target population is constructed. After that the numbers of the target population from the list is written in small pieces of papers and put into drum or jars etc. Subsequently, after mixing the papers well, the researcher takes out

one piece of paper. This method is repeated until the required number of sample is reached.

2. *Stratified Random Sampling*- Unlike the simple random sampling, in the stratified random sampling, the total universe is divided into some strata or sub groups. Consequently, sample is drawn from each stratum. These strata depend on various criteria like age, sex, class, educational level, residential background etc. In order to understand the concept of stratified random sampling we can cite the example of different levels of education i.e. graduate, postgraduate, doctorate etc. The chief objective of this stratification is to secure a reliable sample.

3. *Systematic or Interval Sampling*- In this type of sampling, the researcher randomly selects the first respondent. After that every n^{th} person is selected. Here *n* is a number which is termed as sampling interval.

4. *Cluster Sampling*- Here the population is divided into clusters and sample is drawn from either all the clusters or selected clusters. The initial clusters are called primary sampling units, the clusters within primary clusters are secondary sampling units and the clusters within secondary units are called multi- stage clusters. It is called area sampling when the clusters are geographic units.

5. *Multi- Stage Sampling*- In the multi- stage sampling though samples are selected in various stages, only the samples selected in last stage are studied.

6.*Multi- Phase Sampling*- This process is similar with that of multi- stage sampling. But here the samples drawn in each stage are adequately studied before proceeding to the next stage of sampling.

2.4.2 Non- Probability Sampling

But it needs mention here that in some cases there is no specific list of population to be studied. In this context we can cite the example of the wife battering cases where probability sampling become difficult as it requires the specific number of units to be studied. Therefore non probability sampling is used in such cases. In this type of sampling every unit does not have the chance of getting selected. The non- probability sampling mainly depends

on the researcher who decides which sample unit should be chosen. In this type of sample, the sample units are drawn according to the deliberate intention of the researcher.

SAQ :

Do you think sampling is necessary in the context of research studies? Give reasons in favour of your answer. (30+ 20 words)

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You have already learnt that non probability sampling is non- representative in nature. There are five types of non- probability sample. These are discussed below-

1. ***Convenience Sampling***- In this type of sampling the researcher studies those persons who are conveniently available to him/her or persons whom he accidentally encounters during a certain period of time in his research. Therefore, this sampling is also known as accidental or haphazard sampling.

2. ***Purposive Sampling***- In this type of sampling, the researcher selects those as sample members who have relevance in his research topic and are easily available to the him. For example If the researcher wants to study the beggars he will go to those areas where beggars are found and interview them according to his convenience and choice.

3. ***Quota Sampling***- This sampling is similar to stratified sampling. But unlike the stratified sampling where the units are divided into strata, in this process of sampling, the researcher divides the population in quotas fixed by himself.

4. ***Snowball Sampling***- This type of sampling starts with few respondents who are available to the researcher. These respondents give new names to the researcher who meets the criteria of research. These new respondents again give more names to the researcher.

This process continues until the adequate number of sample is interviewed or there are no more respondent.

5. ***Volunteer Sampling***- Here the respondent volunteers himself/herself to the researcher to give information.

Thus, applying these different types of sampling, research is carried out in social science.

Check Your Progress :

1. Explain the probability and non- probability sampling technique.
2. Distinguish between stratified sampling and quota sampling.
3. What do you mean by snowball sampling?

2.5 Meaning of Data Collection

In the previous sections you have learnt the meaning of sampling. Now you should remember here that data is collected from the selected samples. The process of collecting good data involves following the defined sampling process. Data is the piece of information and it represents the quantitative or qualitative attributes of a variable or set of variables in general. In broader sense, data refers to the facts for describing a group or a situation. In particular sense, it implies the numerical facts such as heights, weights, scores on tests etc. Data can exist as numbers or texts on paper. It can also exist as bits and bytes which can be stored in electronic memory. Again, the facts stored in persons mind are also one form of data.

Again, by data collection we imply the process of preparing and collecting data. In simple terms, data collection implies the gathering of information in the form of figures, words or responses to describe some situations from which conclusions can be drawn. The basic objective of data collection is to obtain information. Again, it also helps in making decision about some issues. We can say that to ensure the accuracy and validity of the findings a formal data collection process is necessary.

2.6 Techniques and Methods of Data Collection

The researcher starts the process of data collection after he/she defines the research problem and chalks out the research design/plan. Now let us discuss the various methods and techniques of data collection-

2.6.1 Questionnaire Method

Questionnaire is a structured set of questions. It is delivered to the respondents generally through mail. Sometimes it may also be delivered by hand. Questionnaire can be described as a document that contains a set of questions, the answers to which are to be provided personally by the respondents.

You should remember here that when a questionnaire is sent to a respondent, a cover letter explaining the importance of the survey is also sent to him/her. Along with this, a self- addressed stamped envelop is also sent to the respondent so that the respondent is not required to spend.

STOP TO CONSIDER :

Qualities of Good Questionnaire

To prepare a good questionnaire, the printing errors should be avoided and the questionnaire should be printed on good quality papers. Structuring is a technique in preparing a good questionnaire and therefore only skilled person should be appointed to prepare the structure of a good questionnaire. The qualities of a good questionnaire are as follows-

1. In the questionnaire, The language used should be, concise, clear and straightforward.
2. Uncommon phrases and expressions should be avoided.
3. The subjective words like bad, good, fair, etc. should be avoided.
4. No single question should deal with more than one issue.
5. The questionnaire should start with easily answerable questions leading to sensitive and difficult ones.
6. The words used in the questionnaire should not injure the ego of the respondents.
7. Complex questions should be avoided.

It needs mention here that the questionnaire may be of two types- structured and unstructured questionnaire.

- Structured- Structured questionnaire is characterized by definite, concrete and preordained questions. Additional question is asked only when there is the necessity of any clarification or additional information. This type of questionnaire is devoid of vagueness and ambiguity. Questions on age, marital status, number of children are some of the examples of structured questionnaire. The structured questionnaire can further be divided into two categories viz. closed-form and open- ended questionnaire. In the former one, alternative answers are given while the latter one gives full choice to the respondents to use his/her own style.
- Unstructured- In this type, questions are not structured and there is ample scope for a variety of answers. It is characterized by flexibility which also helps in gathering maximum possible information from the respondent.

SAQ :

Do you think unstructured questionnaire is better than structured questionnaire in social science research? Give reasons. (30+20 words)

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Now let us have a look at the merits and demerits of Questionnaire-

Merits-

1. This method is cheaper than other methods as it does not require too many investigators. The researcher himself can mail the questionnaires or appoint two or three persons for distribution of questionnaires. The cost involves the printing of the questionnaire, sending them and the stamped envelopes.

2. Though it takes some times to receive the answered yet it is less time consuming than other methods. The questionnaires can be dispersed simultaneously and the researcher can expect the return of all the questionnaires in around 15 to 20 days.
3. Uniformity of response is possible because of standardized vocabulary and sequence.
4. In case of personal questions the respondent feels more comfortable when the interviewer is not around. When it comes to answer some socially undesirable questions, the respondents can express free opinion in the absence of the interviewer.
5. There is no need of trained and skilled person. The respondents themselves can fill up the questionnaire.
6. In this method, the interviewer is not present in the field. Therefore he cannot influence the answers of the respondents. Hence, biases or prejudices of the researcher can be avoided to a large extent.

Demerits of questionnaire-

1. The response rate is very low. As there is no binding, the respondents may not respond.
2. Questionnaires need to be filled by the respondents themselves. Therefore, it is not possible to apply this method in case of illiterate or less- educated people. Hence, it restricts the number of respondents.
3. It is not useful in cases where spontaneous response is needed as it gives enough time to the respondents to think carefully before answering.
4. The researcher is not present in the situation. Therefore, there is also a possibility that the questionnaire may be filled up by other persons and not by the required respondents.
5. This method is not helpful in studying serious problems in detailed manner. As it is impossible to ask additional questions, serious and detailed study is not possible.
6. Sometimes the respondent may leave some questions blank if he does not understand the meaning of the question as the researcher is absent to explain the meaning leading to partial response.

2.6.2 Schedule Method

Unlike the questionnaire method where the questions are sent to the respondents, in schedule method the answers are recorded by the researcher himself. Schedule is like a questionnaire with a set of questions. It is presented with the objective of testing an assumption of hypothesis. Schedule can be used for the respondents located in small areas. The investigator is present and helps in filling up the schedule. This method helps in recording the data which cannot be memorized and requires trained and skilled interviewer. There are generally five types of schedule. These are as follows-

- Observation Schedule- In this type of schedule, questions are puts on specific topic. The researcher put pointed questions to gather information and sometimes he can also put additional questions if he feels necessary.
- Rating Schedule- The researcher can apply this type when he wants to gather information about attitudes, opinions, preferences, inhibitions etc and also wants to asses the value of each unit.
- Document Schedule- This type is based on information of certain documents like for instance the historical documents etc. On the basis of these documents, the researcher constructs the schedule.
- Institutional Survey Schedule- These schedules are mainly used to collect information about the institutions and agencies existing in the society. The size of the schedule depends on the nature and complexity of the institutions.
- Interview Schedule- This schedule is prepared for collecting data as well as testing them.

Now let us discuss the merits and demerits of Schedule Method-

Merits-

1. It becomes easier to clear doubts as the investigator himself is present in the field.
2. The investigator can assume the reliability of the information. Therefore, it is possible to gather reliable information.

Demerits of schedule method-

1. It requires traveling on the part of the investigator. The investigator records the interview by himself and therefore, he needs to present in the field.
2. It is time consuming as the investigator needs to travel which is a time consuming affair.
3. It requires a large number of investigators which is a very costly affair.

STOP TO CONSIDER :

Difference between Questionnaire and Schedule-

Though both questionnaire and schedule contain questions to be filled, there are some differences between these methods. These are as follows-

- Schedule is the direct method of collecting data as the investigator himself goes to the field to collect data. On the other hand, questionnaire is an indirect method as it is mailed to the respondents and there is no need of the investigator to go to the fields.
- In the schedule method, only a small area can be covered while the questionnaire method covers a large area.
- The information collected through schedules is more reliable than the information collected through a questionnaire.
- Schedule is applicable to illiterate as well as the literates while the questionnaire is applicable only in case of the literates or educated ones.

2.6.3 Interview Method

The interview method can be regarded as one of the traditional tools of data collection. The term interview implies conversation with a purpose. There are two types of interview. These are as follows-

- Structured Interview- The structured interview is characterized by predetermined questions and standardized techniques. In this type, each and every detail of the interview like number and nature of questions, order of asking them, wording of questions, recording system etc is standardized and structured. This type of interview is also known as formal interview.

- Unstructured Interview- This type is opposite to the structured one. Here the number of questions, order sequence etc are not standardized. The response pattern decides the wording and the sequence of questions. This type is more purpose- oriented than structure oriented. This type can be described as informal interview.

Let us now discuss the merits and demerits of Interview Method-

Merits-

1. Interview method helps in obtaining more information with greater depth. The interviewer who is present in the field can ask the respondent for additional information.
2. In the unstructured interview method, it is possible to restructure questions as in this method there is no structured set of questionnaires. The interviewer can modify the situation whenever necessary. He can also clear up a misunderstanding about a question as he is present in the field. Therefore the interviewer can extract more information.
3. The interviewer can adjust the language according to the educational level of the interviewee.

Demerits of interview method-

1. When the sample is large and spread in wide geographical area, this method proves to be very expensive.
2. Some respondents like high officials may not be easily approachable.
3. This is a time consuming method. It takes so much time to interview all the people one by one.

2.6.4 Observation Method

In the observation method the researcher uses vision as a means to collect data. In this method the researcher watches the behaviour of other persons without trying to control it. Observation can be defined as 'a planned methodical watching that involves constraints to improve accuracy'. Observation is always direct. Again, field observation takes place in natural setting and tends to be less structured

It needs mention here that the chief objective of observation is to capture human conduct and behaviour as it actually happens. Sometimes, we ignore

important issues related to certain events and situations. The researcher in this method can get details of everything by being in the situation and examining the minute details.

You should remember here that there are two types of observation. It may be participant or non participant. In participant observation the researcher studies the situation by being a part of the situation. He becomes a member of the group he is studying and therefore he is not subject to any restriction or control and observes their behaviour. This type of observation is mostly used in anthropological research. In this type of observation, the researcher must abstain himself from acquiring any special status in the group as the acquisition of status may convert him from a researcher to an active member of the group.

SAQ :

Do you think the researcher can be biased while using the participant observation method? Give reasons in support of your answer. (20+20 words)

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On the other hand, in the non- participant observation the researcher does not take part in the activities of the group which he is observing. He does not intervene in their activities and remains a passive observer. The researcher quietly observes the object of research without interfering in their affairs. Sometimes when the group comes to know that they are being observed their behaviour may change but gradually as time passes they do not feel the presence of the researcher. This type of research is mainly used in sociological research.

- **Systematic and Unsystematic Observation**

According to Reiss, there are two kinds of observation- systematic and unsystematic. His division is based on the ability of the observational data

to generate scientifically useful information. In the systematic observation certain rules and logic are followed while collecting the data. But in unsystematic observation, no such rules or logic are followed.

SAQ :

Do you think systematic observation leads to better inferences? Explain. (50 words)

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Again, Sarantakos has offered for six more types of observation. These are as follows-

- **Naïve and Scientific Observation**

Naïve observation is unstructured and unplanned observation. When the naïve observation becomes systematic and planned, it is called scientific observation. Scientific observation is related to certain goals and it is also testable and controllable.

- **Structured and Unstructured Observation**

The organized and planned observation known as structured observation is characterized by formal procedure, high levels of control and differentiation. It also has a set of well defined observation categories. This type of observation is helpful in descriptive studies. In contrast, the unstructured observation is loosely organized. Here, the process is not defined and the observer has to define the whole process of observation. Observation is gathered in natural settings. This method is mostly used in exploratory research work.

- **Natural and Laboratory Observation**

When observation takes place in natural environment t is called natural observation. On the other hand, if it takes place in laboratory setting, it is called laboratory observation.

- **Open and Hidden Observation**

In the open observation, the participants know the identity of the observer. They are even aware of the purpose of the study. In the hidden observation, both the identity of the observer as well as the purpose of the study are hidden from the participants.

- **Direct and Indirect Observation**

In the direct observation, the observer plays a passive role and does not try to control the situation. He records whatever is taking place without trying to change it. On the other hand, when the direct observation of the subject is not possible it is called indirect observation. Here the subject is either dead or does not want to participate in the research process.

- **Covert and Overt Observation**

In the covert observation, the participants are aware that they are being observed while in the overt observation, they are ignorant of the fact. In the covert observation, the researcher himself takes part in all the activities and becomes a member of the participant group.

Now let us examine the merits and demerits of Observation Method-

Merits of Observation Method

1. The researcher enjoys flexibility in the process of collecting data. He is not bound by any rigidity. As the researcher becomes the member of the group he is observing, he becomes familiar with their behaviour and thinking and it helps him in avoiding unnecessary, misleading or meaningless questions.

2. This method helps the researcher in gathering more data than the data collected by a questionnaire. In this method the researcher observes everything directly. Therefore, he can notice the minute details as well which helps him in acquiring more information.

3. This method does not demand active cooperation of the respondents. Here, only the researcher needs to be active to note the happenings.

Demerits of observation method:

1. The likelihood of biasness is one of the important limitations of this method. By being a part of the group the researcher may develop some biased feelings.

2. This method is applicable only when the group to be surveyed is small. It cannot be applicable in a large group covering large area.
3. This method cannot be applied to certain social and political action which is considered to be private. For example, voting in election.
4. Observation takes place in natural settings. Therefore, it is not possible for the researcher to exert control over the variables.

2.6.5 Case Study Method

The intensive study of a case is called the case study method. The case may be an individual, an institution, a system, a community, an organization, an event, or even the entire culture. According to Kromrey- case study involves studying individual cases, often in their natural environment and for a long period of time.

You should learn here that the case study method applies qualitative method of selecting the sources of data. Case study method can also be called as a research strategy. Moreover, it can also be called an empirical enquiry to investigate phenomenon by using multiple sources of evidence. The case study method studies the whole units in their totality. According to Burn, there are mainly six types of case studies. Theses are-

- Historical Case Studies- In this type, the development of an organization/system is studied over time. In this context we can cite the example of the study of adolescence and youth of an adult criminal. This method basically depends on interview, recording, document etc.
- Observational Case Studies- In this type, the researcher observes the case though he is rarely a complete observer or a total participant. For example observing a drunkard, a teacher, a student, a union leader, some activity, event etc.
- Oral History Case Studies- This method is based on the first person narrative. The researcher collects it through extensive interviewing of the respondent. The success of this method depends on the nature and cooperation of the participant or the respondent.
- Situational Case Studies- In this form a particular event is studied. The researcher collects information from the participants of that

particular event. At last, the researcher puts all the views together which help in understanding the event properly.

- Clinical Case Studies- This type studies a particular individual. For example a patient in the hospital, a prisoner in the jail etc. Extensive interview is used in this method. Apart from that the help of record and report is also taken into consideration.
- Multi- Case Studies- It is a collection of case studies and a form of multiple experiments.

Let us have a look at the merits and demerits of Case Study Method-

Merits-

1. As the researcher studies the history of the case, it becomes easier to understand the behaviour pattern of the concerned unit.
2. It represents the real record of personal experiences.
3. It is very intensive in nature as it emphaises reading everything of some units rather than reading something of every units.
4. It is flexible in nature because it is the discretion of the researcher to approach the problem from any angle.

Demerits of case study method-

1. This method is not comparable. Here the study is concerned with a single case only.
2. There are no set rules to be followed while collecting information and therefore, there is always a danger of false generalization.
3. In this method, the social history and cycles of social limit are minutely studied. To study the whole history of a case, time and money are required. Therefore it can be termed as a time consuming and costly affair.

2.6.6 Content Analysis Method

This method refers to the analysis of contents of documents, books, newspapers, magazines and other form of news materials. In content analysis, the content may be manifest or latent. Content analysis is characterized by objectivity which implies that analysis should be carried out in such a way so that two or more persons obtain same result from the same document.

Content analysis should be systematic and the finding of a content analysis must have theoretical relevance.

According to Sanders and Pinhey, there are five types of content analysis. These are as follows-

- Word Counting Analysis- In content analysis, the key words in different texts are analyzed. For example the analysis of the word 'democracy' in elite newspapers.
- Conceptual Analysis- In this type of analysis, words are grouped into ideas to analyse them. For example the words crime, anomie, corruption, assault etc. can be grouped around the idea of deviance.
- Semantic Analysis- In this kind of analysis, the researcher scales the intensity and weights of the words. The researcher uses strong and weak, positive and negative words etc.
- Evaluation Assertion Analysis- Sometimes the researcher analyses the words exchanged between two groups. For example, if the researcher tries to study a problem leading to strike, the researcher may evaluate the relationship between labour and entrepreneur.
- Contextual Analysis- In this analysis the researcher analyses the known words and concepts and on the basis of this tries to predict the future.

Let us discuss the merits and demerits of Content Analysis Method-

Merits-

1. This method is useful in historical studies where the respondents are no more available to answer the questions.
2. This method is less time consuming.

Demerits of content analysis method-

1. Content analysis is a heavily planned method. Therefore, it ignores the unplanned and spontaneous qualities of field research.
2. In this method, determining the validity and authenticity of data is very difficult. For instance, it is not possible to check the validity of data provided in a newspaper regarding the feelings of the workers during strike.

Check Your Progress :

1. What is the difference between questionnaire and schedule method?
2. Examine the application of interview method in social science research.
3. Discuss the merits and demerits of observation method in collecting data. Give illustrations.
4. Define content analysis.

2.7 Summing Up

After reading this unit, now you are in a position to understand the concepts of sampling and data collection. Now it is clear to you that sampling is the process of drawing samples from the whole universe to be studied, where the samples represents the characteristics of the universe. You have also learnt that sampling can be broadly divided into two categories i. e. probability sampling and non- probability sampling. In the probability sampling, the chances of the units to be selected as sample is higher than the non- probability sampling. You have also learnt the process of data collection in which relevant information of the research is gathered from the selected samples. Again, this unit has also helped you in understanding various techniques of data collection which includes questionnaire, schedule, interview, observation, case study and content analysis along with the merits and demerits of these techniques. In the next unit we shall discuss the analysis and interpretation of collected data.

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Unit 3

Data Processing, Data Analysis and Data Interpretation

Contents

3.1 Introduction

In the previous unit, you have learnt the methods and techniques of collecting data. Once collected the data is ready for analysis and interpretation but before analyzing, the data should be processed so that it becomes ready for analysis. The processed data is analyzed by the researcher and a correct analysis leads to correct interpretation. Here in this unit, we are going to discuss the various processes of data processing, analysis and interpretation. Data processing includes several steps like editing, coding and tabulation and the tabulated data is analysed and interpreted. The process of analysis also involves steps like categorization, frequency distribution, measurement and interpretation and the interpreted data is published as report.

3.2 Objectives:

Data processing, analysis and interpretation are the three most important stages in research. After reading this unit, you will be able to

- *discuss* the process of data processing
- *explain* the process of data analysis
- *analyse* the process of data interpretation

3.3 Data Processing:

Data processing is an intermediary stage between the collection of data and analysis and interpretation of it. The data collected by the researcher needs to be processed so that it can be reduced to a manageable proportion. The researcher can use either manual or electronic process for data processing. The following stages are observed while processing the data-

3.3.1 Editing

Editing simply refers to the process of examining the collected data to detect errors and omissions and to see that they are corrected and prepared for tabulation. Editing refers to careful scrutiny of collected data as information needs editing for better analysis. To elaborate we can cite the example of a researcher who encounters an improbable fact that a family uses 4kg red chilies in a month. As evident, the data collected needs editing and the correct answer should be 0.4 kg. After editing data becomes complete, error free and readable. Editing helps in removing error, inconsistency and incompleteness of data and involves the routine task of checking the filled questionnaire. In this stage, first of all, the researcher needs to check whether all questions have been answered or not. If there is any significant omission, the researcher should find out the reason behind this. Moreover, the accuracy and truthfulness of data provided also need to be checked at this stage as sometimes, the respondents provide fake answers either to hide the fact or mislead the researcher. To avoid such inaccuracy, there should be pre-coding of answers. Again, the researcher can also cross examine the respondent on such answers. To obtain accuracy, all the questionnaires

should be edited immediately as immediable editing confirms the accuracy and uniformity of data collected.

It needs mention here that there are two stages of editing. These are field editing and central editing. Field editing starts in the field itself. The researcher edits the data while recording the responses of the respondents. Sometimes the researcher cannot understand the writings of the respondents. Field editing can erase this difficulty, where the researcher rectifies the answers mostly in the field itself. Field editing is mostly done in the same day or at most the next day. But the researcher must not correct the errors of omission simply by guessing the answers as it may lead to faulty interpretation. Central editing takes place when the data is collected and brought to office. The editor corrects the minor errors like entry in wrong places, entry recorded in months instead weeks etc. Sometimes the editor fills up the missing replies by going through the other information. Moreover, in some cases, the researcher may contact the respondent again to collect the missing information. The nature and quantity of information varies from study to study. Again you should remember here that the researcher also needs to check the relevance of data provided by the respondents. Editing also makes data worthy of coding. Once some errors go unnoticed in this stage, it becomes impossible to rectify it in the subsequent stages. Editing converts the answers into uniform units of measurement before coding to ensure accuracy. It also provides consistency of data. In order to understand and appreciate the logical link between various questions, it is better to edit the whole questionnaire.

3.3.2 Classification

Classification implies arranging the data in homogenous groups on the basis of their characteristics. Through classification, the large volume of raw data is reduced to homogenous groups. The data sharing common characteristics is placed under one group. In this process the unwanted observation is eliminated and the similarities and dissimilarities of data are brought out. This process also aims at presenting the data in a comprehensible manner. Again, the quick comparison in this process enables the researcher to draw the inferences. The characteristics of data may be descriptive like sex,

nationality, honesty etc. or it may be numerical in nature like age, income, height, weight etc. The classification is said to be done according to attributes as the data classified on the bass of attributes or qualities cannot be classified on quantitative basis. On the other hand, when the data is classified on quantitative basis, it is called classification according to class intervals.

You should remember here that there may be simple or manifold classifications. In simple classification, each class is divided into two sub classes and only one attribute is studied. For example, we can select one from attributes like married or unmarried, employed or unemployed, resident or non- resident etc. This classification is also called as classification according to dichotomy. In the manifold classification, there are number of classes and subclasses. Moreover, in this classification, more than one attribute is studied. For example in the first level, industries may be classified into two classes- public sector and private sector. In the second level, it may be classified into large and small industries. In the third level, the classification may be done in terms of profit or loss incurring industries etc.

3.3.3 Transcription

After editing and classification, transcription is the third stage in the process of data processing. Transcription is the transfer of information from interview schedule to a card. Here one card is created corresponding to each unit in the survey population. It makes the manual and mechanical sorting of information easy. Again, it also helps in keeping the records in the original schedule intact without any markings on them. It is advisable to transcript the data by two people independently so that it can be compared and errors can be avoided.

3.3.4 Coding

It needs mention here that while transferring the data from interview schedule to card, the researcher assigns a code to every item in the schedule and response category. In the process of coding, numbers or symbols are assigned to answers in order to categorise them. It should be categorized in such an order so that there must be a class for every data item. Again, it should be kept in mind that a specified answer can be placed in one and only one cell in a given category. Moreover, we should also remember that

every class needs to be defined in terms of only one concept. In the next step, the researcher needs to translate the answers into numerical values. This process is known as coding.

You should remember here that coding simply classifies the answers into meaningful categories. Moreover, it is also helpful in quantifying the qualitative data. The chief objective of coding includes deciding the categories to be used and allocating individual answers to them. But you must remember here that before coding, it is essential to clarify the meaning and purpose of the question and there should be specific codes for each question.

Therefore, it can be said that in general coding is done while preparing the questionnaire which means in most cases fieldwork is done with precoded questions. For coding, code book, codesheet or computer card can be used. Code book assigns numerical codes for response categories. It keeps the record of all details. Again, it also specifies the way in which the item is classified and coded. After the formulation of questionnaire, a tentative code book may be prepared. But the final code book can be prepared only after the collection of data. Code sheet is used to transfer the data from original source (i.e. questionnaire/schedule etc) to cards. The researcher prepares the code sheet to code the answers received. In the computer card, there are 80 columns horizontally and 9 columns vertically and it is used for storing data. Now a days, the researcher directly types the precoded schedule into the computer through the computer terminal. This is known as feeding the data to the computer for processing and analysis.

SAQ :

Do you think editing of data is necessary before coding? Explain. (40 words)

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3.3.5 Tabulation

Editing and coding of data ensures that data is accurate and categorized. After this step, the data is put into some tables. The summarization of results

in the form of statistical table is known as tabulation. Tabulation refers to the process of arranging data in logical and concise order. Through the process of tabulation, raw data is summarized and displayed in compact form.

It has already been mentioned above that tabulation implies total adding and counting of frequencies in each category. In this process, the data is arranged in logical, concise and systematic manner on the basis of classification which generally includes geographical, chronological, quantitative and qualitative classifications. The tables are prepared in accordance with the hypothesis. The tables help in representing the data in a proper way. To elaborate, above every table there should be a specific title and every table should be identified by a number for easy reference. A table consists of a title and columns and rows. There are two kinds of headings in a table- caption and stub. Caption appears on top of the column and is also known as column heading. Again, those appearing in the lines are called stub or line heading and display information in the form of numbers or percentage.

STOP TO CONSIDER :

Hand Tabulation and Mechanical Tabulation

Tabulation can be done either by hand or by mechanical or electronic devices. The size and type of study, cost consideration, time pressure, availability of computers etc. decide the choices. When tabulation is done entirely by manual methods, it is called hand tabulation. On the other hand, when automatic and fast power machines are used for the bulk of data, the process is known as mechanical tabulation. While hand tabulation is applied in small inquiries, electronic tabulation is preferred for the large inquiries.

You should remember here that there are mainly two classifications of tabulation- simple and complex. The simple tabulation results in one way table whereas complex tabulation results in two way tables, three way tables or like. Therefore complex tabulation is also known as manifold tables. Again it is sometimes described as cross tabulation also. In a simple table, information about one group is given while in a complex table, information about several groups is given.

Again there are some other classifications like general purpose table, summarry table, univariate table, bivariate table, multivariate table etc.

- The general purpose table gives information regarding the collected data as a whole.
- Again, in the surmarry table, comparison is made among various aspects of the problem.
- A univariate table has a single variable and this kind of table is used mainly in exploratory analysis. Here, the researcher tries to describe the frequency of occurrence rather than concentrating on its correlates.
- On the other hand, when two variables are put together in a single table it is called bivariate table. This table helps in analyzing the interrelationship between two variables and is also known as contingency table.
- In a multivariate table, one can find three or more variables. By principle, dependent variable is presented in the rows and independent variable in the columns.

As we mentioned, the chief objective of tabulation is to make the data precise to make analysis easier. Tabulation also helps in finding out whether the purpose for which the whole study is organized has been achieved or not. Another advantage of tabulation is that information is presented in shortest possible space. Tabulation also helps in comparative study. The title of the table should be clear and precise and should provide a clear idea about the topic.

The importance of a table can be summed up in the following points-

1. An overall view of the findings can be presented in a simple way through a table.
2. Tables identify trends.
3. A comparable relationship between parts of the findings can be displayed by the tables.

Check Your Progress :

1. What do you mean by editing?

2. Why coding is necessary?

3. What are different types of tables?

3.4 Analysis of Data

You have already learnt that the processing of data prepares it for analyzing. It has already been mentioned above that after collecting, the researcher processes the data and analyzes it. Data processing prepares the data for analysis and in order to obtain answers to research questions, the researcher arranges the data into constituent parts. This is called analyzing the data. Analysis of data is important to confirm or invalidate the hypothesis and depends on the researcher's skill. In fact, it is the most creative aspect of a research. Analysis of data implies the study of tabulated data so that inherent facts and meanings can be derived from it. In this stage, the researcher breaks down the complex factors into simpler ones and makes the data ready for interpretation as it is difficult to interpret raw data. Therefore, the researcher they first analyzes the data in order to interpret it later. Analysis of data, a highly technical and skilled job is one of the most important aspects of research. For a correct analysis, deep and intense knowledge on the part of the researcher is required. Moreover, familiarity with the background of survey also helps the researcher in a proper analysis.

3.4.1 Stages in Analysis of Data

While analyzing the data, the researcher generally follows certain steps. These are as follows-

- ***Categorization***-according to the research problem and purpose of study, some mutually exclusive, independent and exhaustive categories are set up. The collected data is categorized on the basis of their characteristics. The homogenous data are grouped in the same category. It is an important step in the analysis of data.

- ***Frequency Distribution***- the process of tabulating quantitative data in classes is called frequency distribution. It implies the distribution of cases falling into different categories. It presents the frequency of occurrence of certain categories. This distribution appears in two forms- ungrouped and grouped. In ungrouped form, sources are not collapsed into categories. For example, the distribution of ages of the students of a MBA class, each age value (eg 22, 24 etc) will be presented separately in the distribution. In a group distribution the scores, for e.g. 20-30, 30-40 etc. are collapsed into categories so that 2 or 3 scores can be grouped together. You should remember here that there are two types of frequency distribution- primary and secondary. The primary distribution is descriptive in nature and it only provides the number of cases in each class. On the other hand, the secondary distribution presents the comparison of frequencies and percentage and is concerned with relations.

- ***Measurement***- The third stage in the analysis of data is known as measurement. In general, measurement refers to determining the weight, height or some other features of a physical object. Again when we say that we like a song, a painting, it is also a kind of measurement of our likeness or dislikeness. Hence it is clear that we measure physical objects as well as abstract concepts. Measurement implies the process of assigning numbers to objects or observations. Again, you should remember here that nominal, ordinal, interval and ratio are the four scales used for measurement. Now let us discuss the different types of scales-

Nominal- This scale classifies the individuals, companies, products, brands or other entities into categories. Therefore, it is also known as categorical scale. In the nominal scale, numbers are assigned to events in order to label them. In this context, we can cite the example of assigning jersey numbers to basket ball players. Nominal scale helps in keeping track of people, objects and events and neither has an order nor an arithmetic origin. The chief objective of a nominal scale is to describe differences between things by assigning to them categories. In the nominal scale which is simply a classificatory scale a number is assigned to each object for identification. The variables which are measured in a nominal scale may have one, two or more sub categories. For example, while water or tree has only one sub group, the variable gender has two sub groups i.e. male and female.

Ordinal- In the ordinal scale, objects are ranked. The ordinal scale provides the information contained in the nominal scale along with the positional statistics such as median, quartile and percentile. Though the ordinal scale places the evens in order, yet there is no equal interval. It ranks the items from the highest to the lowest. In an ordinal scale, the sub groups are arranged in certain order either in ascending or descending order. To elaborate, the variable 'income' can be measured either quantitatively i.e. in rupee or paisa or qualitatively i. e. preparing sub groups like above average, average, below average etc. Here the differences between the adjacent ranks are not equal. It generally states greater than or less than. But how much greater or less cannot be decided in this scale.

Interval- The interval scale resembles the ordinal scale. Here, the intervals or the distance between numbers on the scale are equal and it has equal units of measurement. Therefore, it becomes easier for the researcher to interpret the order of scale along with the distance between them. In the interval scale, the units are placed in order according to some equal intervals. This scale implies the concept of equality of intervals.

Ratio- This scale contains the properties of interval scale as well as a fixed origin or zero point. In the ratio scale, the ratios of the numbers assigned to categories are determined. Income, distance from home to workplace, height, weight, density are some of the examples of ratio measurement scale. In this scale of measurement, the difference between two intervals is always measured from a zero point. For eg. A person who is 40 years old, is twice as old as one who is 20 years old.

- **Interpretation-** Interpretation implies explanation or the process of finding meanings. Now let us discuss the method of interpretation in the following section.

SAQ :

Do you think ratio scale is better than interval scale? Explain with examples. (30+30 words)

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STOP TO CONSIDER :

Central Tendency

Central tendency is one of the most important forms of measurement. To find the central tendency of the distribution, a set of statistical indices are applied. Central tendency implies calculating mean, mode and median. Mean refers to the average value of the distribution which is arrived at by dividing the sum of scores in the distribution by the number of observations. The mean represents the arithmetic average of a set of measures. To find mean the summation of all the values should be divided by the number of items. For example the mean of 15, 10, 9, 6, 10 will be 10. (15+10+9+6+10= 50 divided by 5=10). One must remember that while calculating mean, all the items of the group must be taken into account. On the other hand, median divides the distribution equally. The median is the midmost measure of any set of measures. It is the mid point of a collected score. The scores are arranged in the order of magnitude and the mid point is the median. To find median, all the values are arranged either in ascending or in descending order and the middle item is called median. To elaborate let us take an example. Suppose there is a list of 11 items, i.e. 9, 7, 11, 19, 15, 6, 5, 14, 20, 22 and 18 and if we arrange it in the ascending order then it will be like 5, 6, 7, 9, 11, 14, 15, 18, 19, 20 and 22. Here the middle item is 14 and it is called the median. Mode is the item which occurs most frequently in a series of values. The mode is the most frequently occurring measure of a set of measures. Mode is the value which occurs maximum time. Through central tendency it becomes easier to know the position of different groups.

3.5 Interpretation

One cannot draw a clear cut dividing line between analysis and interpretation. The analysis of generalizations and results are often referred as interpretation. Both analysis and interpretation are interdependent. Analysis is not complete without interpretation. At the same time interpretation cannot proceed without analysis. In interpretation, the abstract relations are analyzed in more concrete terms. It is useful in relating the empirical findings with the theoretical principles and also guides us in drawing a number of useful inferences from the study. There can be descriptive or analytical interpretation of data. Again, the interpretation can also be from the theoretical perspective. It needs mention here that it is harder to interpret the negative results than the positive results (when the data supports the hypotheses).

You should remember here that there are two ways of interpreting data. Firstly, the relations within the study and its data are interpreted. Secondly, the results of the study and inferences drawn within the data are compared to theory and to results drawn form other researches. Only the properly interpreted data can become socially useful. But this interpretation must be objective and unbiased. Otherwise, it will lead to a misleading interpretation. To arrive at a satisfactory inference, some prerequisites must be satisfied. These pre- requisites are as follows-

1. Homogeneity of data is one of the foremost prerequisites for a correct interpretation. The definition of the units should be same in all situations.
2. Availability of reliable and accurate data is another prerequisite. Without such material, proper interpretation of data is impossible. To arrive at a correct conclusion, accuracy of data is very important.
3. Another important prerequisite is availability of sufficient data. Inadequate data may lead to false interpretation. For a meaningful interpretation, data must be adequate. Interpretation based on unreliable and insufficient data may lead to biased result.
4. To analyze the data relevant and appropriate method should be adopted.

STOP TO CONSIDER :

Sources of Errors in Interpretation

There are some factors which lead to faulty interpretation. These are as follows-

1. If the interpreter is biased than it leads to faulty interpretations. The inhibitions and prejudices of the researcher may hamper the process of achieving a correct inference. Therefore, objectivity is an important requirement for a correct interpretation.
2. Use of averages may lead to wrong interpretations.
3. Sometimes the use of the percentage may be wrongly interpreted.
4. False generalizations may also lead to faulty interpretation.

Interpreted data may be presented in the form of a report. In a report data may be presented in diagrams as well. This is called diagrammatic representation of data. Earlier, the diagrammatic representation was given

utmost importance in report writing. Let us discuss some diagrams and graphs used in report.

- *Graphs*- in a graph, the horizontal line is the x- axis and the vertical line is the y- axis and the point of intersection is known as origin. The x- axis scales the values of independent variable while the y- axis refers to the values of dependent variables.
- *Histograms*- in histogram, the vertical bars present the values of variables. These bars are adjacent to each other.
- *Bar Diagram*- the bar diagram refers to the bars drawn either vertically or horizontally.
- *Pictograph*- in a pictograph, the events are represented by pictures. Total number of pictures represents the total number of events.
- *Pie Chart*- pie chart implies the presentation of data in the form of a circle.

It has already been mentioned above that after the interpretation of data it can be written in the form of a report. This report may be of various forms such as book, reports used for policy making, research paper etc. A clear topic is the first requirement of a report. The topic should not be vague and unspecified and it should be written in the form of a research question. For example, instead of writing 'political elite' it should be written in the form like 'role of political elite in social change', 'factions among political elite' or 'corruption among political elite' etc. The review of literature is another important requirement for a error- free report. Again, there should be a proper research design to carry on the research. In short, after collecting and processing the data the same will be analyzed and interpreted to complete the report.

Check Your Progress :

1. Define frequency distribution.
2. What are the different types of scales?
3. Why interpretation is necessary?
4. What are the prerequisites for data interpretation?

3.4 Role of Statistical Method in Analysis

When the data collected is too large, statistical method is useful to analyze the data. Statistical method is applied when the research problem is affected by multiplicity of causes and it is also not possible to use the experimental method. The tabulated data is analyzed with the help of various statistical techniques. Statistical method is helpful in exploring the unknown. For eg. In agricultural study, statistical method can help in establishing a relationship between fertilizers and crop- yield. Again it also helps in reducing a mass figure to a manageable size. Moreover, it also compares two or more series.

It needs mention here that there are two types of statistical method-

- Descriptive Statistical Method- When the statistical method is used to assess the collective characteristics, it is known as descriptive statistics. The chief objective of this method is to describe what has been observed. It simply describes the behaviour of variable without any attempt to analyze or interpret the data.
- Analytical Statistical Method- Unlike the descriptive one, the analytical method analyses and interprets the observed data.

With the help of these methods data is analysed on the basis of which conclusions are drawn in research.

3.7 Summing Up

After reading this unit you are now in a position to differentiate between various stages of research i. e. data processing, data analysis and data interpretation. Data processing is the stage which lies between data collection and data analysis. In this stage the collected data is made error free. Codes are also given to the edited data and finally with the help of tabulation the complex and large data is made simplified. This stage prepares the data ready for analysis. Here, you have also learnt the stages involved in analysis of data. The chief objective of data analysis is to answer the research questions outlined in the objectives. In this stage the data is first categorized, tabulated in classes leading to interpretation of data by the researcher. The interpreted data is finally published as reports.

3.8 References and Suggested Readings

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