RESEARCH METHODOLOGY

VI SEMESTER

CORE COURSE

BCM6 B16/ BBA6 B17

B.Com./B.B.A.

(2019 Admission onwards)

CBCSS

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UNIVERSITY OF CALICUT

School of Distance Education

Study Material

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RESEARCH METHODOLOGY

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Unit I

Introduction to Research

1.1 Introduction to Research

Research in simple terms refers to search for knowledge. It is a scientific and systematic search for information on a particular topic or issue. It is also known as the art of scientific investigation. Several social scientists have defined research in different ways.

According to Clifford Woody (Kothari, 1988), research comprises “defining and redefining problems, formulating hypotheses or suggested solutions; collecting, organizing and evaluating data; making deductions and reaching conclusions; and finally, carefully testing the conclusions to determine whether they fit the formulated hypotheses”.

Thus, research is an original addition to the available knowledge, which contributes to its further advancement. It is an attempt to pursue truth through the methods of study, observation, comparison and experiment. In sum, research is the search for knowledge, using objective and systematic methods to find solution to a problem.

1.2 Role of Research in Business

Making the right decision is an ideal practice in any business whenever the organization encounters a problem. A good organization primarily conducts research to resolve the critical problems surrounding their business such as competition, customer satisfaction, product innovation, customer complaints, and new government policies affecting the industry.

Decision making process requires systematic and organized efforts to investigate a specific problem in a business setting. The first step in understanding the problem is to identify specifically the main issue that requires further investigation. The next steps are to identify factors associated with the problem, gather the relevant information, analyse data, interpret output and provide the recommendation to the manager for his decision-making. It simply means that the decision making process comprises a series of steps designed and executed with the goal of getting the best solution to the underlying problem faced by the organization. Actually, the entire process in which the managers attempt to solve their problem is the steps in conducting a research project. The research definition in the previous section suggests that research involved the process of inquiry, investigation, examination, and experimentation that need to be conducted systematically, diligently, critically, objectively and in a logical order. Thus, the results of research would be the findings, which would help the managers to deal with the real situation. Therefore, we can define business research as an organized, systematic inquiry concerning the problem, and undertaken with the purpose of finding the best solution to a problem. In addition, the research findings should be able to clarify all ambiguities surrounding the problem. In research the ambiguities surrounding the problem are addressed in term of research questions.

1.3 Value of Information

A value of information (VOI) analysis provides a formal assessment of the value of research, based on the extent to which the information generated through research would improve the expected payoffs associated with a decision by reducing the uncertainty surrounding it. Value of information research offers a quantifiable and replicable methodology to evaluate the opportunity costs that result from suboptimal decisions. In this regard, value of information can be used as a factor to weight applications for funding without the need to directly compare estimates across studies.

1.4 Cost of Information

Information costs are expenditures of time and money that are required to obtain information. The term is often used in relation to due diligence, decision making, problem solving and research.

1.5 Research Design

A research design is nothing but a detailed plan of action for the research. A researcher attempting to solve the research problem, should necessarily prepare a plan which will help him to attain his ultimate motto. This plan is nothing but a research design**.** It is a plan which defines research problem, identifies data needed, decides on tool of data collection, and type of study etc. It is a tentative plan which undergoes many modifications as the research study progresses. It presents a series of guide posts to enable the researcher to progress in the right direction.

According to Fred N. Kerlinger, Research Design is the plan, structure and strategy of investigation conceived so as to obtain answers to research questions and to control variance. The plan is the overall scheme or programme of research. It includes an outline of what the investigator will do from writing the hypotheses and their operational implications to the final analysis of the data.

Factors Affecting Research Design

The following factors affect the design of research:

1. The nature of the study

2. The scope of the study

3. The level of the study

4. Availability of sufficient data

5. Proper exposure to the sources of data, especially primary data;

6. Availability of time

7. Availability of money and manpower

8. Impact of the various internal and external as well as controllable and uncontrollable variables on the research project

9. The ability, skill, knowledge, and technical background of the researcher; and

10. Utility and applicability of the research result in practice.

Need for Research Design

Research design is needed because it facilitates the smooth sailing of the various research operations, thereby making research as efficient as possible yielding maximal information with minimal expenditure of effort, time and money.

Important Concepts Relating to Research Design

Before describing the different research designs, it will be appropriate to explain the various concepts relating to designs so that these may be better and easily understood.

1**. Dependent and independent variables**: A concept which can take on different quantitative values is called a variable. As such the concepts like weight, height, income are all examples of variables. Qualitative phenomena (or the attributes) are also quantified on the basis of the presence or absence of the concerning attribute(s). Phenomena which can take on quantitatively different values even in decimal points are called 'continuous variables'. But all variables are not continuous. If they can only be expressed in integer values, they are non-continuous variables or in statistical language 'discrete variables. Age is an example of continuous variable, but the number of children is an example of non-continuous variable. If one variable depends upon or is a consequence of the other variable, it is termed as a dependent variable, and the variable that is antecedent to the dependent variable is termed as an independent variable. For instance, if we say that height depends upon age, then height is a dependent variable and age is an independent variable. Further, if in addition to being dependent upon age, height also depends upon the individual's sex, then height is a dependent variable and age and sex are independent variables. Similarly, readymade films and lectures are examples of independent variables, whereas behavioural changes, occurring as a result of the environmental manipulations, are examples of dependent variables.

2. Extraneous variable: Independent variables that are not related to the purpose of the study, but may affect the dependent variable are termed as extraneous variables. Suppose the researcher wants to test the hypothesis that there is a relationship between children's gains in social studies achievement and their self-concepts. In this case self-concept is an independent variable and social studies achievement is a dependent variable. Intelligence may as well affect the social studies achievement, but since it is not related to the purpose of the study undertaken by the researcher, it will be termed as an extraneous variable. Whatever effect is noticed on dependent variable as a result of extraneous variable(s) is technically described as an 'experimental error'. A study must always be so designed that the effect upon the dependent variable is attributed entirely to the independent variable(s), and not to some extraneous variable or variables.

3. Control: One important characteristic of a good research design is to minimise the influence or effect of extraneous variable(s). The technical term 'control' is used when we design the study minimising the effects of extraneous independent variables. In experimental researches, the term 'control' is used to refer to restrain experimental conditions.

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

5. Research hypothesis: When a prediction or a hypothesised relationship is to be tested by scientific methods, it is termed as research hypothesis. The research hypothesis is a predictive statement that relates an independent variable to a dependent variable. Usually a research hypothesis must contain, at least, one independent and one dependent variable. Predictive statements which are not to be objectively verified or the relationships that are assumed but not to be tested, are not termed research hypotheses.

6. Experimental and non-experimental hypothesis-testing research: When the purpose of research is to test a research hypothesis, it is termed as hypothesis-testing research. It can be of the experimental design or of the non-experimental design. Research in which the independent variable is manipulated is termed 'experimental hypothesis-testing research' and research in which an independent variable is not manipulated is called 'non-experimental hypothesis-testing research'

7. Experimental and control groups: In experimental hypothesis-testing research when a group is exposed to usual conditions, it is termed a 'control group', but when the group is exposed to some novel or special condition, it is termed an 'experimental group'. It is possible to design studies which include only experimental groups or studies which include both experimental and control groups.

8. Treatments: The different conditions under which experimental and control groups are put are usually referred to as 'treatments. Similarly, if we want to determine through an experiment the comparative impact of three varieties of fertilizers on the yield of wheat, in that case the three varieties of fertilizers will be treated as three treatments.

9. Experiment: The process of examining the truth of a statistical hypothesis, relating to some research problem, is known as an experiment. For example, we can conduct an experiment to examine the usefulness of a certain newly developed drug. Experiments can be of two types viz., absolute experiment and comparative experiment. If we want to determine the impact of a fertilizer on the yield of a crop, it is a case of absolute experiment; but if we want to determine the impact of one fertilizer as compared to the impact of some other fertilizer, our experiment then will be termed as a comparative experiment. Often, we undertake comparative experiments when we talk of designs of experiments.

10. Experimental unit(s): The pre-determined plots or the blocks, where different treatments are used, are known as experimental units. Such experimental units must be selected (defined) very carefully.

Different Research Designs

Different research designs can be conveniently described if we categorize them as: (1) research design in case of exploratory research studies; (2) research design in case of descriptive and diagnostic research studies, and (3) research design in case of hypothesis-testing research studies.

1. Research design in case of exploratory research studies:

Exploratory research studies are also termed as formulative research studies. The main purpose of such studies is that of formulating a problem for more precise investigation or of developing the working hypotheses from an operational point of view. The major emphasis in such studies is on the discovery of ideas and insights. As such the research design appropriate for such studies must be flexible enough to provide opportunity for considering different aspects of a problem under study. Inbuilt flexibility in research design is needed because the research problem, broadly defined initially, is transformed into one with more precise meaning in exploratory studies, which fact may necessitate changes in the research procedure for gathering relevant data. Generally, the following three methods in the context of research design for such studies are talked about: (a) the survey of concerning literature; (b) the experience survey and (c) the analysis of 'insight-stimulating' examples.

The survey of concerning literature happens to be the most simple and fruitful method of formulating precisely the research problem or developing hypothesis. Hypotheses stated by earlier workers may be reviewed and their usefulness be evaluated as a basis for further research. It may also be considered whether the already stated hypotheses suggest new hypothesis. In this way the researcher should review and build upon the work already done by others, but in cases where hypotheses have not yet been formulated, his task is to review the available material for deriving the relevant hypotheses from it. Besides, the bibliographical survey of studies, already made in one's area of interest may as well as made by the researcher for precisely formulating the problem. He should also make an attempt to apply concepts and theories developed in different research contexts to the area in which he is himself working. Sometimes the works of creative writers also provide a fertile ground for hypothesis formulation and as such may be looked into by the researcher.

Experience survey means the survey of people who have had practical experience with the problem to be studied. The object of such a survey is to obtain insight into the relationships between variables and new ideas relating to the research problem. For such a survey people who are competent and can contribute new ideas may be carefully selected as respondents to ensure a representation of different types of experience. The respondents so selected may then be interviewed by the investigator. The researcher must prepare an interview schedule for the systematic questioning of informants. But the interview must ensure flexibility in the sense that the respondents should be allowed to raise issues and questions which the investigator has not previously considered. Generally, the experience collecting interview is likely to be long and may last for few hours. Hence, it is often considered desirable to send a copy of the questions to be discussed to the respondents well in advance. This will also give an opportunity to the respondents for doing some advance thinking over the various issues involved so that, at the time of interview, they may be able to contribute effectively. Thus, an experience survey may enable the researcher to define the problem more concisely and help in the formulation of the research hypothesis. This survey may as well provide information about the practical possibilities for doing different types of research.

Analysis of 'insight-stimulating' examples is also a fruitful method for suggesting hypotheses for research. It is particularly suitable in areas where there is little experience to serve as a guide. This method consists of the intensive study of selected instances of the phenomenon in which one is interested. For this purpose, the existing records, if any, may be examined, the unstructured interviewing may take place, or some other approach may be adopted. Attitude of the investigator, the intensity of the study and the ability of the researcher to draw together diverse information into a unified interpretation are the main features which make this method an appropriate procedure for evoking insights Now, what sort of examples are to be selected and studied? There is no clear-cut answer to it. Experience indicates that for particular problems certain types of instances are more appropriate than others. One can mention few examples of 'insight-stimulating' cases such as the reactions of strangers, the reactions of marginal individuals, the study of individuals who are in transition from one stage to another, the reactions of individuals from different social strata and the like. In general, cases that provide sharp contrasts or have striking features are considered relatively more useful while adopting this method of hypotheses formulation. Thus, in an exploratory of formulative research study which merely leads to insights or hypotheses, whatever method or research design outlined above is adopted, the only thing essential is that it must continue to remain flexible so that many different facets of a problem may be considered as and when they arise and come to the notice of the researcher.

2. Research design in case of descriptive and diagnostic research studies:

Descriptive research studies are those studies which are concerned with describing the characteristics of a particular individual, or of a group, whereas diagnostic research studies determine the frequency with which something occurs or its association with something else. The studies concerning whether certain variables are associated are examples of diagnostic research studies. As against this, studies concerned with specific predictions, with narration of facts and characteristics concerning individual, group or situation are all examples of descriptive research studies. Most of the social research comes under this category. From the point of view of the research design, the descriptive as well as diagnostic studies share common requirements and as such, we may group together these two types of research studies. In descriptive as well as in diagnostic studies, the researcher must be able to define clearly, what he wants to measure and must find adequate methods for measuring it along with a clear-cut definition of 'population' he wants to study. Since the aim is to obtain complete and accurate information in the said studies, the procedure to be used must be carefully planned. The research design must make enough provision for protection against bias and must maximise reliability, with due concern for the economical completion of the research study. The design in such studies must be rigid and not flexible and must focus attention on the following:

(a) Formulating the objective of the study (what the study is about and why is it being made?)

(b) Designing the methods of data collection (what techniques of gathering data will be adopted?)

(c) Selecting the sample (how much material will be needed?)

(d) Collecting the data (where can the required data be found and with what time period should the data be related?)

(e) Processing and analysing the data.

(f) Reporting the findings.

3. Research design in case of hypothesis-testing research studies:

Hypothesis-testing research studies (generally known as experimental studies) are those where the researcher tests the hypotheses of causal relationships between variables. Such studies require procedures that will not only reduce bias and increase reliability, but will permit drawing inferences about causality. Usually experiments meet this requirement. Hence, when we talk of research design in such studies, we often mean the design of experiments. Professor R.A. Fisher's name is associated with experimental designs. Beginning of such designs was made by him when he was working at Rothamsted Experimental Station (Centre for Agricultural Research in England). As such the study of experimental designs has its origin in agricultural research. Professor Fisher found that by dividing agricultural fields or plots into different blocks and then by conducting experiments in each of these blocks, whatever information is collected and inferences drawn from them, happens to be more reliable. This fact inspired him to develop certain experimental designs for testing hypotheses concerning scientific investigations. Today, the experimental designs are being used in researches relating to phenomena of several disciplines. Since experimental designs originated in the context of agricultural operations, we still use, though in a technical sense, several terms of agriculture (such as treatment, yield, plot, block etc.) in experimental designs.

1.6 Types of Research

1. Descriptive Versus Analytical:

Descriptive research consists of surveys and fact-finding enquiries of different types. The main objective of descriptive research is describing the state of affairs as it prevails at the time of study. The term 'ex post facto research' is quite often used for descriptive research studies in social sciences and business research. The most distinguishing feature of this method is that the researcher has no control over the variables here. He/she has to only report what is happening or what has happened. Majority of the ex post facto research projects are used for descriptive studies in which the researcher attempts to examine phenomena, such as the consumers' preferences, frequency of purchases, shopping, etc. Despite the inability of the researchers to control the variables, ex post facto studies may also comprise attempts by them to discover the causes of the selected problem. The methods of research adopted in conducting descriptive research are survey methods of all kinds, including correlational and comparative methods. Meanwhile in the Analytical research, the researcher has to use the already available facts or information, and analyse them to make a critical evaluation of the subject.

2. **Applied Versus Fundamental**:

Research can also be applied or fundamental in nature. An attempt to find a solution to an immediate problem encountered by a firm, an industry, a business organisation, or the society is known as applied research. Researchers engaged in such researches aim at drawing certain conclusions confronting a concrete social or business problem. On the other hand, fundamental research mainly concerns generalizations and formulation of a theory. In other words, “Gathering knowledge for knowledge’s sake is termed ‘pure’ or ‘basic’ research” (Young in Kothari, 1988). Researches relating to pure mathematics or concerning some natural phenomena are instances of Fundamental Research. Likewise, studies focusing on human behaviour also fall under the category of fundamental research. Thus, while the principal objective of applied research is to find a solution to some pressing practical problem, the objective of basic research is to find information with a broad base of application and add to the already existing organized body of scientific knowledge.

3. **Quantitative Versus Qualitative**:

Quantitative research relates to aspects that can be quantified or can be expressed in terms of quantity. It involves the measurement of quantity or amount. Various available statistical and econometric methods are adopted for analysis in such research. Which includes correlation, regressions and time series analysis etc,

On the other, Qualitative research is concerned with qualitative phenomena, or more specifically, the aspects related to or involving quality or kind. For example, an important type of qualitative research is ‘Motivation Research’, which investigates into the reasons for certain human behaviour. The main aim of this type of research is discovering the underlying motives and desires of human beings by using in-depth interviews. The other techniques employed in such research are story completion tests, sentence completion tests, word association tests, and other similar projective methods. Qualitative research is particularly significant in the context of behavioural sciences, which aim at discovering the underlying motives of human behaviour. Such research helps to analyse the various factors that motivate human beings to behave in a certain manner, besides contributing to an understanding of what makes individuals like or dislike a particular thing. However, it is worth noting that conducting qualitative research in practice is considerably a difficult task. Hence, while undertaking such research, seeking guidance from experienced expert researchers is important.

4. **Conceptual Versus Empirical**:

The research related to some abstract idea or theory is known as Conceptual Research. Generally, philosophers and thinkers use it for developing new concepts or for reinterpreting the existing ones. Empirical Research, on the other hand, exclusively relies on the observation or experience with hardly any regard for theory and system. Such research is data based, which often comes up with conclusions that can be verified through experiments or observation. Empirical research is also known as experimental type of research, in which it is important to first collect the facts and their sources, and actively take steps to stimulate the production of desired information. In this type of research, the researcher first formulates a working hypothesis, and then gathers sufficient facts to prove or disprove the stated hypothesis. He/she formulates the experimental design, which according to him/her would manipulate the variables, so as to obtain the desired information. This type of research is thus characterized by the researcher's control over the variables under study. In simple term, empirical research is most appropriate when an attempt is made to prove that certain variables influence the other variables in some way. Therefore, the results obtained by using the experimental or empirical studies are considered to be the most powerful evidences for a given hypothesis

5. **Other Types of Research**:

The remaining types of research are variations of one or more of the afore-mentioned type of research. They vary in terms of the purpose of research, or the time required to complete it, or may be based on some other similar factor. On the basis of time, research may either be in the nature of **one-time or longitudinal time series research**. While the research is restricted to a single time-period in the former case, it is conducted over several time-periods in the latter case. Depending upon the environment in which the research is to be conducted, it can also be **laboratory research or field-setting research**, or simulation research, besides being diagnostic or clinical in nature. Under such research, in-depth approaches or case study method may be employed to analyse the basic causal relations. These studies usually undertake a detailed in-depth analysis of the causes of certain events of interest, and use very small samples and sharp data collection methods. The research may also be explanatory in nature. Formalized research studies consist of substantial structure and specific hypotheses to be verified. As regards to **historical research**, sources like historical documents, remains, etc. Are utilized to study past events or ideas. It also includes philosophy of persons and groups of the past or any remote point of time.

Research has also been classified into **decision-oriented and conclusion-oriented** categories. The decision-oriented research is always carried out as per the need of a decision maker and hence, the researcher has no freedom to conduct the research according to his/her own desires. On the other hand, in the case of Conclusion-oriented research, the researcher is free to choose the problem, redesign the enquiry as it progresses and even change conceptualization as he/she wishes to. **Operations research** is a kind of decision-oriented research, where in scientific method is used in providing the departments, a quantitative basis for decision-making with respect to the activities under their purview.

1.7 Research Process

Research process consists of a series of steps or actions required for effectively conducting research. The following are the steps that provide useful procedural guidelines regarding the conduct of research:

(1) Formulating the research problem;

(2) Extensive literature survey;

(3) Developing hypothesis;

(4) Preparing the research design;

(5) Determining sample design;

(6) Collecting data;

(7) Execution of the project;

(8) Analysis of data;

(9) Hypothesis testing;

(10) Generalization and interpretation, and

(11) Preparation of the report or presentation of the results.

A brief description of the above stated steps will be helpful.

1. Formulating the research problem:

There are two types of research problems, viz., those which relate to states of nature and those which relate to relationships between variables. At the very outset the researcher must single out the problem he wants to study, i.e., he must decide the general area of interest or aspect of a subject-matter that he would like to inquire into. Initially the problem may be stated in a broad general way and then the ambiguities, if any, relating to the problem be resolved. Then, the feasibility of a particular solution has to be considered before a working formulation of the problem can be set up. The formulation of a general topic into a specific research problem, thus, constitutes the first step in a scientific enquiry. Essentially two steps are involved in formulating the research problem, viz., understanding the problem thoroughly, and rephrasing the same into meaningful terms from an analytical point of view. The best way of understanding the problem is to discuss it with one's own colleagues or with those having some expertise in the matter. In an academic institution the researcher can seek the help from a guide who is usually an experienced man and has several research problems in mind. Often, the guide puts forth the problem in general terms and it is up to the researcher to narrow it down and phrase the problem in operational terms. In private business units or in governmental organisations, the problem is usually earmarked by the administrative agencies with whom the researcher can discuss as to how the problem originally came about and what considerations are involved in its possible solutions.

2. Extensive literature survey:

Once the problem is formulated, a brief summary of it should be written down. It is compulsory for a research worker writing a thesis for a Ph.D. degree to write a synopsis of the topic and submit it to the necessary Committee or the Research Board for approval. At this juncture the researcher should undertake extensive literature survey connected with the problem. For this purpose, the abstracting and indexing journals and published or unpublished bibliographies are the first place to go to. Academic journals, conference proceedings, government reports, books etc., must be tapped depending on the nature of the problem. In this process, it should be remembered that one source will lead to another. The earlier studies, if any, which are similar to the study in hand should be carefully studied. A good library will be a great help to the researcher at this stage.

3. Development of working hypotheses:

After extensive literature survey, researcher should state in clear terms the working hypothesis or hypotheses. Working hypothesis is tentative assumption made in order to draw out and test its logical or empirical consequences. As such the manner in which research hypotheses are developed is particularly important since they provide the focal point for research. They also affect the manner in which tests must be conducted in the analysis of data and indirectly the quality of data which is required for the analysis. In most types of research, the development of working hypothesis plays an important role. Hypothesis should be very specific and limited to the piece of research in hand because it has to be tested. The role of the hypothesis is to guide the researcher by delimiting the area of research and to keep him on the right track. It sharpens his thinking and focuses attention on the more important facets of the problem. It also indicates the type of data required and the type of methods of data analysis to be used. How does one go about developing working hypotheses? The answer is by using the following approach: (a) Discussions with colleagues and experts about the problem, its origin and the objectives in seeking a solution; (b) Examination of data and records, if available, concerning the problem for possible trends, peculiarities and other clues; (c) Review of similar studies in the area or of the studies on similar problems; and (d) Exploratory personal investigation which involves original field interviews on a limited scale with interested parties and individuals with a view to secure greater insight into the practical aspects of the problem. Thus, working hypotheses arise as a result of a-priori thinking about the subject, examination of the available data and material including related studies and the counsel of experts and interested parties.

4. Preparing the research design:

The research problem having been formulated in clear cut terms, the researcher will be required to prepare a research design, i.e., he will have to state the conceptual structure within which research would be conducted. The preparation of such a design facilitates research to be as efficient as possible yielding maximal information. In other words, the function of research design is to provide for the collection of relevant evidence with minimal expenditure of effort, time and money. But how all these can be achieved depends mainly on the research purpose. A flexible research design which provides opportunity for considering many different aspects of a problem is considered appropriate if the purpose of the research study is that of exploration. But when the purpose happens to be an accurate description of a situation or of an association between variables, the suitable design will be one that minimises bias and maximises the reliability of the data collected and analysed. There are several research designs, such as, experimental and non-experimental hypothesis testing. Experimental designs can be either informal designs (such as before-and-after without control, after-only with control, before-and-after with control) or formal designs (such as completely randomized design, randomized block design, Latin square design, simple and complex factorial designs), out of which the researcher must select one for his own project.

5. Determining sample design:

All the items under consideration in any field of inquiry constitute a ‘universe’ or ‘population’. A complete enumeration of all the items in the ‘population’ is known as a census inquiry. It can be presumed that in such an inquiry when all the items are covered no element of chance is left and highest accuracy is obtained. But in practice this may not be true. Even the slightest element of bias in such an inquiry will get larger and larger as the number of observations increases. Moreover, there is no way of checking the element of bias or its extent except through a resurvey or use of sample checks. Besides, this type of inquiry involves a great deal of time, money and energy. Not only this, census inquiry is not possible in practice under many circumstances. For instance, blood testing is done only on sample basis. Hence, quite often we select only a few items from the universe for our study purposes. The items so selected constitute what is technically called a sample. The researcher must decide the way of selecting a sample or what is popularly known as the sample design. In other words, a sample design is a definite plan determined before any data are actually collected for obtaining a sample from a given population. Samples can be either probability samples or non-probability samples. With probability samples each element has a known probability of being included in the sample but the non-probability samples do not allow the researcher to determine this probability. Probability samples are those based on simple random sampling, systematic sampling, stratified sampling, cluster/area sampling whereas non-probability samples are those based on convenience sampling, judgement sampling and quota sampling techniques.

6. Collecting the data:

In dealing with any real life problem it is often found that data at hand are inadequate, and hence, it becomes necessary to collect data that are appropriate. There are several ways of collecting the appropriate data which differ considerably in context of money costs, time and other resources at the disposal of the researcher. Primary data can be collected either through experiment or through survey. If the researcher conducts an experiment, he observes some quantitative measurements, or the data, with the help of which he examines the truth contained in his hypothesis. But in the case of a survey, data can be collected by any one or more of the following ways: (i) By observation (ii) Through personal interview (iii) Through telephone interviews (iv) By mailing of questionnaires (v) Through schedules

7. Execution of the project:

Execution of the project is a very important step in the research process. If the execution of the project proceeds on correct lines, the data to be collected would be adequate and dependable. The researcher should see that the project is executed in a systematic manner and in time. If the survey is to be conducted by means of structured questionnaires, data can be readily machine-processed. In such a situation, questions as well as the possible answers may be coded. If the data are to be collected through interviewers, arrangements should be made for proper selection and training of the interviewers. The training may be given with the help of instruction manuals which explain clearly the job of the interviewers at each step. Occasional field checks should be made to ensure that the interviewers are doing their assigned job sincerely and efficiently. A careful watch should be kept for unanticipated factors in order to keep the survey as much realistic as possible. This, in other words, means that steps should be taken to ensure that the survey is under statistical control so that the collected information is in accordance with the pre-defined standard of accuracy. If some of the respondents do not cooperate, some suitable methods should be designed to tackle this problem. One method of dealing with the non-response problem is to make a list of the non-respondents and take a small sub-sample of them, and then with the help of experts vigorous efforts can be made for securing response.

8. Analysis of data:

After the data have been collected, the researcher turns to the task of analysing them. The analysis of data requires a number of closely related operations such as establishment of categories, the application of these categories to raw data through coding, tabulation and then drawing statistical inferences. The unwieldy data should necessarily be condensed into a few manageable groups and tables for further analysis. Thus, researcher should classify the raw data into some purposeful and usable categories. **Coding** operation is usually done at this stage through which the categories of data are transformed into symbols that may be tabulated and counted. **Editing** is the procedure that improves the quality of the data for coding. With coding the stage is ready for tabulation. **Tabulation** is a part of the technical procedure wherein the classified data are put in the form of tables. The mechanical devices can be made use of at this juncture. A great deal of data, specially in large inquiries, is tabulated by computers. Computers not only save time but also make it possible to study large number of variables affecting a problem simultaneously. Analysis work after tabulation is generally based on the computation of various percentages, coefficients, etc., by applying various well defined statistical formulae. In the process of analysis, relationships or differences supporting or conflicting with original or new hypotheses should be subjected to tests of significance to determine with what validity data can be said to indicate any conclusion(s). For instance, if there are two samples of weekly wages, each sample being drawn from factories in different parts of the same city, giving two different mean values, then our problem may be whether the two mean values are significantly different or the difference is just a matter of chance. Through the use of statistical tests we can establish whether such a difference is a real one or is the result of random fluctuations. If the difference happens to be real, the inference will be that the two samples come from different universes and if the difference is due to chance, the conclusion would be that the two samples belong to the same universe. Similarly, the technique of analysis of variance can help us in analysing whether three or more varieties of seeds grown on certain fields yield significantly different results or not. In brief, the researcher can analyse the collected data with the help of various statistical measures.

9. Hypothesis-testing:

After analysing the data as stated above, the researcher is in a position to test the hypotheses, if any, he had formulated earlier.

Do the facts support the hypotheses or they happen to be contrary? This is the usual question which should be answered while testing hypotheses. Various tests, such as Chi square test, t-test, F-test, have been developed by statisticians for the purpose. The hypotheses may be tested through the use of one or more of such tests, depending upon the nature and object of research inquiry. Hypothesis-testing will result in either accepting the hypothesis or in rejecting it. If the researcher had no hypotheses to start with, generalisations established on the basis of data may be stated as hypotheses to be tested by subsequent researches in times to come.

10. Generalisations and interpretation:

If a hypothesis is tested and upheld several times, it may be possible for the researcher to arrive at generalisation, i.e., to build a theory. As a matter of fact, the real value of research lies in its ability to arrive at certain generalisations. If the researcher had no hypothesis to start with, he might seek to explain his findings on the basis of some theory. It is known as interpretation. The process of interpretation may quite often trigger off new questions which in turn may lead to further researches.

11. Preparation of the report or the thesis:

Finally, the researcher has to prepare the report of what has been done by him. Writing of report must be done with great care. The layout of the report should be as follows: (i) the preliminary pages; (ii) the main text, and (iii) the end matter. In its preliminary pages the report should carry title and date followed by acknowledgements and foreword. Then there should be a table of contents followed by a list of tables and list of graphs and charts, if any, given in the report. The main text of the report should have the following parts: (a) Introduction: It should contain a clear statement of the objective of the research and an explanation of the methodology adopted in accomplishing the research. The scope of the study along with various limitations should as well be stated in this part. (b) Summary of findings: After introduction there would appear a statement of findings and recommendations in non-technical language. If the findings are extensive, they should be summarised. (c) Main report: The main body of the report should be presented in logical sequence and broken-down into readily identifiable sections. (d) Conclusion: Towards the end of the main text, researcher should again put down the results of his research clearly and precisely. In fact, it is the final summing up. At the end of the report, appendices should be enlisted in respect of all technical data. Bibliography, i.e., list of books, journals, reports, etc., consulted, should also be given in the end. Index should also be given specially in a published research report. Report should be written in a concise and objective style in simple language avoiding vague expressions such as 'it seems,' 'there may be', and the like. Charts and illustrations in the main report should be used only if they present the information more clearly and forcibly. Calculated 'confidence limits' must be mentioned and the various constraints experienced in conducting research operations may as well be stated.

Unit II

Sources of Data

In statistical analysis, collection of data plays a significant part. The method of collecting information is divided into two different sections, namely primary data and secondary data.

2.1 Primary Data

Primary data is the data that is collected for the first time through personal experiences or evidence, particularly for research. It is also described as raw data or first-hand information. The mode of assembling the information is costly, as the analysis is done by an agency or an external organisation, and needs human resources and investment. The investigator supervises and controls the data collection process directly. The data is mostly collected through observations, physical testing, mailed questionnaires, surveys, personal interviews, telephonic interviews, case studies, and focus groups, etc.

Collection of Primary Data

Primary data is collected in the course of doing experimental or descriptive research by doing experiments, performing surveys or by observation or direct communication with respondents. Several methods for collecting primary data are given below-

1. Observation Method

It is commonly used in studies relating to behavioural science. Under this method observation becomes scientific tool and the method of data collection for the researcher, when it serves a formulated research purpose and is systematically planned and subjected to checks and controls.

➢ Structured (descriptive) and unstructured (exploratory) observation- When an observation is characterized by careful definition of units to be observed, style of observer, conditions of or observation and selection of pertinent data of observation it is a structured observation. When their characteristics are not thought of in advance or not present. it is an unstructured observation.

➢ Participant, Non-participant and disguised observation- When the observer observes by making himself more or less, the member of the group he is observing, it is participant observation but when the observer observes by detaching himself from the group under observation it is non participant observation. If the observer observes in such manner that his presence is unknown to the people he is observing it is disguised observation.

➢ Controlled (laboratory) and uncontrolled(exploratory) observation- If the observation takes place in the natural setting it is a uncontrolled observation but when observation takes place according to some pre-arranged plans ,involving experimental procedure it is a controlled observation.

Advantages-

- Subjective bias is eliminated.
- Data is not affected by past behaviour or future intentions.
- Natural behaviour of the group can be recorded. Limitations

- Expensive methodology.
- Information provided is limited.
- Unforeseen factors may interfere with the observational task

2. Interview Method

This method of collecting data involves presentation of oral verbal stimuli and deeply in terms of oral- verbal responses. It can be achieved by two ways:-

(A) Personal interview- It requires a person known as interviewer to ask questions generally in a face to face contact to the other person. It can be – **Direct personal investigation**- The interviewer has to collect the information personally from the services concerned. **Indirect oral examination-** The interviewer has to cross examine other persons who are supposed to have a knowledge about the problem. **Structured interviews**- Interviews involving the use of pre-determined questions and of highly standard techniques of recording **Unstructured interviews**- It does not follow a system of pre-determined questions and is characterised by flexibility of approach to questioning. **Focussed interview**- It is meant to focus attention on the given experience of the respondent and its effect. The interviewer may ask questions in any manner or sequence with the aim to explore reasons and motives of the respondent. Clinical interviews- It is concerned with broad underlying feeling and motives or individuals' life experience which are used as method to collect information under this method at the interviewer direction. Non directive interview- The interviewer`s function is to encourage the respondent to talk about the given topic with a bare minimum of direct questioning.

Advantages-

- More information and in depth can be obtained.
- Samples can be controlled.
- There is greater flexibility under this method
    - Personal information can as well be obtained.
- Mis-interpretation can be avoided by unstructured interview

Limitations

- It is an expensive method.
- More time consuming.
- Possibility of imaginary info and less frank responses.
- High skilled interviewer is required

(B) Telephonic interviews-

It requires the interviewer to collect information by contacting respondents on telephone and asking questions or opinions orally.

3. Questionnaire

In this method a questionnaire is sent (mailed) to the concerned respondents who are expected to read, understand and reply on their own and return the questionnaire. It consists of a number of questions printed or typed in a definite order on a form or set of forms. It is advisable to conduct a 'pilot study' which is the rehearsal of the main survey by experts for testing the questionnaire for weaknesses of the questions and techniques used.

Advantages

- Free from bias of interviewer.
- Respondents have adequate time to give answers
- Respondents are easily and conveniently approachable
- Large samples can be used to be more reliable.

Limitations

- Low rate of return of duly filled questionnaire.
- Control over questions is lost once it is sent.
- It is inflexible once it is sent.
- Possibility of ambiguous omission of replies.
- Time taking and slow process.

4. Schedules

This method of data collection is similar to questionnaire method with difference that schedule is being filled by the enumerators specially appointed for the purpose. Enumerators explain the aims and objects of the investigation and may remove any misunderstanding and help the respondents to record answer. Enumerators should be well trained to perform their job, he/she should be honest hardworking and patient. This type of data is helpful in extensive enquiries however it is very expensive.

2.2 Secondary Data

Secondary data are those which have been collected by some other persons for his purpose and published. They are usually in the shape of finished products. It is accessible in the form of data collected from different sources such as government publications, censuses, internal records of the organisation, books, journal articles, websites and reports, etc.

Advantages

õ The information can be collected by incurring least cost.

õ The time requires for obtaining the information is very less.

õ Most of the secondary data are those published by big institutions. So they contain large quantity of information.

Disadvantages

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

Sources of Secondary Data

The various sources of secondary data can be divided into two broad categories:

1. Published sources, and

2. Unpublished sources.

1. Published Sources:

The governmental, international and local agencies publish statistical data, and major among them are explained below:

(a) International Publications: There are some international institutions and bodies like IMF, IBRD and UNO who publish regular and occasional reports on economic and statistical matters.

(b) Official Publications of Central and State Governments: Several departments of the Central and State Governments regularly publish reports on a number of subjects. They gather additional information. Some of the important publications are: The Reserve Bank of India Bulletin, Census of India, Statistical Abstracts of States, Agricultural Statistics of India, Indian Trade Journal, etc.

(c) Semi-Official Publications: Semi-Government institutions like Municipal Corporations, District Boards, Panchayats, etc. Publish reports relating to different matters of public concern.

(d) Publications of Research Institutions: Indian Statistical Institute (I.S.I), Indian Council of Agricultural Research (I.C.A.R), Indian Agricultural Statistics Research Institute (I.A.S.R.I), etc. Publish the findings of their research programmes.

(e) Publications of various Commercial and Financial Institutions

(f) Reports of various Committees and Commissions appointed by the Government as the Raj Committee's Report on

Agricultural Taxation, Wanchoo Committee's Report on Taxation and Black Money, etc. Are also important sources of secondary data.

(g) Journals and News Papers: Journals and News Papers are very important and powerful source of secondary data. Current and important materials on statistics and socioeconomic problems can be obtained from journals and newspapers like Economic Times, Commerce, Capital, Indian Finance, Monthly Statistics of trade etc.

2. Unpublished Sources: Unpublished data can be obtained from many unpublished sources like records maintained by various government and private offices, the theses of the numerous research scholars in the universities or institutions etc. There are varieties of published sources from which one can get information for his research work. The important such sources are;

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

Difference Between Primary data and Secondary data

1. Primary data is Original in character. Secondary data is Not original

2. Primary data are those that are collected for the first time. Secondary data refer to those data that have already been collected by some other person

3. Collection of data is expensive in the case of primary data. Collection of secondary data is less expensive.

4. Primary data is in the shape of raw materials. Secondary data is the shape of finished products

5. No particular precaution or editing is required while using the primary data as these were collected with a definite purpose. Both precaution and editing are essential as secondary data were collected by someone else for his own purpose.

6. These are more reliable and suitable for the enquiry because these are collected for a particular purpose. These are less reliable and less suitable as someone else has collected the data which may not perfectly match our purpose.

2.3 Scales of Measurement

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

- Any series of items which is progressively arranged according to value or magnitude into which an item can be placed according to its quantification.

- A continuous spectrum or series of categories

- Used to represent, usually quantitatively, an items or person's place in that spectrum.

Scale Classification

(A) Level of Measurement

• **Nominal Scale** - Numbers or letters assigned to objects which serve as labels for identification or classification. They are Scales "in name only"

• **Ordinal Scale** - Arranges objects or alternatives according to their magnitude in an ordered relationship. e.g., rating career opportunities as excellent, good, average poor or very poor.

• **Interval Scale** - Interval scales not only indicate order; they also measure order or distance in units of equal intervals. When an interval scale is used to measure psychological attribute, the researcher can comment on the magnitude of differences or compare the average differences on attributes that are measured, but cannot determine the actual strength of the attitude towards an object

• **Ratio Scale** - A ratio scale has equal interval properties of an interval scale but has two additional features:

• Has a true zero. Possible to indicate the complete absence of a property.

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

- ### Likert Scale

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

- ### Semantic Differential

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

- ### Numerical Scales

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

- ### Constant Sum Scale

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

- ### Staple Scale

Measures the direction and intensity of an attitude simultaneously.

2.4 Scaling Techniques

Some of the important scaling techniques are as follows:

✓ **Rating Scale:** It means measuring an attribute by judgement in a continuum. For eg. Students are rated by their teachers. In rating three elements are taken into consideration namely judges, continuum and subjects. Judges must be impartial. Continuum must accommodate the attributes realistically. Subjects should be amenable to rating. Rating scales are generally used for measuring the attitudes and the intensity of attitudes.

✓ **Ranking Scales:** Ranking scales are identical to rating scales. In ranking scales, we make relative the score will place judgements against other similar objects. There are two generally used approaches of ranking scales namely.

1. Method of Paired Comparison where the respondent can express his attitude by making a choice between two objects.

2. Method of Ranking Order where the respondents are asked to rank their choices.

✓ **Attitude Scales**: In this type of scale, the attitude of an individual towards a matter can be known from the score of his responses given on a questionnaire. The score will place him in a scale. He simply expresses his likes or dislikes, agreement or disagreement with the issue involved as given in the forms of questions. On the basis of reply, he is assigned a score which indicates his position. In the attitude scale some relevant statements are to be considered by the respondents. The statements are found in such a way as to be intimately related to the attribute which is sought to be measured.

✓ **Factor Scaling:** This is a type of scaling in which multi dimensions of a complex attitude is identified.

2.5 Validity and Reliability

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

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

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

– Construct

– Criterion related

– Content

– Inter-rater / Intra-rater

- **Construct Validity**

It is the most important type of validity. Construct validity is the degree to which the instrument actually measures whether or not an underlying construct is being measured. For example, does a math test actually measure math achievement? Does a personality test actually measure personality?

Criterion Related Validity

Criterion Related Validity is of two types: -

• Concurrent validity – Degree to which scores on one test are correlated with scores on another test administered at the same time. Only one group is used.

• Predictive validity – Degree to which scores on one test predicts scores on a test administered in the future. Only one group is used.

Reliability

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

• split-half,

• rationale equivalence and inter-rater

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

Measures of Reliability

• Stability (test / re-test)

• Equivalence (alternate forms)

• Equivalence and Stability Combined

• Internal consistency

• Scorer / Rater

Internal Consistency

Questions on tests should be equally difficult throughout entire instrument

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

Unit III

Primary Data Collection

3.1 Observation and Its Different Types

The observation method is the most commonly used method specially in studies relating to behavioural sciences. In a way we all observe things around us, but this sort of observation is not scientific observation. Observation becomes a scientific tool and the method of data collection for the researcher, when it serves a formulated research purpose, is systematically planned and recorded and is subjected to checks and controls on validity and reliability. Under the observation method, the information is sought by way of investigator's own direct observation without asking from the respondent. For instance, in a study relating to consumer behaviour, the investigator instead of asking the brand of wrist watch used by the respondent, may himself look at the watch.

Advantages

- Subjective bias is eliminated, if observation is done accurately.

- The information obtained under this method relates to what is currently happening; it is not complicated by either the past behaviour or future intentions or attitudes.

- This method is independent of respondents' willingness to respond and as such is relatively less demanding of active cooperation on the part of respondents as happens to be the case in the interview or the questionnaire method. This method is particularly suitable in studies which deal with subjects (i.e., respondents) who are not capable of giving verbal reports of their feelings for one reason or the other.

Limitations.

- It is an expensive method.
- The information provided by this method is very limited.
- Sometimes unforeseen factors may interfere with the observational task. At times, the fact that some people are rarely accessible to direct observation creates obstacle for this method to collect data effectively.

Types of Observation

- **Structured and Unstructured Observation**

In case the observation is characterised by a careful definition of the units to be observed, the style of recording the observed information, standardised conditions of observation and the selection of pertinent data of observation, then the observation is called as **structured observation**. But when observation is to take place without these characteristics to be thought of in advance, the same is termed as **unstructured observation.** Structured observation is considered appropriate in descriptive studies, whereas in an exploratory study the observational procedure is most likely to be relatively unstructured.

- **Participant and Non-Participant Observation**

This distinction depends upon the observer's sharing or not sharing the life of the group he is observing. If the observer observes by making himself, more or less, a member of the group he is observing so that he can experience what the members of the group experience, the observation is called as the **participant observation**. But when the observer observes as a detached emissary without any attempt on his part to experience through participation what others feel, the observation of this type is often termed as **non-participant observation**. (When the observer is observing in such a manner that his presence may be unknown to the people he is observing, such an observation is described as disguised observation).

- **Controlled and Uncontrolled Observation**.

If the observation takes place in the natural setting, it may be termed as **uncontrolled observation**, but when observation takes place according to definite pre-arranged plans, involving experimental procedure, the same is then termed **controlled observation**. In non-controlled observation, no attempt is made to use precision instruments. The major aim of this type of observation is to get a spontaneous picture of life and persons. It has a tendency to supply naturalness and completeness of behaviour, allowing sufficient time for observing it. But in controlled observation, we use mechanical (or precision) instruments as aids to accuracy and standardisation. Such observation has a tendency to supply formalised data upon which generalisations can be built with some degree of assurance.

Features of observation

- Physical & mental activity
- Selective
- Purposive & not informal

• Grasps the significant events & occurrences

• Should be exact & based on standardized tools of research.

Advantages

• Actual or habits of person are observed

• Obtain information from those who are unable to effectively communicate in written or oral form

• No better way to gather information than through observation

• Most reliable method of data collection

Disadvantages

• Result of observation depends on the skill of the observer

• Options and attitudes cannot be obtained by observation

• It should be expensive to tie up personnel in such tasks

• The researcher's findings are limited to those observed

3.2 Qualitative Research Methods

Qualitative research is a type of scientific research. In general terms, scientific research consists of an investigation that:

• seeks answers to a question

• systematically uses a predefined set of procedures to answer the question

• collects evidence

• produces findings that were not determined in advance

• produces findings that are applicable beyond the immediate boundaries of the study

Qualitative research is especially effective in obtaining culturally specific information about the values, opinions, behaviours, and social contexts of particular populations. The three most common qualitative methods, are participant observation, in-depth interviews, and focus groups. Each method is particularly suited for obtaining a specific type of data.

• **Participant observation** is appropriate for collecting data on naturally occurring behaviors in their usual contexts.

• **In-depth interviews** are optimal for collecting data on individuals' personal histories, perspectives, and experiences, particularly when sensitive topics are being explored.

• **Focus groups** are effective in eliciting data on the cultural norms of a group and in generating broad overviews of issues of concern to the cultural groups or subgroups represented.

3.3 Focus Group

A focus group discussion is an interaction among one or more experts and more than one individual with the intention of gathering data. In focus group discussion investigators interview people with common qualities or experience for eliciting ideas, thoughts and perceptions about particular subject areas or certain issues associated with an area of interest.

Advantages of focus group discussion in research:

- It is an inexpensive and fast method of acquiring valuable data.
- Co-workers and friends are more comfortable in voicing views in each other's company than on their own with the researcher.
- Participants are given a chance to reflect or react to the viewpoint of others with which they may disagree or of which they're unaware.
- The dynamic discussion between participants stimulates their thoughts and reminds them of their own thoughts regarding the research subject.
- All individuals along with the researcher have a chance to ask questions, and these will produce more information when compared with individual interviews.
- Informants can build on the answers of others.
- The researcher can clarify clashes among participants and ask about these diverse opinions

Disadvantages of focus group discussion in research:

- The researcher has trouble controlling discussion and managing the process in comparison to individual interview.
- A few individuals could possibly be introverts while others take control of the debate and impact the end result, or possibly even introduce bias.

- The group climate can hinder or fail to energize the individual, or it can be livelier and produce more data.
- Recording data can present difficulties; it is actually not possible to record when so many participants are speaking at the same time. Also tape recorders may record just those who are closer.
- Data analysis could be time consuming and challenging task.
- Focus group discussions usually are not replicable. The validity and dependability of the findings are tough to ascertain on their own.

3.4 Behaviour Mapping

Behavioural mapping is a research tool used to observe and record behaviours in a particular setting at a particular time. Behavioural mapping can be either place-based or individual-based, depending on whether the focus of observation is to identify locational or temporal patterns of behaviours.

3.5 Delphi Study

The Delphi technique is a well-established approach to answering a research question through the identification of a consensus view across subject experts. It allows for reflection among participants, who are able to distinct and reconsider their opinion based on the anonymised opinions of others. The Delphi technique is a quantitative option aimed at generating consensus. It solicits opinions from groups in an iterative process of answering questions. After each round the responses are summarised and redistributed for discussion in the next round

How to Conduct a Delphi Survey

1. Develop the Delphi Survey Research Questions.
2. Design the Delphi Survey Research.
3. Construct a Delphi Survey Research Sample.
4. Develop Round One of the Delphi Questionnaire.
5. Conduct a Pilot Study and Analyze Outcomes.
6. Send Out and Analyze Round-One Questionnaire.

3.6 Extreme Users‘ Interview

Extreme User Interviews is a method employed to understand user responses and insights at two opposite ends of the usage spectrum. An ‘extreme’ participant should exhibit sharpened traits of your target users. For example, if your research is focused on a kitchen appliance, an interview with a professional chef will give you quality insights into the experience of cooking. Similarly, someone who barely cooks are at the other end of the spectrum and can help shed light on the cooking experience.

Advantages

- **Meaningful Insights:** Quite relevant and meaningful insights can be gathered from extreme user interviews
- **No peer pressure if done individually:** If extreme user interviews are done one-on-one, there is no worry about individuals getting peer-pressured into a response that they don’t entirely agree with.

- **Adaptive:** The researcher can adapt as per the quality and kind of responses being provided by the extreme users.

- **Empathy and Connection:** The researcher can give his/her undivided attention to the participants as well as connect with individual participants uniquely. This can allow the participants to feel comfortable during the interview while being authentic as well as open about the situation or issues being discussed.

- **Wide range of data collection:** In case of extreme-user interviews, because the sample size of participants is small, usually individuals are picked based on their expertise or amateurism on the subject of research. Therefore, the data collected spreads over a wider spectrum than otherwise.

Disadvantages

✓ **Participant identification and recruitment:** Careful identification and further recruitment of participants can make or break the research.

✓ **Time Consuming**: The participant identification, definition, recruitment and then interview is time consuming.

✓ **Relatively expensive:** As the interview involves experts in their field, the participant recruitment costs would be higher than usual

3.7 Quantitative Research Methods

Quantitative research is defined as a systematic investigation of phenomena by gathering quantifiable data and performing statistical, mathematical, or computational techniques. Quantitative research collects information from existing and potential customers using sampling methods and sending out online surveys, online polls, questionnaires, etc., the results of which can be depicted in the form of numerical. After careful understanding of these numbers to predict the future of a product or service and make changes accordingly.

Quantitative outcome research is mostly conducted in the social sciences using the statistical methods used above to collect quantitative data from the research study. In this research method, researchers and statisticians deploy mathematical frameworks and theories that pertain to the quantity under question.

Quantitative research templates are objective, elaborate, and many times, even investigational. The results achieved from this research method are logical, statistical, and unbiased. Data collection happened using a structured method and conducted on larger samples that represent the entire population.

As mentioned above, quantitative research is data-oriented. There are two methods to conduct quantitative research. They are:

1.Primary quantitative research methods

2.Secondary quantitative research methods

1. Primary quantitative research Methods

There are four different types of quantitative research methods:

Primary quantitative research is the most widely used method of conducting market research. The distinct feature of primary research is that the researcher focuses on collecting data directly rather than depending on data collected from previously done research. It includes,

1. Survey Research:

Survey Research is the most fundamental tool for all quantitative outcome research methodologies and studies. Surveys used to ask questions to a sample of respondents, using various types such as online polls, online surveys, paper questionnaires, web-intercept surveys, etc. Every small and big organization intends to understand what their customers think about their products and services, how well are new features faring in the market and other such details. By conducting survey research, an organization can ask multiple survey questions, collect data from a pool of customers, and analyse this collected data to produce numerical results. It is the first step towards collecting data for any research. This type of research can be conducted with a specific target audience group and also can be conducted across multiple groups along with comparative analysis. A prerequisite for this type of research is that the sample of respondents must have randomly selected members. This way, a researcher can easily maintain the accuracy of the obtained results as a huge variety of respondents will be addressed using random selection. Traditionally, survey research was conducted face-to-face or via phone calls but with the progress made by online mediums such as email or social media, survey research has spread to online mediums as well.

Traditionally, survey research was conducted face-to-face or via phone calls but with the progress made by online mediums such as email or social media, survey research has spread to online mediums as well. There are two types of surveys, either of which can be chosen based on the time in-hand and the kind of data required:

- **Cross-sectional surveys**: Cross-sectional surveys are observational surveys conducted in situations where the researcher intends to collect data from a sample of the target population at a given point in time. Researchers can evaluate various variables at a particular time. Data gathered using this type of survey is from people who depict similarity in all variables except the variables which are considered for research. Throughout the survey, this one variable will stay constant.

- **Longitudinal surveys**: Longitudinal surveys are also observational surveys but, unlike cross-sectional surveys, longitudinal surveys are conducted across various time durations to observe a change in respondent behavior and thought-processes. This time can be days, months, years, or even decades. For instance, a researcher planning to analyse the change in buying habits of teenagers over 5 years will conduct longitudinal surveys.

2. Correlational research:

A comparison between two entities is invariable. Correlation research is conducted to establish a relationship between two closely-knit entities and how one impacts the other and what are the changes that are eventually observed. This research method is carried out to give value to naturally occurring relationships, and a minimum of two different groups are required to conduct this quantitative research method successfully. Without assuming various aspects, a relationship between two groups or entities must be established.

Researchers use this quantitative research design to correlate two or more variables using mathematical analysis methods. Patterns, relationships, and trends between variables are concluded as they exist in their original set up. The impact of one of these variables on the other is observed along with how it changes the relationship between the two variables. Researchers tend to manipulate one of the variables to attain the desired results. Ideally, it is advised not to make conclusions merely based on correlational research. This is because it is not mandatory that if two variables are in sync that they are interrelated

3.**Causal-comparative research**:

This research method mainly depends on the factor of comparison. Also called quasi-experimental research, this quantitative research method is used by researchers to conclude the cause-effect equation between two or more variables, where one variable is dependent on the other independent variable. The independent variable is established but not manipulated, and its impact on the dependent variable is observed. These variables or groups must be formed as they exist in the natural set up. As the dependent and independent variables will always exist in a group, it is advised that the conclusions are carefully established by keeping all the factors in mind.

Causal-comparative research is not restricted to the statistical analysis of two variables but extends to analysing how various variables or groups change under the influence of the same changes. This research is conducted irrespective of the type of relation that exists between two or more variables. Statistical analysis is used to distinctly present the outcome obtained using this quantitative research method.

4. Experimental research:

Also known as true experimentation, this research method is reliant on a theory. Experimental research, as the name suggests, is usually based on one or more theories. This theory has not been proven in the past and is merely a supposition. In experimental research, an analysis is done around proving or disproving the statement. This research method is used in natural sciences. Traditional research methods are more effective than modern techniques.

There can be multiple theories in experimental research. A theory is a statement that can be verified or refuted. After establishing the statement, efforts are made to understand whether it is valid or invalid. This type of quantitative research method is mainly used in natural or social sciences as there are various statements which need to be proved right or wrong.

2. Secondary quantitative Research Methods

Secondary quantitative research or desk research is a research method that involves using already existing data or secondary data. Existing data is summarized and collocted to increase the overall effectiveness of research. This research method involves the collection of quantitative data from existing data sources like the internet, government resources, libraries, research reports, etc. Secondary quantitative research helps to validate the data that is collected from primary quantitative research as well as aid in strengthening or proving or disproving previously collected data.

Following are five popularly used secondary quantitative research methods:

1. **Data available on the internet:** With the high penetration of internet and mobile devices, it has become increasingly easy to conduct quantitative research using the internet. Information about most research topics is available online, and this aids in boosting the validity of primary quantitative data as well as proving the relevance of previously collected data.

2. **Government and non-government sources:** Secondary quantitative research can also be conducted with the help of government and non-government sources that deal with market research reports. This data is highly reliable and in-depth and hence, can be used to increase the validity of quantitative research design.

3. **Public libraries:** Now a sparingly used method of conducting quantitative research, it is still a reliable source of information though. Public libraries have copies of important research that were conducted earlier. They are a storehouse of valuable information and documents from which information can be extracted.

4. **Educational institutions:** educational institutions conduct in-depth research on multiple topics, and hence, the reports that they publish are an important source of validation in quantitative research.

5. **Commercial information sources:** Local newspapers, journals, magazines, radio, and TV stations are a great source to obtain data for secondary quantitative research. These commercial information sources have in-depth, first-hand information on economic developments, political agenda, market research, demographic segmentation, and similar subjects.

Characteristics of Quantitative Research Methods

Some distinctive characteristics of quantitative research are:

- **Structured tools:** Structured tools such as surveys, polls, or questionnaires are used to gather quantitative data. Using such structure methods helps in collecting in-depth and actionable data from the survey respondents.

- **Sample size:** Quantitative research is conducted on a significant sample size that represents the target market. Appropriate sampling methods have to be used when deriving the sample to fortify the research objective

- **Closed-ended questions:** Closed-ended questions are created per the objective of the research. These questions help collect quantitative data and hence, are extensively used in quantitative research.

- **Prior studies:** Various factors related to the research topic are studied before collecting feedback from respondents.

- **Quantitative data:** Usually, quantitative data is represented by tables, charts, graphs, or any other non-numerical form. This makes it easy to understand the data that has been collected as well as prove the validity of the market research.

- **Generalization of results:** Results of this research method can be generalized to an entire population to take appropriate actions for improvement.

3.8 Various Types of Interviews

The interview method of collecting data involves presentation of oral-verbal stimuli and reply in terms of oral-verbal responses. This method can be used through personal interviews and, if possible, through telephone interviews.

(a) Personal interviews: Personal interview method requires a person known as the interviewer asking questions generally in a face-to-face contact to the other person or persons. This sort of interview may be in the form of direct personal investigation or it may be indirect oral investigation. In the case of direct personal investigation, the interviewer has to collect the information personally from the sources concerned. He has to be on the spot and has to meet people from whom data have to be collected. This method is particularly suitable for intensive investigations. But in certain cases, it may not be possible or worthwhile to contact directly the persons concerned or on account of the extensive scope of enquiry, the direct personal investigation technique may not be used. In such cases an indirect oral examination can be conducted under which the interviewer has to cross-examine other persons who are supposed to have knowledge about the problem under investigation and the information, obtained is recorded.

Most of the commissions and committees appointed by government to carry on investigations make use of this method. The method of collecting information through personal interviews is usually carried out in a structured way. As such we call the interviews as **structured interviews**. Such interviews involve the use of a set of predetermined questions and of highly standardised techniques of recording. Thus, the interviewer in a structured interview follows a rigid procedure laid down, asking questions in a form and order prescribed. As against it, the unstructured interviews are characterised by a flexibility of approach to questioning.

Unstructured interviews do not follow a system of pre-determined questions and standardised techniques of recording information. In a non-structured interview, the interviewer is allowed much greater freedom to ask, in case of need, supplementary questions or at times he may omit certain questions if the situation so requires. He may even change the sequence of questions. He has relatively greater freedom while recording the responses to include some aspects and exclude others.

Focussed interview is meant to focus attention on the given experience of the respondent and its effects. Under it the interviewer has the freedom to decide the manner and sequence in which the questions would be asked and has also the freedom to explore reasons and motives. The main task of the interviewer in case of a focussed interview is to confine the respondent to a discussion of issues with which he seeks conversance. Such interviews are used generally in the development of hypotheses and constitute a major type of unstructured interviews.

Cinical interview is concerned with broad underlying feelings or motivations or with the course of individual's life experience. The method of eliciting information under it is generally left to the interviewer's discretion. In case of non-directive interview, the interviewer's function is simply to encourage the respondent to talk about the given topic with a bare minimum of direct questioning. The interviewer often acts as a catalyst to a comprehensive expression of the respondents' feelings and beliefs and of the frame of reference within which such feelings and beliefs take on personal significance.

Merits of Personal Interview

- More information and that too in greater depth can be obtained.

- Interviewer by his own skill can overcome the resistance, if any, of the respondents; the interview method can be made to yield an almost perfect sample of the general population.

- There is greater flexibility under this method as the opportunity to restructure questions is always there, especially in case of unstructured interviews.

- Observation method can as well be applied to recording verbal answers to various questions.

- Personal information can as well be obtained easily under this method.

- Samples can be controlled more effectively as there arises no difficulty of the missing returns; non-response generally remains very low.

- The interviewer can usually control which person(s) will answer the questions. This is not possible in mailed questionnaire approach. If so desired, group discussions may also be held

- The interviewer may catch the informant off-guard and thus may secure the most spontaneous reactions than would be the case if mailed questionnaire is used.

- The language of the interview can be adopted to the ability or educational level of the person interviewed and as such misinterpretations concerning questions can be avoided.

- The interviewer can collect supplementary information about the respondent’s personal characteristics and environment which is often of great value in interpreting results.

Demerits

- It is a very expensive method, especially when large and widely spread geographical sample is taken.

- There remains the possibility of the bias of interviewer as well as that of the respondent; there also remains the headache of supervision and control of interviewers.

- Certain types of respondents such as important officials or executives or people in high income groups may not be easily approachable under this method and to that extent the data may prove inadequate.
- This method is relatively more-time-consuming, especially when the sample is large and recalls upon the respondents are necessary.
- The presence of the interviewer on the spot may over-stimulate the respondent, sometimes even to the extent that he may give imaginary information just to make the interview interesting.
- Under the interview method the organisation required for selecting, training and supervising the field-staff is more complex with formidable problems.
- Interviewing at times may also introduce systematic errors.
- Effective interview presupposes proper rapport with respondents that would facilitate free and frank responses. This is often a very difficult requirement.

(b). Mail Interview

Put very simply, e-mail interviewing refers to conducting interviews via e-mail, asynchronously, which allows the respondent to answer questions at their own pace and over a relatively long period of time (in comparison to traditional interviewing methods).

Benefits of email interview

- ✓ To reach respondents around the world
- ✓ More freedom
- ✓ Save time and money

(c)Telephonic Interviews

This method of collecting information consists in contacting respondents on telephone itself. It is not a very widely used method, but plays important part in industrial surveys, particularly in developed regions.

Merits

1. It is more flexible in comparison to mailing method.
2. It is faster than other methods i.e., a quick way of obtaining information.
3. It is cheaper than personal interviewing method; here the cost per response is relatively low.
4. Recall is easy; call-backs are simple and economical.
5. There is a higher rate of response than what we have in mailing method; the non-response is generally very low.
6. Replies can be recorded without causing embarrassment to respondents.
7. Interviewer can explain requirements more easily.
8. At times, access can be gained to respondents who otherwise cannot be contacted for one reason or the other.
9. No field staff is required.
10. Representative and wider distribution of sample is possible.

Demerits

1. Little time is given to respondents for considered answers; interview period is not likely to exceed five minutes in most cases.
2. Surveys are restricted to respondents who have telephone facilities.
3. Extensive geographical coverage may get restricted by cost considerations.
4. It is not suitable for intensive surveys where comprehensive answers are required to various questions.
5. Possibility of the bias of the interviewer is relatively more.
6. Questions have to be short and to the point; probes are difficult to handle

3.9 Pilot Survey and Its Conduct

Pilot study is a standard scientific tool for 'soft' research, allowing scientists to conduct a preliminary analysis before committing to a complete study or experiment. A pilot study is a mini-version of a full-scale study or a trial run done in preparation of the complete study. The latter is also called a ‘feasibility’ study. It can also be a specific pre-testing of research instruments, including questionnaires or interview schedules.

Importance of Pilot study in social research.

➢ It often provides the researcher with ideas, approaches, clues the researcher may not have foreseen before conducting the study. Such ideas and clues increase the chances of getting clearer findings in the main study.

- It permits a thorough check of the planned statistical and analytical procedures, giving the researcher a chance to evaluate their usefulness to the data. The researcher may then be able to make needed alterations in the data collecting methods and therefore analyse data in the main study more efficiently.

- It can greatly reduce the number of unanticipated problems because the researcher has all opportunity to redesign parts of his/her study to overcome difficulties that the pilot study reveals.

- It may save lot of time and money. The pilot study almost always provides enough data for the researcher to decide whether to go ahead with the main study.

- In the pilot study, the researcher may try out a number of alternative measures and then select those that produce the clearest result for the main study.

- Pilot study is especially beneficial for students. The less research experience the student has, the more s/he likely to benefit from a pilot study. Because of that possibility the student should attempt a pilot study whenever possible.

- A pilot study also helps in answering methodological questions.

Steps in Conducting a Pilot study

Pilot studies can be based on quantitative and/or qualitative methods and large-scale studies might employ a number of pilot studies before the main survey is conducted. The researchers may start with "qualitative data collection and analysis on a relatively unexplored topic, using the results to design a subsequent quantitative phase of the study" .

- The first phase of a pilot might involve using in-depth interviews or focus groups to establish the issues to be addressed in a large-scale questionnaire survey.

- Next the questionnaire, e.g., the wording and the order of the questions, or the range of answers/options on multiple-choice questions, might be piloted.

- A final pilot could be conducted to test the research process, e.g., the different ways of distributing and collecting the questionnaires.

Reasons for Conducting a Pilot Study

Pilot studies are conducted for a range of different reasons. The most important reasons are as follows:

❖ Developing and testing adequacy of research instrument

❖ Assessing the feasibility of a (full-scale) study/survey

❖ Designing a research protocol

❖ Assessing whether the research protocol is realistic and workable

❖ Establishing whether the sampling frame and technique are effective

❖ Assessing the likely success of proposed recruitment approaches

- Identifying logistical problems which might occur using proposed methods
- Estimating variability in outcomes to help determining sample size
- Collecting preliminary data
- Determining what resources (finance, staff) are needed for a planned study
- Assessing the proposed data analysis techniques to uncover potential problems
- Developing a research question and research plan
- Training a researcher in as many elements of the research process as possible
- Convincing funding bodies that the research team is competent and knowledgeable
- Convincing funding bodies that the main study is feasible and worth funding
- Convincing other stakeholders that the main study is worth supporting

3.10 Components and Design of Questionnaire

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

Objectives

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

Structuring and Designing the Questionnaire

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

Cover Note

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

Developing a Questionnaire

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

Major Decisions

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

Question Content

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

Form and Layout

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

Determining the Order of Questions

• Start with easy and interesting questions.

• General to specific questions (funnel sequence).

• Use filter questions (and prompters).

• Ask sensitive or potentially embarrassing questions at the end of the questionnaire.

• Use alternative phrasings of the same question to yield more accurate

3.11 Open ended question Vs. Multiple choice questions

Open-Ended questions –

The respondent is asked to provide his or her own answers. Open-ended questions must be coded before they can be processed for computer analysis. Do you intend to go on an outstation holiday within the next six months?

Closed-Ended Questions –

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

Multiple-Choice Questions

The researcher provides a choice of answers and respondents are asked to select one or more of the alternatives given. Do you intend to go on an outstation holiday within the next six months?

- Definitely will not go
- Probably will not go
- Undecided
- Probably will go
- Definitely will go
- Other (please specify)

Dichotomous Questions

It has only two response alternatives: Yes or No, agree or disagree, and so on. Often, the two alternatives of interest are supplemented by a neutral alternative, such as “No opinion,” “don't know,” “both,” or “none.” Do you intend to go on an outstation holiday within the next six months?

- Yes
- No
- Don't know

Unit IV

Sampling

4.1 Population Defined

All items in any field of inquiry constitute a ‘Universe’ or ‘Population.’

4.2 Sampling Frame

Sampling frame is the list of elements from which the sample is actually drawn. Actually sampling frame is nothing but correct list of population. Example: Telephone directory,

4.3 Sampling Vs. Census

A complete enumeration of all items in the ‘population’ is known as a census inquiry. It can be presumed that in such an inquiry, when all items are covered, no element of chance is left and highest accuracy is obtained. But in practice this may not be true. Even the slightest element of bias in such an inquiry will get larger and larger as the number of observations increases. Moreover, there is no way of checking the element of bias or its extent except through a resurvey or use of sample checks. Besides, this type of inquiry involves a great deal of time, money and energy. Therefore, when the field of inquiry is large, this method becomes difficult to adopt because of the resources involved. At times, this method is practically beyond the reach of ordinary researchers. Perhaps, government is the only institution which can get the complete enumeration carried out.

Even the government adopts this in very rare cases such as population census conducted once in a decade. Further, many a time it is not possible to examine every item in the population, and sometimes it is possible to obtain sufficiently accurate results by studying only a part of total population. In such cases there is no utility of census surveys.

However, it needs to be emphasised that when the universe is a small one, it is no use resorting to a sample survey. When field studies are undertaken in practical life, considerations of time and cost almost invariably lead to a selection of respondents i.e., selection of only a few items. The respondents selected should be as representative of the total population as possible in order to produce a miniature cross-section. The selected respondents constitute what is technically called a 'sample' and the selection process is called 'sampling technique.' The survey so conducted is known as 'sample survey'. Algebraically, let the population size be N and if a part of size n (which is $< N$) of this population is selected according to some rule for studying some characteristic of the population, the group consisting of these n units is known as 'sample'. Researcher must prepare a sample design for his study i.e., he must plan how a sample should be selected and of what size such a sample would be.

Steps in Selecting a Sample

While developing a sampling design, the researcher must pay attention to the following points:

(i) Type of universe: The first step in developing any sample design is to clearly define the set of objects, technically called the Universe, to be studied. The universe can be finite or infinite. In finite universe the number of items is certain, but in case of an infinite universe the number of items is infinite, i.e., we cannot have any idea about the total number of items. The population of a city, the number of workers in a factory and the like are examples of finite universes, whereas the number of stars in the sky, listeners of a specific radio programme, throwing of a dice etc. are examples of infinite universes.

(ii) Sampling unit: A decision has to be taken concerning a sampling unit before selecting sample. Sampling unit may be a geographical one such as state, district, village, etc., or a construction unit such as house, flat, etc., or it may be a social unit such as family, club, school, etc., or it may be an individual. The researcher will have to decide one or more of such units that he has to select for his study.

(iii) Source list: It is also known as 'sampling frame' from which sample is to be drawn. It contains the names of all items of a universe (in case of finite universe only). If source list is not available, researcher has to prepare it. Such a list should be comprehensive, correct, reliable and appropriate. It is extremely important for the source list to be as representative of the population as possible.

(iv) Size of sample: This refers to the number of items to be selected from the universe to constitute a sample. This a major problem before a researcher. The size of sample should neither be excessively large, nor too small. It should be optimum. An optimum sample is one which fulfils the requirements of efficiency, representativeness, reliability and flexibility. While deciding the size of sample, researcher must determine the desired precision as also an acceptable confidence level for the estimate. The size of population variance needs to be considered as in case of larger variance usually a bigger sample is needed. The size of population must be kept in view for this also limits the sample size. The parameters of interest in a research study must be kept in view, while deciding the size of the sample. Costs too dictate the size of sample that we can draw. As such, budgetary constraint must invariably be taken into consideration when we decide the sample size.

(v) Parameters of interest: In determining the sample design, one must consider the question of the specific population parameters which are of interest. For instance, we may be interested in estimating the proportion of persons with some characteristic in the population, or we may be interested in knowing some average or the other measure concerning the population. There may also be important sub-groups in the population about whom we would like to make estimates. All this has a strong impact upon the sample design we would accept.

(**vi) Budgetary constraint**: Cost considerations, from practical point of view, have a major impact upon decisions relating to not only the size of the sample but also to the type of sample. This fact can even lead to the use of a non-probability sample.

(**vii) Sampling procedure**: Finally, the researcher must decide the type of sample he will use i.e., he must decide about the technique to be used in selecting the items for the sample. In fact, this technique or procedure stands for the sample design itself. There are several sample designs (explained in the pages that follow) out of which the researcher must choose one for his study. Obviously, he must select that design which, for a given sample size and for a given cost, has a smaller sampling error.

4.4 Types of Sampling Methods

Probability Sampling

Probability sampling is also known as ‘choice sampling’ or ‘random sampling’. Under this sampling design, every item of the universe has an equal chance of being included in the sample. In a way, it is a lottery method under which individual units are selected from the whole group, not deliberately, but by using some mechanical process. Therefore, only chance would determine whether an item or the other would be included in the sample or not. The results obtained from probability or random sampling would be assured in terms of probability.

There are four main types of probability sampling:

- **Simple random sampling:** As the name indicates, simple random sampling is nothing but a random selection of elements for a sample. This sampling technique is implemented where the target population is considerably large.

- **Stratified random sampling**: In the stratified random sampling method, a large population is divided into groups (strata), and members of a sample are chosen randomly from these strata. The various segregated strata should ideally not overlap one another.

- **Cluster sampling:** Cluster sampling is a probability sampling method using which the main segment is divided into clusters, usually using geographic and demographic segmentation parameters.

- **Systematic sampling:** Systematic sampling is a technique where the starting point of the sample is chosen randomly, and all the other elements are chosen using a fixed interval. This interval is calculated by dividing the population size by the target sample size.

Non-probability sampling

Non-probability sampling is where the researcher's knowledge and experience are used to create samples. Because of the involvement of the researcher, not all the members of a target population have an equal probability of being selected to be a part of a sample.

There are five non-probability sampling models:

- **Convenience sampling**: In convenience sampling, elements of a sample are chosen only due to one prime reason: their proximity to the researcher. These samples are quick and easy to implement as there is no other parameter of selection involved.

- **Consecutive sampling**: Consecutive sampling is quite similar to convenience sampling, except for the fact that researchers can choose a single element or a group of samples and conduct research consecutively over a significant period and then perform the same process with other samples.

- **Quota sampling:** Using quota sampling, researchers can select elements using their knowledge of target traits and personalities to form strata. Members of various strata can then be chosen to be a part of the sample as per the researcher's understanding.

- **Snowball sampling**: Snowball sampling is conducted with target audiences, which are difficult to contact and get information. It is popular in cases where the target audience for research is rare to put together.

- **Judgmental sampling:** Judgmental sampling is a non-probability sampling method where samples are created only based on the researcher's experience and skill.

4.5 Determination of Sample Size

'Sample size' is a market research term used for defining the number of individuals included to conduct research. Researchers choose their sample based on demographics, such as age, gender, or physical location. The total number of individuals in a particular sample is the sample size.

Terms associated with Sample size determination

Before we jump into sample size determination, let's take a look at the terms you should know:

1. **Population size:** Population size is how many people fit your demographic. For example, you want to get information on doctors residing in North America. Your population size is the total number of doctors in North America. Your population size doesn't always have to be that big. Smaller population sizes can still give you accurate results as long as you know who you're trying to represent.

2. **Confidence level:** Confidence level tells you how sure you can be that your data is accurate. It is expressed as a percentage and aligned to the confidence interval. For example, if your confidence level is 90%, your results will most likely be 90% accurate.

3. **The margin of error (confidence interval):** When it comes to surveys, there's no way to be 100% accurate. Confidence intervals tell you how far off from the population means you're willing to allow your data to fall. A margin of

error describes how close you can reasonably expect a survey result to fall relative to the real population value. Remember, if you need help with this information, you can use our margin of error calculator.

4. **Standard deviation:** Standard deviation is the measure of the dispersion of a data set from its mean. It measures the absolute variability of a distribution. The higher the dispersion or variability, the greater the standard deviation and the greater the magnitude of the deviation. For example, you have already sent out your survey. How much variance do you expect in your responses? That variation in response is the standard of deviation.

Sample size calculation

With all the necessary terms defined, it's time to learn how to determine sample size using a sample calculation formula. Your confidence level corresponds to a Z-score. This is a constant value needed for this equation. Here are the z-scores for the most common confidence levels:

90% – Z Score = 1.645

95% – Z Score = 1.96

99% – Z Score = 2.576

If you choose a different confidence level, various online tools can help you find your score.

Necessary Sample Size = (Z-score)2 * Std.Dev*(1-StdDev) / (margin of error)2

Here is an example of how the math works, assuming you chose a 90% confidence level, .6 standard deviation, and a margin of error (confidence interval) of +/- 4%.

((1.64)2 x .6(.6)) / (.04)2

(2.68x .0.36) / .0016

.9648 / .0016

=603

4.6 Sources of Error in Measurement

Measurement should be precise and unambiguous in an ideal research study. This objective, however, is often not met with in entirety. As such the researcher must be aware about the sources of error in measurement. The following are the possible sources of error in measurement

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

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

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

4.7 Sampling and Non-Sampling Errors and Measures to Reduce Errors.

(1) Sampling Error

In a sample survey, since only a small portion of the population is studied, its results are bound to differ from the census results and thus, have a certain amount of error. In statistics the word error is used to denote the difference between the true value and the estimated or approximated value. This error would always be there no matter that the sample is drawn at random and that it is highly representative. This error is attributed to fluctuations of sampling and is called sampling error. Sampling error exist due to the fact that only a sub set of the population has been used to estimate the population parameters and draw inferences about the population. Thus, sampling error is present only in a sample survey and is completely absent in census method.

Sampling errors occur primarily due to the following reasons:

1. **Faulty selection of the sample**: Some of the bias is introduced by the use of defective sampling technique for the selection of a sample e.g., Purposive or judgment sampling in which the investigator deliberately selects a representative sample to obtain certain results. This bias can be easily overcome by adopting the technique of simple random sampling.

2**. Substitution**: When difficulties arise in enumerating a particular sampling unit included in the random sample, the investigators usually substitute a convenient member of the population. This obviously leads to some bias since the characteristics possessed by the substituted unit will usually be different from those possessed by the unit originally included in the sample.

3. **Faulty demarcation of sampling units**: Bias due to defective demarcation of sampling units is particularly significant in area surveys such as agricultural experiments in the field of crop cutting surveys etc. In such surveys, while dealing with border line cases, it depends more or less on the discretion of the investigator whether to include them in the sample or not.

4. **Error due to bias in the estimation method**: Sampling method consists in estimating the parameters of the population by appropriate statistics computed from the sample. Improper choice of the estimation techniques might introduce the error.

5. **Variability of the population**: Sampling error also depends on the variability or heterogeneity of the population to be sampled.

Types of Sampling Errors

- **Biased Errors:** The errors that occur due to a bias of prejudice on the part of the informant or enumerator in selecting, estimating measuring instruments are called biased errors. Suppose for example, the enumerator uses the deliberate sampling method in the place of simple random sampling method, then it is called biased errors. These errors are cumulative in nature and increase when the sample size also increases. These errors arise due to defect in the methods of collection of data, defect in the method of organization of data and defect in the method of analysis of data.

➢ **Unbiased Errors:** Errors which occur in the normal course of investigation or enumeration on account of chance are called unbiased errors. They may arise accidentally without any bias or prejudice. These errors occur due to faulty planning of statistical investigation. To avoid these errors, the statistician must take proper precaution and care in using the correct measuring instrument. He must see that the enumerators are also not biased. Unbiased errors can be removed with the proper planning of statistical investigations. Both these errors should be avoided by the statisticians

(2) Non Sampling Errors

The errors mainly arising at the stages of data collection and processing of data are termed non sampling errors . The non-sampling errors are unavoidable in census and surveys. The data collected by complete enumeration in census is free from sampling error but would not remain free from non-sampling errors. The data collected through sample surveys can have both – sampling errors as well as non-sampling errors. The non-sampling errors arise because of the factors other than the inductive process of inferring about the population from a sample.

Sources of non-sampling errors:

Non sampling errors can occur at every stage of planning and execution of survey or census. It occurs at the planning stage, fieldwork stage as well as at tabulation and computation stage. The main sources of the non sampling errors are

♣ lack of proper specification of the domain of study and scope of the investigation,

♣ incomplete coverage of the population or sample,

- ♣ faulty definition,
- ♣ defective methods of data collection and
- ♣ tabulation errors.

Classification of Non-sampling errors

(a) Specification errors: These errors occur at planning stage due to various reasons, e.g., inadequate and inconsistent specification of data with respect to the objectives of surveys/census, omission or duplication of units due to imprecise definitions, faulty method of enumeration/interview/ambiguous schedules etc.

(b) Ascertainment errors: These errors occur at field stage due to various reasons e.g., lack of trained and experienced investigations, recall errors and other type of errors in data collection, lack of adequate inspection and lack of supervision of primary staff etc.

(c) Tabulation errors: These errors occur at tabulation stage due to various reasons, e.g., inadequate scrutiny of data, errors in processing the data, errors in publishing the tabulated results, graphs etc.

Unit V

Report Writing and Evaluation

5.1 Introduction

Mostly, research work is presented in a written form. The practical utility of research study depends heavily on the way it is presented to those who are expected to act on the basis of research findings. Research report is a written document containing key aspects of research project. Research report is a medium to communicate research work with relevant people. It is also a good source of preservation of research work for the future reference. Many times, research findings are not followed because of improper presentation. Preparation of research report is not an easy task. It is an art. It requires a good deal of knowledge, imagination, experience, and expertise. It demands a considerable time and money. A research report is a document prepared by an analyst or strategist who is a part of the investment research team in a stock brokerage or investment bank. A research report may focus on a specific stock or industry sector, a currency, commodity or fixed-income instrument, or on a geographic region or country. Research reports generally, but not always, have actionable recommendations such as investment ideas that investors can act upon.

A report is a written presentation of factual information based on an investigation or research. Reports form the basis for solving problems or making decisions, often in the subjects of business and the sciences. The length of reports varies; there are short memorandum (memo) reports and long reports. Most often you will be asked to write a long report.

What makes an effective report?

♣ Clear, concise and accurate

♣ Easy for the audience to understand

♣ Appropriate for the audience

♣ Well organised with clear section heading

Features of Research Report

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

5.2 Types of Reports

"Research report can vary differently in its length, type and purpose. Kerlinger (2004) states that the results of a research investigation can be presented in number of ways via a technical report, a popular report, a monograph or at times even in the form of oral presentation." Some typology of research reports is more popular for business purposes can be as

❖ **Long Report and Short Report**: These kinds of reports are quite clear, as the name suggests. A two-page report or sometimes referred to as a memorandum is short, and a thirty-page report is absolutely long. But what makes a clear division of short reports or long reports? Well, usually, notice that longer reports are generally written in a formal manner.

❖ **Internal and External Report**: As the name suggests, an internal report stays within a certain organization or group of people. In the case of office settings, internal reports are for within the organization. We prepare external reports, such as a news report in the newspaper about an incident or the annual reports of companies for distribution outside the organization. We call these as public reports.

❖ **Vertical and Lateral Report:** This is about the hierarchy of the reports' ultimate target. If the report is for your management or for your mentees, it's a vertical report. Wherever a direction of upwards or downwards comes into motion, we call it a vertical report. Lateral reports, on the other hand, assist in coordination in the organization. A report traveling between units of the same organization level (for example, a report among the administration and finance departments) is lateral.

❖ **Periodic Report:** Periodic reports are sent out on regularly pre-scheduled dates. In most cases, their direction is upward and serves as management control. Some, like annual reports, is not vertical but is a government mandate to be periodic in nature. That is why we have annual or quarterly or half-yearly reports. If they are this frequent, it only makes sense to pre-set the structure of these reports and just fill in the data every period. That's exactly what happens in most cases too.

❖ **Formal and Informal Reports:** Formal reports are meticulously structured. They focus on objectivity and organization, contain deeper detail, and the writer must write them in a style that eliminates factors like personal pronouns. Informal reports are usually short messages with free-flowing, casual use of language. We generally describe the internal report/memorandum as an informal report. For example, a report among your peers, or a report for your small group or team, etc.

❖ **Informational Report**: Informational reports (attendance reports, annual budget reports, monthly financial reports, and such) carry objective information from one area of an organization to maybe a larger system.

❖ **Proposal Report:** These kinds of reports are like an extension to the analytical/problem-solving reports. A proposal is a document one prepares to describe how one organization can provide a solution to a problem they are facing. There's usually always a need to prepare a report in a business set-up. The end goal is usually very solution-oriented. We call such kinds of reports as proposal reports.

❖ **Functional Report:** These kinds of reports include marketing reports, financial reports, accounting reports, and a spectrum of other reports that provide a function specifically. By and large, we can include almost all reports in most of these categories. Furthermore, we can include a single report in several kinds of reports

❖ **Descriptive Report**: In descriptive report, researcher describes the facts, trends or opinions experienced or gathered during the research work. In such reports, data presentation and analysis are more importantly presented. Such reports are more suitable in case of describing current situations, etc. It is more popular method of report writing.

❖ **Analytical Report:** As name given analytical, such reports are prepared with analysing and interpretation of the facts or trends or situations. This means analytical report is one step ahead than descriptive reports. Such reports follow the scientific investigation and reporting. Analytical reports also recommend some measures to improve the situation with stating different problems on the situation. Policy research and managerial research which are normally funded by any agencies seeking solution of prevailing problems demand analytical report.

❖ **Technical Research Report**: A technical research report is a detailed document that you present after carrying out industry-based research. This report is highly specialized because it provides information for a technical audience; that is, individuals with above-average knowledge in the field of study. In a technical research report, the researcher is expected to provide specific information about the research process, including statistical analyses and sampling methods. Also, the use of language is highly specialized and filled with jargon. Examples of a technical research report include legal and medical research reports.

❖ **Popular Research Report**: A popular research report is one for a general audience; that is, for individuals who do not necessarily have any knowledge in the field of study. A popular research report aims to make information accessible to everyone. It is written in very simple language, which makes it easy to understand the findings and recommendations. Examples of popular research reports are the information contained in newspapers and magazines.

5.3 Planning Report Writing

- Identify the readers
- Determine your purpose
- Formulate specific questions
- Conduct research to answer the questions
- Draw valid conclusions (for analytical or recommendation reports)
- Decide on recommendations (for recommendations)
- Write the report

5.4 Research Report Format

Anybody, who is reading the research report, must necessarily be conveyed enough about the study so that he can place it in its general scientific context, judge the adequacy of its methods and thus form an opinion of how seriously the findings are to be taken. For this purpose, there is the need of proper layout of the report. The layout of the report means as to what the research report should contain. A comprehensive layout of the research report should comprise

(A) Preliminary Pages

In its preliminary pages the report should carry a title and date, followed by acknowledgements in the form of 'Preface' or 'Foreword'. Then there should be a table of contents followed by list of tables and illustrations so that the decision-maker or anybody interested in reading the report can easily locate the required information in the report.

(B) Main Text

The main text provides the complete outline of the research report along with all details. Title of the research study is repeated at the top of the first page of the main text and then follows the other details on pages numbered consecutively, beginning with the second page. Each main section of the report should begin on a new page. The main text of the report should have the following sections:

✓ **Introduction:** The purpose of introduction is to introduce the research project to the readers. It should contain a clear statement of the objectives of research i.e., enough background should be given to make clear to the reader why the problem was considered worth investigating. A brief summary of other relevant research may also be stated so that the present study can be seen in that context. The hypotheses of study, if any, and the definitions of the major concepts employed in the study should be explicitly stated in the introduction of the report. The methodology adopted in conducting the study must be fully explained. The scientific reader would like to know in detail about such thing: How was the study carried out? What was its basic design? If the study was an experimental one, then what were the experimental manipulations? If the data were collected by means of questionnaires or interviews, then exactly what questions were asked (The questionnaire or interview schedule is usually given in an appendix)? If measurements were based on observation, then what instructions were given to the observers? Regarding the sample used in the study the reader should be told: Who were the subjects? How many were there? How were they selected? All these questions are crucial for estimating the probable limits of generalizability of the findings. The statistical analysis adopted must also be clearly stated. In addition to all this, the scope of the study should be stated and the boundary lines be demarcated. The various limitations, under which the research project was completed, must also be narrated.

✓ **Statement of findings and recommendations:** After introduction, the research report must contain a statement of findings and recommendations in non-technical language so that it can be easily understood by all concerned. If the findings happen to be extensive, at this point they should be put in the summarised form.

✓ **Results:** A detailed presentation of the findings of the study, with supporting data in the form of tables and charts together with a validation of results, is the next step in writing the main text of the report. This generally comprises the main body of the report, extending over several chapters. The result section of the report should contain statistical summaries and reductions of the data rather than the raw data. All the results should be presented in logical sequence and split into readily identifiable sections. All relevant results must find a place in the report. But how one is to decide about what is relevant is the basic question. Quite often guidance comes primarily from the research problem and from the hypotheses, if any, with which the study was concerned. But ultimately the researcher must rely on his own judgement in deciding the outline of his report. "Nevertheless, it is still necessary that he states clearly the problem with which he was concerned, the procedure by which he worked on the problem, the conclusions at which he arrived, and the bases for his conclusions.

✓ **Implications of the results**: Toward the end of the main text, the researcher should again put down the results of his research clearly and precisely. He should, state the implications that flow from the results of the study, for the general reader is interested in the implications for understanding the human behaviour. Such implications may have three aspects as stated below:

(a) A statement of the inferences drawn from the present study which may be expected to apply in similar circumstances.

(b) The conditions of the present study which may limit the extent of legitimate generalizations of the inferences drawn from the study.

(c) The relevant questions that still remain unanswered or new questions raised by the study along with suggestions for the kind of research that would provide answers for them.

It is considered a good practice to finish the report with a short conclusion which summarises and recapitulates the main points of the study. The conclusion drawn from the study should be clearly related to the hypotheses that were stated in the introductory section. At the same time, a forecast of the probable future of the subject and an indication of the kind of research which needs to be done in that particular field is useful and desirable.

✓ **Summary**: It has become customary to conclude the research report with a very brief summary, resting in brief the research problem, the methodology, the major findings and the major conclusions drawn from the research results.

(C) End Matter

At the end of the report, appendices should be enlisted in respect of all technical data such as questionnaires, sample information, mathematical derivations and the like ones. Bibliography of sources consulted should also be given. Index (an alphabetical listing of names, places and topics along with the numbers of the pages in a book or report on which they are mentioned or discussed) should invariably be given at the end of the report. The value of index lies in the fact that it works as a guide to the reader for the contents in the report

5.5 Principles of Report Writing

Report writing differs from person to person depending on personality, imaginative and creative abilities, experience, and training. However, most researchers agree that following general principles must be kept in mind to produce a better research report. These principles are often called as qualities or requirements of a good report.

❖ **Selectiveness:** It is important to exclude the matter, which is known to all. Only necessary contents should be included to save time, costs, and energy. However, care should be taken that the vital points should not be missed.

❖ **Comprehensiveness:** Report must be complete. It must include all the necessary contents. In short, it must contain enough detail to covey meaning.

❖ **Cost Consideration:** It must be prepared within the budgeted amount. It should not result into excessive costs.

❖ **Accuracy:** As far as possible, research report must be prepared carefully. It must be free from spelling mistakes and grammatical errors.

❖ **Objectivity:** Report must be free from personal bias, i.e., it must be free from one's personal liking and disliking. The report must be prepared for impersonal needs. The facts must be stated boldly. It must reveal the bitter truth. It must suit the objectives and must meet expectations of the relevant audience/readers.

❖ **Clarity :** Report must reveal the facts clearly. Contents and conclusions drawn must be free from ambiguities. In short, outcomes must convey clear-cut implications.

❖ **Preciseness:** Research report must not be unnecessarily lengthy. It must contain only necessary parts with adequate description.

❖ **Simplicity :** Report must be simple to understand. Unnecessary technical words or terminologies (jargons) should be avoided.

❖ **Proper Language:** Researcher must use a suitable language. Language should be selected as per its target users.

❖ **Reliability:** Research report must be reliable. Manager can trust on it. He can be convinced to decide on the basis of research reports.

❖ **Proper Format:** An ideal repost is one, which must be prepared as per commonly used format. One must comply with the contemporary practices; completely a new format should not be used.

❖ **Attractive:** Report must be attractive in all the important regards like size, colour, paper quality, etc. Similarly, it should use liberally the charts, diagrams, figures, illustrations, pictures, and multiple colours.

5.6 APA Style of Using References

A references page is the last page of a research paper that's been written in APA style. It lists all the sources you've used in your project so readers can easily find what you've cited. References can be described as giving credit, with citation, to the source of information used in one's work. Research is a build-up on what other people have previously done thus referencing helps to relate your own work to previous work. References are a way to provide evidence to support the assertions and claims in your own assignments. References are also a way to give credit to the writers from whom you have borrowed words and ideas. References should always be accurate, allowing your readers to trace the sources of information you have used. The best way to make sure you reference accurately is to keep a record of all the sources you used when reading and researching for an assignment.

5.7 What is referencing?

Referencing is a standardised way of acknowledging the sources of information and ideas that you have used in your assignments and which allows the sources to be identified.

Why reference?

Referencing is important to avoid plagiarism, to verify quotations and to enable readers to follow up what you have written and more fully understand the cited author's work.

Steps in referencing

- Record the full bibliographic details and relevant page numbers of the source from which information is taken.
- Insert the citation at the appropriate place in the text of your document.
- Include a reference list that includes all in-text citations at the end of your document. In-text citations
- In an author-date style, in-text citations usually require the name of the author(s) and the year of publication.
- A page number is included if you have a direct quote, paraphrase a passage or you want to direct the reader to a specific page or idea. Page numbers may also be included if the you are referring to a long work and the page numbers might be useful to the reader.

How to create a reference list/bibliography

- A reference list includes just the books, articles, and web pages etc that are cited in the text of the document. A bibliography includes all sources consulted for background or further reading.
- A reference list is arranged alphabetically by author. If an item has no author, it is cited by title, and included in the alphabetical list using the first significant word of the title.
- If you have more than one item with the same author, list the items chronologically, starting with the earliest publication.
- Each reference appears on a new line.

- ❖ Each item in the reference list is required to have a hanging indent.
- ❖ References should not be numbered.

Importance of References

Referencing is important for a number of reasons, some of which include:

- It allows for acknowledgement of the use of other people's opinions, ideas, theories and inventions.
- Helps readers understand what influenced the writer's thinking and how their ideas were formulated.
- Helps the readers evaluate the extent of the writer's reading.
- Enables readers to visit source materials for themselves and verify the information.

APA style

APA style uses the author/date method of citation in which the author's last name and the year of the publication are inserted in the actual text of the paper. It is the style recommended by the American Psychological Association and used in many of the social sciences. APA referencing is a variant on Harvard style. Many of the conventions are the same, with brief author-date citations in brackets in the body of the text and full citations in the reference list. It is usual to include a reference list only rather than a bibliography in APA style. Citations for websites are also slightly different, with no need to include an access or retrieval date unless the page content is likely to change over time. Example of APA style referencing for a research article are as follows

Kambouri-Danos, M., Ravanis, K., Jameau, A., & Boilevin, J. (2019). Precursor models and early years science learning: A case study related to the water state changes. *Early Childhood Education Journal*, 47(4), 475-488. http://doi.org/10.1007/s10643-019-00937-5.

5.8 Reference Styles

Reference styles are standardised rules for presenting information about the sources used in a text. Typically, a style will describe how to organise information about author(s), publication year, title and page numbers. There are many different ways to organise the references of a text. Some reference styles follow the author-year format, while others are based on footnotes and/or numerical references. Some of the most commonly used reference styles in academic writing are:

õ **American Psychological Association (APA6th) –** APA style uses the author/year method of citation in which the author's last name and the year of the publication are inserted in the actual text of the paper. It is the style recommended by the American Psychological Association and used in many of the social sciences. Commonly used in psychology, economics, educational sciences and health sciences.

Eg. Easton, B. (2008). Does poverty affect health? In K. Dew & A. Matheson (Eds.), *Understanding health inequalities in Aotearoa New Zealand* (pp. 97–106). Dunedin, New Zealand: Otago University Press.

- **The Chicago styles**- Chicago-style source citations come in two varieties: (1) notes and bibliography and (2) author-date. The **notes and bibliography** system is preferred by many working in the humanities—including literature, history, and the arts. In this system, sources are cited in numbered footnotes or endnotes. Each note corresponds to a raised (superscript) number in the text. Sources are also usually listed in a separate bibliography. The notes and bibliography system can accommodate a wide variety of sources, including unusual ones that don't fit neatly into the author-date system.The **author-date system** is more common in the sciences and social sciences. In this system, sources are briefly cited in the text, usually in parentheses, by author's last name and year of publication. Each in-text citation matches up with an entry in a reference list, where full bibliographic information is provided.

Eg. Sam Staggs, *Born to Be Hurt: The Untold Story of Imitation of Life* (New York: St. Martin's Press, 2009), 84.

õ **Harvard –** Harvard referencing style uses references in two places in a piece of writing: **in the text and in a reference list at the end**. In general, each author name that appears in the text must also appear in the reference list, and every work in the reference list must also be referred to in the main text. Eg**.** Ashbourn, J. (2014) *Biometrics in the new world: the cloud, mobile technology and pervasive identity*. 2nd edn. London: Springer.

õ **Modern Language Association (MLA)** – MLA format follows **the author-page method of in-text citation**. This means that the author's last name and the page number(s) from which the quotation or paraphrase is taken must appear in the text, and a complete reference should appear on your Works Cited page.

Eg Gosine, Kevin, and Emmanuel Tabi. "Disrupting Neoliberalism and Bridging the Multiple Worlds of Marginalized Youth via Hip-Hop Pedagogy: Contemplating

Possibilities." *Review of Education, Pedagogy, and Cultural Studies*, vol. 38, no. 5, 2016, pp. 445-467. *Research Gate*, doi: 10.1080/10714413.2016.1221712.

õ **Vancouver –** In Vancouver referencing, which is a numeric referencing style, each source is given a number which corresponds to the order in which it appears in the text. If the same source is referred to again in the text, the same number is used. The reference list comprises a single numbered list of citations with full details. You may also include a separate bibliography, alphabetically ordered by author, which lists works that you have used as part of your research for your assignment but not cited in the text

5.9 Documentation

A documentation style is a standard approach to the citation of sources that the author of a paper has consulted, abstracted, or quoted from. It prescribes methods for citing references within the text, providing a list of works cited at the end of the paper, and even formatting headings and margins. Different academic disciplines use different documentation styles; your instructor may require you to use a particular style, or may allow you use one of your choosing.

5.10 Footnotes and Bibliography

Footnote is notes placed at the bottom of a page. They cite references or comment on a designated part of the text above it. For example, say you want to add an interesting comment to a sentence you have written, but the comment is not directly related to the argument of your paragraph. In this case, you could add the symbol for a footnote. Then, at the bottom of the page you could reprint the symbol and insert your comment. A footnote is a reference, explanation, or comment placed below the main text on a printed page. Footnotes are identified in the text by a numeral or a symbol. In research papers and reports, footnotes commonly acknowledge the sources of facts and quotations that appear in the text.

A few footnotes usage rules:

- Footnotes are numbered consecutively throughout the research paper, not restarting numbering on each page.
- Each quotation requires a footnote.
- Footnotes are always double-spaced.
- Footnotes are referenced using a superscript number.

Footnotes in Research

- ❖ Footnotes can be found on the bottom of the same page as the original quote to which it is referring, or at the end of the paper or book entirely, after the page of References.
- ❖ Entire citations are not necessary in footnotes; instead, the footnote should merely refer to the name of the publication and date as listed on the reference page.
- ❖ If a copyright permission footnote is added, the original letter regarding copyright permission must be attached to the paper.

Types of Footnotes

There are six different types of footnotes:

- ✓ Normal – contain the text of any footnote in the document.

- ✓ Separator – define the separator used to separate the footnote from the document text.
- ✓ Continuation separator – define the separator used to separate the footnote from the document text when the footnote or endnote is a continuation from the previous page.
- ✓ Continuation notice – define the notice text to let readers know that the footnote has continued on the next page.
- ✓ A content footnote is used to provide additional information or reference that simplifies or supplements information in the text.
- ✓ A copyright permission footnote is used to give credit to the source for long quotations, tables or graphs, and other lengthy information within a text. Both types of footnotes will appear at the bottom of the printed page and the text that has a footnote will have a small letter or number following it. This same number or letter will appear at the bottom of the page beside the footnote.

Footnote Style Formatting

There are three main styles for footnotes used in writing today, and each has a slightly different way of making a footnote: APA (American Psychological Association), MLA (Modern Language Association), and Chicago Manual.

➢ **APA:** Content notes should use a superscript number that is also used at the bottom of the page with the note. APA does not recommend the use of footnotes unless it is necessary for explanation because it is expensive to reproduce. MLA: MLA format for footnotes is very similar to APA style.

- **MLA** recommends limited use of footnotes and if they are needed, to use endnotes in place of footnotes. The reason for this is because footnotes can often take up too much space at the bottom of the page whereas the endnotes don't take up any room because they are on a separate page at the end of the piece of writing

Bibliography

A bibliography is a list of all of the sources researcher have used (whether referenced or not) in the process of researching research work. In general, a bibliography should include:

- the authors' names
- the titles of the works
- the names and locations of the companies that published your copies of the sources
- the dates your copies were published
- the page numbers of your sources (if they are part of multi-source volumes)

Bibliography can be defined as, ―A list of reference materials (involving any kind of content ; text, music, paintings, video etc.) elucidating the type, nature and other detailed information on the basis of name, date, place and genre of the materials.

“A complete categorical compilation of any type of content based on its creator(s), editors and time (of production, distribution)”

Bibliography, also known as works cited, reference list is basically an orderly study and referencing of books and source materials used in academic research. It might or might not include any information on the literary analysis or criticism of the materials cited. The bibliography should be on a separate page. It should list the relevant sources used in the research for the paper. Bibliography should begin with the heading "Bibliography." Bibliographic entries should include an alphabetical list of all of the sources you used in your work. Furthermore, you may include other relevant sources that you consulted but did not note in the body of your work. Entries should begin with the author‟s last name first. The elements of each citation should be separated by periods and the publication facts should not be enclosed in parentheses.

Ex: Last name, First name. Title of book. City of publication: Publishing company, Year.

Frevert, Ute. *Women in German History from Bourgeois Emancipation to Sexual Liberation.* New York: Berg Publishers, 1989.

5.11 Writing the Report

Researchers can prepare report at their ease as there are no such set rules or procedure of writing reports. However, following general guidelines can help for writing research reports:

1. **Revising expectation** Before starting report writing, researcher should revisit the purpose of research and expectation from the researcher. If the researcher is intended to submit academic reports, minimum steps and format are well designed. But funded research expects analytical reports in most of the situations. So, researcher should identify the answer of some questions as what is the objective of research? Is there any

format of reports? Is there word limit? Who will read the report? What is the process of report evaluation? etc. Answers of such questions help to make a good report.

2. **Preparing outline** on the basis of nature of data, objective of research, and requirement of the evaluating agency, researcher need to prepare outline i.e., roadmap to the research report. This helps to decide in how many chapters, in how many topics, whether descriptive or analytical report is required to prepare. In simple words, outline helps to arrange the idea before starting write up. It is the planning phase for the content of report for making it more effective. During this phase, researcher should also plan the time frame within which a report is to be completed and submitted. Remember, academic report i.e. Thesis, GRP or Project work need to be submitted within specific time period. At the same time, funded research also demands to submit at the stipulated time.

3. Arranging data on the basis of objectives, population and sample for the research, researcher collects the data from different sources. Different types of data are collected for the purpose. Such different data from different sources need to be processed and tabulated. Only relevant data are sequentially arranged so that right information will be obtained at the right time for the right purpose. For this different tables of data need to be prepared and named properly.

4. Start writing Now, researcher should start writing the report. Report should start within introduction and proceed with the content and topic arranged on the outline. Each topic or section consists of specific feature and way of writing. Thus, instead writing haphazardly, researcher should follow the sections.

5. Preparing the first draft: The report completed with a single effort may not be excellent. Thus, researcher should update and upgrade the report with series of revisions. For this purpose, the first draft is to be prepared and revisit the whole draft carefully. Add or remove the necessary descriptions, interpretations, and analysis. After completing the first draft, it is better to keep the report aside for a day or two so that it will be easy to divert effort to another essential task.

6. Review and rewrite Every report consists of scope of some improvement. It is true that in each reading, you can find something to rewrite or rearrange. This makes the report more interesting and excellent. Thus, researcher must read and reread the draft again and again. During this course of action, you need to compare the report with format (if any specific format is required), methodological conformation, values and data revisit as there may be some misprints, if possible, language expert need to be consulted. After rewriting the drafts, the final draft will be prepared which can be submitted to the concern authority.

5.12 Briefing

A research briefing is a summary of a single piece of proper research or a series of research studies on a similar topic. A briefing is a concise and understandable consolidation of just the main points of longer, more complex, academic and often impenetrable research.

A good research briefing will have a number of attributes,

- Reader centric - the briefing needs to be on a topic of interest and use to the reader

- Useful - this is usually because the reader can use the information to actually do something as a result of reading the briefing

- Brief! People are busy so the briefing has to get the right information to the reader as quickly as possible

- Understandable - It needs to be based on the readers reading comprehension, experience, expertise and knowledge levels The point of a search briefing is to remove jargon and academic lagged and make it readily understandable

- Accurate - the briefing has to fairly represent the main findings of the research without bias or distortion

5.13 Evaluation of a Research Report.

Evaluation of a research report is intended to assess following points and suggestions for correction may be given if found necessary.

❖ The Title and Abstract

➢ Are the tile and abstract clear and concise?

➢ Do they promise no more than the study can provide?

❖ The problem

➢ Is the problem stated clearly?

➢ Is the problem researchable?

➢ Is background information on a problem presented?

➢ Is the significance of the problem given?

- ➢ Are the variables defined operationally?

❖ The Hypothesis

- ➢ Are hypotheses testable and stated clearly?
- ➢ Are hypotheses based on sound rationale?
- ➢ Are assumptions, limitations and delimitations stated?

❖ Review of Repeated Literature

- ➢ Is it adequately covered?
- ➢ Are most of the source's primary?
- ➢ Are important findings noted?
- ➢ Is it well organised?
- ➢ Is the literature given directly relevant to the problem?
- ➢ Have the references been critical analysed and the results of studies compared and constructed?
- ➢ Is the review well organised?
- ➢ Does it conclude with a brief summary and its implications for the problem investigated?

❖ Sample

- ➢ Are the size and characteristics of the population studied described?
- ➢ Is the size of the sample appropriate?
- ➢ Is the method of selecting the sample clearly described?

❖ Instruments and Tools

➢ Are data gathering instruments described clearly?

➢ Are the instruments appropriate for measuring the intended variable?

➢ Are validity and reliability the instruments discussed?

➢ Is systematic procedure followed if the instrument was developed by one researcher?

➢ Are administration, searing and interpretation procedures described?

❖ Design and Procedure

➢ Is the design appropriate for testing the hypotheses?

➢ Are the procedures described in detail?

➢ Are control procedures described?

❖ Results

➢ Is the statistical method appropriate?

➢ Is the level of significance given?

➢ Are tables and figures given?

➢ Is every hypothesis tested?

➢ Are the data in each table and figure described clearly?

➢ Are the results stated clearly?

❖ Discussions

- ➢ Is each finding discussed?
- ➢ Is each finding discussed in term of its agreement and disagreement with previous studies?
- ➢ Are generalizations consistent with the results?
- ❖ Conclusions and Recommendations
- ➢ Are theoretical and practical implications of the findings discussed?
- ➢ Are recommendations for further action made?
- ➢ Are recommendations for further research made?
- ❖ Summary
- ➢ Is the problem restated?
- ➢ Are the number and type of subjects and instruments described?
- ➢ Are procedures described?
- ➢ Are the major findings and conclusions described?