Chapter One: Introduction

1.1 What is research?

The word research has its stem SEARCH, which means to look for. With the prefix re, the word means to look for again, more carefully, more exhaustively.Research involves looking for or examining something in a very careful, objective and exhaustive manner so as to develop a valid knowledge or understanding of that thing.Research is primarily concerned with the acquisition of a valid knowledge of our environment, people, things, events and situations around us in order to harmonize with it.

In general, different authorities of the field define research differently. The following are the most common phrases used to define the concept research:

- Research can be defined as finding out the truth about a thing, event or situation.
- Research can also be viewed as a process of acquiring relevant information in order to solve a given problem.
- It is a scientific approach to study a problem;
- It is a systematic and objective search for reliable knowledge; etc.

Generally, research is the process of inquiry and discovery of knowledge involving scientific methods. It is a process of inquiry (the search for truth). The truth as used here refers to what the individual or society concerned regards as valid and dependable. It is a process of inquiry (the search for truth). The truth as used here refers to what the individual or society concerned regards as valid and dependable. It involves scientific methods in search of the truth on the basis of factual and objective evidences. The scientific method is the means by which researchers are able to make conclusive statements about their studies with a minimum of bias. It involves several steps such as observation of researchable problem; Question (translating that research idea into an answerable question); Hypothesis (testable guess) to explain some aspect of your observation; Measuring and experimentation; Analysis (looking for explanations or solutions).

Ways of Generating Valid Knowledge

In generating knowledge, there are four major ways. These are Empiricism, Rationalism, Deduction and Induction.

Empiricism

Empiricism is concerned primarily with the acquisition of valid objective sense-data. This is knowledge based purely on observation and experimentation. The term empiricism connotes a commitment to the study of tested knowledge.

Rationalism

Unlike empiricism which emphasizes on external process, rationalism is an internal mechanism for generating valid knowledge.To the proponents of rationalism, ideas conceived in mind ultimately take forms and shape reality. Empiricism and rationalism are however complementary.

Deduction

Deductive reasoning consists mainly of three propositions. The first two propositions called premises provide the explanatory statements from which the third propositions or conclusion is derived. In deduction, the conclusion follows necessarily from the premises. If the premises are true, then the conclusion must also be true. For example: A dead tree is in danger of falling (General Law). The tree is dead (Statement of antecedent condition)

Therefore the tree is in danger of falling (Conclusion). If any of the premises is false, so also will be the conclusion. For example: All women like children. Mary is a woman. Mary likes children.

Induction

This inference is based on a number of observations. Sometimes we make conjectures about the likelihood of an occurrence. For example, if I throw up an unbiased or a fair coin a hundred times, the tail and head have equal chances of occurrence. This form of reasoning is known as induction. Unlike a deductive logic whose conclusion is certain, the conclusion of an inductive inference follows from the premises with only a certain degree of probability.

All the various forms of reasoning discussed above are man's attempts to describe, explain and predict events around him so as to relate to and/or control them. Therefore, the reasons for undertaking research are related with those different motivations.

1.2 Classification/Types of Research

Classification of research can be based on different considerations. Thus, we can base our classification on:

- The nature of the dominant data (qualitative or quantitative),
- The purpose of the research (applied or basic),
- The type of analysis that will be carried out (descriptive or analytical) (Conceptual or Empirical research)
- Other types of research

The attempt to classify research into these categories is somewhat misleading since most research has elements of all the categories. It should be said that it is only an aid to broad understanding of the different types of research rather than distinct categories.

Qualitative and quantitative research Methodology

Qualitative research

Qualitative research methods were developed in the social sciences to enable researchers to study social and cultural phenomena. Qualitative research methods are designed to help researchers understand people and the social and cultural contexts within which they live. Qualitative research, broadly defined, means "any kind of research that produces findings not arrived at by means of statistical procedures or other means of quantification". It uses a naturalistic approach that seeks to understand phenomena in context-specific settings.

Hence, qualitative research deals with designs techniques and measure that do not produce discrete numerical data. It involves extensive narrative data in order to gain insights into phenomena. Data analysis includes the coding of the data and production of verbal synthesis (inductive process). The major types of qualitative research approaches are:

- Historical/Narrative research:
- Ethnographic research
- Case study
- Participant observational research,
- Action research,
- Ground theory

Historical/Narrative research: Descriptions of events that draw on multiple sources of information to understand more fully what happened. By using a narrative approach, the research tries to understand how "people think and act in the situated contexts in which they live through their stories. Narratives are frameworks through which people view, understand, and make sense of their experience.

Ethnographic research: Coming largely from the field of anthropology, ethnographic strategies focus on the study of a culture, particularly what "socio-cultural knowledge participants bring to and generate in the social setting being studied. “The most common ethnographic approach is participant observation as a part of field research. An ethnographer becomes immersed in a culture as an active participant and records extensive notes to later analyze.

Case study: It attempts to shed light on phenomena by studying in depth a single case example of the phenomena. The case can be an individual person, an event, a group, or an institution.

Participant observational research: Participant observation is a qualitative method

Frequently used in social science research. It is based on a long tradition of ethnographic study in anthropology. In participant observation, the observer becomes "part" of the environment, or the cultural context. The method usually involves the researcher's spending considerable time "in the field," as anthropologists do.

Ground Theory: it is "a general methodology for developing theory that is grounded in data systematically gathered and analyzed', adding that it is sometimes called the constant comparative method and that it is applicable as well to quantitative research. The purpose of the methodology is to develop theory, through an iterative process of data analysis and theoretical analysis, with verification of hypotheses ongoing throughout the study. In grounded theory, the data may come from observations, interviews, and videotape or document analysis, and, as in other qualitative research, these data may be considered strictly qualitative or may be quantitative. A grounded theory perspective leads the researcher to begin a study without completely preconceived notions about what the research questions should be, assuming that the theory on which the study is based will be tested and refined as the research is conducted.

Action Research: Action research aims to contribute both to the practical concerns of people in an immediate problematic situation and to the goals of social science by joint collaboration within a mutually acceptable ethical framework. It also makes clear emphasizes, that action research is concerned to enlarge the stock of knowledge of the social science community. It is this aspect of action research that distinguishes it from applied social science, where the goal is simply to apply social scientific knowledge but not to add to the body of knowledge. Action research has been accepted as a valid research method in applied fields such as organization development and education.

Characteristic Features of Qualitative Research

Some of the major characteristics of qualitative research are listed below:

- Qualitative research uses the natural setting as the source of data. The researcher attempts to observe, describe and interpret settings as they are, maintaining what Patton calls an "empathic neutrality".
- The researcher acts as the "human instrument" of data collection.
- Qualitative researchers predominantly use inductive data analysis.
- Qualitative research reports are descriptive, incorporating expressive language and the "presence of voice in the text".
- Qualitative research has an interpretive character, aimed at discovering the meaning events have for the individuals who experience them and the interpretations of those meanings by the researcher.
- Qualitative researchers pay attention to the idiosyncratic (personal peculiarity) as well as the pervasive, seeking the uniqueness of each case.

- Qualitative research has an emergent (as opposed to predetermined) design, and researchers focus on this emerging process as well as the outcomes or product of the research.
- Qualitative research is judged using special criteria for trustworthiness, criteria such as credibility, transferability, Dependability, conformability.

Quantitative research

Quantitative research includes designs, techniques and measures that produce discrete numerical or quantifiable data. Data analysis is mainly statistical (**deductive process**). Types of quantitative research approach:

- Statistical/Correlational Analysis,
- Experimental,
- Quasi-Experimental,
- Surveys/ Ex post facto,
- Descriptive research,
- Causal-comparative research, etc.

Statistical/Correlational Analysis: A research design to see whether there is a relationship between two or more variables.

Experimental: A strategy that tests the effect of an independent variable by applying it to one group of cases but not to a second group.

Quasi-Experimental: At least one variable is manipulated to determine the effect of the manipulation. Intact, naturally formed groups are used.

Surveys/ Ex post facto: Surveys collect information, typically from an individual, to measure relationships or correlations among variables such as background, behavior, attitudes/beliefs, opinions, and knowledge of events or policies. (If surveys include open-ended questions, they could represent a qualitative methodology.)

Descriptive research: It involves collecting data in order to test hypotheses or answer questions regarding the subjects of the study. In contrast with the qualitative approach the data are numerical. The data are typically collected through a questionnaire, an interview, or through observation. In descriptive research, the investigator reports the numerical results for one or more variables on the subjects of the study.

Causal-comparative research: attempts to establish cause-effect relationships among the variables of the study. The attempt is to establish that values of the independent variable have a significant effect on the dependent variable. This type of research usually involves group comparisons. The groups in the study make up the values of the independent variable, for

example gender (male versus female). However, in causal-comparative research the independent variable is not under the experimenters control, that is, the experimenter can't randomly assign the subjects to a gender classification (male or female) but has to take the values of the independent variable as they come. The dependent variable in a study is the outcome variable.

1.3 Significance of Research

Research makes progress possible. It promotes the development of logical habits of thinking and organization. It is necessary in collecting information on the economic and social structure of the nation and ssolves problems. It can facilitate the decisions of the policy maker. It provides the basis for nearly all government Policies. E.g., government's budgets rest in part on an analysis of the needs and desires of the people.

The significance of research can also be understood keeping in view of the following points:

1. Careerism or a way to attain a high position in the social structure by doing thesis or dissertation;
2. Serve to professionals as source of livelihood;
3. To philosophers and thinkers, research may mean the outlet for new ideas and insights;
4. To literary men and women, research may mean the development of new styles and creative work;
5. To analysts and intellectuals, research may mean the generalizations of new theories.

Hence, the reasons or motives for conducting research are related with exploration, explanation, description, understanding and prediction.

1. Exploration: to investigate little understood phenomena and identify/ discover important variables. It is important to generate questions for further research, etc.
2. Explanation: It helps to explain why forces created the phenomenon in question, and to identify why the phenomenon is shaped as it is.
3. Description: it is a research process conducted to document and characterizes the phenomenon of interest
4. Understanding: It is deeper than description and helps to comprehend and understand processes, interaction, phenomenon and people.
5. Prediction: It is the most complex and helps to predict future outcomes for the phenomenon and to forecast the events and behaviors resulting from the phenomenon.

Geographers undertake research for all the reasons/ motivations mentioned above often in combination with each other. For example, in you study you may start with some exploratory investigations to determine which variables or factors are important. Next you might try to describe the phenomena and how they are related. You may follow this by seeking to explain what caused the phenomena, to make a prediction about future outcomes.

Example-1, if we were interested to investigate why people migrate to new, relatively unknown area, the four could be linked in the following way:

- Explore possible causes/ reasons why people might want to move

- Describe the patterns of migration based upon the factors found during exploration
- Explain the patterns of migration identified when describing the exploratory factors
- Predict possible future migrations based upon the explanations of current patterns of migration

1.4 Geography as a Research Discipline

Any research project has the following three components:

- A subject matter (what is being studied?)
- Methodology or Approach (how it is being studied)
- Philosophical bases

A. Subject Matter/Geographical Knowledge

Though various definitions exist, Geography can be regarded as a science concerned with the rational development, and testing of theories that attempt to explain and predict the spatial distribution and location of various characteristics on the surface of the earth. For geographers research is the process of trying to gain a better understanding of the relation- ships between humans, space, place and environment which leads them use scientific methods.

B. Methodology

Geography uses the approaches used in both natural sciences (the quantitative approach) and social sciences (the qualitative approach). More over it uses the mixed methods approach.

C. Philosophical bases of research

Philosophy aims at the logical clarification of thoughts. Its task is to make thoughts clear and to give them sharp boundary. There has been different opinion on how research should be conducted since human begin observing and recording phenomenon. Over the centuries philosophers have argued about:

- Ideology: the understanding of social or political reasons or purpose for seeking knowledge;
- Epistemology: how knowledge is derived at; the assumptions about how we can know the world (what can we know? How can we know it?). The study of the nature of knowledge including how it is created and shaped. It is concerned with what can be known and the confidence we have in knowledge.
- Ontology: the set of specific assumptions underlying a theory or system of idea (what can be known?)

- Methodology: a coherent set of rules and procedures which can be used to investigate a phenomenon or situation (within the framework dictated by epistemological and ontological ideas). As Hill (1981) discusses, your research aims to provide answers to questions. In doing so, you will be claiming to know something about a particular situation or phenomena or even the world in general. All such claims raise ideological, epistemological, ontological and methodological questions.

Understanding philosophical approaches is important for two reasons:

- for understanding what other researchers have done and why and
- for finding an approach on which to base your own research and provide the theoretical context to justify your findings.

Orlikowski and Baroudi (1991) suggest three categories, based on the underlying research epistemology: positivist, interpretive and critical.

Positivist Research Philosophy

Positivists generally assume that reality is objectively given and can be described by measurable properties which are independent of the observer (researcher) and his or her instruments. Positivist studies generally attempt to test theory, in an attempt to increase the predictive understanding of phenomena. Examples of a positivist approach to qualitative research include Yin's (2002) and Benbasat et al's (1987) work on case study research.

Interpretive Research Philosophy

Interpretive researchers start out with the assumption that access to reality (given or socially constructed) is only through social constructions such as language, consciousness and shared meanings. The philosophical base of interpretive research is hermeneutics and phenomenology (Boland, 1985). Interpretive studies generally attempt to understand phenomena through the meanings that people assign to them and interpretive methods of research "aimed at producing an understanding of the context of the information system, and the process whereby the information system influences and is influenced by the context" (Walsham 1993). Interpretive research does not predefine dependent and independent variables, but focuses on the full complexity of human sense making as the situation emerges (Kaplan and Maxwell, 1994). Examples of an interpretive approach to qualitative research include Boland's (1991) and Walsham's (1993) work. Klein and Myers' (1999) paper suggests a set of principles for the conduct and evaluation of interpretive research.

Critical Research Philosophy

Critical researchers assume that social reality is historically constituted and that it is produced and reproduced by people. Although people can consciously act to change their social and economic circumstances, critical researchers recognize that their ability to do so is constrained by various forms of social, cultural and political domination. Critical research focuses on the

oppositions, conflicts and contradictions in contemporary society, and seeks to be emancipatory i.e. it should help to eliminate the causes of alienation and domination. Examples of a critical approach to qualitative research include Ngwenyama and Lee's (1997) and Hirschheim and Klein's (1994) work.

1.5 The History of Defining Geographic Problem

In the West during the second half of the 19th and the 20th century, the discipline of geography went through four major phases:

- Environmental determinism,
- Regional geography,
- The quantitative revolution, and
- Critical geography.

Environmental determinism

Environmental determinism is the theory that a people's physical, mental and moral habits are directly due to the influence of their natural environment. Prominent environmental determinists included Carl Ritter, Ellen Churchill Semple, and Ellsworth Huntington. Popular hypotheses included "heat makes inhabitants of the tropics lazy" and "frequent changes in barometric pressure make inhabitants of temperate latitudes more intellectually agile." Environmental determinist geographers attempted to make the study of such influences scientific. Around the 1930s, this school of thought was widely rejected as lacking any basis and being prone to (often bigoted) generalizations. Environmental determinism remains an embarrassment to many contemporary geographers, and leads to skepticism among many of them of claims of environmental influence on culture (such as the theories of Jared Diamond).

Regional geography

Regional geography represented a reaffirmation that the proper topic of geography was study of places (regions). Regional geographers focused on the collection of descriptive information about places, as well as the proper methods for dividing the earth up into regions.

Well known names from this period are Alfred Hettner from Germany and Vidal de la Blache from France. The philosophical basis of this field in United States was laid out by Richard Hartshorne who defined geography as a study of areal differentiation which later led to critic of this approach as overly descriptive and unscientific.

The Quantitative revolution

The quantitative revolution was geography's attempt to redefine itself as a science, in the wake of the revival of interest in science following the launch of Sputnik (space age). Quantitative revolutionaries, often referred to as "space cadets", declared that the purpose of geography was to test general laws about the spatial arrangement of phenomena. They adopted the philosophy of

positivism from the natural sciences and turned to mathematics—especially statistics—as a way of proving hypotheses. The quantitative revolution laid the groundwork for the development of geographic information systems. Well-known geographers from this period are Fred K. Schaefer, Waldo Tobler, William Garrison, Peter Hagget, Richard J. Chorley, William Bunge or Torsten Hägerstrand.

Critical geography

Though positivist and post-positivist approaches remain important in geography, critical geography arose as a critique of positivism. The first strain of critical geography to emerge was humanist geography. Drawing on the philosophies of existentialism and phenomenology, humanist geographers (such as Yi-Fu Tuan) focused on people's sense of, and relationship with, places. More influential was Marxist geography, which applied the social theories of Karl Marx and his followers to geographic phenomena. David Harvey and Richard Peet are well-known Marxist geographers. Feminist geography is, as the name suggests, the use of ideas from feminism in geographic contexts. The most recent strain of critical geography is postmodernist geography, which employs the ideas of postmodernist and poststructuralist theorists to explore the social construction of spatial relations.

- Existentialism: Existentialism is primarily concerned with values. Existentialism focuses upon how individuals come to create and place meaning to their world and how they subscribe values to objects and to others.
- Phenomenology : A number of geographers, such as Buttimer (1976) Ley (1977), Relph (1976), Seamon (1979) and Tuan (1974) have adopted variations of softer approaches which are characterized by their search for meaning (Ley, 1977). These geographers saw phenomenology as a vital alternative to the peoples less and dehumanizing positivistic and behavioural approaches being adopted. In essence, the approach emphasizes the social construction of places, taking into account suc aspects as their emotional, aesthetic and symbolic appeal and seeks to reflect the ties between individuals and environment (Unwin, 1992).
- Marxism: Marxist approach within geography emerged at approximately the same time as humanistic approaches, and similarly were a reaction against the growth of spatial science (positivism) within the discipline. Whereas humanistic approaches criticized spatial science because of its disregard of human agency, Marxist argued that it failed to recognize the economic and political constraints imposed upon spatial patterns by the way in which society worked. A Marxist geographer seeks to identify how social relations vary over space and time in order to reproduce and sustain the modes of production and consumption, to suggest alternative futures, and to offer political resistance (Peet and Lyons, 1981).
- Feminism: Feminist Empiricists focus on the science and empiricism, noting the bias and male values that is inherent in this. The fact that many scientists, especially in past centuries, were male did not help this blindness. Feminist standpoints take particular

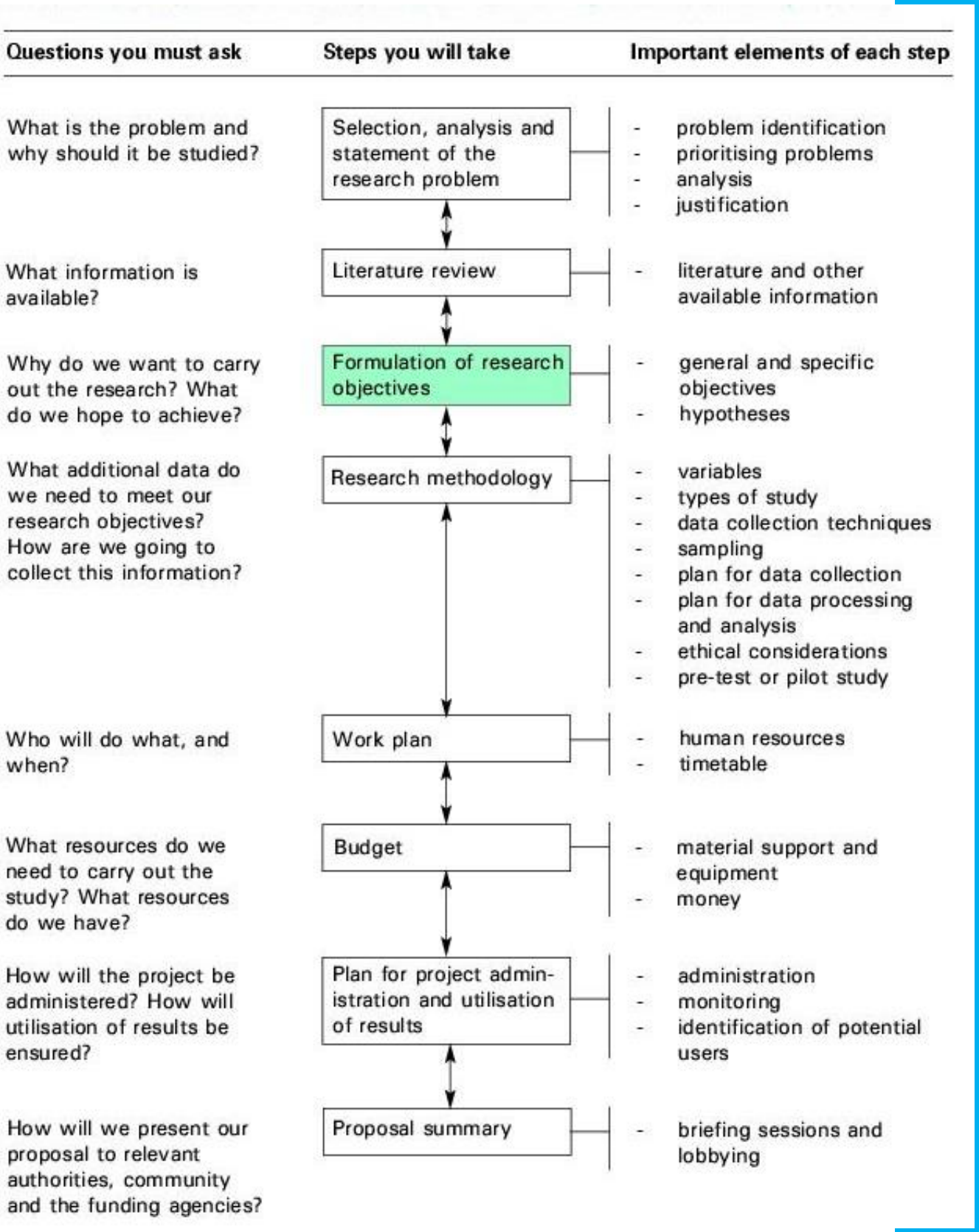
positions, for example criticizing the subjugation of women in the family home. Feminist postmodernists take the usual postmodern position of deconstructing and negating all other methods but without putting much in their place. Indeed, it is part of the nature of postmodernism to view confusion as a normal state.

- Postmodernism: Postmodernity is the study of the temporal and spatial organization and the complex interaction of economic, social, political and cultural processes in the late twentieth century. Postmodernism is based upon the notion that there is no one answer, that no one discourse is superior or dominant to anther, and that no-one's voice should be excluded from dialogue. They argue that there is no one absolute truth and that there is no truth outside interpretation. Post-structuralism: Poststructuralist: argue that the relationship between societies is mediated culturally through language. In contrast to postmodernism, much of the focus is upon the individual and methodolo- gical and epistemological issues rather than society and cultural critique (Rosenau, 1992).

1.6 Steps in Geographic Research

The following order concerning various steps provides a useful procedural guideline regarding the research process:

- formulating the research problem;
- extensive literature survey;
- developing Objectives
- developing the hypothesis;
- preparing the research design;
- determining sample design;
- collecting the data;
- execution of the project;
- analysis of data;
- hypothesis testing;
- generalisations and interpretation, and
- Preparation of the report or presentation of the results, i.e., formal write-up of conclusions reached.


Questions you must ask
Steps you will take
Important elements of each step
What is the problem and why should it be studied?
Selection, analysis and statement of the research problem
- problem identification
- prioritising problems
- analysis
- justification
What information is available?
Literature review
- literature and other available information
Why do we want to carry out the research? What do we hope to achieve?
Formulation of research objectives
- general and specific objectives
- hypotheses
What additional data do we need to meet our research objectives? How are we going to collect this information?
Research methodology
- variables
- types of study
- data collection techniques
- sampling
- plan for data collection
- plan for data processing and analysis
- ethical considerations
- pre-test or pilot study
Who will do what, and when?
Work plan
- human resources
- timetable
What resources do we need to carry out the study? What resources do we have?
Budget
- material support and equipment
- money
How will the project be administered? How will utilisation of results be ensured?
Plan for project administration and utilisation of results
- administration
- monitoring
- identification of potential users
How will we present our proposal to relevant authorities, community and the funding agencies?
Proposal summary
- briefing sessions and lobbying

Chapter Two: Research Design and Literature Review

2.1 The Research Problem

Research problem refers to some difficulty which a researcher experiences in the context of either a theoretical or practical situation or wants to obtain a solution.

Components of a research problem are stated as follows:

- There must be an objective (s) which has some difficulty or the problem. If one wants nothing, one cannot have a problem.
- There must be alternative means for obtaining the objective(s) one wishes to attain. There must be at least two means available to a researcher for if he has no choice of means, he cannot have a problem.
- There must remain some doubt in the mind of a researcher with regard to the selection of alternatives. Research must answer the question concerning the relative efficiency of the possible alternatives.
- There must be some environment(s) to which the difficulty pertains. It, thus, requires a researcher to find out the best solution for the given problem, i.e.,
  - ✓ To find out by which course of action the objective can be attained optimally in the context of a given environment.
  - ✓ There are several factors which may result in making the problem complicated. E.g, the environment may change affecting the efficiencies of the courses of action or the values of the outcomes; the number of alternative courses of action may be very large;

All such elements (or at least the important ones) may be thought of in context of a research problem.

Selecting the Problem

- The problem undertaken for study must be carefully selected.
- Help may be taken from a research guide in this connection. Nevertheless, try your own! cannot be borrowed.
- A problem must spring from the researcher's mind.
- Subject which is overdone should not be normally chosen.
- Controversial subject should not become the choice of an average researcher.
- Too narrow or too vague problems should be avoided.
- It should be familiar and feasible so that the related research material or sources of research are within one's reach. E.g., reading + consultation.
- The selection of a problem must be preceded by a preliminary study. Brief feasibility study must always be undertaken. If so, the research will not be a boring, rather it will be love's labour.
- The qualifications and the training of a researcher, the costs involved, the time factor are few others. A researcher must ask himself the following questions:

(a) Whether he is well equipped in terms of his background to carry out the research?
(b) Whether the study falls within the budget he can afford?
(c) Whether the necessary cooperation can be obtained? If the answers to all these questions are OK, a researcher can proceed.

Necessity of Defining the problem

The problem must be defined unambiguously for discriminating relevant data from the irrelevant ones. It enables the researcher to be on the track whereas an ill defined problem may create hurdles. Questions like:

- What data are to be collected?
- What characteristics of data are relevant and need to be studied?
- What relations are to be explored?

In fact, formulation of a problem is often more essential than its solution. It is only on careful detailing the problem that we can work out the research design and can smoothly carry on all the consequential steps involved while doing research.

Technique Involved in Defining a Problem

What does one mean when he/she wants to define a research problem? In other words, defining a problem involves the task of laying down boundaries within which a researcher shall study the problem with a pre-determined objective in view. The following steps should be followed:

(i) Statement of the problem in a general way;
(ii) Understanding the nature of the problem;
(iii) Surveying the available literature
(iv) Developing the ideas through discussions; and
(v) Rephrasing the research problem into a working proposition.

A brief description of all these points will be helpful.

(i) Statement of the problem in a general way: State in a broad general way. In case of social research, it is necessary to do often call pilot survey. Then the researcher can himself state the problem. The feasibility of a particular solution has to be considered also

(ii) Understanding the nature of the problem: Understand its origin and nature clearly. Discuss it with those who first raised it and if the researcher has stated the problem himself.

(iii) Surveying the available literature: All available literature concerning the problem at hand with relevant theories in the field, reports and records. "Knowing what data are available often serves to narrow the problem itself as well as the technique that might be used." If there are certain gaps in the theories, or whether the existing theories applicable to the problem under study are inconsistent with each other. All this will enable a researcher to take new strides in the field for furtherance of

knowledge. Studies on related problems are useful for indicating the type of difficulties that may be encountered in the present study as also the possible analytical shortcomings.

(iv) **Developing the ideas through discussions:** Various new ideas can be developed through such an exercise. The researcher must discuss his problem with his colleagues and others**.** This is quite often known as an experience survey. People with rich experience are in a position to enlighten the researcher**.** Discussions with such persons should not only be confined to the formulation of the specific problem at hand, but should also be concerned with other issues.

(v) **Rephrasing the research problem:** Finally, the researcher must sit to rephrase the research problem into a working proposition. Once the nature of the problem has been clearly understood, the environment has been defined.

Additionally, the following points need consideration in doing research or problem identification:

(a) Technical terms and words or phrases, should be clearly defined.

(b) Basic assumptions or postulates (if any) should be clearly stated.

(c) A criteria for the selection of the problem should be provided.

(d) The suitability of the time-period and the sources of data available must also be considered by the researcher in defining the problem.

(e) The scope of the investigation or the limits within which the problem is to be studied must be mentioned explicitly in defining a research problem.

EXAMPLE

"Why is productivity in Japan so much higher than in Ethiopia"? In this form the question has a number of ambiguities such as:

- ✓ What sort of productivity is being referred to?
- ✓ With what industries the same is related?
- ✓ With what period of time the productivity is being talked about?

In view of all such ambiguities the given statement or the question is much too general to be amenable to analysis. Rethinking and discussions about the problem may result in narrowing down the question to: "What factors were responsible for the higher labour productivity of Japan's manufacturing industries during the decade 1971 to 1980 relative to Ethiopia's manufacturing industries?"

This latter version of the problem is definitely an improvement over its earlier version.

Further rethinking and rephrasing might place the problem on a still better operational basis as shown below: "To what extent did labour productivity in 1971 to 1980 in Japan exceed that of Ethiopia in respect of 15 selected manufacturing industries? "What factors were responsible for the productivity differentials between the two countries by industries?" With this sort of formulation, the various terms involved such as 'labour productivity', 'productivity differentials', etc. must be explained clearly. The researcher must also see that the necessary data

are available. In case the data for one or more industries selected are not available for the concerning time-period, then the mentioned or said industries will have to be substituted by other industry or industries. The suitability of the time-period must also be examined. Thus, all relevant factors must be considered by a researcher before finally defining a research problem.

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

2.2 Designing a geographic Research

What is Research Design?

The formidable problem that follows the task of defining the research problem is the preparation of the design of the research project, popularly known as the "research design".

Decisions regarding what, where, when, how much, by what means concerning an inquiry or a research study constitute a research design. "A research design is the arrangement of conditions for collection and analysis of data in a manner that aims to combine relevance to the research purpose with economy in procedure." In fact, the research design is the conceptual structure within which research is conducted; it constitutes the **blueprint** for the collection, measurement and analysis of data. As such the design includes an outline of what the researcher will do from writing the hypothesis and its operational implications to the final analysis of data.

The design decisions happen to be in respect of:

(i) What is the study about?
(ii) Why is the study being made?
(iii) Where will the study be carried out?
(iv) What type of data is required?
(v) Where can the required data are found?
(vi) What periods of time will the study include?
(vii) What will be the sample design?
(viii) What techniques of data collection will be used?
(ix) How will the data be analysed?
(x) In what style will the report be prepared?

One may split the overall research design into the following parts:

(a) The sampling design which deals with the method of selecting items to be observed for the given study;

(b) The observational design which relates to the conditions under which the observations are to be made;
(c) The statistical design which concerns with the question of how many items are to be observed and how the information and data gathered are to be analysed; and
(d) The operational design which deals with the techniques by which the procedures specified in the sampling, statistical and observational designs can be carried out.

The following are the most important features of a research design:
(i) It is a plan that specifies the sources and types of information relevant to the research problem.
(ii) It is a strategy specifying which approach will be used for gathering and analysing the data.
(iii) It also includes the time and cost budgets since most studies are done under these two constraints.
In brief, research design must, at least, contain:
(a) a clear statement of the research problem;
(b) Procedures and techniques to be used for gathering information;
(c) the population to be studied; and
(d) Methods to be used in processing and analysing data.

In general, research design is needed because it facilitates the various research operations, thereby making research as efficient as possible yielding maximal information with minimal expenditure of effort, time and money. Like that of a house construction, we need a blueprint well thought out and prepared by an expert architect; hence we need a research design or a plan in advance of data collection and analysis for our research project. It stands for advance planning of the methods to be adopted for collecting the relevant data and the techniques to be used in their analysis, keeping in view the objective of the research and the availability of staff, time and money. It should be prepared with care as any error in it may upset the entire project.
Research design, in fact, has a great bearing on the reliability of the results arrived at and as such constitutes the firm foundation of the entire edifice of the research work. Sometimes a well thought out research design is at times not realised by many. Thoughtlessness in designing the research project may result in rendering the research exercise futile. It is, therefore, imperative that an efficient and appropriate design must be prepared before starting research operations. The design helps the researcher to organize his ideas in a form whereby it will be possible for him to look for flaws and inadequacies. Such a design can even be given to others for their comments and critical evaluation. In the absence of such a course of action, it will be difficult for the critic to provide a comprehensive review of the proposed study.

2.3 Reviewing a Literature

The main purpose reviewing literature within the context of a research is to establish its originality; that is, the work proposed has not already been done. Almost always something related has been done; the review organizes these, discusses them, and points out their limitations, some of which will be addressed in the research. A second purpose is to place the proposed research in context, that is, to show its importance within a wider problem area. This must be established from the opinions of others, who define the context and identify important unsolved problems. A third purpose is to compare methodological approaches to your problem. There are almost several ways to address a research problem and here you compare these approaches and justify your own approach (which may combine aspects of the others).

In general, review of related literature serves the following specific purposes:

- It enables the researcher to define the limits of his study
- It presents definitions and concepts that are not yours
- The researcher can avoid unfruitful and useless problem areas
- The researcher can avoid unintentional duplication of well established findings
- It gives the researcher an understanding of the research methodology
- It also helps to know about the recommendation of previous researchers
- It also helps to identify the factors that are the causes of the dependent variable
- It substantiates data and results that are not from your own research
- It refers to other studies related to your results

Hence, the purpose of the literature review is to situate your research in the context of what is already known about a topic. It need not be exhaustive; it needs to show how your work will benefit the whole. It should provide the theoretical basis for your work, show what has been done in the area by others, and set the stage for your work. It should probably move from the more general to the more focused studies, but need not be exhaustive, only relevant.
Sometimes the literature review is incorporated into the introduction section. However, most professors prefer a separate section, which allows a more thorough review of the literature.

The literature review serves several important functions:

- Ensures that you are not "reinventing the wheel".
- Gives credits to those who have laid the groundwork for your research.
- Demonstrates your knowledge of the research problem.
- Demonstrates your understanding of the theoretical and research issues related to your research question.
- Shows your ability to critically evaluate relevant literature information.
- Indicates your ability to integrate and synthesize the existing literature.
- Provides new theoretical insights or develops a new model as the conceptual framework for your research.

- Convinces your reader that your proposed research will make a significant and substantial contribution to the literature (i.e., resolving an important theoretical issue or filling a major gap in the literature).

Most literature reviews suffer from the following problems:

- Lacking organization and structure
- Lacking focus, unity and coherence
- Being repetitive and verbose
- Failing to cite influential papers
- Failing to keep up with recent developments
- Failing to critically evaluate cited papers
- Citing irrelevant or trivial references
- Depending too much on secondary sources

There are different ways to organize your literature review. Make use of subheadings to bring order and coherence to your review. For example, having established the importance of your research area and its current state of development, you may devote several subsections on related issues as: *theoretical models, measuring instruments, cross-cultural and gender differences, etc*.

Sources of literature

- The library is the most likely physical location for the research literature. Within library there is access to books, periodicals, technical reports, and academic thesis.
- Now a days Internet service has made world wide access of information. They are comprehensive, fast and cost effective.

Irrespective of the sources of the literature, ethics of research that the source is acknowledged through a clear system of reference (avoid plagiarism).

Chapter Three: Sampling Design and Techniques

3.1 Sampling Design and Sample Size Determination

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

A complete enumeration of all items in the 'population' is known as a **census** inquiry. 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. In such cases there is no utility of census surveys. 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 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. A sampling design is a definite plan for obtaining a sample from a given population.

Sampling Design refers to the technique or the procedure the researcher would adopt in selecting items for the sample. Sample design may as well lay down the number of items to be included in the sample i.e., the size of the sample. Sample design is determined before data are collected. There are many sample designs from which a researcher can choose. Some designs are relatively more precise and easier to apply than others.

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.

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 may be a social unit such as family, club, school, etc., or it may be an individual.

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.

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. 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. Researcher must determine the desired precision as also an acceptable confidence level for the estimate. 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.

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 subgroups 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 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. Researcher must keep in view the two causes of incorrect inferences viz. systematic bias and sampling error. Systematic bias results from errors in the sampling procedures, and it cannot be reduced or eliminated by increasing the sample size. At best the causes responsible for these errors can be detected and corrected. Usually a systematic bias is the result of one or more of the following factors:

1. Inappropriate sampling frame: If the sampling frame is inappropriate i.e., a biased representation of the universe, it will result in a systematic bias

2. Defective measuring device: If the measuring device is constantly in error**.** In survey work, if the questionnaire or the interviewer is biased.

3. Non-respondents: If we are unable to sample all the individuals initially included in the sample, there may arise a systematic bias. The reason is that in such a situation the likelihood of establishing contact or receiving a response from an individual is often correlated with the measure of what is to be estimated.

4. Indeterminacy principle: Sometimes we find that individuals act differently when kept under observation than what they do when kept in non-observed situations. For instance, if workers are aware that somebody is observing them in course of a work study the change the situation.

5. Natural bias in the reporting of data: Respondents in the reporting of data is often the cause of a systematic bias in many inquiries. There is usually a downward bias in the income data collected by government taxation department, whereas we find an upward bias in the

income data collected by some social organization. Generally in psychological surveys, people tend to give what they think is the 'correct' answer rather than revealing their true feelings.

Sampling errors are the random variations in the sample estimates around the true population parameters. Since they occur randomly and are equally likely to be in either direction, and the expected value of such errors happens to be equal to zero. Sampling error decreases with the increase in the size of the sample, and it happens to be of a small in homogeneous population. It can be measured for a given sample design and size. The measurement of sampling error is usually called the 'precision of the sampling plan'. If we increase the sample size, the precision can be improved. But increasing the size of the sample has its own limitations. Hence, select a better sampling design viz. cost/ error. *While selecting a sampling procedure, researcher must ensure that the procedure causes a relatively small sampling error and helps to control the systematic bias in a better way*.

Characteristics of a Good Sample Design

The characteristics of a good sample design are:

(a) It must result in a truly representative sample.

(b) It must be results in a small sampling error.

(c) It must be viable in the context of funds available.

(d) It must be such so that systematic bias can be controlled in a better way.

(e) Sample should be such that the results of the sample study can be applied, in general, for the universe with a reasonable level of confidence.

Different Types of Sample Design

There are different types of sample designs based on two factors viz., the representation basis and the element selection technique. On the representation basis, the sample may be probability or non probability sampling. On element selection basis, the sample may be either unrestricted or restricted. When each sample element is drawn individually from the population at large, then the sample so drawn is known as 'unrestricted sample', whereas all other forms of sampling are covered under the term 'restricted sampling'.

Sample size Determination

Sampling is the process of obtaining information from a subset (sample) of a larger group (population).The results for the sample are then used to make estimates of the larger group. It is faster and cheaper than asking the entire population. There are three issues in determining the sample size. These are:

1. Financial
2. Managerial
3. Statistical

Generally, the larger the sample size the smaller the statistical error, but the greater the cost, both financial and in terms of managerial resources. Hence, sample size determination is the way of balancing between financial and statistical issues.

1. What can I afford?
2. Rule of thumb past experience historical precedence gut feeling some consideration of sample error
3. Make up of sub-groups (cells) what statistical inferences you hope to make between sub groups (rare to fall below 20 for a sub group).

Statistical Methods: To determine sample size we need three pieces of information

1. An estimate of the population Standard Deviation
2. The Acceptable Level of Sampling Error
3. 2. The Desired Level of Confidence that the Sample Result will fall within a certain range (result +/- sampling error) of true population values

Whenever a sample study is made, there arises some sampling error. Controlled by selecting a sample of adequate size, researcher will have to specify the precision in order to estimates concerning the population parameters. For instance, he may estimate the mean of the universe within ± 3 of the true mean with 95 per cent confidence. Here the desired precision is ±3, i.e. if the sample mean is 100, the true value of the mean will be 97-103. In other words, the acceptable error, e, is equal to 3. Keeping this in view, we can now explain the determination of sample size so that specified precision is ensured.

$$no = \frac{z^2 pq}{d^2} \rightarrow n = \frac{no}{1 + \frac{no - 1}{N}}$$

Where

no = the desired sample size when the population is greater than 10,000

n = number of sample size when population is less than 10,000

z = 95% confidence limit i.e. 1.96

p = 0.1 i.e. (proportion of the population to be included in the sample i.e. 10%)

q = 1-0.1 i.e. (0.9)

N = Total number of population

d = margin of error or degree of accuracy desired (0.05).

3.2 Probability Sampling

The sample reflects the characteristics of the population from which it is drawn. Sampling methods are classified as either probability or non probability. In probability sampling each member of the population has a known probability of being selected. Probability methods include random sampling, systematic sampling, stratified sampling and clustered sampling.

3.2.1 Simple random sampling

Random Sampling is the purest form of probability sampling. Each member of the population has an equal chance to be selected. The advantage of probability sampling is that sampling error can be calculated. Sampling error is the degree to which a sample might differ from the population. The most common types of simple random sampling method are:

- Lottery method
- Random number table

3.2.2 Systematic sampling

Systematic sampling is called an N^{th} name selection technique. This is quicker but not everyone has a chance to be included, the first number could be chosen at random. After the required sample size has been calculated, every N^{th} record is selected from a list of population members. Its only advantage over the random sampling technique is simplicity.

3.2.3 Stratified sampling

Where there is heterogeneity in the population this can be reflected in the strata, i.e., each stratum can be weighed to reflect the heterogeneity. In this way a proportional representation of the whole population can be gained. It is commonly used probability method that is superior to random sampling because it reduces sampling error. A stratum is a subset of the population that shares at least one common characteristic. The researcher first identifies the relevance stratums and their actual representation in the population. Random sampling is then used to select subjects for each stratum until the number of subjects in that stratum is proportional to its frequency in the population.

3.2.4 Cluster or multistage sampling

Clustered Sampling is used where there is a wide geographical spread. Clusters may be chosen subjectively to be representative of the whole.

3.2.5 Proportionate sampling

Proportional and non-proportional quota sampling: sample until exact proportions of certain types of units are obtained, or until sufficient units in several different categories are obtained.

3.3 Non probability Sampling

Non-probability Sampling does not involve the use of randomization. Therefore, to be considered representative, non-probability sampling methods cannot rely on the theory of probability (random theory). We can also use purposive or even accidental, haphazard, or convenience sampling to get a representative sample relying on other techniques than randomization. Patton (1990) identifies and describes 16 types of purposeful sampling. These include:

- convenience sampling
- snowball or chain sampling
- extreme or deviant case sampling;
- typical case sampling;
- maximum variation sampling;
- confirming or disconfirming case sampling;
- politically important case sampling; and others

3.3.1 Purposive Sampling

Purposeful sampling seeks information-rich cases which can be studied in depth (Patton, 1990). Here members are selected from the population in some non probability manner.

3.3.2 Quota sampling

Quota sampling is the non probability equivalent of stratified sampling. Like stratifies sampling the researcher first identifies the strata and their proportions as they are represented in the population. Then convenience or judgment sampling is used to select the required number of subjects from each stratum. This differs from stratified sampling where the stratums are filled by random sampling.

3.3.3 Snowball sampling

Snowball sampling is a special non probability method used when the desired sample characteristics is rare. It may be extremely difficult or cost prohibitive to locate respondents in these situation. Snowball sampling relies on referrals from initial subjects to generate additional subjects. While this technique can dramatically lower search costs, it comes at the expense of introducing bias because the technique itself reduces the likelihood that the sample will represent a good cross section from the population.

3.4 The use of GIS in research

GIS is a computer based system that allows the study of natural & man made systems with an explicit bearing in space. GIS allows data entry, data manipulation and production of interpretable output that may teach us lessons about the phenomena. GIS is applied in different disciplines; such as urban planning, Biology, Natural hazard analysis, Geology, Mining, Forest management, Hydrology, Geography, etc…

A Biologist may be interested on the impact of slash and burn practices on amphibian populations in a given forest; GIS helps for better understanding of the involved long term threats to those populations. A Natural hazard analyst might like to identify high risk areas annual monsoon-related flooding. GIS helps to relate the phenomena with rainfall patterns and terrain characteristics. A Geological engineer might want to identify the best localities for constructing buildings in an area with regular earth quakes. GIS helps to relate the phenomena to rock formations characteristics. Mining engineer may be interested in determining which prospective copper mines are best fit for future exploration. GIS helps to relate the phenomena taking into account parameters such as extent, depth and quality of ore body amongst others.

Forest manager might want to optimize timber production using data on soil and current tree stand distributions. It also helps to relate the phenomena with the presence of a number of operational constraints, such as the requirement to preserve tree diversity. Our world is continuously changing. Natural changes: volcanic eruptions, meteorite impacts; Man made changes: land use changes; Unclear source of change: El Nino, green house effects and global warming, landslides. If the change is a mix of manmade and natural the phenomenon usually becomes unclear. We want to understand the phenomena of geographic change. A geographic data model is an abstraction of the real world that employs a set of data objects to identify all these changes. Hence, it should be clear that GIS is software that allows us to analyze geographic phenomena and understand them better. Geographic phenomena are a manifestation of an entity or processes of interest that can be named or described; can be geo-referenced; can be assigned a time (interval) at which it is/was present. E.g. water management: - objects of study are measurement of actual evapo-transpiration, metrological data, and mmeasurement of total water use. All of the above phenomena can be named/described (what it is), Georeferenced (where it is), provided with a time interval at which each exists (when it happened). The answers to these questions are the relations mutually existing between objects and their position on earth which is the focus of GIS. It describes objects and/or phenomena from the real world in the form of their position with respect to a known coordinate system, their attributes that are unrelated to position, their spatial interrelations with each other (topological relations) and their temporal relationships. In general, GIS is an organized collection of computer hardware, software, geographical data, and personnel designed to efficiently capture, store, update, manipulate, analyze and display all forms of geographically referenced data.