

## Chapter 5

# Research Planning and Sampling

The third step of any social studies research is to prepare a research design. Research design is a mapping strategy which is based on sampling technique. It essentially includes objectives, sampling, research strategy, tools and techniques for collecting the evidences, analysing the data and reporting the findings. Thus, research design is the statement of the object of the inquiry and how a satisfactory culmination to be effected. A research design is the work before getting the project underway.

### MEANING OF RESEARCH PLAN/DESIGN

Research design is a choice of an investigator about the components of his project and development of certain components of the design. A design of research does not consists of an ordered sequential step-by-step procedure. It is a planning stage of research which is usually made logically visualizing its practicability. The selection of research components is done keeping in view of the objectives of the research. Research hypotheses also provide the basis for designing a research work. A research design includes the following components :

- (a) Research method or research strategy.
- (b) Sampling design.
- (c) Choice of research tools, and
- (d) Choice of statistical techniques.

A design of research is good or not, it is judged by standards such as the degree of accuracy attainable on the level of relevant evidence sought. A distinction should be drawn between statistical significance and substantive significance and appropriately applied. Above all, a good research design must be practical.

The review of the literature and related research reports are set as an important component of design. Also the classification and development of the classes of inquiry and their models are offered as major aspects of research design. Designing of research may be described as a mapping, because the research design components tend to fit into three distinct but interrelated parts; it is convenient to discuss the design components within these three components.

Kerlinger asserts that research design has two basic purposes: (1) to provide answers to research questions, and (2) to control the variance.

A research design components and proposals should give an adequate attention to each appropriate and applicable design component.

### DEFINITION OF RESEARCH PLAN/DESIGN

Reduced to the simplest of terms, “research design is a mapping strategy. It is essentially a statement of the object of the inquiry and the strategies for collecting the evidences, analysing the evidences and reporting the findings.”

It should be made clear that the design components are in part mandatory and in part choices made by the researcher. Just as the object of the inquiry often determines the class of inquiry or model to be utilised, so too, does the model or class of inquiry determine the consideration and development of certain of the design components. In fact, it is essentially the variation in some of the design-components that differentiates among the classes of inquiry.

## DESIGN FORMAT FOR A RESEARCH PROPOSAL

### Title

- I. Problem Statement and its clarifying components.
  - (A) Statement of the problem.
  - (B) Clarification of the problem statement:
    1. Definitions.
    2. Delimitations.
    3. Assumptions.
    4. Theory base.
- II. Group Components for Operation
  - (A) Hypothesis/Question design.
  - (B) Sample population-sample or group at hand design:
    1. Population delineated, delimited and defined.
    2. Sample delineated, delimited and defined.
    3. Group at hand delineated, delimited and defined.
  - (C) Observation Design:
    1. Data (evidences) Collection
    2. Instrumentation:
      - (a) Questionnaire.
      - (b) Schedule.
      - (c) Sources
      - (d) Standard measures.
  - (D) Statistical Designs:
    1. Descriptive statistical design
    2. Inferential statistics for generalization design.
    3. Statistical randomization procedures for control design.
    4. Computer assistance design.
  - (E) Organizational Design.
- III. Significance and Review Sections:
  - (A) Significance of the objectives of the Inquiry.
  - (B) Review of the Related Literature and Research Reports.

The object is to test the relationships indicated in the hypotheses in such a manner that the researcher will be able to either accept or reject the hypotheses. To accomplish this a basic design must

be established which will (1) allow the researcher to control the different variables and (2) ensure that the controlled treatments are comparable.

## CHARACTERISTICS OF GOOD RESEARCH DESIGN

In a general sense we could answer the question (what makes for good research design)? With such statements as the design should be appropriate for the hypotheses or the design should be feasible within the limits of available resources. The following are the specific characteristics of a good research design:

1. It should be free from bias or learnings.
2. It should be free from confounding effect. A good research design eliminates confounding of variables or kept it to a minimum so the results can be interpreted separately. There should be a statistical precision. The hypotheses can be tested by employing most appropriate statistical technique.

There should be enough scope to impose the control over the situation. There are basically four ways by which control can be enhanced :

- (a) Through the method of Randomization.
- (b) Holding conditions or factors constant.
- (c) Building conditions or factors into the design as independent variables.
- (d) Statistical adjustment.

## POTENTIAL PROBLEMS IN RESEARCH DESIGN

There are several difficulties which make poor research design:

1. Inadequately stating and testing hypotheses.
2. Missing or unusable data.
3. Bias in sampling.
4. Inadequate measurement.
5. Lack of precision in statistical technique or inappropriate statistical devices.

## Research Methodology

Research methodology involves the systematic procedures by which the researcher starts from the initial identification of the problem to its final conclusions. The role of the methodology is to carry on the research work in a scientific, and valid manner. The method of research provides the tools and techniques by which the research problem is attacked. The methodology consists of procedures and techniques for conducting a study. Research procedures are of little value unless they are used properly. The tools and techniques will not get the work done. The proper use of research method must be learned by the researcher.

Research methodology involves such general activities as identifying problems, review of the literature, formulating hypotheses, procedure for testing hypotheses, measurement, data collection analysis of data, interpreting results and drawing conclusions. Thus, research methodology consists of all general and specific activities of research. Mastery of the research methodology invariably enhances understanding of the research activities. Thus, it seems that research design and methodology have the same meaning i.e. mapping strategy of research.

## SUITABILITY IN SHAPING METHODOLOGY OF EDUCATIONAL RESEARCH

Webster has defined methodology as “the science of method or arrangement” which is not a particularly useful definition. Method is defined as orderliness and regularly or habitual practice of them in action.“ By placing stress on ‘arrangement’, orderliness regularity and habitual practice. the methodologies derive their substance essentially from the classically ideal controlled experiment which permeates rightly or otherwise. in the literature of educational research. The methodology means with reference to research that it is a type of inquiry.

Suitability as a criterion for consideration of a type of inquiry is much like that of utility but suitability of educational research methodology requires two conditions:

- internal validity (control), and
- external validity (sampling).

Kish referred to internal validity as control and to external validity as representation of sample. Thus, internal validity (control) is the condition which permits blaming the independent information variable for the findings or being certain that the observation was produced by the information variable. External validity (sampling or representation) is a condition permitting the generalization or inference for the findings to the population from which the sample was drawn.

The Crucial Issue of Social Studies Research Design: It is difficult to design a research project that meets both of these conditions. The classical ideal controlled experiment is endowed with both of these attributes. However, in education the controlled experiment will tend to be strong on internal validity and less strong on representation (external validity). There is visually no claim to external validity in more control observation.

At this risk of over simplification, the investigation may be described as possessing less control concern than does the study and even less of a claim to external validity. The choice of this type of inquiry depends, in part, on the attainability of control and/or representation with a given research project and in part, on the relative need for control and/or representativeness.

The other type of inquiry is ‘action research’. Control or internal validity and representativeness or external validity are desirable conditions. However, ‘action research’ is an adhoc methodology and the conditions of control and/or representativeness are special applications. Thus, they are discussed as they are individually applied.

### Internal Validity

The world we know is composed of variables. A variable is described as a thing subject to change or fluctuation. Research is a process by which knowledge is either increased or clarified and progress is stimulated towards man’s need for problem solving. But problem solving and understanding derive from control or knowing the effect of a particular variable on other variables.

Internal Validity derives from the control of variables. Control variable or constant is frequently added to the set or substitution for the development variable. A most common set of variables consists of dependent, independent and intervening variables. The use of independent variable to describe the variable to be manipulated and dependent variable to describe the other part of the relationship is frequently erroneously applied to a given research inquiry.

Information variables: All the independent variables are information variables. An information variable is the treatment applied to a group of subjects to discern the effect it has on the group characteristic.

The information variable is the treatment applied to a group of subjects to discern the effect it has on the group under the conditions imposed. The experimental variable and control variable are information variables.

**Confounding Variable:** The intervening variables are confounding variables. A confounding variable is one which, if not controlled or held constant between groups, will cloud the certainty about the effect the information variable has on the group characteristics- the dependent variables identified as relevant confounding variables having to be controlled in the given inquiry. The dependent variable is the constant.

Relevant confounding variables may also lie the subjects. Sometimes these variables are overlooked because they are not apparent.

Internal validity is accomplished to some extent by selection or control of the relevant confounding variables. It is essentially a procedure of matching the subjects on the basis of the confounding variables.

Randomization is another procedure in the attempt to attain satisfactory or acceptable internal validity. It should be noted that statistical randomization does neither eliminate nor control the confounding variables.

### **External Validity**

External validity (sampling for representation) is the condition permitting the generalization or inference of the sample findings to the population from which the sample was selected.

Representation is a desirable condition in the experiment and especially demanding condition in the survey research.

As the likelihood of representation (external validity) increases through sampling procedures. the certainty of internal validity (control) decreases. Because findings derived from samples are subject to error, procedures such as sampling-error statistics are used for estimating the accuracy of the sampling-findings. A sampling error is the difference between the true measure of the population (parameters) and an estimate of that parameter which is the sample-finding or observed measure. The degree of external validity is reported as level of confidence at .01, .0, level of significance.

The .01 level means that if other samples were drawn from the same population, the likelihood of obtaining a comparable sample finding is 99 in 100 samples.

### **MEANING AND DEFINITION OF SAMPLING**

Sampling is indispensable technique of behavioural research, the research work cannot be undertaken without use of sampling. The study of the total population is not possible and it is also impracticable. The practical limitation: cost, time and other factors which are usually operative in the situation, stand in the way of studying the total population. The concept of sampling has been introduced with a view to making the research findings economical and accurate.

The research design is based on the sampling of the study. A good research design provides information concerning with the selection of the sample population treatments and controls to be imposed.

Generalizability of the research findings is, of course, dependent upon the sampling procedures followed. An ideally either a representative or random sample would be desirable to provide maximum information about the generalizability of research data.

### **W.G. Cochran defined the term sampling**

“In every branch of science we lack the resources, to study more than a fragment of the phenomena that might advance our knowledge.”

In this definition a ‘fragment’ is the sample and ‘phenomena’ is the ‘population’. The sample observations are applied to the phenomena i.e. generalization.

‘Sampling design’ in fact means the joint procedure of selection and estimation. Sampling should be such that error of estimation is minimum.

“In the social sciences, it is not possible to collect data from every respondent relevant to our study but only from some fractional part of the respondents. The process of selecting the fractional part is called sampling.”

– *David S. Fox*

Sampling is fundamental to all statistical methodology of behavioural and social research. Bad sampling vitiates the data at the source and no amount of subsequent statistical findings will improve its quality. In fact sampling is the part of the strategy of research and has by now acquired the status of technical job.

In physical sciences there is a no problem of sampling, any fragment or piece of a phenomena is the true representative, therefore, the generalization based on the sample is true. But in behavioural and social sciences sampling is the crucial problem to have a representative sample. Sampling means, selection of individuals from the population in such a way that every individual has the equal chance to be taken into the sample population.

Population or universe means, the entire mass of observations, which is the parent group from which a sample is to be formed. The sample observations provide only an estimate of the population characteristics.

The term ‘population’ or universe conveys a different meaning than a traditional one. In census survey, the count of individuals (men, women and children) is known as population. But in research methodology population means the characteristics of a specific group. For example, secondary teachers of Uttar Pradesh, who have some specific features (teaching experience, male and female, academic qualification, teaching attitudes, teaching aptitude etc.). Another example, high school students of Rajasthan who have some specific characteristics (age group), boys and girls personality, scholastic aptitude, academic motivation etc.). Thus, secondary teachers from one population and high students from another populations, they have different characteristics.

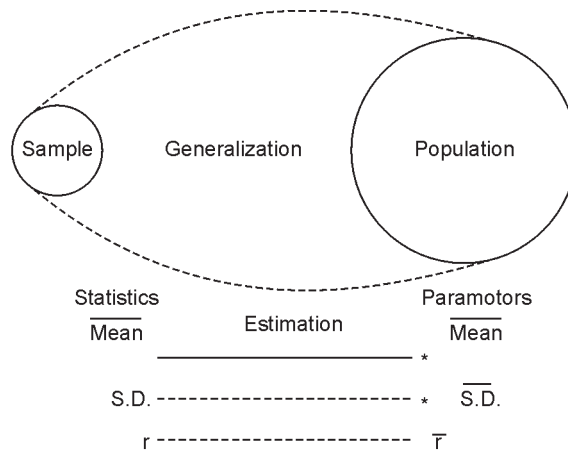
In selecting a sample subjects it is very essential that researcher should define his population and enumerate its characteristics.

## **FUNCTIONS OF POPULATION AND SAMPLING**

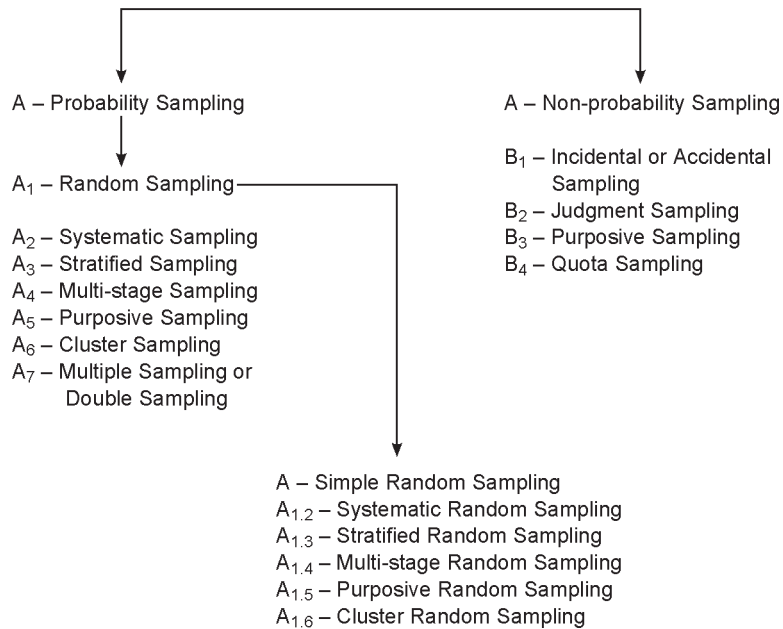
Research work is guided by inductive thinking. The researcher proceeds from specificity to generality. The sample observation is the specific situation, which are applied to the population, it is the general situation.

The sampling is the fundamental to all the statistical techniques and statistical analysis. The measures of a sample are known as statistics and measures of a population are termed as parameters. Mean, Standard deviation and Coefficient of Correlation of sample observations are known statistics and Mean S.D. and Coefficient of Correlation of a population are called parameters. Generally parameters are estimated on the basis of sample statistics. The accuracy of the parameters depends on sample

representativeness or statistics. In research work generalization is made by estimating parameters on the basis of sample statistics.



**Induction in Research  
Types of Sampling  
of  
Methods of Sampling  
(Sampling Designs)**



## RANDOMIZATION

Randomization is a method of sampling in which each individual of the population has the equal chance or probability of selection of the individuals for constituting a sample. The choice of one individual is in no way tied with other. The individuals of a sample are independently drawn from the population. All members of the population have essentially the same probability of being selected. The following are the main characteristics of randomization:

1. Each individual of the population has equal chance of being picked up into the sample.
2. One individual does not effect in selection of the other. There is no tie with one another.
3. It is free from subjective factor or personal error or bias and prejudices or imagination of the investigator.
4. It ensures that the sample formed by this method. may be representative of the population.

### Methods of Randomization

The following are main methods of randomization:

- (a) Lottery method of randomization.
- (b) Tossing a coin (Head or tail) method.
- (c) Throwing a dice.
- (d) Blind folded method.
- (e) Random tables (Tiptt's Table of Randomization).

The randomization can be done by employing either of the methods for selecting sample subjects from the population. Generally random tables are used for constituting a sample in educational research.

### Advantages of Randomization

The following are the major advantages of randomization:

1. It is an objective method of sampling.
2. It is an economical method from money, energy point of view.
3. It is a convenient approach of sampling in the field of research.
4. It permits the application of statistical devices and treatments of data. The error due sampling can be estimated.
5. It maintains the accuracy in the analysis of results.
6. It is a practical method of sampling.
7. A representative sampling may be selected by using randomization.

### Limitation of Randomization

The following are the main limitations of this method :

Randomization does not ensure the representativeness of population. A random sample may be good representative or may not be. There is no guarantee for representativeness of the population by the method.

If randomization is not done rigorously, it may allow for personal areas or subjectivity.

Actual randomization involves some practical operations, if the situations are not favourable the process of randomization might be effected.