

RESEARCH METHODOLOGY



Editor
Dr. Ram P. Savanekar

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Editorial

It gives immense pleasure to publish the present book on **RESEARCH METHODOLOGY** for multidisciplinary faculties and research scholars. Nowadays, research has a unique importance in the field of higher education all over the globe. Research methodology plays a significant role in the accomplishment of any research of any discipline. All the professors and researchers have made a devoted effort to enlighten the process of research methodology through their different perspectives on the auspicious occasion of 75th year (Diamond Jubilee Year) of India's Independence Day. An honest effort has been made through the assistance and cooperation of professors and researchers to analyze and explicate their views in context with Research Methodology which has been a boon for knowledge through the present editorial book.

Research in every field is necessary not just to identify the problem for Research but to determine the best method to solve that problem as well. To accomplish the concerted research of any field Research methodology plays an important role in any discipline because research method influences results, gives proper direction and makes the research valuable. The main objective of the research is to reinvestigate and inform about new knowledge. Thus, any research seeks to contextualize its findings within the larger body of research. Research must always be of good quality in order to present new knowledge. Hence, the researchers should have proper knowledge of research methodology to maintain the quality of research and to give the proper direction to the research.

The contribution of all the professors, researchers and authors who have contributed their views on **Research Methodology** are invaluable. The prime object of the present book is to encourage and guide to the researchers and research scholars regarding their future research work. This is an honest effort to contribute various multidisciplinary research ideas of the researchers of different fields on a single platform. The present book on Research Methodology will definitely perform role as a research guide to the research scholars of various disciplines. No doubt, the book will develop a deep insight in

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Research Methodology Chapter : Sampling Technique

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

DEFINITIONS OF SAMPLING

1. **David S. Fox.** "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". 'Sampling Design' means the joint procedure of selection and estimation. Sampling should be such that error of estimation is minimum.

2. **W. G. Cochran.** "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, i.e., generalization.

TECHNIQUE OF SAMPLE INVESTIGATION

In the technique of sample investigation certain units from the whole domain of survey are selected as being representative. Now these are studied in detail and the conclusions arrived from these are extended to the entire field or domain. Unlike census investigation, not all units are studied in sample investigation, but only some of these are selected for study on a certain definite basis. An example would make this clear. If we have to study all the students. We may not study all the students. We may collect figures of about five per cent of them only. Supposing there are 10,000 students; then we may collect expenditure figures of only 500 and extend our conclusions to all of them. If full care is taken in the selection of representatives students and data is collected faithfully, the applicability of these conclusions to the entire set will be of very high reliability.

THE VALUE OF SAMPLING TECHNIQUE

In the quantified research, the sampling technique is made maximum use of, and in no field of research can its importance and value be belittled. In researches in the educational, economic, commercial and

scientific domains, the sampling technique also has very high value in day-to-day activity. In making our daily purchases of food-stuff, vegetables, fruits, etc. it is not considered necessary to examine each and every piece of the commodity: only a handful of goods are examined and the idea about the whole is formed and this usually proves a justified procedure. In the words of Snedecor : " A cart load of coal is accepted or rejected on the evidence gained from testing only few pounds. The physicians make inference about a patient's blood through examination of a single drop. Samples are devices for learning about large masses by observing few individuals". In education, Sampling is a widely used technique. The census technique is rarely used, its most striking example being population count.

FEATURES OF SAMPLING TECHNIQUE

1. **Reliability** : If the choice of sample units is made with due care and the matter under survey is not heterogeneous, the conclusion of the sample survey can have almost the same reliability as those of census survey.
2. **Economy** : The sampling technique is much less expensive, much less time-consuming than the census techniques.
3. **Detailed Study** : Since the number of sample units is fairly small these can be studied intensively and elaborately. They can be examined from multiple viewpoints.
4. **Scientific Base** : This is a scientific technique, because the conclusion derived from the study of certain units can be verified from other units. By taking random samples we can determine the amount of deviation from the norm.
5. **Greater Suitability in Most Situations** : Most of the surveys are made by the technique of sample survey, because wherever the matter is of a homogeneous nature the examination of few units suffices. This is the case in the majority of situations.

DISADVANTAGES OF SAMPLING TECHNIQUE

1. **Less Accuracy** : In comparison to census technique the conclusions derived from sample are more liable to error. Therefore, sampling technique is less accurate than the census technique.
2. **Changeability of units** : If the units in the field of survey are liable to change or if these are not harmonious the sampling technique will be very hazardous. It is not scientific to extend the conclusions derived from one set of sample to other sets which are unlike or are changeable.
3. **Misleading Conclusions** : If due care is not taken in the selection of samples or if they are arbitrarily selected the conclusions derived from them will become misleading if extended to all units. For example, in

assessing the monthly expenditure of university students we select for sample study only rich students, our results will be highly erroneous if extended to all students.

4. Need for Specialized Knowledge: The sample technique can be successful only if a competent and able scientist makes the selection if this is done by average scientist, the selection is liable to be wrong.

RANDOMIZATION

Randomization is a method of sampling in which each individual of the population has equal chance or probability of selection for constituting a sample. The choice of one individual is in no way tied with that of the 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.

Characteristics of Randomization

1. Each individual of the population has equal chance of being picked up into the sample.
2. One individual does not affect the 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.

Methods of Randomization

1. Lottery method of randomization.
2. Tossing a coin (Head or tail) method.
3. Throwing a dice.
4. Blind folded method.
5. Random tables (Tipett's Table of Randomization).

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

Merits of Randomization

1. **Economy:** It is an economical method from money and energy point of view.
2. **Objectivity:** It is an objective method of sampling.
3. **Convenience:** It is a convenient approach to sampling in the field of research.
4. **Statistical:** It permits the application of statistical devices and treatments of data. The error due to it can be estimated.
5. **Accuracy:** It maintains the accuracy in the analysis of results.
6. **Practicability:** It is a practical method of sampling.

7. **Representativeness:** A representative sampling may be selected by using randomization.

Demerits of Randomization

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

2. **Bias:** If randomization is not done rigorously, it may allow for personal bias or subjectivity.

3. **Conditional:** As actual randomization involves some practical operations, the process of randomization might be affected if the situations are not favourable.

4. **Not Effective:** The method of randomization cannot be used effectively in educational research, because principals and heads cannot permit to select subjects randomly from a class or an institution. The selected subject may not co-operate.

Characteristics of a good Sample

1. **Free from Bias:** A good sample is *free from bias*. It does not permit prejudices, pre-conceptions and imaginations to influence its choice.

2. **True Representative:** A good sample is *the true representative* of the population corresponding to its properties.

3. **Objective:** A good sample is an *objective* one. It refers to objectivity in selecting procedure or absence of subjective elements from the situation.

4. **Accurate:** A good sample maintains *accuracy*. It yields accurate estimates or statistics and does not involve errors.

5. **Comprehensive:** A good sample is *comprehensive* in nature. This is closely linked with true-representativeness. A comprehensive sample is controlled by specific purpose of the investigation. A sample may be comprehensive in traits but may not be a good representative of the population.

6. **Economical:** A good sample is *economical* from energy, time and money point of view.

7. **Approachable:** The subject of good sample are easily *approachable*. The research tools can be easily administered on them and data can be easily collected.

8. **Good Size:** The *size* of good sample is such that it yields an accurate result. The probability of error can be estimated.

9. **Feasible:** A good sample makes the research work more *feasible*.

10. **Practical :** A good sample has the *practicability* for research situation.

Merits of Sampling Technique

1. View of R. A. Fisher

- (i) It has a greater *adaptability*.
- (ii) It is an *economical* technique.
- (iii) It has *high speed* for generalization.
- (iv) It has a *greater precision and accuracy* in the observation.

2. The View of W. G. Cochran

- (i) This technique has *great accuracy*.
- (ii) It has a *greater speed* in conducting a research work.
- (iii) It has a *greater scope* in the field or research.
- (iv) It reduces the *cost of observation* or data collection.

Types of Errors in Sampling

The sample of behavioural research suffer from two types of errors:

- (1) Random error, and (2) Systematic error.

These errors can be classified further as:

- (a) Sampling errors, and (b) Error of Measurement.

Thus, it provides a four-ways classification shown as follows:

1. Unavoidable errors: These occur whenever sampling is done. The sample selected at random may be high, low or average with regard to the trait measured. This error can be minimized by selecting a large sample.

2. Errors of bias: These sampling errors do not cancel out, but rather lean systematically in one or the other direction of the population value, due to any decision of researcher for selecting subjects for the sample. The systematic error exists. The data are of limited use as the basis for generalizing to the population.

3. Errors of measurement: These are derived from any instrument of less than complete reliability and cancelled out by selecting a large sample. The sum of errors of measurement is always zero.

4. Systematic errors of measurement: If, in the resting of subject for intelligence, the test administrator allows an extra three minutes for the test, there will probably be systematic tendency for the sample statistics to be higher than the population parameters.

The systematic errors are the bad errors in both sampling and measurement. The magnitude of random sampling errors as they affect the sample statistics is given below:

$$SE_M = \frac{\sigma}{N}$$

If greater accuracy is required, it can be obtained by increasing the size of sample or the homogeneity of the variable under investigation or by using adequate sampling design. If the results obtained are systematically

higher or lower than the corresponding true value, the sample is biased and the discrepancy is called an error of bias.

SIZE OF SAMPLE

The size of a sample depends upon the precision the researcher desires in estimating the population parameter at particular confidence level. There is no single rule that can be used to determine sample size. It is best to use as large a sample as possible as a larger sample is more likely to be representative of the population. With a large sample the data are likely to be more accurate and precise. The larger the sample, the smaller the standard error. The standard error of a sample mean is inversely proportional to the square root of n . Thus, in order to double the precision of one's estimation, the sample size should be quadrupled. One should include at least 30 subjects in a sample since this number permits the use of large sample statistics. Statistically speaking, a sample $n=30$ is considered large, since with this n , the t -distribution and the normal curve are practically the same for hypothesis testing purposes. In experimental research, one should select a sample that will permit at least 30 in each group. Descriptive research typically uses larger sample. One should select 10-20 per cent of the accessible population for the sample.

Determination of the size of Sample. In an experimental study, it is essential to equate the control and experimental groups. However, in survey study the sample should be representative of population. Thus, size of sample is an important condition for determining the size of the sample. Other things being equal, the larger the sample, the greater the precision and accuracy of the data it provides. The precision of data is determined primarily by the size of the sample, rather than by the percentage of the population represented in the sample. The term 'large sample' is vague, it varies with the nature of study. The exact procedure to determine the sample size required varies with the nature of the variable and its sampling distribution.

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