Advantages and Disadvantages of Probability Sampling Methods in Social Research

Saroj Kumar Singh

Deptt. Of Rural Economics, S. N. S. R. K. S. College, Saharsa
(A Constituent Unit of B. N. M. U., Madhepura, Bihar)
E-mail: drsaroj999@gmail.com

Abstract—*For studying a social problem, it is difficult to study the whole universe of the problem under study. It is because it is both costly, time consuming and complex as well as financially not viable. Today it is being increasingly felt that social researchers have neither time, nor money nor energy nor resources to study the entire population, which is connected or proposed to be covered in a study. Thus, this paper attempts evaluating information from sampling and assesses its advantages and disadvantages so that researcher could decide the way of selecting a sample from a given population and appropriate conclusion and suggestions could be made.*

1. INTRODUCTION

For studying a social problem, it is difficult to study the whole universe of the problem under study. It is because it is both costly, time consuming and complex as well as financially not viable. Today it is being increasingly felt that social researchers have neither time, nor money nor energy nor resources to study the entire population, which is connected or proposed to be covered in a study. In other words, Census Method of study is proving more and more costly and time consuming. The idea of gathering data from a population is one that has been successfully used over the years and is called a census. This method is mentioned several times in the bible. It was also used by the Ancient Egyptians "to obtain empirical data describing their subjects" Accordingly, it is felt that the representative sample should be picked up and conclusions drawn should be supposed to represent the whole population. According to P.V. Young, "A statistical sample is miniature picture or cross section of the entire group or aggregate from which the sample is taken. The entire group from which a sample is chosen is known as The Population, Universe, or Supply." The sample method involves taking a representative selection of the population and using the data collected as research information. It has also been described as a representative "taste" of a group. The sample should be "representative in the sense that each sampled unit will represent the characteristics of a known number of units in the population." *Sampling is used in practice for a variety of reasons such as;

i. Sampling is cheaper than census method. It is economical too. ii. As the magnitude of operations is small in case of sampling, so data collection, and analysis can be carried out accurately and efficiently. iii. Sampling is the only way when the population is as large as the population of a country. iv. Sampling enables the researcher to make a precise estimate of the standard error, which helps in obtaining information concerning some characteristic of the population. * It is therefore sampling method is becoming more and more popular. In fact social researcher Census Method is being replaced by sampling method. Convenient to pick up a sample out of the universe proposed to be covered by the study. However, sampling needs much care. It should be representative and picked up in a manner that it represents the universe as a whole. *

2. OBJECTIVES OF THE STUDY

The objectives of the paper are as follows:

1) To find out different types of probability sampling methods and its advantages and disadvantages in social research t its advantages and disadvantages of the sampling methods in social research.

2) To draw appropriate conclusion and suggest measures to reduce errors in sampling..

This paper will focus on sampling as a method to select participants for surveys; more specifically interviewing and self-administered questionnaires. Probability and non-probability sampling as well as the surrounding validity issues will be discussed.

3. PROBABILITY SAMPLING METHODS

There are various types of sampling methods. The methods on the whole have its own advantages as well as disadvantages Sampling theory is important to understand in regards to selecting a sampling method because it seeks to "make sampling more efficient" (Cochran 5). Cochran posits that using correct sampling methods allows researchers the ability

to reduce research costs, conduct research more efficiently (speed), have greater flexibility, and provides for greater accuracy.

Two standard categories of the sampling method exist. These two categories are called probability sampling and non-probability sampling.

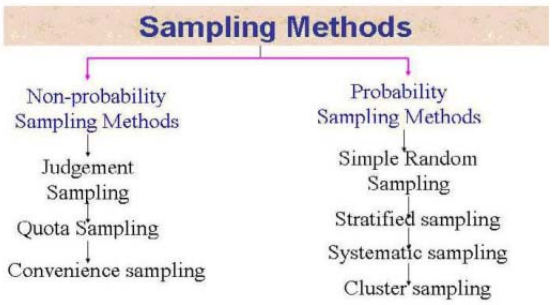
Probability sampling is sometimes called random sampling and non-probability sampling is sometimes called non-random sampling. These terms are interchangeable.

Probability and non-probability sampling have advantages and disadvantages and the use of each is determined by the researcher's goals in relation to data collection and validity. Each sampling category includes various methods for the selection process. Sampling methods are broadly categorized into two groups: Probability sampling methods and Non-probability sampling methods.

In probability sampling methods, the researcher should know the universe from which the sample is drawn. Under this sampling design every item of the universe has an equal chance of inclusion in the sample.

3.1. Simple Random Sampling * *

Selecting a student from the complete students names from a box with blind or folded eyes is the best example of random sampling; it is the best technique and unbiased method. It is the best process of selecting representative sample. But the major disadvantage is that for this technique we need the complete sampling frame i.e. the list of the complete items or population which is not always available. Probability sampling methods are of three types) Simple random sampling: in this method, each element has the equal probability to be selected as a sample. It is bias free. Here an element cannot come twice as sample.



3.2. Stratified Random Sampling

* In stratified random sampling the population is first divided into different homogeneous group or strata which may be based upon a single criterion such as male or female. On the other hand, upon combination of more criteria like sex, caste, level of education and so on. This method is generally applied when different category of individuals constitutes the population viz. general, O.B.C, S.C, S.T or upper caste, middle caste, backward caste or small farmers, big farmers, marginal farmers landless farmers etc. To have an actual picture of a particular population about the standard of living, in case of India it is advisable to categorize the population on the basis of caste, religion, or land holding otherwise some section may be under-represented or not represented at all. Stratified random sampling may be of two types.. Proportionate stratified random sampling and Dis-proportionate stratified random sampling

3.2.1. Proportionate Stratified Random Sampling. In case of proportionate random sampling method, the researcher stratifies the population according to known characteristics and subsequently, randomly draws the sample in a similar proportion from each stratum of the population according to its proportion. That is, the population is divided into several sub-populations depending upon some known characteristics, this sub population is called strata, and they are homogeneous. Suppose, a Gaon Panchayats consists of 1000 voters among which 60% is Hindus, 30% is Muslims and 10% is schedule tribes. Now the investigator wants to draw a sample of 150 voters from the population as per their proportion. That can be done by multiplying the sample number with their proportion; as per this method the sample size of Hindu voter will be 150 x 60% = 90, Muslims will be 150 x 30% = 45 and S.T will be 150 x 10% = 15. Therefore, the investigator has to collect the complete voter list of the G.P and randomly select the sample from each category as calculated above. In this method, the sampling error is minimized and the sample possesses all the required characteristics of the population.

3.2.2. Disproportionate Stratified Random Sampling. In this method the sampling unit in each stratum is not necessarily be as per their population. Suppose for the said G.P the investigator wants to the know the voting pattern of male and female of Hindu, Muslim and S.T voters; in that case he must take equal no. of male and female voter from each category. Here the investigator has to give equal weightage to each stratum. This is a biased type of sampling and in this case some stratum is over-represented and some are less represented; these are not truly representative sampling, still this to be used in some special cases.

3.3. Systematic Sampling

In this method every nth element is selected from a list of population having serial number. For a large population (say, one lakh) is taken into study and the sample size is 100, so the investigator is to select every nth name means 1000th name. The starting name may be anyone within 1000, so selecting a particular element/person taking the 1000th name cannot represent the different strata or groups that may exist in that big population. Moreover, once the starting number is decided and collected data it cannot be changed or switched over the other category as per its definition (systemic). Moreover, the list may have the chance to repeat the same category of

element by passing the other. It is biased and misleading but useful in homogeneous population.

Advantages: The systematic sampling design is simple and convenient to adopt. The time and work involved in sampling by this method are "relatively less. The results obtained are also found to be generally satisfactory provided care is taken to see that there are no periodic features associated with the sampling interval. If populations are sufficiently large, systematic sampling can often be expected to yield -suits similar to those obtained by proportional stratified sampling.

Disadvantages: The main limitation of the method is that it becomes less representative if we are dealing with populations having “hidden periodicities”. Also if the population is order in a systematic way with respect to the characteristics the investigator is interested in, then it is possible that only certain types of item will be included in the population, or at least more of certain types than others. For instance, in a study of worker’ wages the list may be such that every tenth worker on the list gets wages above Rs. 750per month.

3.4. Cluster Sampling

This is another type of probability sampling method, in which the sampling units are not individual elements of the population, but group of elements or group of individuals are selected as sample. In cluster, sampling the total population is divided into a number of relatively small sub-divisions or groups, which are themselves clusters and then some of these cluster are randomly selected for inclusion in the sample. * Suppose an investigator wants to study the functioning of mid-day meal service in a district in that case he can use some schools clustering in a block or two without selecting the schools scattering all over the district. Cluster sampling reduces the cost and labor of collecting the data of the investigator but less precise than random sampling

4. NON-PROBABILITY SAMPLING METHODS

In this type of sampling, items for the sample are selected deliberately by the researcher instead of using the techniques of random sampling. It is also known as purposive or judgment sampling. For instance an investigator wants to verify the profit making and self-dependency of the self-help groups in their chosen enterprises assisted by the central Govt. fund in a state; then the investigator may select one or two districts having more number of S.H.G, getting comparatively more fund, and researcher having long term experience in that locality. This is a biased type of sampling bears large sampling errors. This type of sampling is rarely adopted in large and important purposes. However, for research purpose the research scholar may take this. Some important techniques of non-probability sampling methods are: Quota Sampling, Purposive Sampling, Systematic Sampling, Snow Ball Sampling And Double Sampling

4.1. Judgment Sampling

In this method of sampling the choice of sample items depends exclusively on the judgment of the investigator. In other words, the investigator exercises his judgment in the choice and includes those items in the sample, which he thinks are most typical of the universe with regard to the characteristics under investigation. For example, if sample of ten students is to be selected from a class of sixty for analysing the spending habits of students, the investigator would select 10 students who, in his opinion, are representative of the class.

Advantages: Though the principles of sampling theory are not applicable to judgment sampling, the method is sometimes used in solving many types of economic and business problems. The use of judgment sampling is, justified under a variety of circumstances:

i. When only a small number of sampling units are in the universe, simple random selection may miss the more important elements, whereas judgment selection would certainly include them in the sample.

ii. When we want to study some unknown traits of a population, some of whose characteristics are known, we may then stratify the population according to these known properties and select sampling units from each stratum on the basis of judgment. This method is used to obtain a more representative sample.

iii. In solving everyday business problems and making public policy decisions, executives and public officials are often pressed for time and cannot wait for probability sample designs. Judgment sampling is then the only practical method to arrive at solutions to their urgent problems.

Disadvantages: Judgment sampling method is however associated with the allowing limitations:

i. This method is not scientific because the population units to be sampled may be affected by the personal prejudice or bias of the investigator. Thus, judgment sampling involves the risk that the investigator may establish foregone conclusions by including those items in the sample which conform to his preconceived notions. For example, if an investigator holds the view that the wages of workers in a certain establishment are very low, and if he adopts the judgment sampling method, he may include only those workers in the sample whose wages are low and thereby establish his point of view which may be far from the truth. Since an element of subjectiveness is possible, this method cannot be recommended for general use.

ii. There is no objective way of evaluating the reliability of sample results. The success of this method depends upon the excellence in judgment. If the individual making decisions is knowledgeable about the population and has good judgment, then the resulting sample may be

representative, otherwise the inferences based on the sample may be erroneous. It may be noted that even if a judgment sample is reasonably representative, there is no objective method for determining the size or likelihood of sampling error. This is a big defect of the method.

4.2. Quota Sampling

Quota sampling is a type of judgment sampling and is perhaps the most commonly used sampling technique in non-probability category. In a quota sample, quotas are set up according to some specified characteristics such as so many in each of several income groups, so, many in each age, so many with certain political or religious affiliations, and so on. Each interviewer is then told to interview a certain number of persons which constitute his quota. Within the quota, the selection of sample items depends on personal judgment. For example, in a radio listening survey, the interviewers may be told to interview 500 people living in a certain area and that out of every 100 persons interviewed 60 are to be housewives, 25 farmers and 15 children under the age of 15. Within these quotas the interviewer is free to select the people to be interviewed. The cost per person interviewed may be relatively small for a quota sample but there are numerous opportunities for bias which may invalidate the results. For example, interviewers may miss farmers working in the fields or talk with those housewives who are at home. If a person refuses to respond, the interviewer simply selects someone else. Because of the risk of personal prejudice and bias entering the process of selection, the quota sampling is not widely used in practical work.

Quota sampling and stratified random sampling are similar in as much as in both methods the universe is divided into parts and the total sample is allocated among the parts. However, the two procedures diverge radically. In stratified random sampling the sample with each stratum is chosen at random. In quota sampling, the sampling within each cell is not done at random; the field representatives are given wide latitude in the selection of respondents to meet their quotas.

Quota sampling is often used in public opinion studies. It occasionally provides satisfactory results if the interviewers are carefully trained and if they follow their instructions closely. It is often found that since the choice of respondents within a cell is left to the field representatives, the more accessible and articulate people within a cell will usually be the ones who are interviewed. Slight negligence on the part of interviewers may lead to interviewing ineligible respondents. Even with alert and conscientious field representatives it is often difficult to determine such control category as age, income, educational qualifications, etc.

4.3. Convenience Sampling

A convenience sample is obtained by selecting 'convenient' population units. The method of convenience sampling is also called the chunk A chunk refers to that fraction of the population being investigated which is selected neither by probability nor by judgment but by convenience. A sample obtained from readily available lists such as automobile registrations; telephone directories, etc., is a convenience sample and not a random sample even if the sample is drawn at random from the lists. If a person is to submit a project report on labour-management relations in textile industry and he takes a textile mill close to his office and interviews some people over there, he is following the convenience sampling method. Convenience samples are prone to bias by their very nature-selecting population elements which are convenient to choose almost always make them special or different form the best of the elements in the population in some way.

Hence the result obtained by following convenience sampling method can hardly be representative of the population—they are generally biased and unsatisfactory. However, convenience sampling is often used for making pilot studies. Questions may be tested and preliminary information may be obtained by the chunk before the final sampling design is decided upon.

5. ASSESSMENT OF THE PROBABILITY SAMPLING METHODS

As with all research methods, sampling provides some room for error on the part of the researcher. Being aware of those possible errors is essential in selection of the sampling method used as well as calculation of the data collected. Simply being aware of possible errors is often not enough. Arlene Fink believes that no matter how thorough and proficient the researcher is, “sampling bias or error is inevitable” (25). Sampling error may be defined as “the error that results from taking one sample instead of examining the whole population” (Lohr 15). Lohr simply defines several types of sample errors as “under coverage, nonresponse, and sloppiness in data collection”.

Under coverage refers to selecting a sample that is not large enough. The error here is that the information gathered from a small sample is not representative of the population and cannot be generalized to that population. Gary Henry indicates, “Small sample size may contribute to a conservative bias (Type II error) in the application of the statistical test”. This happens when “a null hypothesis is not rejected although in fact it is false”.

Non-response is a non-sampling error that precludes that some members of the population who are eligible to be sampled are unwilling to participate or do not answer all questions on the survey(s) (Cochran 292: Fink 26; Henry 124; Lohr 6). Lohr indicates, “The main problem caused by non-response is potential bias of population estimates.” Non-sampling errors “occurs because of imprecision in the definition of the target and study population and errors in survey design and measurement” (Fink 25). Some errors of non-sampling include changes due to historical circumstances, neglecting definitions

and inclusion and exclusion of criteria, and instrument or survey process instrument bias (Fink 26).

Researchers should keep in mind that an “increase and sample size and an increased homogeneity of the elements being sampled” allow for the reduction of sampling error (Babbie 89). However, Lohr warns that “increasing the sample size without targeting nonresponse does nothing to reduce nonresponse bias; a larger sample size merely provides more observations from the class of persons that would respond to the survey”.

6. CONCLUSION AND SUGGESTIONS

Researchers may choose from a variety of sampling methods. The researcher goals inform which sampling method is best for the research to be conducted. The main choice in regards to sample method choice is whether the researcher wants to generalize the findings from the sample to the whole of the population being studied. Being aware of possible errors due to the sample method chosen is also very important because giving possible errors within the results section allows the study to be regarded as valid. Many sample method choices are available; the researcher must choose the method that is right for the study.

In conclusion, it can be said that using a sample in research saves mainly on money and time, if a suitable sampling strategy is used; appropriate sample size selected and necessary precautions taken to reduce on sampling and measurement errors, then a sample should yield valid and reliable information. * *

REFERENCES

[1] Salant, P. and D. A. Dillman (1994). *How to conduct your own survey*. John Wiley & Sons, Inc.

[2] Patton, M.Q.(1990). *Qualitative evaluation and research methods.* SAGE Publications. Newbury Park, London New Delhi.

[3] Lapin, L. L. (1987) *Statistics for mordern business decisions* Harcourt Brace Jovanovich, Inc..

[4] Babbie, Earl 1990. *Survey Research Methods* Wadsworth Publishing Company, Belmont, California:

[5] Cochran, William G. 1953. *Sampling Techniques* New York: John Wiley & Sons,

[6] Fink, Arlene. 1995. *How to Sample in Surveys* VOl ** 6. London: Sage Publications,

[7] Jones, Howard L “The Application of Sampling Procedures to Business Operations.” *Journal of the American Statistical Association*. 50.271 (1955): 763-774.