Frequently Asked Questions

1. Define a sample design.

Answer:
A sample design is a definite plan for obtaining a sample from a given population. It refers to the technique or a procedure an investigator would adopt in selecting the item for the sample that is size of the sample. A sample design is determined before data are collected. There are many sample designs or techniques from which an investigator can choose. Some designs are relatively more precise and easy to apply than others are. One must select a sample design, which should be reliable and appropriate for their study

2. What is the role of sampling in a decision making process?

Answer:
In the present era of technological civilization the government of a country requires detailed information about the requirements of the people, the production in the country, the resources available etc. to frame its policies in all fields. Such data is also very important for industrial organization to plan their production, expansion of activities, sales organization etc. The collection of data is an activity of major importance in the life of a nation.

With large population and multiplication of activities in almost all fields the collection of information from each unit of a population say from each farm, each household is simply out of question. The financial outlay and time required for such a program will be very disproportionate to the utility of the final result when available. The only course open is to collect data from a small part of the population and obtain information about the population based on this data what is known as statistical inference. Hence, sampling is a very powerful tool in each and every field of human activity.

3. What is the need for sampling?

Answer:
Sampling is used in practice for variety of reasons such as:

- Sampling can save time and money
- Sampling may enable more accurate measurements for a sample study is generally conducted by trained and experienced investigators
- Sampling remains the only way when the population consists of infinitely many members
- Sampling remains the only choice when the test involves the destruction of the item under study.
- Sampling usually enables to estimate sampling the sampling errors

4. Distinguish between probability and Non-probability sampling.

Answer:
In random sampling selection of the sample is done in such a manner that the chance of selection of each unit of the universe is the same. In other words, the selection of the units depends entirely on chance one does not know before, and which units will actually constitute a sample. It is for the reason that this method is also known as the method of chance selection.

In Non-probability or Non – Random or Deliberate sampling the investigator himself choose from the population few such units, which according to his estimates are best representatives of the population. His selection is deliberate and is based on his own ideas about the representativeness of the sampled units. Hence, this is a ssubjective procedure in which the probability of selection for some population units is zero or unknown before drawing the sample.

5. List few of the probability and non-probability sampling techniques.

Answer:
Some of the probability sampling techniques in which each unit has an equal chance of being included in the sample are

1) Simple random sampling

2) Systematic sampling

3) Stratified sampling

4) Cluster sampling

Non-probability (non-random) sampling– in which each unit has an unequal chance of being included in the sample

1) Convenience sampling

2) Judgement sampling

3) Snowball sampling

4) Quota sampling

6. What are the advantages and limitations of non-random sampling?

Answer:

Advantages

- Cheaper and faster than Probability Sampling
- Reasonably representative if collected in a thorough manner

Limitations

This technique of selection has many drawbacks

The first and foremost of them is the bias or prejudice of the investigator has enough scope to work and influence the selection

If the investigator is biased, it is but natural that he would select such a sample, which would give conclusions, which suit his requirements and views.

If for example an investigator wants to show that average monthly expenditure of the students residing in the hostels of an University are very high, he can select such a sample which consists of those students only who are aristocratic and who spends much more than others.

Another defect of this technique is that it is not possible to have any idea about the degree of accuracy achieved in any statistical investigation conducted by this method.

7. What are the advantages and limitations of random sampling?

Answer:

Advantages:

Random selections of the samples have many advantages over the Non-random selection.

The most important merit of this technique is that the theory of probability, it is possible to have an idea about the errors of estimation and we can always find out whether the results are significant or not. It is possible to assign limits within which the true value of the measure of universe must invariably lie.

Another point in favour of this technique is that the selection is not affected by the prejudice or bias of the investigator.

Limitations of Probability Sampling

However, it must always be kept in mind that in many cases it is difficult to say that the selection has been purely random and the sample is fully representative of the population and more expensive than non-probability samples. This random sampling technique is purely based on the theory of probability.

8. Explain the process of sampling design.

Answer:

The sampling design process may be grouped under the following heads.

1) Definition of the population to be sampled with the objectives
2) Determination of the frame
3) Determine the sampling procedure
4) Determine the appropriate sample size
5) Execute Sampling design

1. Definition of the population to be sampled with the objectives

First, define in clear words about the objectives of the survey. Sometimes the sponsoring agents also will not know about the objectives of the survey like what it wants and how it is going to make use the results. However, they should take utmost care so that their objectives should go along with the available resource, interims of money, manpower and the time limit required for the completion of the survey. Then we should decide whom do you want to survey? What are the characteristics of those who have the information?

The main step in developing any sampling design is to clearly define the set of objects from which the sample is chosen technically called target Population. For e.g. In sampling of farms clear rules must be framed regarding the size, shape etc. of the farm giving importance for the border line cases so that an investigator will be able to decide in the field without any hesitation whether to

2. Determine the Sampling frame
   Frame can be defined as some list or map or other acceptable material, which covers the population, decided upon and which serves as a guide for the population to be covered. Since Frame is the one which determines the structure of the sample survey it has become one of the major practical problems. A good experience helps in constructing a good frame.

3. Determine the sampling Design
   The most important part however is the selection of the samples. A sample study would give dependable conclusions only if the sample is the true representative of the universe. There are different types of sample designs based on two factors, the representation basis and the element selection technique. Broadly speaking on representation basis there are three methods by which the samples can be selected and they are:

   - Probability (Random) sampling
   - Non-probability (Deliberate) sampling
   - Mixed 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 the other forms of sampling are covered under the term restricted sampling.

4. Determine the Appropriate sample size
   This refers to the number of items to be selected from the universe to constitute a sample, which is one of the major problems in sample design. The size of the sample should be neither excessively large nor too small. It should be optimum. An optimum sample is the one, which fulfils the requirements of efficiency, representativeness, reliability and flexibility. The size and the parameters of the population should also be kept in mind while deciding the size of the sample. In practical situation, one can chalk out an outline of the table, which would help us in eliminating the collection of irrelevant information.

5. Execute Sampling design
   The procedure for selection of the sample and estimation of population parameters along with the margin of error are some of the important statistical problems that should receive most of our attention. Finally the investigator should decide the type of the 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 procedure or technique stands for sample design itself.

There are several sample designs out of which an investigator has to select judiciously which will guarantee reliable estimates. Obviously he must select the design which for a given sample size and cost has a smaller sampling error.

9. Give one example for Random, Non-random and Mixed sampling.

Answer:
Let us take an example of selecting some 100 hostellers from a university with a view to study the average monthly expenditure. We can either choose them at random from the total number of hostellers in that university in which we can select based on the random sampling. Or else, we can select 50 hostellers whose monthly expenditure to our knowledge is neither too high nor too low. In this case, we can first divide the students hostel wise and from each hostel we can select the students on the basis of random sampling in which we will be making the selection on the basis of mixed sampling.

10. What are the characteristics of a good sampling design?

Answer:
Characteristics of a Good Sampling design

1) Sample design must result in a truly representative sample.
2) Sample design must be such which results in small sampling errors
3) Sample design must be viable in the context of funds available for the research study.
4) Sample design must be so that a systematic bias can be controlled in a better way.
5) Sample should be such that the results of the sample study can be applied, in general , for the population with a reasonable level of confidence

11. What are the principles of sampling?

Answer:
The theory of sampling is based on the following important principles

1) Principle of Statistical regularity:
   This principle is related to the mathematical theory of probability. According to King, "The law of statistical regularity lays down that a moderately large number of items chosen at random from a large group are almost sure on the average to possess the characteristics of the large group". This principle focuses the importance of selecting a sample at random so that each and every unit in the population has an equal chance of being selected in the sample. In other words, selection must not be made by deliberate exercise of one's direction. A sample selected in this manner would be representative of the population.
   An immediate derivation from the principle of Statistical regularity is the principle of inertia of large numbers which states that "other things being equal, as the sample size increases the results tend to be more reliable and accurate". This is because when we deal with large numbers the variations in the aggregate result is likely to be insignificant (Because variations in the component parts tend to balance each other).

2) Principle of Validity:

Sample design should enable us to obtain valid tests and estimates about the parameters of the population. The sample obtained by the method of probability sampling satisfies this principle.

3) Principle of Optimization:
This principle impresses upon obtaining optimum results in terms of efficiency and cost of the design with the resources at our disposal. The reciprocal of the sampling variance of an estimate provides a measure of efficiency while a measure of the cost of the design is provided by the total expenses incurred in terms of money and manpower. The principle of optimization aims at
    i) Achieving the given level of efficiency at a minimum cost and
    ii) Obtaining maximum possible efficiency with the given level of cost

12. What are the points to be considered while deciding the size of the sample?

Answer:
One should not collect too many data, which are never examined and analyzed. This refers to the number of items to be selected from the universe to constitute a sample, which is one of the major problems in sample design. The size of the sample should be neither excessively large nor too small. It should be optimum. An optimum sample is the one, which fulfils the requirements of efficiency, representativeness, reliability and flexibility. The size and the parameters of the population should also be kept in mind while deciding the size of the sample. In practical situation, one can chalk out an outline of the table, which would help us in eliminating the collection of irrelevant information.

13. What do you mean by a mixed sampling?

Answer:

A mixture of random sampling and non-random sampling is known as a mixed sampling. The universe is first divided into same groups based on non-random sampling and from each subdivision; certain items are selected in accordance with random sampling. In this technique in one stage the process is subjective and in another stage it s completely random. This technique is better than Non-random sampling and some situations this technique is very much useful. Suppose we want to study about the radio listening habits of rural citizens, we first divide the population of that rural area into homemakers, farmers, under age 15 etc. Then select the people based on random sampling in which case we will be selecting based on mixed sampling.

14. Write a note on a Sampling Frame

Answer:
Frame can be defined as some list or map or other acceptable material, which covers the population, decided upon and which serves as a guide for the population to be covered.

Since Frame is the one which determines the structure of the sample survey it has become one of the major practical problems. A frame, which has been already prepared for some other purpose, has to be scrutinized and should be checked to see that it is free from all sort of defects like unknown amount of duplication, ineligibles, omissions etc. and should be

brought up-to-date before using them. A good experience helps in constructing a good frame.

- For example:
- Students who eat Samosas
- Young people at random in the street
- Phone Directory

15. What are the essentials of a good sampling design?

Answer:
For the sampling technique to be useful, it is necessary that a samples drawn using one of the sampling techniques possess a few essentials. They are:

- Adequacy
- Independent selection
- Homogeneity
- Representative