# INTRODUCTION TO SAMPLE SURVEY

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# CENSUS AND SAMPLE SURVEY

- 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.
- It can be presumed that in such an inquiry, when all items are covered, no element of chance is left and highest accuracy is obtained.

# CENSUS AND SAMPLE SURVEY

- But when the field of inquiry is large, this method becomes difficult to adopt because of the resources involved.
- many a time it is not possible to examine every item in the population.
- it is possible to obtain sufficiently accurate results by studying only a part of total population called respondents

# CENSUS AND SAMPLE SURVEY

- The selected respondents constitute what is technically called a ‘sample’.
- The selection process is called ‘sampling technique.’
- The survey so conducted is known as ‘sample survey’.

# IMPLICATION OF A SAMPLE DESIGN

- A sample design is a technique or the procedure that the researcher would adopt in selecting items for the sample from a given population.
- Sample design is determined before data are collected.
- Researcher must select/prepare a sample design which should be reliable and appropriate for his research study.

# STEPS IN SAMPLE DESIGN

1. Type of universe
   - can be finite (number of items is certain, eg : number of workers in a factory) or infinite (number of items is infinite, eg : number of stars in the sky).

2. Sampling unit
   - may be a geographical one (state, district, village, etc.,) or a construction unit (house, flat, etc.,) or a social unit (family, club, school, etc.,) or an individual.

3. Source list
   - contains the names of all items of a universe

# STEPS IN SAMPLE DESIGN

4. Size of sample
    - refers to the number of items to be selected from the universe to constitute a sample
5. Parameters of interest
    - one must consider the specific population parameters which are of interest (proportion of persons with some characteristic in the population)
6. Budgetary constraint
    - Cost considerations
7. Sampling procedure
    - 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.

# CRITERIA OF SELECTING A SAMPLING PROCEDURE

- While selecting a sampling procedure, researcher must ensure that the procedure causes a relatively small sampling error and helps to control the systematic bias.
- Systematic bias results from errors in the sampling procedures.
- Sampling errors are the random variations in the sample estimates around the true population parameters

# CRITERIA OF SELECTING A SAMPLING PROCEDURE

A Systematic Bias is the result of one or more of the following factors:

1. Inappropriate sampling frame
2. Defective measuring device
3. Non-respondents
4. Indeterminancy principle
5. Natural bias in the reporting of data

# CRITERIA OF SELECTING A SAMPLING PROCEDURE

Sampling Errors

–Sampling error decreases with the increase in the size of the sample 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 viz., a large sized sample increases the cost of collecting data and also enhances the systematic bias.

–Thus the effective way to increase precision is usually to select a better sampling design which has a smaller sampling error for

a given sample size at a given cost.

# CHARACTERISTICS OF A GOOD SAMPLE DESIGN

a) Sample design must result in a truly representative sample.

b) Sample design must be such which results in a small sampling error.

c) Sample design must be viable in the context of funds available for the research study.

d) Sample design 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 DESIGNS

- Probability sampling is based on the concept of random selection.
- Non-probability sampling is ‘non-random’ sampling.

# DIFFERENT TYPES OF SAMPLE DESIGNS

- Non-probability Sampling
  - Non-probability sampling is also known by different names such as deliberate sampling, purposive sampling and judgement sampling.
  - In this type of sampling, items for the sample are selected deliberately by the researcher; his choice concerning the items remains supreme.

# DIFFERENT TYPES OF SAMPLE DESIGNS

- Probability Sampling
  - Probability sampling is also known as ‘random sampling’ or ‘chance sampling’.
  - Under this, every item of the universe has an equal chance of inclusion in the sample.
  - Random sampling ensures the law of Statistical Regularity which states that if on an average the sample chosen is a random one, the sample will have the same composition and characteristics as the universe.
  - This is the reason why random sampling is considered as the best technique of selecting a representative sample.

# COMPLEX RANDOM SAMPLING DESIGNS

1. Systematic sampling
2. Stratified sampling
3. Cluster sampling
4. Area sampling
5. Multi-stage sampling
6. Sampling with probability proportional to size
7. Sequential sampling

# COMPLEX RANDOM SAMPLING DESIGNS

- Systematic sampling
  - only the first unit is selected randomly and the remaining units of the sample are selected at fixed intervals
  - For instance, if a 4 per cent sample is desired, the first item would be selected randomly from the first twenty-five and thereafter every 25th item would automatically be included in the sample.

# COMPLEX RANDOM SAMPLING DESIGNS

- Stratified sampling
  - If a population from which a sample is to be drawn does not constitute a homogeneous group
  - Under stratified sampling the population is divided into several sub-populations that are individually more homogeneous than the total population (the different sub-populations are called ‘strata’)
  - then we select items from each stratum to constitute a sample.

# COMPLEX RANDOM SAMPLING DESIGNS

Q. A population is divided into three strata so that N1 = 5000, N2 = 2000 and N3 = 3000. Respective standard deviations are: s1 = 15, s2 = 18 and s3 = 5.

How should a sample of size n = 84 be allocated to the three strata, if we want optimum allocation using disproportionate sampling design?

# COMPLEX RANDOM SAMPLING DESIGNS

Solution: Using the disproportionate sampling design for optimum allocation, the sample sizes for different strata will be determined.

The allocation in such a situation results in the following formula for determining the sample sizes different strata:

$$n_i = \frac{n \cdot N_i \sigma_i}{N_1 \sigma_1 + N_2 \sigma_2 + \ldots + N_k \sigma_k} \qquad \text{for } i = 1, 2, \ldots \text{ and } k.$$

where s1, s2 , ... and sk denote the standard deviations of the k strata.

N1, N2,…, Nk denote the sizes of the k strata n1, n2,…, nk denote the sample sizes of k strata.

# COMPLEX RANDOM SAMPLING DESIGNS

Sample size for strata with $N_1 = 5000$

$$n_1 = \frac{84(5000)(15)}{(5000)(15) + (2000)(18) + (3000)(5)}$$

$$= 6300000/126000 = 50$$

Sample size for strata with $N_2 = 2000$

$$n_2 = \frac{84(2000)(18)}{(5000)(15) + (2000)(18) + (3000)(5)}$$

$$= 3024000/126000 = 24$$

Sample size for strata with $N_3 = 3000$

$$n_3 = \frac{84(3000)(5)}{(5000)(15) + (2000)(18) + (3000)(5)}$$

$$= 1260000/126000 = 10$$

# COMPLEX RANDOM SAMPLING DESIGNS

- Cluster sampling
  - Thus in cluster sampling the total population is divided into a number of relatively small subdivisions which are themselves clusters of still smaller units and then some of these clusters are randomly selected for inclusion in the overall sample.
- Area sampling
  - If clusters happen to be some geographic subdivisions, in that case cluster sampling is better known as area sampling

# COMPLEX RANDOM SAMPLING DESIGNS

- Multi-stage sampling
  - Multi-stage sampling is a further development of the principle of cluster sampling.

- Sampling with probability proportional to size
  - In case the cluster sampling units do not have the same number of elements, it is considered appropriate to use a random selection process where the probability of each cluster being included in the sample is proportional to the size of the cluster.

# COMPLEX RANDOM SAMPLING DESIGNS

- Sequential sampling
  - This sampling design is some what complex sample design.
  - The ultimate size of the sample under this technique is not fixed in advance, but is determined according to mathematical decision rules on the basis of information yielded as survey progresses

# THANKYOU