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SEM-I

Subject
Business Mathematics & Statistics-I

Chapter 3
POPULATION & SAMPLE

UNIT 3
POPULATION & SAMPLE

A) STATISTICS-

The term statistics related to

-Collection of data

- Presentation of data

- Analysis of data

- Interpretation of data

Means statistics is the study of collection, analysis, interpretation and presentation of data.

Definition-

"Statistics is a science which deals with collection, presentation, analysis and interpretation of numerical data"

Importance of Statistics-

- Used for weather forecasting.
- Used for Research work.
- Used Insurance term.
- Used Financial Market.
- Used Medical Field.
- Used in Industry.
- Used in Political Field.

Scope of Statistics

A) **Statistics in Economics**-

1) Useful in formulation of Economic laws- statistics is also use in formulation of economic laws. For example- Law of consumption, demand, supply and law of income distribution

2) Used in Estimation of National Income- Statistics tools are used in estimation of national income. Per capita income, poverty line, industrial production, distribution of income and wealth, wages, profits, savings etc.

3) Used for Efficient planning & Economic- Statistical tools like index number, time series analysis, demand analysis and forecasting techniques are used for efficient planning and economic development of country.

B) **Statistics In Management science**-

1) Market survey- In market survey statistics is use for collection of data, for interpretation of data. This forms are the basis of various marketing decision.

2) Decision Making- Statistics also used for decision making in management science related to product quantity issues and profit maximization and wealth maximization.

3) Investment Decision- In taking decision regarding investment, use the concept of time value of money while calculation net present value and discounted cash flow.

C) Statistics in Industry-

1) Used in scientific Management- It consist time and motion studies which also include a statistics.

2) Production and Performance- Personnel administration for the study of statistical data relation to wages, cost of living, incentives plans, production policy and performance standard etc.

3) Quality determination, Accounting and Inventory Control- Statistics also used for evaluation of the assets and liabilities of business concerns and for quality determination and inventory control.

Limitation of statistics-

1- Statistics is not suitable for qualitative search
2- Statistics laws are not exact
3- Statistics table may be misused.
4- Sometimes statistics do not provide complete solution.

B) CONCEPT OF POPULATION, CENSUS, AND SAMPLE

a) Population/Universe-

The population can be finite or infinite, countable or uncountable. No. of workers in factory is finite or countable but no.of bacteria in particular space can be infinite/uncountable.

Definition- A Population is a group of a set of similar items or things.

Illustration-

1- For country, people living of country is a population
2- For college, no. of students, teachers ,staff is a population.

b) Census-

A Census is complete enumeration of population or groups.

Advantages-

* Accuracy
* Suitability
* Intensive study
* Reliability

Disadvantages-

* 1)Costly method

- 2) Time consuming
- Chance of errors

c) Sample-

A sample is any part of the fully defined population

Means it is a selection of few units from total units

The elements are sample are known as sample point, sampling units or observations

Illustration-

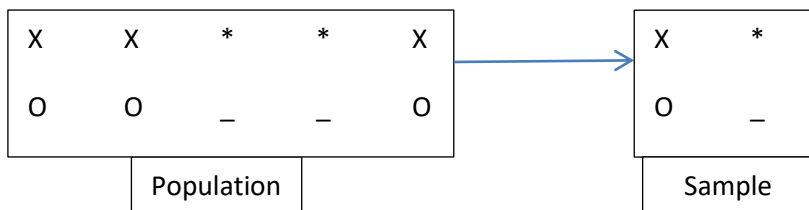-To study of buying habits of people , Specific areas are selected as sample

- To test the quality of milk, one glass of milk is a sample

Advantages-

- It is less costly method
- It is require less time
- It require less manpower to collect data

Disadvantages-

- Not properly conducted
- Generate errors
- Skilled personnel are not available.

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X    X    *    *    X              X    *

O    O    _    _    O              O    _

      Population                        Sample
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Comparison between Census and Sampling

Points	Census	Sampling
Meaning	Census is complete enumeration of population	Sampling is a selection of few units form total units.
Enumeration	Complete	Partial
Study of	Each & Every unit	Few units
Time	Require more time	Less time require
Cost	Expensive Method	Less expensive method
Result	Accurate	Less Accurate
Errors	Not present	Depend of size of population

Methods of data collection

1) **Observation**-

   Observation is the process in which one or more persons observe what is occurring. observation is systematic study through eye. It planned, purposive , systematic efforts to focus on situation and collect date

2) **Interview**-

   Interview as technique of data collection. It is very popular method for collection data. It is flexible tool for getting information. In interview , Interviewer asked a question and collect a information.

3) **Schedule**-

   It is one of the very commonly used tools of data collection. Schedule is the usually applied to set of question which are asked and filled by an interviewer in face to face situation with other person.

4) **Questionnaire-**

   It provides most speedy and simple technique to collect data. In this one person sent a questionnaire form to subordinate for getting information may be mail or by post. It is similar to schedule but it has little difference. In schedule it consist face to face communication.

5) **Projective Techniques**

   This technique is adopted to present a comprehensive profile of individual personality structure. Adoption of such techniques is not an easy. It requires specialized training.

6) **Case study method-**

   The case study is form of qualitative analysis involving the very careful and complete observation of person, situation, institution

Methods Of Sampling

"Sampling is an art, process techniques of selecting a suitable sample or a part of population."

A) **Probability Sampling**
   1) **Simple Random Sampling**
      i)   **Simple random sampling with replacement**
      ii)   **Simple random sampling without replacement**
   2) Stratified sampling
   3) Cluster Sampling
   4) Area sampling
   5) Systematics sampling
   6) Multistage sampling.

B) **Non- Probability Sampling**-
   1) Purposive/Judgment sampling
   2) Convenience sampling
   3) Quota Sampling
   4) Snowball sampling

A) Probability sampling-
   In probability sampling samples are usually selected with the help of random numbers. Probability sampling means in population, each unit have a chance to become a part of sample.
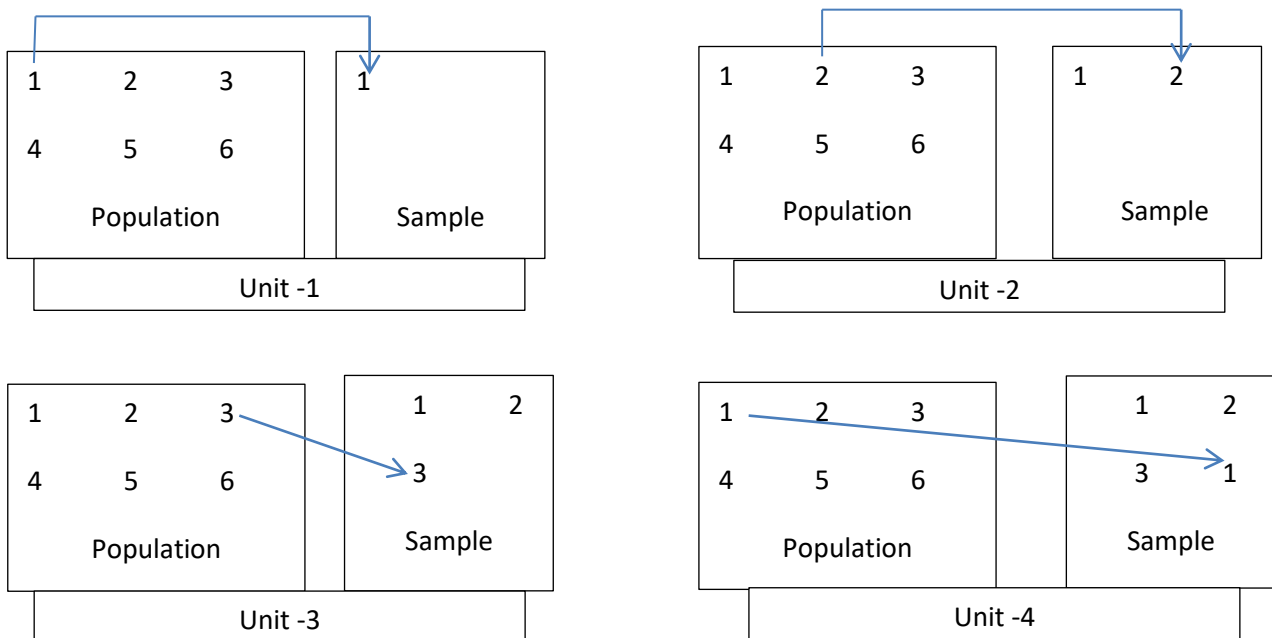
1) **Simple Radom Sampling-**
   In SRS each elements in population has an equal and independent chance of being selected. It have a two types. i.e. SRSWR(Simple random Sampling with Replacement) and SRSWOR(Simple random sampling without replacement)

   i) **SRSWR(Simple random Sampling with Replacement)-**
      In sampling with replacement, each sample unit of the population has selected randomly and after its study the sample is replace back in the population. After words the secon sample is selected and gain replaced. This process is continued till the study of last unit. Size of population remain same for each selection-
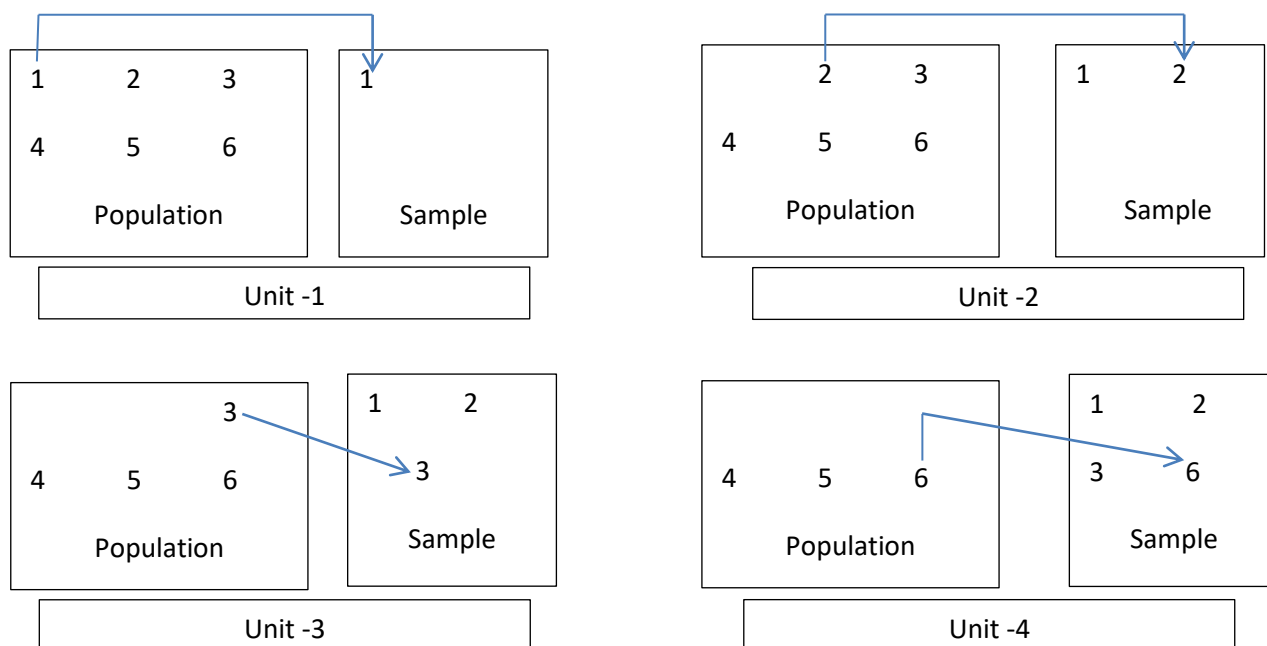
      With Diagram –

   ii) **SRSWOR(Simple Random Sampling Without Replacement)**
      In sampling without replacement each sample unit of the population has only one chance to be selected in sample

In this method the units or elements are selected at random and are not replaced back into the population. In this size of population goes decreasing while selection.

Merits of Simple Random Sampling-
1. No advanced knowledge is required.
2. Assessment of accruing of result is possible.
3. It is true representation of universe.
4. It is simple and saving time and money.

Demerits of Simple Random Sampling-
1. It is require complete list of universe.
2. Size of sample is being increased.

2) Stratified Sampling-

Stratum means class/division. When random sampling is arranged according to division then it is known as stratified sampling. Population is divided into different groups. For example- If 150 students are to be selected out 1500, then firstly then college students will be divided into 3 groups on the basis of Arts, Commerce and Science. Suppose there are 500,700,300 respectively and 10% sample is to be taken i.e.50, 70.

Merits-

1.It is more precise

2.Gives smaller error in estimation.

Demerits-

1.It is very difficult to divide the universe homogeneous strata.

2.If strata will disproportionate , sample may not be representative.

3) Systematic Sampling-

When the researcher purposively selects certain units for study from universe, it is called systematic sampling. It is having equal probability of selection. This is calculated as K= N/n

K- Sampling intervals, N- population size, n- sample size

    Merits-   **Demerits-** Assumes Size of population can be determined.
1. Easy to operate
2. Probability are present

4)Cluster Sampling-

Cluster means no.of persons or objects in small or close group. When sample is selected from small/Close group it is called as cluster sampling.

5)Area Sampling-

Area sampling is a special form of cluster sampling in which the sample items are clustered on a geographic area basis. Within the area, the researcher may select all members of area or part of areas may be selected. Boundaries are defined.

6)Multistage sampling-

Complex type of cluster sampling. Because populations are divided into stages to make sampling process more practical. For example- State_District_Villages_Houshold.

B) Non- Probability Sampling-

    The non-probability method of sampling is a process where probabilities cannot be assigned to the units objectively.

1) Judgment sampling/purposive sampling-

    Purposive sampling is selecting a sample on the basis of own knowledge of the population, its elements and the nature of research aims.

2) Convenience Sampling-

    It is also known as accidental sampling. In this sampling the researcher selects the cases that are easily accessible to him. Convenience sampling includes participants who are readily available and agree to participate in a study.

3) Quota Sampling-

    Quota sampling is a method which is commonly used in marketing researches and election polls. It is a type of stratified judgment sampling. Quota is fixed according the the proportion of different class in the population.

4) Snowball sampling-

Snowball sampling is a technique where a researcher picks the first few samples and either recruits them or asks them to recommend other subjects they know who fit the description of samples needed.