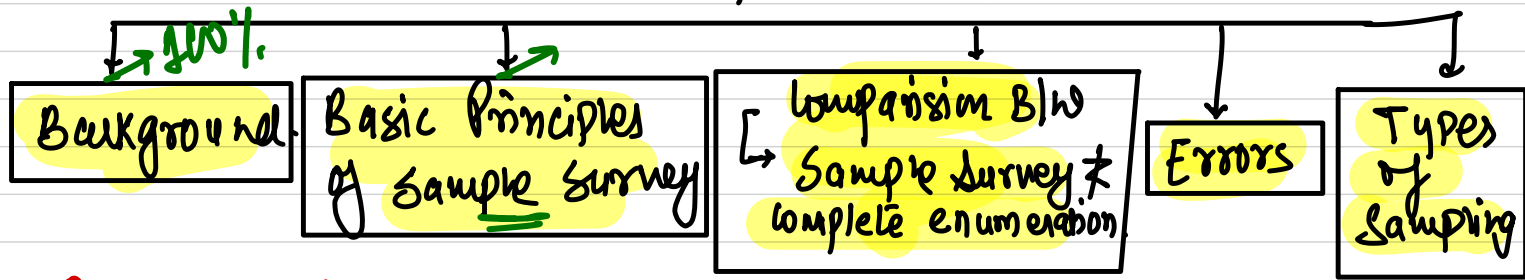


Sampling - Theory Notes



① Background

Sampling is used when we want to know about a vast, infinite universe or population, but also have to consider about important factors like, cost, efficiency etc.

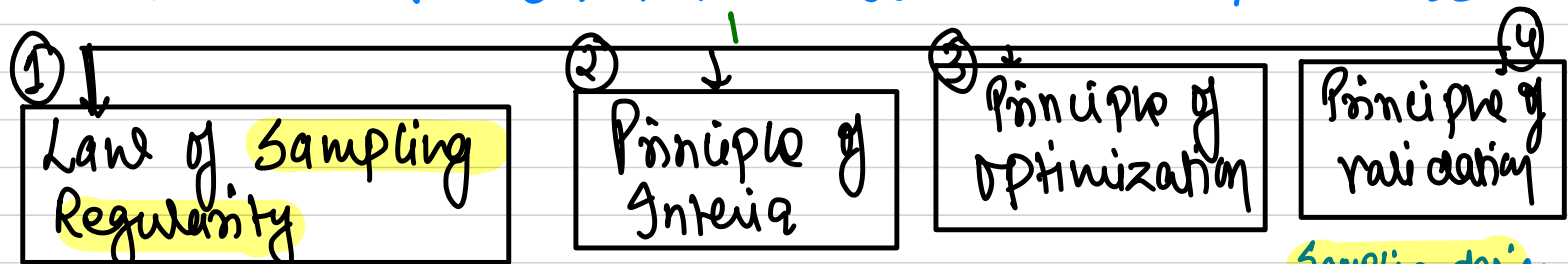


* Sample Survey is study of unknown Population

On the Basis of Proper Representative ⇒ Sample Observation.

② Basic Principles of Sample Survey.

So from above we can say Sample Survey is the study of unknown Population, on the Basis of Representative Sample. But how Sample can tell us about unknown universe.



Moderately Large Numbers of Sample Chosen at Random from large group almost possess the characteristics of large group.

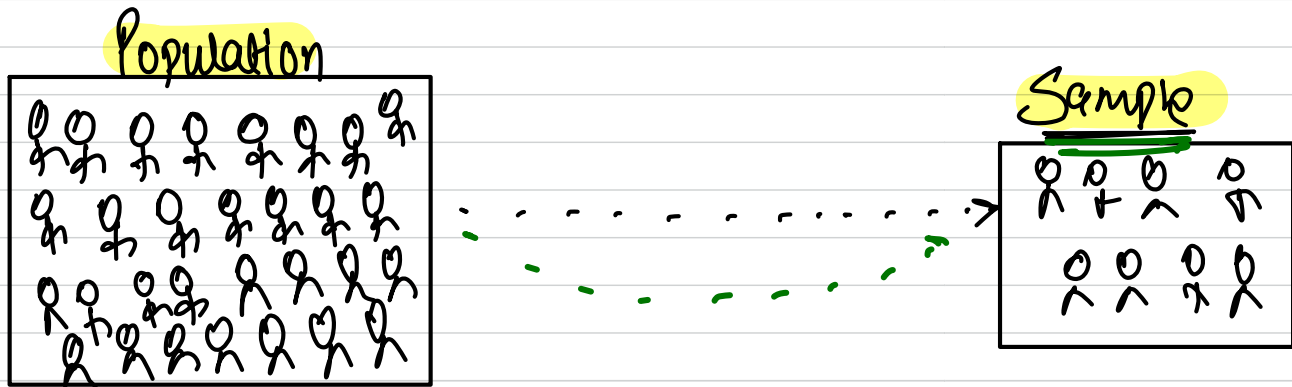
Large Numbers are likely to be more → Reliable
→ Accurate
→ Precise.

RAP

Optimum level of efficiency at minimum loss OR maximum efficiency at given level of cost.

Sampling design will be valid only if we can obtain
→ Valid estimates
→ Valid Test.
Only Probability Sampling can ensure.

③ Comparison Between Sample Survey & Complete enumeration ^{→ census}



When information collected for all the units then it called complete enumeration or Census.

It is Part of Population

For many case we prefer Sample Survey as compare to complete enumeration.

Sample Survey

Complete enumeration

① Speed:- Conducted Quickly.

—

② Cost:-

Cost of collecting data of each unit of sample is More Because Trained employees are Required.

Total cost is less.

—

③ Reliability:- More Reliable, Because of Trained Employee → Supervision.

—

④ Accuracy: Sampling is Subject to Sampling fluctuation known as Sampling error.
✓ Variations in the value of Statistics.
Non-Sampling Error ✓

Free from Sampling Error but subject to

Non-Sampling Error.

- Wrong Rec of obs.
- Biases
- Wrong Interpretation of Data.

⑤ Necessity: Sampling becomes necessity when it comes to Destructive Sampling → where item get exhausted.
eg:- Life of Bulb, Coin Tossing [Hypothetical Pop]

- When population size is NOT large
- When defect of one item may lead to complete destruction.
↳ like Process in aircraft.

④ Errors in Sample Survey.
→ Sampling Error
→ Non Sampling Error.

Sampling Errors.

- ① Errors arising out due to defective Sampling design.
- ② Error arising out due to Substitution.
- ③ Errors Owing to faulty demographic of units.
- ④ Errors owing to wrong choice of statistic.
- ⑤ Variability in the Population.

Sampling is are prone to

Sampling error

Non-Sampling error.

- SE Imp
- Standard deviation of a Statistic.
 - Standard Error Can be Regarded as Measure of Precision by Sampling.

⑤ Types of Sampling.

① Random Sampling (Probability Sampling)

* It is a Scientific Tec of drawing samples from Population according to some laws of Probability.

Types of Random Sampling

④ Simple Random Sampling [SRS]

• In this Method each unit have equal chance of being part of sample.

- It can be WR, WOR
- Very Simple & effective.

Can be used when: —

- ① Population is Not Very large.
- ② Sample size Not Very small.
- ③ Population is Not heterogeneous.

⑤ Stratified Sampling.

* In this method Population is divided into groups (Strata) from which the sample is selected.

- Strata (groups) don't Overlap.

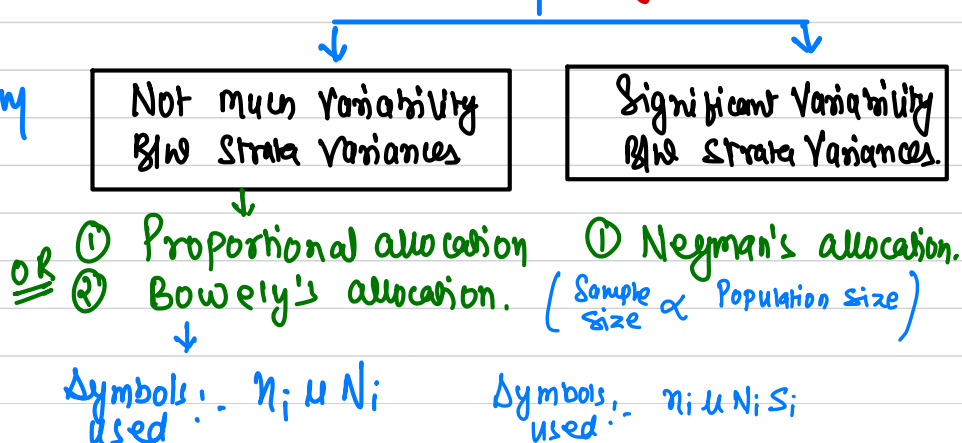
Can be used when: —

- ① Population is large.
- ② When Some Prior Information available.
- ③ Population is heterogeneous.

Best part of SRS

It is completely free from Sample's Biases.

Allocation of Sample



NOTE:- For Stratified Sampling :-

Purpose:

- ① To Make Representative of all the Sub Population.
- ② To Provide an estimate of Parameters not only for strata but also Overall Estimate.
- ③ \downarrow variability \times \uparrow Precision.

③ Systematic Sampling.

Samples are selected at Regular Interval where 1st unit is selected Randomly.

- We can say it is partly \rightarrow Probability Samp.
 \rightarrow Non-Probability Samp.

• Known as Linear Systematic Sampling

- It is affected if there are Undetected Periodicity.

How to find Interval.

$$N = nK$$

\downarrow
Sample interval.

④ Multi Stage Sampling.

- It is complicated Type of Sampling.
- Population are supposed to be in STAGES.
- It adds Flexibility into Sampling process.
- It is less Accurate than Stratified Sampling.

⑤ Purpose of Judgemental Sampling

- Sample drawn is entirely Based on Personal Judgement of Investigator.
- Sampler's Bias is there.

* Some Important Key Takeaway.

* A Parameter is characteristic of Population.

* Sampling Distribution is The Probability distribution of Statistic.

The mean of Statistic
So obtained from
Probability distribution

Known as ✓

Expectation

x_i	2	3	4	...
P_i	$1/2$	$1/3$	$2/3$...