SOS POLITICAL SCIENCE AND PUBLIC ADMINISTRATION MBA HRD **203**
SUBJECT NAME: RESEARCH METHODOLOGY
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TOPIC NAME: TYPES OF SAMPLE DESIGN

TYPES OF SAMPLE DESIGN

Types of Sampling Designs

Probability Sampling Method

- Simple Random Sampling
- Systematic Sampling
- Stratified Sampling
- Cluster Sampling Complex
- Multistage Random sampling

Non-Probability Sampling Method

- Convenience Sampling
- Judgment Sampling
- Quota Sampling
- Snowball sampling

Non Probability sampling

Convenience sampling attempts to obtain a sample of convenient elements. Often, respondents are selected because they happen to be in the right place at the right time.

- Selection of sampling units is entirely left on the least expensive and less time consuming mode

- Many potential sources of selection bias are present

- Not recommended for descriptive and causal research but can be used for exploratory research.

- **Judgement sampling** is a form of convenience sampling in which the population elements are selected based on the judgment of the researcher

  Examples:
  - Test markets selected to determine the potential of new product
  - Purchase engineers selected in industrial marketing research

Quota sampling may be viewed as two-stage restricted judgmental sampling.

- The first stage consists of developing control categories, or quotas, of population elements. – to develop these quotas the researcher lists relevant control characteristics and determine the distribution of these characteristics in the target population.The relevant control characteristics (gender, age, race) are identified on the basis of judgment

- In the second stage, sample elements are selected based on convenience or judgment. Once the quota have been assigned, there is considerable freedom of selecting the element to be included in the sample. The only requirement is that the element selected fit the control characteristics.

Control Variable	Population composition		Sample composition
Gender	**Number**	**%**	
Male	48	48	480
Female	52	52	520
	___	___	___
	100	100	1000

Snowball Sampling

In **snowball sampling**, an initial group of respondents is selected, usually at random.

- ❑ After being interviewed, these respondents are asked to identify others who belong to the target population of interest.
- ❑ Subsequent respondents are selected based on the referrals.
- ❑ Even though probability sampling is used in this method to select the initial respondents but later on the selection is non probability one.
- ❑ Advantage- increases the likelihood of locating the desired characteristic in the population
- Eg- selection of members of scattered minority population.

Probability Sampling

The probability or chance of every unit in the population being included in the sample is known. Selection of the specific units in the sample depends entirely on chance. every element is selected independently of every other element and the sample is drawn by random procedure from a sampling frame.

- **Simple Random Sampling** : Draw of sample size (n) in such a way that each of the 'N' members of the population has the same chance of inclusion in sample.

  - Lottery method
  - Tippets number
  - Selection from a sequential list
  - Use of grid system

Simple Random Sampling

1. Select a suitable sampling frame.

2. Each element is assigned a number from 1 to N (pop. size).

3. Generate n (sample size) different random numbers between 1 and N.

4. The numbers generated denote the elements that should be included in the sample.

Complex Random Sampling Designs

Systematic Sampling

- The sample is chosen by selecting a random starting point and then picking *every i^{th}* element in succession from the sampling frame.

- The sampling interval, *i*, is determined by dividing the population size N by the sample size n and rounding to the nearest integer.

- When the ordering of the elements is related to the characteristic of interest, systematic sampling increases the representativeness of the sample.

- If the ordering of the elements produces a cyclical pattern, systematic sampling may decrease the representative ness of the sample.

  For example, there are 100,000 elements in the population and a sample of 1,000 is desired. In this case the sampling interval, i, is 100. A random number between 1 and 100 is selected. If, for example, this number is 23, the sample consists of elements 23, 123, 223, 323, 423, 523, and so on.

Stratified Sampling

- A two-step process in which the population, which is heterogeneous in composition, is partitioned into subpopulations, or strata, having homogeneous characteristics.

- The strata should be **mutually exclusive and collectively exhaustive** in that every population element should be assigned to one and only one stratum and no population elements should be omitted.

- Next, elements are selected from each stratum by a random procedure, usually SRS.(at this stage it differs from quota sampling as in quota sampling the allocation is on judgment and convenience basis)

- A major objective of stratified sampling is to increase precision without increasing cost.
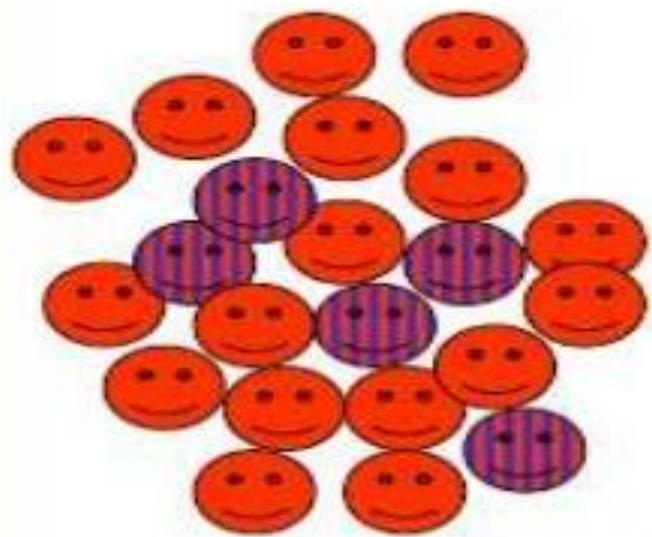
- The elements within a stratum should be as homogeneous as possible, but the elements in different strata should be as heterogeneous as possible.

- Variables used to partition the population into strata are referred as stratification variables.

- The stratification variables should also be closely related to the characteristic of interest.

- Finally, the variables should decrease the cost of the stratification process by being easy to measure and apply.

- In **proportionate stratified sampling**, the size of the sample drawn from each stratum is proportionate to the relative size of that stratum in the total population.

  - $n_i = n \cdot N_i / (N_1 + N_2 + .. N_k)$

- In **disproportionate stratified sampling**, the size of the sample from each stratum is proportionate to the relative size of that stratum and to the standard deviation of the distribution of the characteristic of interest among all the elements in that stratum.

  - $n_i = n \cdot N_i \cdot sd_i / (N_1 sd_1 + N_2 sd_2 + ... + N_k sd_k)$

- In addition to differences in stratum size and variability, we may have differences in stratum sampling cost. Here we can apply the cost optimal disproportionate sampling design where
 - C_i = cost of sampling in stratum I

Cluster Sampling

- The target population is first divided into mutually exclusive and collectively exhaustive subpopulations, or clusters.

- Then a random sample of clusters is selected, based on a probability sampling technique such as SRS.

- For each selected cluster, either all the elements are included in the sample (one-stage) or a sample of elements is drawn probabilistically (two-stage).
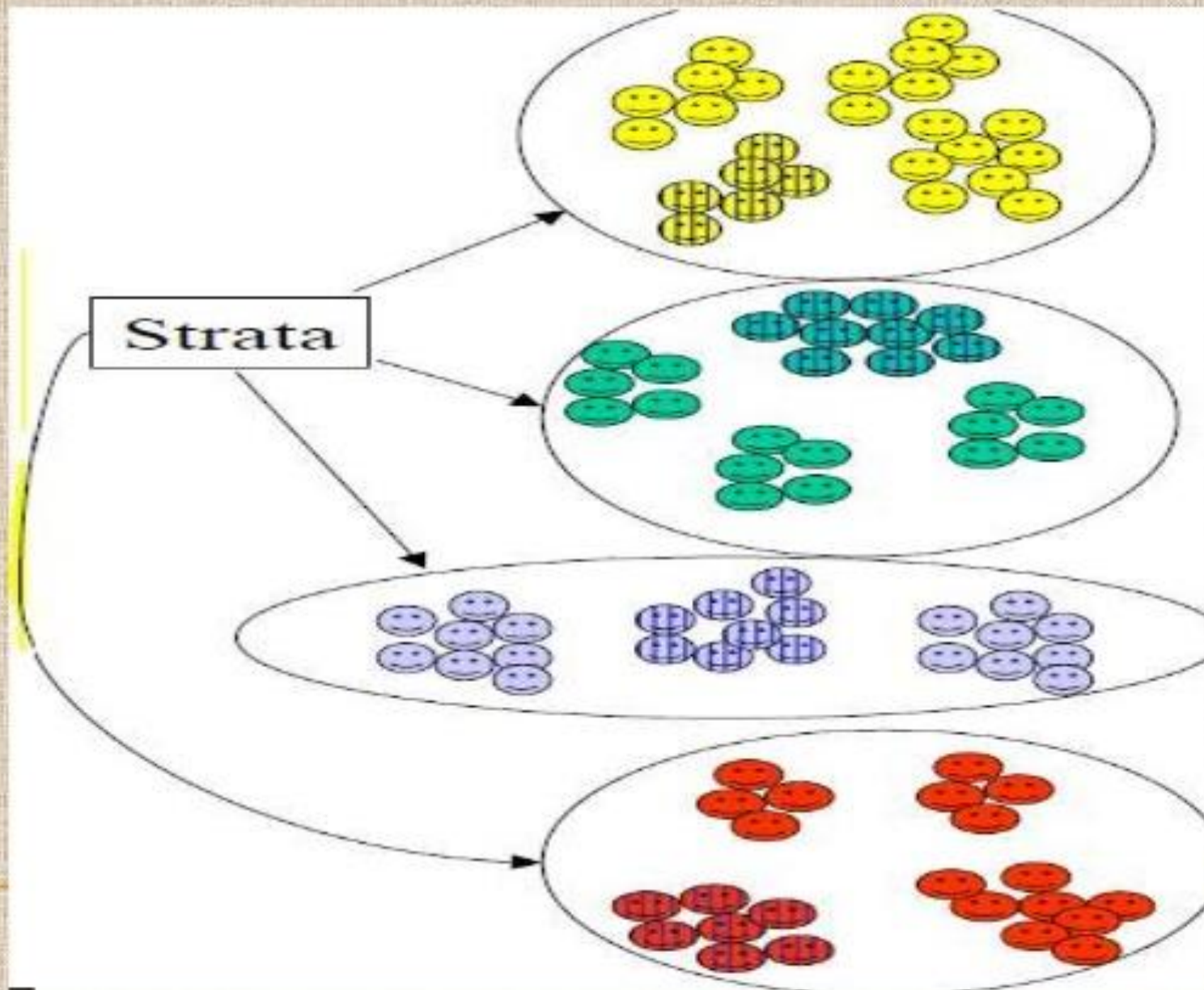
Pure Cluster sampling
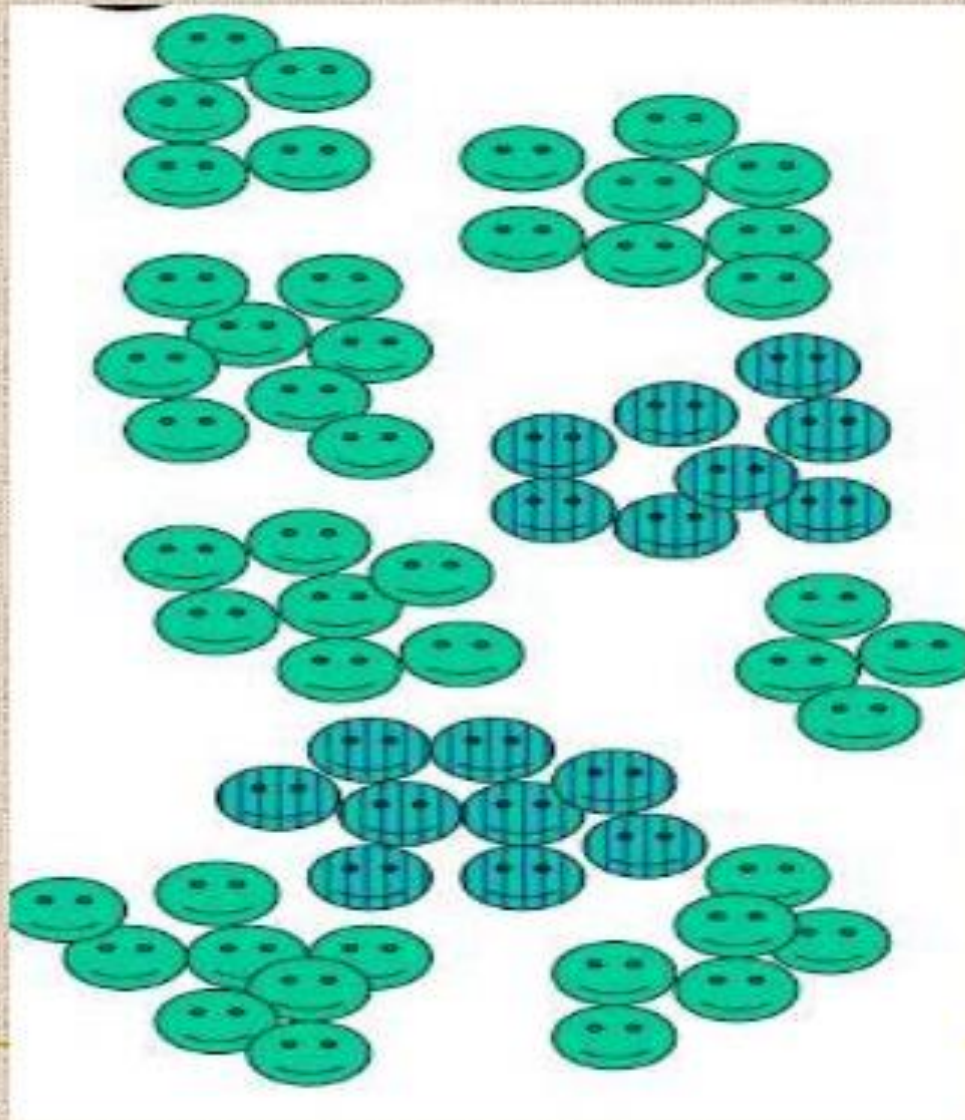
Cluster Sampling

- Elements within a cluster should be as heterogeneous as possible, but clusters themselves should be as homogeneous as possible. Ideally, each cluster should be a small-scale representation of the population.

- Area Sampling- if cluster happens to some geographic sub division

- In **probability proportionate to size sampling**, the clusters are sampled with probability proportional to size. In the second stage, the probability of selecting a sampling unit in a selected cluster varies inversely with the size of the cluster.

Stratified Cluster sampling

Area Sampling

- If clusters happen to be some geographic subdivisions, in that case cluster sampling is known as area cluster. All other features remain the same.

THANK YOU