Research Methodology

SAMPLING PLAN

BASIC CONCEPTS IN SAMPLES AND SAMPLING

- **Sample Plan:** is the process followed to select units from the population to be used in the sample
- **Population:** the entire group under study as defined by research objectives. Sometimes called the "universe."
  - Researchers define populations in *specific terms* such as heads of households, individual person types, families, types of retail outlets, etc.
  - Population geographic location and time of study are also considered.

BASIC CONCEPTS IN SAMPLES AND SAMPLING

- **Sample:** a subset of the population that should represent the entire group

- **Sample Unit:** the basic level of investigation… consumers, store managers, shelf-facings, teens, etc. The research objective should define the sample unit

- **Census:** an accounting of the complete population

BASIC CONCEPTS IN SAMPLES AND SAMPLING

- **Sampling Error:** any error that occurs in a survey because a sample is used (random error)
- **Sample Frame:** a master list of the population (total or partial) from which the sample will be drawn
- **Sample frame error (SFE):** the degree to which the sample frame fails to account for all of the defined units in the population (e.g a telephone book listing does not contain unlisted numbers) leading to sampling frame error.

Factors that determine the sample size

- 1. Diversity of Target Population
- The larger the diversity, the larger the sample size should be.

- 2. Degree of Precision
- The higher the precision requirement the larger the sample size needs to be.

Factors that determine the sample size

- 3. Sample Design & Method

- The sample method you select dictates your sample size. A good example is a Stratified Random Sample requires a smaller sample size than a Simple Random Sample to reach the same level of precision.

- 4. Budget

- What is your budget for this survey? Ultimately, financial considerations and availability of personnel to gather the data may define the sample size and method you choose.

BASIC SAMPLING CLASSIFICATIONS

- **Probability sampling**–techniques in which each sample from the population of interest has a known probability of selection under a given sampling scheme.
  - The idea behind this type is random selection.
- **Non-Probability Sampling** – sampling techniques in which members of the population have a unknown chance (probability) of being selected
  - The primary difference between probability methods of sampling and non-probability methods is that in the latter you do not know the likelihood that any element of a population will be selected for study.

PROBABILITY SAMPLING METHODS

- The following are the probability Sampling techniques
  1. Simple random Sampling
  2. Stratified Sampling
  3. Cluster sampling
  4. Systematic sampling

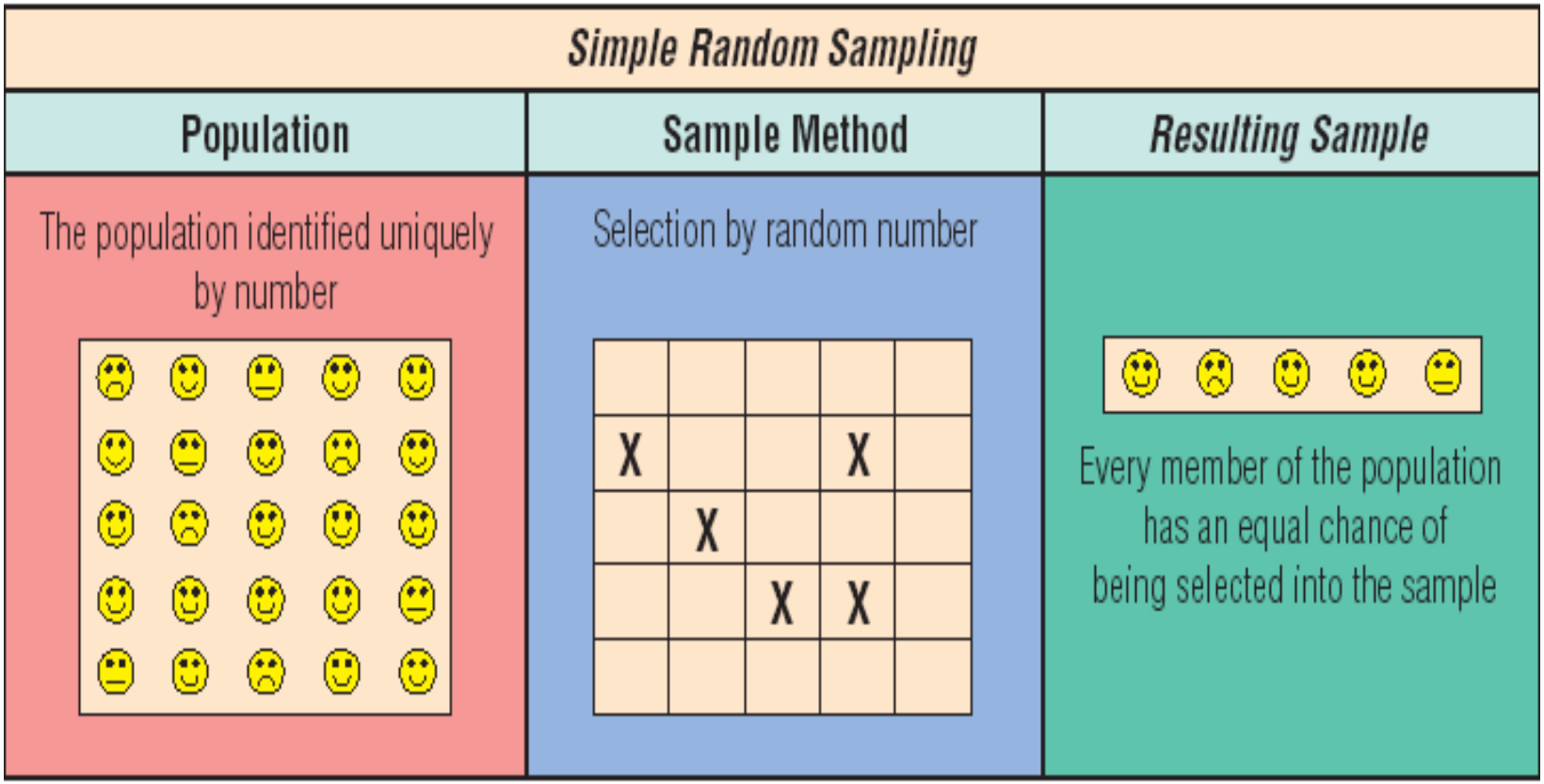
SIMPLE RANDOM SAMPLING

- Simple Random Sampling (SRS)- the probability of being selected is "known and equal" for all members of the population
  - Blind Draw Method (e.g. names "placed in a hat" and then drawn randomly)
  - Random Numbers Method (all items in the sampling frame given numbers, numbers then drawn using table or computer program)

SIMPLE RANDOM SAMPLING

- **Advantages:**
  - Known and equal chance of selection
  - Easy method when there is an electronic database
- **Disadvantages: (Overcome with electronic database)**
  - Complete accounting of population needed
  - Cumbersome to provide unique designations to every population member
  - Very inefficient when applied to skewed population distribution (over- and under-sampling problems) – this is not "overcome with the use of an electronic database)

SIMPLE RANDOM SAMPLING



STRATIFIED RANDOM SAMPLING

- The stratified sampling method is used when the population distribution of items is skewed.
- It allows us to draw a more representative sample.
- Hence if there are more of certain type of item in the population the sample has more of this type and if there are fewer of another type, there are fewer in the sample.

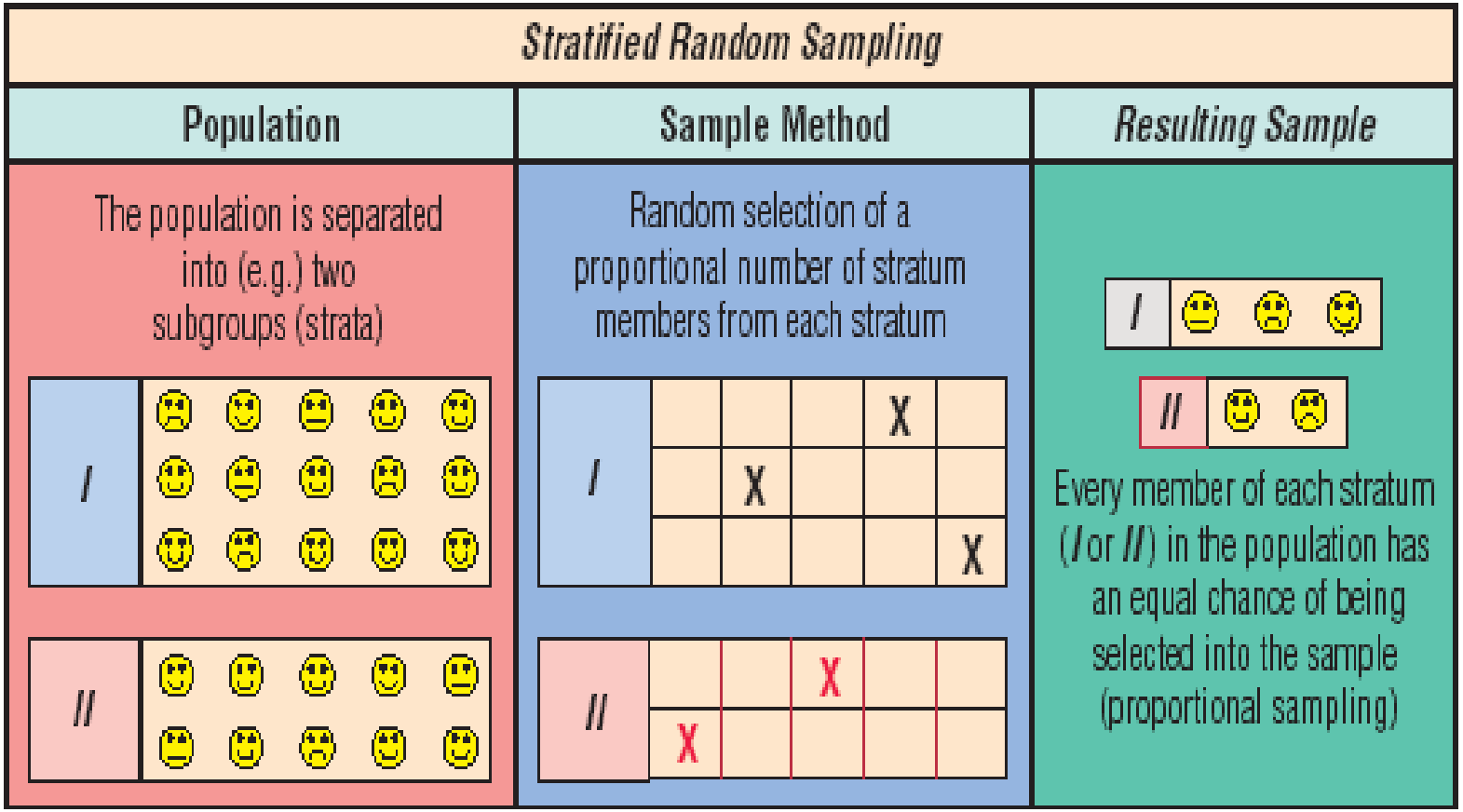
STRATIFIED RANDOM SAMPLING

- Stratified Sampling: the population is separated into homogeneous groups/segments/strata and a sample is taken from each.
- The results are then combined to get the picture of the total population.
- Sample stratum size determination
  - *Proportional method (stratum share of total sample is stratum share of total population)*
  - *Disproportionate method (variances among strata affect sample size for each stratum*

STRATIFIED RANDOM SAMPLING

- Stratified random sampling involves the following steps
  1. Identify the population
  2. Define the criterion for stratification
  3. List the population according to the defined stara or subgroups.
  4. Determine the required sample size and the appropriate representation in each stratum. This can be proportionate or equal.
  5. Select, using random numbers, an appropriate number of subjects for each stratum.

STRATIFIED RANDOM SAMPLING



STRATIFIED RANDOM SAMPLING

- **Advantage:**
  - More accurate overall sample of skewed population…see next slide for WHY
- **Disadvantage:**
  - More complex sampling plan requiring different sample sizes for each stratum

CLUSTER SAMPLING

- In some instances the sampling unit consists of a group or cluster of smaller units that we call elements or subunits (these are the units of analysis for your study).

- There are two main reasons for the widespread application of cluster sampling. When it is not possible to obtain sampling frame because:-
  - the populations is either very larger
  - the population is scattered over a large geographical area

CLUSTER SAMPLING

- **Cluster Sampling:** method by which the population is divided into groups (clusters), any of which can be considered a representative sample.
- These clusters are mini-populations and therefore are heterogeneous.
- Once clusters are established a random draw is done to select one (or more) clusters to represent the population.
- Types of cluster sampling include
  - Systematic sampling (discussed next)
  - Area sampling???

CLUSTER SAMPLING

- Cluster sampling involves the following steps
  - Identify the population
  - Define the cluster forming the population
  - Determine the required sample size.
  - List all the clusters in a random order
  - Using the table of random numbers, select the required number of clusters according to the sample size required.
  - All members in the selected clusters are included in the sample as units of observation

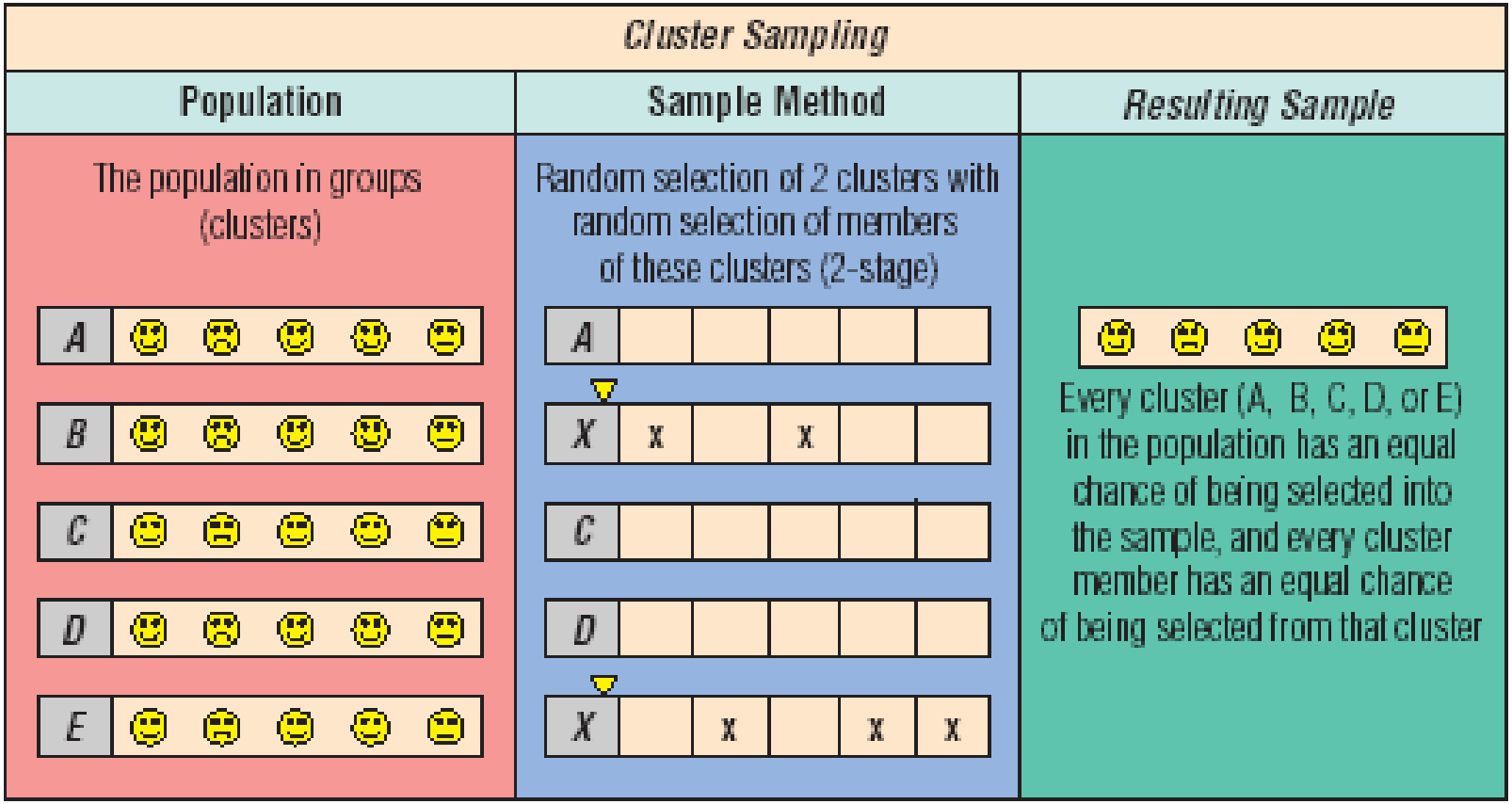
CLUSTER SAMPLING

- Important things about cluster sampling:
  1. Most large scale surveys are done using cluster sampling;
  2. Clustering may be combined with stratification, typically by clustering within strata;
  3. In general, for a given sample size n cluster samples are less accurate than the other types of sampling in the sense that the parameters you estimate will have greater variability than an SRS, stratified random or systematic sample.

CLUSTER SAMPLING

- **Advantages**
  - Economic efficiency … faster and less expensive than SRS
  - Does not require a list of all members of the universe
- **Disadvantage:**
  - Cluster specification error…the more homogeneous the cluster chosen, the more imprecise the sample results

CLUSTER SAMPLING



SYSTEMATIC RANDOM SAMPLING

- **Systematic Sampling:**
  - In practice, it is a variant of simple random sampling that involves some listing of elements – every nth element of list is then drawn for inclusion in the sample. Say you have a list of 10,000 people and you want a sample of 1,000.
  - It is a way to select a probability-based sample from a directory or list.
  - This method is at times more efficient than simple random sampling. This is a type of cluster sampling method.

SYSTEMATIC RANDOM SAMPLING

- Sampling interval (SI) = population list size (N) divided by a pre-determined sample size (n)

- How to draw:
  1. Calculate SI,
  2. Select a number between 1 and SI randomly,
  3. Go to this number as the starting point and the item on the list here is the first in the sample, 4) add SI to the position number of this item and the new position will be the second sampled item, 5) continue this process until desired sample size is reached.

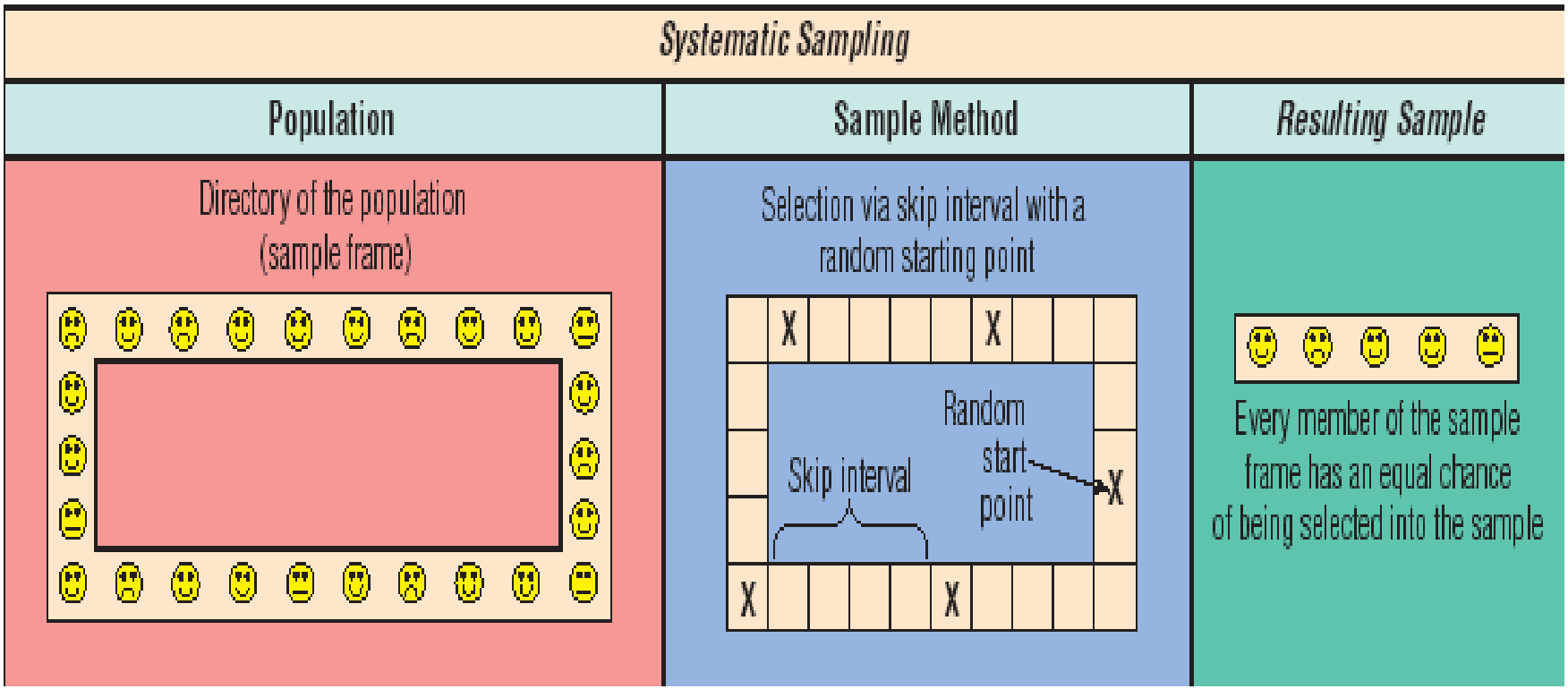
SYSTEMATIC RANDOM SAMPLING

- Creating such a sample includes three steps:
  1. Divide number of cases in the population by the desired sample size. In this example, dividing 10,000 by 1,000 gives a value of 10.

  2. Select a random number between one and the value attained in Step 1. In this example, we choose a number between 1 and 10 – say we pick 7.

  3. Starting with case number chosen in Step 2, take every tenth record (7, 17, 27, etc.).

SYSTEMATIC RANDOM SAMPLING



SYSTEMATIC RANDOM SAMPLING

- The advantages of systematic sampling method over simple random sampling include:
  - It is easier to draw a sample and often easier to execute without mistakes. This is a particular advantage when the drawing is done in the field.
  - Intuitively, you might think that systematic sampling might be more precise than SRS. In effect it stratifies the population into n strata, consisting of the 1st k units, the 2nd k units, and so on.
    - Thus, we might expect the systematic sample to be as precise as a stratified random sample with one unit per stratum. The difference is that with the systematic one the units occur at the same relative position in the stratum whereas with the stratified, the position in the stratum is determined separately by randomization within each stratum.

NON-PROBABILITY SAMPLING

- Also known as ***Biased Sampling.***
- Non-probability sampling is used when the researcher is not interested in selecting a sample that is representative of the population.
- Most qualitative studies use non probability samples because the focus is on in-depth information and not making inferences or generalization.

NON-PROBABILITY SAMPLING

- Non-probability sampling techniques include:-

1. Convenient sampling or accidental sampling
2. Judgment sampling
3. Quota sampling
4. Purposive sampling
5. Snowball sampling

CONVENIENT SAMPLING

- **Convenient Sampling–** is a technique involves selecting cases or units of observation as they become available to the researcher.
- Also known as volunteer or accidental sampling
- **Convenience Samples:** samples drawn at the convenience of the interviewer. People tend to make the selection at familiar locations and to choose respondents who are like themselves.

CONVENIENT SAMPLING

- Two errors that can occur occurs
  - In the form of members of the population who are infrequent or nonusers of that location and
  - Who are not typical in the population

- The main feature of convenient sampling technique is that subjects are easily and conveniently available and are also accessible.

- Researcher who us this method have little or no basis to argue that it is representative.

JUDGMENT SAMPLING

- **Judgment Sampling :** is a technique that involves judges or expert judgment on picking the samples
- Judgment samples – require a judgment or an "educated guess" on the part of the interviewer as to who should represent the population.
- Also, "judges" (informed individuals) may be asked to suggest who should be in the sample.
  - Subjectivity enters in here, and certain members of the population will have a smaller or no chance of selection compared to others.

PURPOSIVE SAMPLING

- **Purposive Sampling-** is a technique that allows the researcher to use cases that the required information in respect to the objectives of his/her study.
- Cases of subjects are therefore handpicked because they are informative or the possess the required characteristics.
- The researcher who proposes to use purposive sampling must specify the criteria for choosing the particular cases.

SNOWBALL SAMPLING

- **Snowball Sampling–** In this technique, initial subjects with the desired characteristics are identified using a purposeful sampling technique.

- The few subjects identified then name others that they know have the required characteristics until the researcher gets the number of cases he/she requires➔ thus it also know as ***Referral Sampling.***

- This technique is useful when the population that possesses the characteristics under study is not well known and there is need to find subjects.

SNOWBALL SAMPLING

- The few thus identified may assist in identifying the others that they may know of

- **Snowball Samples–** require respondents to provide the names of additional respondents

  - Members of the population who are less known, disliked, or whose opinions conflict with the respondent have a low probability of being selected

QUOTA SAMPLING

- **Quota Sampling** – technique is similar to stratified random sampling and the objective is to include various groups or quotas of the population in the study based on some criteria.

- The researcher purposively selects subjects to fit the quotas identified

- **Quota Samples:** samples that set a specific number of certain types of individuals to be interviewed
  - Often used to ensure that convenience samples will have desired proportion of different respondent classes

DEVELOPING A SAMPLE PLAN

- **Sample plan:** definite sequence of steps that the researcher goes through in order to draw and ultimately arrive at the final sample

- **Step 1: Define the relevant population.**
  - *Specify the descriptors, geographic locations, and time for the sampling units.*

- **Step 2: Obtain a population list**, if possible; may only be some type of sample frame
  - *List brokers, government units, customer lists, competitors' lists, association lists, directories, etc*
  - *Incidence rate (occurrence of certain types in the population, the lower the incidence the larger the required list needed to draw sample from)*

DEVELOPING A SAMPLE PLAN

- **Step 3: Design the sample method** (size and method).
  - *Determine specific sampling method to be used. All necessary steps must be specified (sample frame, n, … re-contacts, and replacements)*

- **Step 4: Draw the sample.**
  - *Select the sample unit and gain the information*
  - Drop-down substitution
  - Oversampling
  - Re-sampling

DEVELOPING A SAMPLE PLAN

- **Step 5:Assess the sample.**
  - *Sample validation – compare sample profile with population profile; check non-responders*
- **Step 6: Resample if necessary.**