Module 3

Research Methodology and IPR

Design of Sampling: Introduction, Sample Design, Sampling and Non-sampling Errors, Sample Survey versus Census Survey, Types of Sampling Designs.
Measurement and Scaling: Qualitative and Quantitative Data, Classifications of Measurement Scales, Goodness of Measurement Scales, Sources of Error in Measurement Tools, Scaling, Scale Classification Bases, Scaling Technics, Multidimensional Scaling, Deciding the Scale.
Data Collection: Experimental and Surveys, Collection of Primary Data, Collection of Secondary Data, Selection of Appropriate Method for Data Collection, Case Study Method.

3.1 What is Sampling?

The process of selecting a number of individuals for a study in such a way that the individuals represent the larger group from which they were selected. The process by which this is done is called sampling design

3.1.1 What is population?

The larger group from which individuals are selected to participate in a study.

3.1.2 What is target population?

A set of elements equal to or larger than the population for which the researcher wants to generalize the findings .

3.2 Steps in sample design

1. Type of Universe : Define the set of objects , called universe, to be studied. It can be finite or infinite.
2. Sampling unit : The unit to be sampled. Could be an individual, a State, a family.
3. Sampling frame : The source list from which the units are to be chosen. For example if we want states, which country? Frame could be telephone directory, voters list, Ration card holders etc. It should be correct, reliable and appropriate. It should be representative of the population to be studied.
4. Size of sample : Items to be selected from Universe. Should be efficient, reliable and flexible. Parameters in research, cost involved, variance all must be considered.
5. Sampling Design - How to sample?? Technique used for selection

3.3 Criterion for selection of Sampling Procedure

Two Costs are involved – Cost of data collection and Cost of incorrect inference. Can give rise to two types of error.

i) Systematic errors – Due to sampling procedure. Cant be reduced by increasing sampling size. Reasons are

- Inappropriate Sampling Frame
- Defective measuring device – Questionnaire is biased or physical measuring device is erroneous
- Non respondents
- Indeterminacy principle – Individuals behave differently under observation.
- Bias in reporting data – For example Reporting income

ii) Sampling Errors: Random variations in sample estimates. They occur in both directions and hence normally add up to zero. Sampling error decreases with the increase in the size of the sample, and it happens to be of a smaller magnitude in case of homogeneous population. 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 cost increases. 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. while selecting a sampling procedure, researcher must ensure that the procedure causes a relatively small sampling error and helps to control the systematic bias in a better way.

3.4 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.

3.5 What is difference between Sampling survey and census survey

The main difference between a census and a sample survey is that a census collects data from the entire population, while a sample survey collects data from a subset of the population.

- ✓ Cost: Sample surveys are often less expensive than censuses.
- ✓ Time: Sample surveys are often faster to collect and process than censuses.
- ✓ Accuracy: The level of accuracy required for the study.
- ✓ Representativeness: The sample must be representative of the population to provide reliable results.
- ✓ Data requirements: Sampling can reduce the amount of data that needs to be analyzed.
- ✓ Data complexity: Sampling can simplify complex data sets.
- ✓ Data patterns: Sampling can help identify patterns and trends in large data sets.

3.6 Non Probability Sampling: No basis for estimating the probability that each item in the population has of being included in the sample. Non-probability sampling the researcher purposively chooses the particular units of the universe for constituting a sample on the basis that the small mass that they so select out of a huge one will be typical or representative of the whole. Thus, the judgement of the researcher of the study plays an important part in this sampling design. Hence also called Purposive or judgmental sampling. Possibility of bias of researcher entering the sampling.

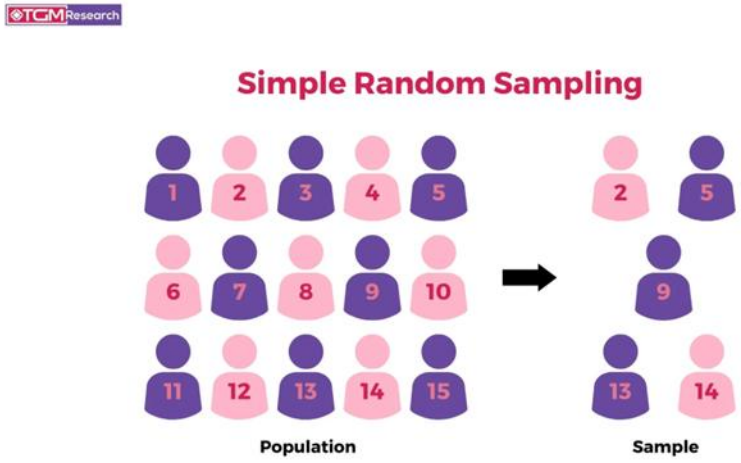
Some types

- 3.6.1 Convenience Sampling : the process of including whoever happens to be available at the time …called "accidental" or "haphazard" sampling. Difficult to establish cause-effect relationship.
- **3.6..2** Purposive sampling: The researcher selects a sample based on experience or knowledge of the group to be sampled. Also called "judgment" sampling . This has potential for inaccuracy in the researcher's criteria and resulting sample selections.
- 3.6.3 Quota Sampling : A researcher gathers data from individuals possessing identified characteristics and quotas.
- 3.6.4 Snowball sampling : The researcher selects a small number of participants. Then the participants are asked to recommend other potential participants for a study. This method is also known as chain sampling, chain-referral sampling, or referral sampling. It is not representative of the population being studied because it's not chosen through random selection. This means that statistical inferences cannot be made about the entire population.
- 3.6.5 Self Selection Sampling : The participants express desire to be a part of the research.

3.7 **. Probability Sampling** : Every item of the universe has an equal chance of inclusion in the sample. It is, so to say, a lottery method in which individual units are picked up from the whole group not deliberately but by some mechanical process. Here it is blind chance alone that determines whether one item or the other is selected. The results obtained from probability or random sampling can be assured in terms of probability i.e., we can measure the errors of estimation or the significance of results obtained from a random sample.

- 3.7.1 Simple Random Sampling : Method of sample selection which gives each possible sample combination an equal probability of being picked up and each item in the entire population to have an equal chance of being included in the sample. This applies to sampling without replacement . Best method to achieve a representative sample.
- Selection process
    - Identify and define the population
    - Determine the desired sample size
    - List all members of the population

- Assign all members on the list a consecutive number
- Select an arbitrary starting point from a table of random numbers and read the appropriate number of digits.



https://tgmresearch.com/simple-random-sampling

Advantages

- Easy to conduct
- Fair and unbiased selection
- Requires minimum knowledge of population
- High probability of achieving a representative sample
- Meets assumptions of many statistical procedures

Disadvantages

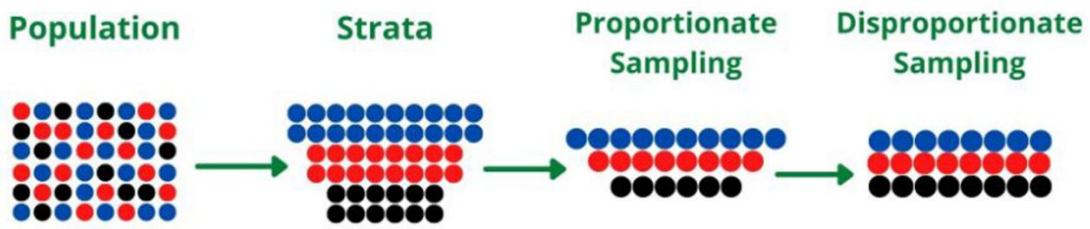
- Identification of all members of the population can be difficult
- Contacting all members of the sample can be difficult
- More errors
- Requires large population size

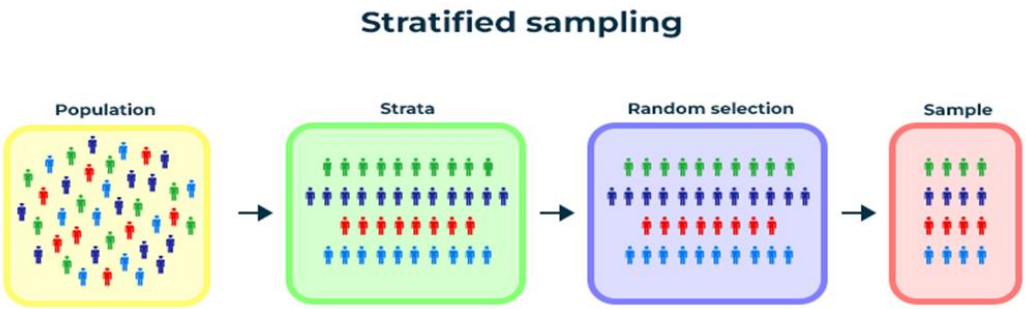
3.7.2 Stratified Random Sampling : If the Universe is not homogeneous , then the population is divided into groups or strata. Each strata is more homogeneous than the total population. Samples are selected from each strata. Strata, is a sub group, Questions are

- How to form Strata : Based on some criterion, such as geographic location, grade level, age, or income
- How to choose samples from each strata : Randomly
- How many samples from each strata : According to proportion of the strata population to the total population.

Selection process

- Identify and define the population
- Determine the desired sample size
- Identify the variable and subgroups (i.e., strata) for which you want to guarantee appropriate representation
- Classify all members of the population as members of one of the identified subgroups
- Select same number of samples from each strata or Sample each strata in proportion to its size





If there is variability in both strata size and its variance , then we choose as follows:

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

where σ1 , , ... and σk denote the standard deviations of the k strata, N1 , N2 ,…, Nk denote the sizes of the k strata and n1 , n2 ,…, nk denote the sample sizes of k strata and n is the sample size. This is called 'optimum allocation' in the context of disproportionate sampling.

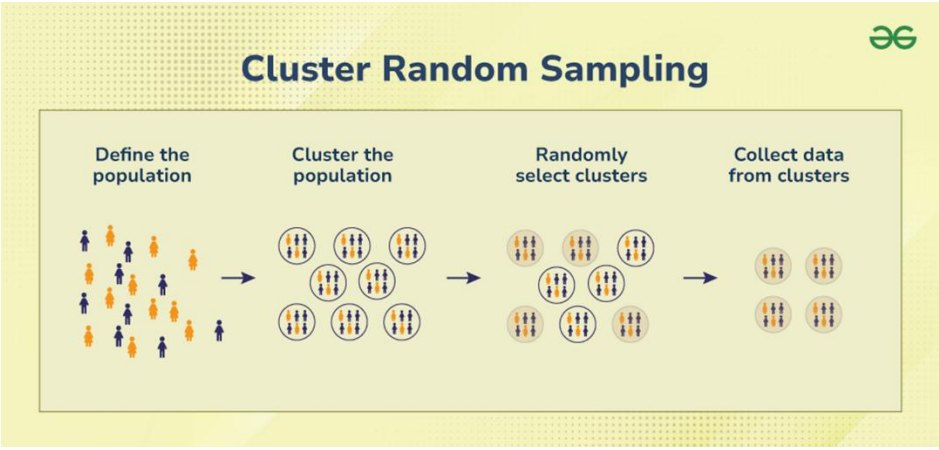
(The standard deviation is a measure of the amount of variation of the values of a variable about its mean.)

3.7.3 Cluster Sampling : It is a probability sampling technique where researchers divide the population into multiple groups (clusters) for research. So, researchers then select random groups with a simple random or systematic random sampling technique for data collection and unit of analysis. Say if we have 10000 samples of a part, packed in boxes of 50. Total number of boxes is 200. If we need 600 samples, we randomly select 10 boxes and test each component in these boxes.

Cluster sampling, no doubt, reduces cost by concentrating surveys in selected clusters. But, certainly, it is less precise than random sampling. There is also not as much information in 'n' observations within a cluster as there happens to be in 'n' randomly drawn observations. If cluster is based on area it is called area sampling. Multi stage clustering is also possible for large Universe.

Selection process

- ✓ Identify and define the population
- ✓ Determine the desired sample size
- ✓ Identify and define a logical cluster
- ✓ List all clusters that make up the population of clusters
- ✓ Estimate the average number of population members per cluster
- ✓ Determine the number of clusters needed by dividing the sample size by the estimated size of a cluster
- ✓ Randomly select the needed numbers of clusters
- ✓ Include in the study all individuals in each selected cluster



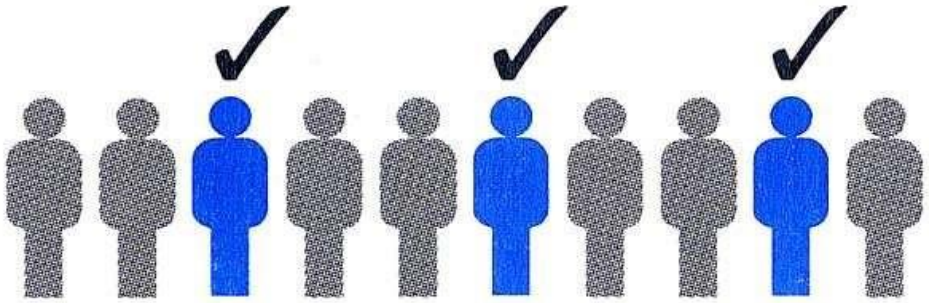
3.7.4. Systematic Random Sampling

Selection process

- ➢ Identify and define the population
- ➢ Determine the desired sample size

- Obtain a list of the population
- Determine what K is equal to by dividing the size of the population by the desired sample size
- Start at some random place in the population list
- Take every Kth individual on the list

It is easy. But all members do not have equal chance.



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- ✓ It is easy. But all members do not have equal chance.

3.8 Measurement and Scaling

By measurement we mean the process of assigning numbers to objects or observations, the level of measurement being a function of the rules under which the numbers are assigned. It is easy to assign numbers in respect of properties of some objects – Height, age, weight, number of stores, salary, etc. There is a standard unit of measurement against which the number is assigned. It is relatively difficult in respect of others - social conformity, intelligence, Comfort level, happiness etc. In measuring, we devise some form of scale in the range and then transform or map the properties of objects from the domain onto this scale.

3.9 Scales of measurement or Levels of measurement

A scale is a device or an object used to measure or quantify any event or another object. There are four scales of measurement.

3.9.1. Nominal Scale : First level of measurement. Used to categorize data into mutually exclusive categories or groups.

- ✓ A nominal scale variable is classified into two or more categories. In this measurement mechanism, the answer should fall into either of the classes.

- ✓ It is qualitative. The numbers are used here to identify the objects.
- ✓ The numbers don't define the object characteristics.
- ✓ The data is only categorized.
- ✓ Example : Brand of a car, gender, city of birth, Marital status

3.9.2 Ordinal Scale : Second level of measurement. The ordinal scale is the 2nd level of measurement that reports the ordering and ranking of data without establishing the degree of variation between them. Ordinal represents the "order." Ordinal data is known as qualitative data or categorical data. It can be grouped, named and also ranked.

- ➢ The ordinal scale shows the relative ranking of the variables
- ➢ It identifies and describes the magnitude of a variable
- ➢ Along with the information provided by the nominal scale, ordinal scales give the rankings of those variables
- ➢ The interval properties are not known
- ➢ Examples : Rank in class, Ranking of banks; Survey questions with ranking.

3.9.3 Interval scale : A numerical scale where the variables' order is known and the difference between these variables is also known. Variables that have familiar, constant, and computable differences are classified using the Interval scale. It is easy to remember the primary role of this scale, too, 'Interval' indicates 'distance between two entities,' which is what the Interval scale helps achieve. These scales are effective as they open doors for the statistical analysis of provided data. Mean, median, or mode can be used to calculate the central tendency in this scale. The only drawback of this scale is that there is no pre-decided starting point or a true zero value.

- Example : Test scores (e.g., IQ or exams)
- Temperature in Fahrenheit or Celsius

3.9.4 Ratio Scale: 4^{th} level of measurement. Has characteristics of interval level and absolute zero is defined. A true zero means there is an absence of the variable of interest. In ratio scales, zero does mean an absolute lack of the variable.

- ➢ Ratio scale has a feature of absolute zero
- ➢ It doesn't have negative numbers, because of its zero-point feature
- ➢ It affords unique opportunities for statistical analysis. The variables can be orderly added, subtracted, multiplied, divided. Mean, median, and mode can be calculated using the ratio scale.

Ratio scale has unique and useful properties. One such feature is that it allows unit conversions like kilogram – calories, gram – calories, etc

3.10 : Goodness of measurement

RELIBILITY - is the consistency of your measurement, or the degree to which an instrument measures the same way each time it is used under the same condition with the same subjects. In short, it is the repeatability of your measurement. A measure is considered reliable if a person's score on the same test given twice is similar. It is important to remember that reliability is not measured, it is estimated. A good instrument will produce consistent scores.

Validity - is a test of how well an instrument (questionnaire, survey, device) that is developed measures the particular concept it is intended to measure.

USABILITY(practicality) ease in administration, scoring, interpretation and application, low cost,

PRACTICIBILITY - It should be feasible

3.11 : Errors in measurement

1. Respondent: At times the respondent may be reluctant to express strong negative feelings or may have very little knowledge but may not ignorance. All this reluctance is likely to result in an interview of 'guesses.' Transient factors like fatigue, boredom, anxiety, etc. may limit the ability of the respondent to respond accurately and fully.

2. Situation: Situational factors may also come in the way of correct measurement. Any condition which places a strain on interview can have serious effects on the interviewer-respondent rapport. Eg. Somebody else is present.

3. Measurer: The interviewer can distort responses by rewording or reordering questions. The behavior, style and looks may encourage or discourage certain replies from respondents.

4. Instrument: Error may arise because of the defective measuring instrument. The use of complex words, beyond the comprehension of the respondent, ambiguous meanings, poor printing, inadequate space for replies, response choice omissions, etc. are a few things that make the measuring instrument defective and may result in measurement errors. Another type of instrument deficiency is the poor sampling of the universe of items of concern.

3.12. Scaling

Scaling describes the procedures of assigning numbers to various degrees of opinion, attitude and other concepts. This can be done in two ways viz., (i) making a judgement about some characteristic of an individual and then placing him directly on a scale that has been defined in terms of that characteristic and (ii) constructing questionnaires in such a way that the score of individual's responses assigns him a place on a scale. A scale is a continuum, consisting of the highest point (in terms of some characteristic e.g., preference,.) and the lowest point along with several intermediate points between these two extreme points. The points are related. Means $1^{st} > 2^{nd} > 3^{rd}$…..

3.13 Scale classification bases

3.13. 1. Subject orientation: Under it a scale may be designed to measure characteristics of the stimuli, by a respondent who completes it or to judge the stimulus object which is presented to the respondent. In respect of the former, we presume that the stimuli

presented are sufficiently homogeneous so that the between stimuli variation is small as compared to the variation among respondents. In the latter approach, we ask the respondent to judge some specific object in terms of one or more dimensions and we presume that the between-respondent variation will be small as compared to the variation among the different stimuli presented to respondents for judging.

3.13.2 Response form : Under this we may classify the scales as categorical and comparative. Categorical scales are also known as rating scales. These scales are used when a respondent scores some object without direct reference to other objects. Under comparative scales, which are also known as ranking scales, the respondent is asked to compare two or more objects. In this sense the respondent may state that one object is superior to the other or that three models of pen rank in order 1, 2 and 3. The essence of ranking is, in fact, a relative comparison of a certain property of two or more objects.

Do you like this Car? - Categorical

How would you rate Desire, Innova and Honda City? -Comparative

3.13.3 Degree of subjectivity: With this basis the scale data may be based on whether we measure subjective personal preferences or simply make non-preference judgements. In the former case, the respondent is asked to choose which person he favors (Do you like Amir Khan or Kamala Hasan?) or which solution he would like to see employed (Do you want to have a peer review or superior review?), whereas in the latter case he is simply asked to judge which person is more effective in some aspect (Do you think Kamala Hasan is better looking than Amir Khan? Or Do you think Kamal Hasan is a better actor than Amir Khan)or which solution will take fewer resources without reflecting any personal preference.

3.13.4. Scale properties: Considering scale properties, one may classify the scales as nominal, ordinal, interval and ratio scales.

3.13.5. Number of dimensions: In respect of this basis, scales can be classified as 'unidimensional' and 'multidimensional' scales. Under the former we measure only one attribute of the respondent or object, whereas multidimensional scaling recognizes that an object might be described better by using the concept of an attribute space of 'n' dimensions, rather than a single-dimension continuum

3.14. How do you scale – Scaling techniques

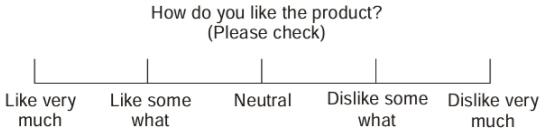
- Arbitrary approach: It is an approach where scale is developed on ad hoc basis.
- Consensus approach: Here a panel of judges evaluate the items chosen for inclusion in the instrument in terms of whether they are relevant to the topic area and unambiguous in implication.
- Item analysis approach: Under it a number of individual items are developed into a test which is given to a group of respondents. After administering the test, the total scores are calculated for every one. Individual items are then analyzed to determine which items discriminate between persons or objects with high total scores and those with low scores.

- Cumulative scales are chosen on the basis of their conforming to some ranking of items with ascending and descending discriminating power. For instance, in such a scale the endorsement of an item representing an extreme position should also result in the endorsement of all items indicating a less extreme position.
- Factor scales may be constructed on the basis of intercorrelations of items which indicate that a common factor accounts for the relationship between items. This relationship is typically measured through factor analysis method.

3.15 Scaling techniques

- I Rating scales: The rating scale involves qualitative description of a limited number of aspects of a thing or of traits of a person. When we use rating scales (or categorical scales), we judge an object in absolute terms against some specified criteria i.e., we judge properties of objects without reference
- to other similar objects.
- Eg : Like –Dislike
- Agree – neutral – Disagree
- Excellent – Good –Average – bad – Extremely bad

Graphic rating



Itemized rating scale (also known as numerical scale) presents a series of statements from which a respondent selects one as best reflecting his evaluation.

What did you most like in our restaurant?

- Food
- Quick Service
- Pricing
- Ambience
- Attitude

II Ranking Scales

- We make relative judgements against other similar objects. The respondents under this method directly compare two or more objects and make choices among them.

- Method of paired comparisons: Under it the respondent can express his attitude by making a choice between two objects/items/choices, say between a new flavor of soft drink and an established brand of drink.
- Total judgments N, with n choices = n(n-1)/2. Say n =10; N =45
- Method of rank order: Under this method of comparative scaling, the respondents are asked to rank their choices. With 10 items, we have 10 items to be ranked.

III Multi dimensional scaling

A statistical method that analyzes data with three or more variables by reducing it to a lower dimension. It's used to visualize the relationships between variables in a spatial model. MDS utilizes advanced optimization algorithms to minimize the discrepancy between the original high-dimensional distances and the distances in the reduced space. For example, given a matrix of distances between cities, MDS can be used to generate a map of the cities in two dimensions.

3.16 : Data Collection

It is the process by which the researcher collects the information needed to answer the research problem. The task of data collection begins after a research problem has been defined and research design chalked out.

In Collecting the Data, the Researcher Must Decide

- ✓ Which data to collect?
- ✓ How to collect the Data?
- ✓ Who will collect the Data?

3.16.1 When to collect the Data?

The selection of a method for collecting information depends upon the

- ✓ Resources available
- ✓ Credibility
- ✓ Analysis and reporting
- ✓ Resources
- ✓ And the skill of the evaluator

3.16. 2 Methods of Data Collection

Primary Data : Primary data are those which are collected for the first time and are original in character.

Secondary Data: Secondary data are those which have already been collected by someone else and which have through some statistical analysis.

3.16.3 Features of Data Collection methods

1. Quality and Accuracy : The choice of the method affects the quality and accuracy of the data.
2. Relevance, Validity, and Reliability: Effective data collection methods help ensure that the data collected is relevant to the research objectives, valid (measuring what it intends to measure), and reliable (consistent and reproducible).
3. Bias Reduction and Representativeness: Carefully chosen data collection methods can help minimize biases inherent in the research process, such as sampling or response bias.
4. Informed Decision Making: Accurate and reliable data collected through appropriate methods provide a solid foundation for making informed decisions based on research findings. Important for both pure and applied research.
5. Achievement of Research Objectives: Data collection methods should align with the research objectives to ensure that the collected data effectively addresses the research questions or hypotheses.
6. Support for Validity and Reliability: The choice of data collection methods can either enhance or detract from the validity and reliability of research findings. Therefore, selecting appropriate methods is critical for ensuring the credibility of the research.

3.17 Primary Data Colelction methods:

- Experiments
- Surveys (sample surveys or census surveys)
    - Observation
    - Interviews
    - Questionnaires
    - Schedules
- When the research type is experimental (Science, Engineering, Technology, Medical) experiments are considered as a major source of primary data. On the other end, surveys are performed when the research is descriptive in nature.

3.17.1 Method 1 - Observation

- Observation method is a method under which data from the field is collected with the help of observation by the observer or by personally going to the field. Observations enable the researcher to describe existing situations using the five senses,
- Observation may be defined as systematic viewing, coupled with consideration of seen phenomenon
- Example Observe children playing a game
- Observe consumers in a store
- Observe parents in a school function

Key Characteristics of Observational Research:

- **Non-Intrusive**: Observes participants without altering their environment.
- **Qualitative Focus**: Emphasizes detailed, descriptive data, though quantitative methods can also be used.
- **Natural Settings**: Conducted in real-world locations where participants normally exist, such as schools, workplaces, or homes.
- **Flexible**: Allows researchers to adapt observations based on unexpected events or behaviors.

Classification -1:

Structured Observation : When the observation is characterized by a careful definition of the units to be observed, the style of recording the observed information, standardized conditions of observation and the selection of related data of observation. Example : In a classroom setting, a researcher observes how many times students raise their hands during a lesson to gauge engagement.

- ➢ Allows for replicability and consistency across observations.
- ➢ Simplifies data analysis by using a structured format.
- ➢ May overlook unexpected or nuanced behaviors.
- ➢ Limits flexibility to adapt observations based on context.

Unstructured Observation : When it takes place without the above characteristics. For example, a researcher observes a wedding to understand behavior of people of varying economic status.

- Provides comprehensive, in-depth data.
- Captures unexpected behaviors and interactions.
- Data can be challenging to analyze due to lack of structure.
- Subjectivity may lead to researcher bias.

Classification -2:

- Participant Observation: When the observer is member of the group which he is observing then it is Participant Observation. By engaging with participants and experiencing the setting firsthand, researchers gain an in-depth perspective on group dynamics and behaviors. A researcher joins an organization to study employees behavior.

- ✓ Provides rich, detailed data and insights.
- ✓ Builds trust with participants, encouraging open behavior.
- ✓ May lead to researcher bias.
- ✓ Time-consuming and may influence participant behavior.

In this we can have

Covert observation: Where the participants are unaware of being observed. (Disguised Observation)

Overt Observation: where the participants are aware of being observed

Non-Participant Observation: When observer is observing people without giving any information to them then it is Non-Participant Observation. A psychologist studies children playing.

- Minimizes observer influence on participants.
- Enables objective, unbiased observations.
- Limited depth of understanding compared to participant observation.
- May miss subtle contextual details without interaction.

Classification - 3

- Controlled observation : It is a method of observation that takes place in a controlled environment and follows a pre-arranged plan. in controlled observation, we use mechanical (or precision) instruments as it aids to accuracy and standardization. Such observation has a tendency to supply formalized data upon which generalizations can be built with some degree of assurance. Controlled observation is used in experiments to test causal hypotheses and infer causality. I general conducted in laboratories.

  Uncontrolled observation : It takes place in a natural setting without a pre-arranged plan. The major aim of this type of observation is to get a spontaneous picture of life and persons. It has a tendency to supply naturalness and completeness of behavior, allowing sufficient time for observing it. Uncontrolled observation is used in exploratory research to get a natural picture of people and life. Uncontrolled observation doesn't use precision instruments and can be susceptible to subjective interpretation

3.17.2 Method 2 – Interviews

An interview is a qualitative research method that relies on asking questions in order to collect data. Interviews involve two or more people, one of whom is the interviewer asking the questions. The interview's goals could include exchanging ideas and experiences, extracting data on a wide range of topics. Usually, interviews are most useful for research that is qualitative, which means it focuses more on concepts and experiences than on numerical values.

1. Structured Interviews : Structured interviews comprise closed-ended questions, which are questions that respondents can answer with "yes" or "no." or open-ended questions. The interviewer usually asks the exact same questions in the same order to each interviewee. Often, researchers can complete structured interviews quickly, as they follow a standard format that they can easily replicate.

Example :

1. What are your strengths and weaknesses?

2. What are your career goals?
3. How open are you to criticism?
4. What do you do when you are stressed?
5. You have an issue with your increment. How will you put it forth to HR?

Asking set questions in a set order can help you see patterns among responses, and it allows you to easily compare responses between participants while keeping other factors constant. This can mitigate research biases and lead to higher reliability and validity. However, structured interviews can be overly formal, as well as limited in scope and flexibility.

2. Unstructured Interview: It is the most flexible type of interview. The questions and the order in which they are asked are not set. Instead, the interview can proceed more spontaneously, based on the participant's previous answers.. Unstructured interviews are by definition open-ended. This flexibility can help you gather detailed information on your topic, while still allowing you to observe patterns between participants. Helps to build rapport. But bias is likely to creep in and you should not ask leading questions. It is useful if you have a solid background in your research topic and have conducted interviews before; your research question is exploratory in nature, and you are seeking descriptive data that will deepen and contextualize your initial hypotheses. Your research necessitates forming a deeper connection with your participants, encouraging them to feel comfortable revealing their true opinions and emotions.

3. Semi structured interview : combines pieces of both structured and unstructured interviews. An interview might have specific questions to answer, but they have the flexibility to make changes. This interview type gives researchers the creative advantage of the entire interview process. The follow-up question gives a deeper detail or explanation from the respondent. Flexible and allows researcher to ask questions in any format.

4. Personal Interview : Requires the interviewer to ask questions face to face with the respondent. Ideal for researchers who want to talk directly to individuals and answer the research questions. An interviewer can ask follow-up questions to gain more knowledge and insight about a topic in a personal interview. Because of the face-to-face interaction, a personal interview has a higher response rate than other interview methods.

Provides good response rate

Provides a greater opportunity to observe the behaviour and attitude of the respondent

Allows a respondent to adapt to questions if they do not understand something

Ensures in-depth answers to questions

5. Focus Group Interviews : A focus group brings together a group of participants to answer questions on a topic of interest in a moderated setting. Focus groups are qualitative in nature and often study the group's dynamic and body language in addition to their answers. Responses can guide future research on consumer products and services, human behavior, or controversial topics.

Such interviews are used generally in the development of hypotheses and constitute a major type of unstructured interviews. Focus groups can provide more nuanced and unfiltered feedback than individual interviews and are easier to organize than experiments or large surveys. However, their small size leads to low external validity and the temptation as a researcher to "cherry-pick" responses that fit your hypotheses. Very useful when the topic is exploratory in nature, and you are seeking information that will help you uncover new questions or future research ideas.

6. Telephonic Interview: Interview over telephone. Could be structured, un structured or semi structured. Inexpensive. Respondents may be more truthful as their emotions, gestures are hidden.

7. Non –directive interview: interviewer's function is simply to encourage the respondent to talk about the given topic with a bare minimum of direct questioning.

8 : Email interview : Interviewing via email or web page may be a workable option. In such an interview, the respondent and interviewee need not be present in the same location simultaneously. As a result, researchers can collect a large amount of valuable data from different participants. With more and more customers moving to online marketplaces, interviewing via email or online can help researchers find meaningful answers to their questions

3.17.3 Method 3 – Questionnaire

- ✓ A Questionnaire is sent (by post or by mail) to the persons concerned with a request to answer the questions and return the Questionnaire.
- ✓ A Questionnaire consists of a number of questions printed in a definite order on a form.

Essentials of Good Questionnaire

- ➢ Should be short and simple
- ➢ Follow a sequence of questions from easy to difficult one
- ➢ Technical terms should be avoided
- ➢ Should provide adequate space for answers in questionnaire
- ➢ Directions regarding the filling of questionnaire should be given
- ➢ Physical Appearance – Quality of paper, Colour
- ➢ Sequence must be clear
- ➢ Avoid leading questions
- ➢ Focused

Very commonly used in marketing research

Types of Questions

Open-ended questions: This gives the respondents the ability to respond in their own words.

Example : What did you most like about the Resort

Close-ended or fixed alternative questions : This allows the respondents to choose one of the given alternatives.

Self Administered questionnaire: All questions are standardized so that all respondents receive the same questions with identical wording.

- Cost-effective
- Easy to administer for small and large groups
- Anonymous and suitable for sensitive topics
- Self-paced
- Not suitable for people with limited literacy

3.17.4 Method 4 – Schedules

- Very similar to Questionnaire method
- The main difference is that a schedule is filled by the enumerator who is specially appointed for the purpose.
- Enumerator goes to the respondents, asks them the questions from the Questionnaire in the order listed, and records the responses in the space provided.
- Enumerators explain the aims and objects of the investigation and also remove the difficulties which any respondent may feel in understanding the implications of a particular question or the definition or concept of difficult terms.
- Enumerator must be trained in administering the schedule

3.18 : Collection of secondary data : Data that are already available i.e., they refer to the data which have already been collected and analyzed by someone else. When the researcher utilizes secondary data, then he has to look into various sources from where he can obtain them. Not confronted with the problems that are usually associated with the collection of original data. Secondary data may either be published data or unpublished data. Usually published data are available in:

- various publications of the central, state are local governments;
- various publications of foreign
- governments or of international bodies and their subsidiary organisations;
- technical and trade journals;
- books, magazines and newspapers;
- reports and publications of various associations of industry, banks, stock exchanges
- reports prepared by research scholars, universities, economists, etc. in different fields;

- public records and statistics, historical documents, and other sources of published information.
- The sources of unpublished data are many; they may be found in diaries, letters, unpublished biographies and autobiographies and also may be

available with scholars and research workers, trade associations, labor bureaus and other public, private individuals and organisations.

Researcher has to be very careful when using secondary data.

Characteristics of good data collection method.

We have to ensure

1. Reliability of data: The reliability can be tested by finding out such things about the said data: (a) Who collected the data? (b) What were the sources of data? (c) Were they collected by using proper methods (d) At what time were they collected?(e) Was there any bias of the compiler? (t) What level of accuracy was desired? Was it achieved ?
2. Suitability of data: The data that are suitable for one enquiry may not necessarily be found suitable in another enquiry. Hence, if the available data are found to be unsuitable, they should not be used by the researcher.
3. Adequacy of data: If the level of accuracy achieved in data is found inadequate for the purpose of the present enquiry, they will be considered as inadequate and should not be used by the researcher.

How to select method of data collection?

1. Nature, scope and object of enquiry – Primary or secondary?
2. Availability of funds
3. Time factor
4. Precision required

Each method of data collection has its uses and none is superior in all situations.

3.19 : Case study method

According to H. Odum, “The case study method is a technique by which individual factor whether it be an institution or just an episode in the life of an individual or a group is analyzed in its relationship to any other in the group.” It is a fairly exhaustive study of a person (as to what he does and has done, what he thinks he does and had done and what he expects to do and says he ought to do) or group is called a life or case history. Burgess has used the words “the social microscope” for the case study method.” Pauline V. Young describes case study as “a comprehensive study of a social unit be that unit a person, a group, a social institution, a district or a community. "In brief, we can say that case study method is a form of qualitative analysis where in careful and complete observation of an individual or a situation or an institution is done; efforts are made to study each and every aspect of the concerning unit in minute details and then from case data generalizations and inferences are drawn. Used in sociology and ethnographic research.

Characteristics

1. Researcher chooses a single unit for study
2. Unit is studied intensively
3. Understand complex interactions in the unit
4. Qualitative approach
5. Behavioural pattern is studied
6. Enables generalized knowledge to grow

Advantages

- In-depth data: Case studies can provide detailed qualitative data.
- Flexibility: Researchers can choose methods like interviews, observations, or surveys to collect data.
- Low-stakes practice: Case studies can help you practice making decisions with incomplete information.
- Identify rare cases: Case studies can help identify rare manifestations of a disease or drug.
- Develop theories: Case studies can help develop new theories, challenge existing theories, or expand on existing theories.
- Practical solutions: Case studies can help find practical solutions to problems.

Disadvantages

- Unrepresentative samples: Case studies may not be representative of the general population.
- Researcher bias: Researchers may allow their own feelings to influence the case study.
- Lack of generalizability: Case study results may not be generalizable to the larger population.
- Lack of replicability: Case study results may be difficult to replicate.
- Time-consuming: Case studies can be time-consuming to conduct.
- Cost: Case studies can be expensive.