

# RESEARCH PROCESS, DATA AND SAMPLING

## RESEARCH PROCESS

The research process is similar to undertaking a journey.

For a research journey, there are two important decisions to make-

- *What you want to find out about or what research questions (problems) you want to find answers to;*
- *How to go about finding their answers.*

There are practical steps through which you must pass in your research journey in order to find answers to your research questions.

The path to finding answers to your research questions constitutes *research methodology*.

At each operational step in the research process, you are required to choose from a multiplicity of methods, procedures, and models of research methodology which will help you to best achieve your objectives.

*This is where your knowledge base of research methodology plays a crucial role.*

### Steps in Research Process:

1. Formulating the Research Problem
2. Extensive Literature Review
3. Developing the objectives
4. Preparing the Research Design including Sample Design
5. Collecting the Data
6. Processing and Analysis of Data
7. Generalisation and Interpretation (Conclusion and Recommendation)

### STEP1. FORMULATING THE RESEARCH PROBLEM

It is the first and most crucial step in the research process

- Main function is to decide what you want to find out
- The way you formulate a problem determines almost every step that follows.

### Sources of research problems

Research in social sciences revolves around four Ps:

- **People**- a group of individuals
- **Problems**- examine the existence of certain issues or problems relating to their lives; to ascertain attitude of a group of people towards an issue
- **Programs**- to evaluate the effectiveness of an intervention
- **Phenomena**- to establish the existence of regularity.

In practice, most research studies are based upon at least a combination of two *Ps*.

Every research study has two aspects:

#### 1. Study population –

- People: individuals, organizations, groups, communities  
(*They provide you with the information or you collect information about them*)

## 2. Subject area –

- **Problems:** issues, situations, associations, needs, profiles
- **Program:** content, structure, outcomes, attributes, satisfaction, consumers, service providers, etc.
- **Phenomenon:** cause-and-effect relationships, the study of a phenomenon itself

*(Information that you need to collect to find answers to your research questions)*

*You can examine the professional field of your choice in the context of the four Ps in order to identify anything that looks interesting.*

### **Considerations in selecting a research problem:**

These help to ensure that your study will remain manageable and that you will remain motivated.

1. **Interest:** a research endeavour is usually time consuming, and involves hard work and possibly unforeseen problems. One should select a topic of great interest to sustain the required motivation.
2. **Magnitude:** It is extremely important to select a topic that you can manage within the time and resources at your disposal. Narrow the topic down to something manageable, specific and clear.
3. **Measurement of concepts:** Make sure that you are clear about the indicators and measurement of concepts (if used) in your study.
4. **Level of expertise:** Make sure that you have an adequate level of expertise for the task you are proposing since you need to do the work yourself.
5. **Relevance:** Ensure that your study adds to the existing body of knowledge, bridges current gaps and is useful in policy formulation. This will help you to sustain interest in the study.
6. **Availability of data:** Before finalizing the topic, make sure that data are available.
7. **Ethical issues:** How ethical issues can affect the study population and how ethical problems can be overcome should be thoroughly examined at the problem formulating stage.

### **Steps in Formulation of a Research Problem:**

Working through these steps presupposes a reasonable level of knowledge in the broad subject area within which the study is to be undertaken. Without such knowledge, it is difficult to clearly and adequately 'dissect' a subject area.

- |        |  |
|--------|--|
| Step 1 | Identify a broad field or subject area of interest to you. |
| Step 2 | Dissect the broad area into subareas.                      |
| Step 3 | Select what is of most interest to you.                    |
| Step 4 | Raise research questions.                                  |
| Step 5 | Formulate objectives.                                      |
| Step 6 | Assess your objectives.                                    |
| Step 7 | Double check.  |

So far we have focused on the basis of your study, the research problem. But every study in social sciences has a second element, the study population from whom the required information to find answers to your research questions is obtained.

As you narrow the research problem, similarly you need to decide very specifically who constitutes your study population, in order to select the appropriate respondents.

## **STEP 2. REVIEWING THE LITERATURE:**

- The essential preliminary task in order to acquaint yourself with the available body of knowledge in your area of interest.
- Literature review is an integral part of the entire research process and makes the valuable contribution to every operational step.
- Reviewing literature can be time-consuming, daunting and frustrating, but is also rewarding. Its functions are:
  1. Bring clarity and focus to your research problem;
  2. Improve your methodology;
  3. Broaden your knowledge;
  4. Contextualise your findings.

### **Procedure for reviewing the literature:**

1. search for existing literature in your area of study
2. review the literature selected
3. develop a theoretical framework
4. develop a conceptual framework.

## **STEP 3 – THE FORMULATION OF OBJECTIVES:**

- Objectives are the goals you set out to attain in your study.
- They inform a reader what you want to attain through the study.
- It is extremely important to word them clearly and specifically.

### **Objectives should be listed under two headings:**

1. main objectives (aims);
2. Sub-objectives.

- The main objective is an overall statement of the thrust of your study. It is also a statement of the main associations and relationships that you seek to discover or establish.
- The sub-objectives are the specific aspects of the topic that you want to investigate within the main framework of your study.
- They should be numerically listed.
- Wording should clearly, completely and specifically communicate to your readers your intention.
- Each objective should contain only one aspect of the Study.
- Use action oriented words or verbs when writing objectives.

## Identifying Variables:

In a research study, it is important that the concepts used should be operationalised in measurable terms so that the extent of variations in respondents' understanding is reduced if not eliminated.

Techniques about how to operationalise concepts, and knowledge about variables, play an important role in reducing this variability.

Their knowledge, therefore, is important in 'fine tuning' your research problem.

For example:

- 'Jet Airways' is a perfect example of quality cabin service.
- Food in this restaurant is
- The middle class in India is getting more

*When people express these feelings or preferences, they do so on the basis of certain criteria in their minds. Their judgement is based upon indicators that lead them to conclude and express that opinion.*

These are judgements that require a sound basis on which to proclaim. This warrants the use of a measuring mechanism and it is in the process of measurement that knowledge about variables plays an important role.

## The definition of a variable:

An image, perception or concept that can be measured – hence capable of taking on different values – is called a variable.

## The difference between a concept and a variable:

Concepts are mental images or perceptions and therefore their meaning varies markedly from individual to individual.

A concept cannot be measured whereas a variable can be subjected to measurement by crude/refined or subjective/objective units of measurement.

It is therefore important for the concept to be converted into variables.

Concept e.g. Excellent High achiever Rich Satisfaction Domestic violence	Variable e.g. gender(male/female) age (x years y months) weight (–kg) height (–cms) religion (Catholic, Hindu) Income (Rs —per year)
--	---

## Types of DATA (Measurement of Scales)

There are four types of data that may be gathered in social research, each one adding more to the next. Thus ordinal data is also nominal, and so on. A useful acronym to help remember this is NOIR (French for 'black').

## Nominal Scale:

A nominal scale enables the classification of individuals, objects or responses into subgroups based on a common/shared property or characteristic. A variable measured on a nominal scale may have one, two or more subcategories depending upon the extent of variation.

The sequence in which subgroups are listed makes no difference as there is no relationship among subgroups. Nominal items are usually categorical, in that they belong to a definable category, such as 'employees'.

## Ordinal or Ranking Scale:

Besides categorizing individuals, objects, responses or a property into subgroups on the basis of common characteristic, it ranks the subgroups in a certain order. *They are arranged either in ascending or descending order according to the extent a subcategory reflects the magnitude of variation in the variable.*

*For example, 'income' can be measured either quantitatively (in rupees and paise) or qualitatively using subcategories 'above average', 'average' and 'below average'. The 'distance' between these subcategories are not equal as there is no quantitative unit of measurement. 'Socioeconomic status' and 'attitude' are other variables that can be measured on ordinal scale.*

## Interval Scale:

An interval scale has all the characteristics of an ordinal scale. In addition, it uses a unit of measurement with an arbitrary starting and terminating points.

For example,

Celsius scale:	Fahrenheit scale:	0°C to 100°C	32°F to 212°F
----------------	-------------------	--------------	---------------

Attitudinal scales:

10-20

21-30

31-40 etc

## Ratio Scale:

A ratio scale has all the properties of nominal, ordinal and interval scales plus its own property: *the zero point of a ratio scale is fixed, which means it has a fixed starting point.* Since the difference between intervals is always measured from a zero point, this scale can be used for mathematical operations.

The measurement of variables like income, age, height, and weight are examples of this scale. A person who is 40 years old is *twice* as old as one who is 20 years old.

## Parametric vs. Non-parametric

Interval and ratio data are parametric and are used with parametric tools in which distributions are predictable (and often Normal).

Nominal and ordinal data are non-parametric and do not assume any particular distribution. They are used with non-parametric tools such as the Histogram.

## Continuous and Discrete

**Continuous measures** are measured along a continuous scale which can be divided into fractions, such as temperature. Continuous variables allow for infinitely fine sub-division, which means if you can measure sufficiently accurately, you can compare two items and determine the difference.

**Discrete variables** are measured across a set of fixed values, such as age in years (not microseconds). These are commonly used on arbitrary scales, such as scoring your level of happiness, although such scales can also be continuous.

### STEP 4 – PREPARING THE RESEARCH DESIGN

*The research design is the conceptual structure within which research would be conducted.*

The function of research design is to provide for the collection of relevant information with minimal expenditure of effort, time and money.

The preparation of research design, appropriate for a particular research problem, involves the consideration of the following:

1. Objectives of the research study.
2. Method of Data Collection to be adopted
3. Source of information—Sample Design
4. Tool for Data collection
5. Data Analysis– qualitative and quantitative

**1. Objectives of the Research Study:** Objectives identified to answer the research questions have to be listed making sure that they are:

1. numbered, and
2. the statement begins with an action verb.

**2. Methods of Data Collection:** There are two types of data

primary data — collected for the first time

Secondary Data — those which have already been collected and analysed by someone else.

### METHODS OF PRIMARY DATA COLLECTION

#### OBSERVATION METHOD:

Commonly used in behavioural sciences

It is the gathering of primary data by investigator's own direct observation of relevant *people, actions and situations* without asking from the respondent.

e.g.

- *A hotel chain sends observers posing as guests into its coffee shop to check on cleanliness and customer service.*
- *A food service operator sends researchers into competing restaurants to learn menu items prices, check portion sizes and consistency and observe point-of purchase merchandising.*

Observation can yield information which people are normally *unwilling or unable to provide*.

## **SURVEY METHOD**

Survey Method Approach is most suited for gathering descriptive information.

**Structured Surveys** use formal lists of questions asked of all respondents in the same way.

**Unstructured Surveys** let the interviewer probe respondents and guide the interview according to their answers.

**Survey research may be Direct or Indirect.**

**Direct Approach:** The researcher asks direct questions about behaviours and thoughts.  
e.g. Why don't you eat at MacDonalds?

**Indirect Approach:** The researcher might ask: "What kind of people eat at MacDonald's?"

From the response, the researcher may be able to discover why the consumer avoids MacDonald's. It may suggest factors of which the consumer is not consciously aware.

## **CONTACT METHODS:**

Information may be collected by

- Mail
- Telephone
- Personal interview

### **Mail Questionnaires:**

#### **Advantages:**

- Can be used to collect large amounts of information at a low cost per respondent.
- Respondents may give more honest answers to personal questions on a mail questionnaire.
- No interviewer is involved to bias the respondent's answers.
- Convenient for respondent's who can answer when they have time.
- Good way to reach people who often travel.

#### **Limitations:**

- not flexible
- take longer to complete than telephone or personal interview
- response rate is often very low
- Researcher has no control over who answers.

### **Telephone Interviewing:**

- quick method
- more flexible as interviewer can explain questions not understood by the respondent
- depending on respondent's answer they can skip some Qs and probe more on others
- allows greater sample control
- response rate tends to be higher than mail

**Drawbacks:**

- Cost per respondent higher
- Some people may not want to discuss personal Qs with interviewer
- Interviewer's manner of speaking may affect the respondent's answers
- Different interviewers may interpret and record response in a variety of ways
- under time pressure, data may be entered without actually interviewing

**Personal Interviewing:**

It is very flexible and can be used to collect large amounts of information. Trained interviewers can hold the respondent's attention and are available to clarify difficult questions. They can guide interviews, explore issues, and probe as the situation requires. Personal interview can be used in any type of questionnaire and can be conducted fairly quickly. Interviewers can also show actual products, advertisements, packages and observe and record their reactions and behavior.

**This takes two forms-**

- Individual – Intercept interviewing
- Group – Focus Group Interviewing

**Intercept interviewing:**

- Widely used in tourism research.
- Allows researcher to reach known people in a short period of time.
- only method of reaching people whose names and addresses are unknown
- Involves talking to people at homes, offices, on the street, or in shopping malls.
- interviewer must gain the interviewee's cooperation
- time involved may range from a few minutes to several hours( for longer surveys compensation may be offered)
- involves the use of judgmental sampling e. interviewer has guidelines as to whom to "intercept", such as 25% under age 20 and 75% over age 60

**Drawbacks:**

- Room for error and bias on the part of the interviewer who may not be able to correctly judge age, race etc.
- The interviewer may be uncomfortable talking to certain ethnic or age groups.

**Focus Group Interviewing:**

It is rapidly becoming one of the major research tools to understand people's thoughts and feelings.

It is usually conducted by inviting six to ten people to gather for a few hours with a trained moderator to talk about a product, service or organization. The meeting is held in a pleasant place, and refreshments are served to create a relaxed environment.

The moderator needs objectivity, knowledge of the subject and industry, and some understanding of group and consumer behavior.



The moderator starts with a broad question before moving to more specific issues, encouraging open and easy discussion to bring out true feelings and thoughts.

At the same time, the interviewer focuses the discussion, hence the name *focus group interviewing*.

**Drawbacks:**

- Cost: may cost more than telephone survey
- Sampling: group interview studies keep small sample size to keep time and cost down, therefore it may be difficult to generalize from the results.

## EXPERIMENTAL METHOD

Also called *Empirical Research* or *Cause and Effect Method*, it is a data-based research, coming up with conclusions which are capable of being verified by observation or experiment.

Experimental research is appropriate when a proof is sought that certain variables affect other variables in some way.

e.g.

- *Tenderisers (independent variable) affect cooking time and texture of meat( dependent variable).*
- *The effect of substituting one ingredient in whole or in part for another such as soya flour to flour for making high protein bread.*
- *Develop recipes to use products.*

## DETERMINING SAMPLE DESIGN

Researchers usually draw conclusions about large groups by taking a sample.

*A Sample is a segment of the population selected to represent the population as a whole.* Ideally, the sample should be representative and allow the researcher to make accurate estimates of the thoughts and behaviour of the larger population.

Designing the sample calls for three decisions:

*Who will be surveyed? (The Sample)*

- The researcher must determine what type of information is needed and who is most likely to have it.

*How many people will be surveyed? (Sample Size)*

- Large samples give more reliable results than small samples. However, it is not necessary to sample the entire target population.

*How should the sample be chosen? (Sampling)*

- Sample members may be chosen *at random* from the entire population (*probability sampling*)
- The researcher might *select people who are easier* to obtain information from (*non probability sampling*)

*The needs of the research project will determine which method is most effective*

# Types of Sampling

## 1. Probability sampling

**Simple random sampling:** Every member of the population has a known and equal chance of being selected.

**Stratified random sampling:** Population is divided into mutually exclusive (heterogeneous) groups (strata) then random sampling is drawn from each group (stratum).

**Systematic sampling:** Systematic sampling is a technique for creating a random probability sample in which each piece of data is chosen at a fixed interval for inclusion in the sample.

**Cluster (area) sample:** The population is divided into mutually exclusive groups such as blocks, and the researcher draws a sample of the group to interview.

## 2. Non-probability sampling

**Convenience sampling:** The researcher selects the easiest population members from which to obtain information.

**Judgement sampling:** The researcher uses his/her judgment to select population members who are good prospects for accurate information.

**Quota sampling:** The researcher finds and interviews a prescribed number of people in each of several categories.

**Snowball Sampling:** A strategy used to gather a sample for a research study, in which study participants give the researcher referrals to other individuals who fit the study criteria. Snowball samples cannot be generalized to the population because they are not selected randomly.

## TOOL FOR DATA COLLECTION (RESEARCH INSTRUMENTS)

The construction of a research instrument or tool for data collection is the most important of a research project because anything you say by way of findings or conclusions is based on the type of information you collect, and the data you collect is entirely dependent upon the questions that you ask of your respondents. The famous saying about computers- "garbage in garbage out"- is also applicable for data collection. *The research tool provides the input into a study and therefore the quality and validity of the output (the findings), are solely dependent it.*

### **Guidelines to Construct a Research Tool:**

*The underlying principle behind the guidelines suggested below is to ensure the validity of instrument by making sure that your questions relate to the objectives of your study.*

*Step I: Clearly define and individually list all the specific objectives or research Questions for your study.*

*Step II: For each objective or research questions, list all the associated questions That you want to answer through your study.*

*Step III: Take each research question listed in step II and list the information Required to answer it.*

*Step IV: Formulate question(s) to obtain this information.*

## **Questionnaire:**

Structured surveys/ interviews employ the use of a questionnaire.

*A questionnaire consists of a set of questions presented to a respondent for answers. The respondents read the questions, interpret what is expected and then write down the answers themselves.*

*It is called an Interview Schedule when the researcher asks the questions (and if necessary, explain them) and record the respondent's reply on the interview schedule.*

Because there are many ways to ask questions, the questionnaire is very flexible. A questionnaire should be developed and tested carefully before being used on a large scale.

There are three basic types of questionnaire:

- Closed-ended
- Open-ended
- Combination of both

### **1. Closed-ended Questionnaire:**

- Closed-ended questions include all possible answers/prewritten response categories, and respondents are asked to choose among them. E.g. multiple choice questions, scale questions.
- Type of questions used to generate statistics in quantitative research.
- As these follow a set format, and most responses can be entered easily into a computer for ease of analysis, greater numbers can be distributed.

### **2. Open-ended Questionnaire:**

- Open-ended questions allow respondents to answer in their own words.
- The questionnaire does not contain boxes to tick but instead leaves a blank section for the respondent to write in an answer.
- Whereas closed-ended questionnaires might be used to find out how many people use a service open-ended questionnaires might be used to find out what people think about a service.
- As there are no standard answers to these questions, data analysis is more complex.
- As it is opinions which are sought rather than numbers, fewer questionnaires need to be distributed.

### **3. Combination of both:**

-This way it is possible to find out how many people use a service and what they think of the service in the same form.

-Begins with a series of closed-ended questions, with boxes to tick or scales to rank, and the finish with a section of open-ended questions or more detailed response.

## **STEP 5: COLLECTING DATA**

Having formulated the research problem, developed a study design, constructed a research instrument and selected a sample, you then collect the data from which you will draw inferences and conclusions from your study. Depending upon your plans, you might commence interviews, mail out a questionnaire, conduct experiments and/or make observations.

## STEP 6: PROCESSING AND ANALYSING DATA

Processing and analysing data involves a number of closely related operations which are performed with the purpose of summarizing the collected data and organizing these in a manner that they answer the research questions (objectives).

**The Data Processing operations are:**

1. **Editing**- a process of examining the collected raw data to detect errors and omissions and to correct these when possible.
2. **Classification**- a process of arranging data in groups or classes on the basis of common characteristics. Depending on the nature of phenomenon involved.
  - *Classification according to attributes*: here data is analysed on the basis of common characteristics which can either be
    - : *Descriptive such as literacy, sex, religion etc. or*
    - : *Numerical such as weight, height, income etc.*
  - *Classification according to class – intervals*: is done with data relating to *income, age, weight, tariff, production, occupancy etc.* Such quantitative data are known as the *statistics of variables* and are classified on the basis of class–intervals.

e.g. persons whose income are within Rs 2001 to Rs 4000 can form one group or class, those with income within Rs. 4001 to Rs. 6000 can form another group or class and soon.

**3. Tabulation**-Tabulation is the process of summarizing raw data and displaying the same in compact form for further analysis. It is an orderly arrangement of data in columns and rows. Tabulation is essential because:

- a. It conserves space and reduces the explanatory and descriptive statement to a minimum.
- b. It facilitates the process of comparison.
- c. It facilitates the summation of items and the detection of errors and omissions.
- d. It provides the basis for various statistical computations.

Tabulation may also be classified as simple and complex tabulation. Simple tabulation generally results in one-way tables which supply answers to questions about one characteristic of data only. Complex tabulation usually results on two-way tables (which give information about two inter-related characteristics of data), three way tables or still higher order tables, also known as manifold tables.

## 7. Generalisation and Interpretation (Conclusion and Recommendation)

In this section, the generalization and interpretation are done on the basis of data which have been collected from the survey or secondary source.