

CHAPTER 4

Research Design



<https://www.smstudy.com/article/exploratory-research-design>

Contents

1. Introduction to Research Design

2. Need for Research Design

3. Features of Good Research Design

4. Important Concepts Relating to Research Design

5. Classification of Research Design

1. Introduction to Research Design

- Detailed outline of how an investigation will take place.
- typically include
 - how data is to be collected
 - what instruments will be employed
 - how the instruments will be used and the intended means for analyzing data collected.
- The study type may dictate certain research design (number of alternative designs to achieve the study objectives)
- The type of research design chosen depends on:-
 - The type of problem
 - The knowledge already available about the problem
 - The resource available for the study

– Research design

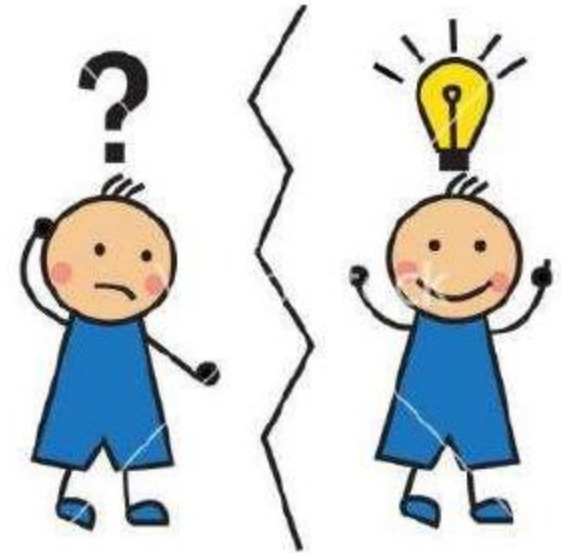
- a) Decisions regarding what, where, when, how much, by what means.....
- b) Is the master plan specifying the methods and procedures for collecting and analyzing the needed information
- c) Includes what the researcher will do from writing the hypothesis and its operational implications to the final analysis of data

2. Need for Research Design

- Research design is needed because it facilitates the smooth sailing of the various research operations, thereby making research as efficient as possible yielding maximal information with minimal expenditure of effort, time and money.
- Research Design helps:-
 - to give directions
 - in decision making
 - Prevents blind searching
 - to get a reliable result
 - make research to be efficient

– Research design should answer

- a) What is the study about?
- b) Why is the study being made?
- c) Where will the study be carried out?
- d) What type of data is required?
- e) Where can the required data be found
- f) What will the sample design?
- g) What periods of time will the study include?
- h) What techniques of data collection will be used?
- i) How will the data be analyzed
- j) In what style will the report be prepared?



3. Feature of Good Research Design/

- The design which gives the **smallest experimental error** is supposed to be the best design in many investigations.
- Similarly, a design which **yields maximal information** and provides an opportunity for considering **many different aspects of a problem** is considered most appropriate and efficient design in respect of many research problems.
- Thus, **the question of good design is related to the purpose or objective of the research problem** and also with the nature of the problem to be studied.
- A research design appropriate for a particular research problem, usually involves the consideration of the following factors:
 - (i) the means of obtaining information
 - (ii) the availability and skills of the researcher and his staff, if any
 - (iii) the objective of the problem to be studied
 - (iv) the nature of the problem to be studied
 - (v) the availability of time and money for the research work

4. Important Concepts Relating to Research Design

- Before describing the different research designs, it will be appropriate to explain the various concepts relating to designs so that these may be better and easily understood.

1. Dependent and independent variables

- ✓ **Independent variable** : It is a variable that stands alone and isn't changed by the other variables you are trying to measure.
- ✓ **Dependent variable** : is something that depends on other factors.

2. Extraneous variable

- ✓ undesirable variables that influence the relationship between the variables that an experimenter is examining.
- ✓ Another way to think of this, is that these are variables that influence the outcome of an experiment, though they are not the variables that are actually of interest.

3. Control

- One important characteristic of a good research design is to minimize the influence or effect of extraneous variable(s).

4. Confounded relationship

- When the dependent variable is not free from the influence of extraneous variable(s) the relationship between the dependent and independent variables is said to be confounded/confused by an extraneous variable(s).

5. Research hypothesis

- When a prediction or a hypothesized relationship is to be tested by scientific methods, it is termed as **research hypothesis**.
- The research hypothesis is a predictive statement that relates an independent variable to a dependent variable.

6. Experimental and non-experimental hypothesis-testing research

- When the purpose of research is to test a research hypothesis, it is termed as hypothesis-testing research.
- It can be of the experimental design or of the non-experimental design.
 - For instance, a researcher wants to study whether intelligence affects reading ability for a group of students and for this purpose he randomly selects 50 students and tests their intelligence and reading ability by calculating the coefficient of correlation between the two sets of scores.

7. Treatments

- The different conditions under which experimental and control groups are referred to as treatment.

8. Experiments

- Examining the truth of a statistical hypothesis, relating to some research problem, is known as an experiment.
 - For example, an experiment to examine the usefulness of a certain newly developed drug/ material
- Experiments can be of two types:- absolute experiment and comparative experiment.
 - If we want to determine the impact of a fertilizer on the yield of a crop, it is a case of absolute experiment; but if we want to determine the impact of one fertilizer as compared to the impact of some other fertilizer, our experiment then will be termed as a comparative experiment.

9. Experimental unit(s)

- The pre-determined plots or the blocks, where different treatments are used, are known as experimental units.
- Such experimental units must be selected (defined) very carefully.
Example : Animal, human , plants....

- ✓ Experiment is defined as the systematic procedure carried out under controlled conditions in order to discover an unknown effect, to test or establish a hypothesis.
- ✓ Design of experiments (DOE) is a systematic method to determine the relationship between factors affecting a process and the output of that process.
- There are three principles of experimental designs:
 - 1. The Principles of Replication**
 - The experiment should be repeated more than once
 - 2. The Principles of randomization**
 - Equal out the effects of unknown or uncontrollable sources of variation (factors).
 - 3. The principles of local control**
 - Local control means the control of all factors except the ones about which we are investigating
 - Experimental error is based on the variations from experimental unit to experimental unit.

5. Classification of Research Design

- Different research designs can be conveniently described if we categorize them as:

1. Hypothesis-testing research studies

- Known as experimental studies or design of experiments
 - Tests the hypotheses of causal relationships between variables
- Usually experiments meet this requirement

2. Exploratory research studies

- The major emphasis is *on the discovery of ideas and insights*
- Also termed as formulative research studies
- Formulating a problem for more precise investigation of developing the working hypotheses from an operational point of view

3. Descriptive and diagnostic research studies

- Descriptive research studies
 - Describing the characteristics of a particular individual, or of a group
- Diagnostic research studies
 - Determine the frequency with which something occurs
 - or its association with something else

Exercises 4-1

- What is the difference between research design and research method?
- Explain the type of research design that you use in your project (MSc thesis proposal).

Thank You!

