

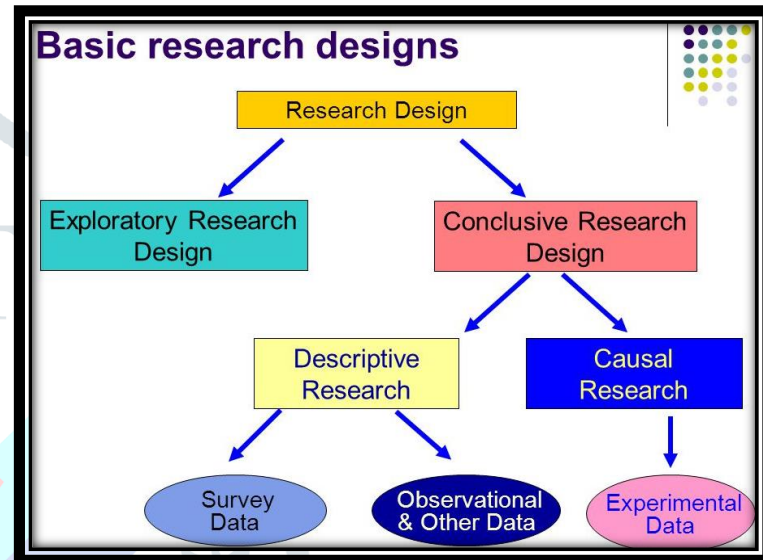
# Research Design

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## INTRODUCTION

After the formulation of a suitable research hypothesis, the next step in the, research process is to develop an appropriate research design. A research, designs answer the question as to how one should proceed to answer his research questions and test his hypothesis. Research design is a mapping strategy which is based on sampling technique. It essentially includes objectives, sampling research strategy, tools and techniques for collecting the evidences, analysis the data and reporting the findings. Thus, research design is the statement of the object of the inquiry and how a satisfactory culmination to be effected. A researcher design is the work before getting, the project underway.



## MEANING AND IMPORTANCE OF RESEARCH DESIGN

Research design is a choice of an investigator about the components of his project and development of certain components of the design. A design of research does not consist of an ordered sequential step-by-step procedure. It is a planning stage of research which is -Usually made logically visualizing its practicability. The selection of research component is done keeping in view of the objectives of the research components is done keeping in view of the objectives of the research. Research hypotheses also provide the basis for designing a research work. Research design means the exact nature of the research work in a systematic manner. It involves the information about the research work in view of, framework of study, availability of various data, observations, analysis, Sampling etc. Research Design includes the structure of research work. There are four methods of Research Designs, namely sampling Design, Observational Design, Statistical Design and Operational design.

In the words of **Kerlinger** 'Research design is a plan, structure and strategy of investigation so conceived as to obtain answers of research questions or problems. The plan is to complete scheme or programme of the research.' **Thyer** says "A traditional research design is a blue print or detailed plan for how a research study is to be completed - Operationalisation of variables that can be measured, selecting a sample of interest to Study, collecting data to be used as a basis for testing hypothesis and analyzing the results.. Thus, a research design is basically a systematic plan of action to verify the research hypothesis. It must be added. that the concept of research design is relevant even in situations where the purpose of research undertaken is exploratory and diagnostic without any pre conceived hypothesis Even in this situation, the researcher has to elaborate a plan of how he would like to proceed to attain his research objective.

The research design has an important role in a research project.

1. It provides the procedural plan with an appropriate sequence of activities
2. It defines the scope of the study, variables to be studied specifies manner of measurement, accuracies to be achieved. Sample design and size required to achieve that accuracy'. The process of data collection and, how the collected data are to be analysed
3. The final outcomes of the research project depend to a great extent on strength of the research design adopted.

## IMPORTANT CONCEPTS RELATING TO RESEARCH DESIGN

**1. Dependent and independent variables:** ---- When one variable depends upon other variable, it is known as Dependent variable and the variable antecedent to the dependent variable is called Independent variable.

**2. Extraneous variable:** ---- Independent variable affect upon the dependent variable, and not concerning the subject matter, is called extraneous variable.

**3. Control:** ---- The control over extraneous variable essential.

**4. Hypothesis:** ---- Hypothesis contained one independent and one dependent variable.

**5. Continued relationship:** ----When Extraneous variable and Dependent variable come together then it is called continued relationship.

**6. Experimental and non experimental hypothesis testing research:** ---- a research in which an independent variable is manipulated is termed as experimental hypothesis testing research and a research in which independent variable is not manipulated is called 'non experimental hypothesis testing research'.

**7. Experimental and control groups:** ---- When a group is exposed to usual conditions, it is termed as a control group,

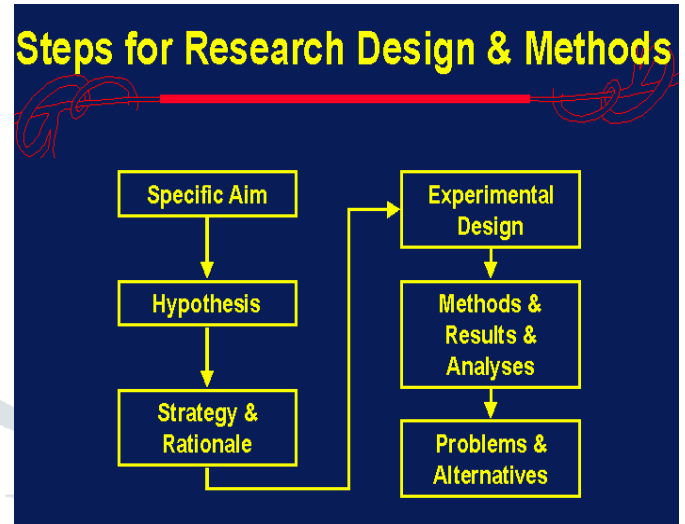
**8. Treatments:** ---- When experimental and control groups are put in different conditions it is known as 'treatments'.

**9. Experiment:** ----The procedure to observe the truth of a statistical hypothesis, connected to some research problem is called an experiment. Experimental units must be selected very carefully.

## STEPS IN RESEARCH DESIGN

The research design consists of a number of interrelated steps:

1. Identification of variables that have relevance to the research hypothesis on which information is to be collected.
2. Developing data collection instruments that leads to data that pass the test of reliability and validity
3. Determine the target group from whom the data is be collected
4. Determining the manner in which the individuals are to be selected for data collection, including the number to be covered.
5. Determining how the data is to be collected
6. Determining how the data are to be processed in the light of the hypothesis
7. Determining the time and other resourced required



## OBJECTIVES AND TYPES OF RESEARCH DESIGNS

The precise objectives of a research study obviously vary from study to study. However, the nature of the objectives can in general be classified into few types. These are as follows:

(a) **Assessment of the situation are at a particular point of time** : a large number of research studies undertaken are of diagnostic type and are conducted primarily to find out the status of phenomenon at a particular point of time consider the following examples of studies:

1. To explore the cultural practices in a human settlement.
2. To attain the activity pattern (employed, unemployed ,out of labour force status) of a population
3. To ascertain the prevalence of AIDS in a community currently.
4. To find out the differences between states regarding school dropout rates.
5. To study how people have voted in an election through exit poll Survey,
6. To examine if women, participation in work is related to variables like their education, husband 's income, number of children etc



7. To identify the factors influencing the managerial styles of people.

...In each of the above cases, the objective is merely to find out the present status about the prevalence and magnitude of a particular variable or relationship between two or more variables. Such studies can be with or without a prior hypothesis. If nothing about the variable (variables) is postulated in advance by the researcher on the basis of certain considerations or hunches, then it would be without a prior hypothesis and the objective of the research study is merely to estimate the present position on the other hand if the researcher expects to find a pattern about the behaviour of the variable than the study will be with the prior hypothesis and the objective of the study would be to verify the hypothesis. For example, the researcher may propose the hypothesis such as —the school drop-out rate is less in states with higher per capita income or the 'pattern of voting in an election would depend on the age of the voter- The objective of the study would be to see , if there is enough evidence to accept or reject the hypothesis through appropriate strategically.

(b) **Assessment of the change in the situation at two points of time:** another common type of research objective is to assess the impact of a policy, programme, project or treatment. Let us consider a few examples:

A programme of midday meal in schools has been in operation for some years. The implementers of the programme want to know whether the programme has resulted in an increase in school attendance and if so by how much

A scheme to promote self employment among the youth through bank loan and training has been initiated by the government. After some years the authorities have to decide whether the objective of the scheme has been achieved i.e whether more young person are coming forward to take up self-employment and whether there has been any improvements in their incomes.

- A major industrialist has launched a new advertisement campaign for the sale of his goods. After some time he wants to assess the impact of the new advertisement on the sales.

- Farmers fuse started using a new brand of fertilizers called organic fertilizers. After some time, say three years they want to know if organic fertilizers made any difference in the crop yield and its quality has the use of the new brand brought about higher yields and yields of better quality.

Villages in a region have been suffering from acute water scarcity for several years. One year there were unusual rains and all the water tanks have become full. There has been no water shortage from them on has the improved availability of water has changed the villagers lives and if so in what manner?

Problems of this type are known. as evaluation studies as the focus is on evaluating the outcome or impart of a programme or event They require data on the concerned variable ( school attendance, incomes, volume of sales , crop yield and its quality ,availability of water and its impact on villagers life in the above examples respectively) before the launch of programme or occurrence of an event as well as subsequently to enable that has taken place. This implies that two observations are required one before and one after.

(c) **Continuous Assessment over a long period of time:**--in yet on other type, the researcher objective is to access how the variable (or variable, has behaved not merely just before and after an event or Programme, but over a long period of time. Consider the following examples:

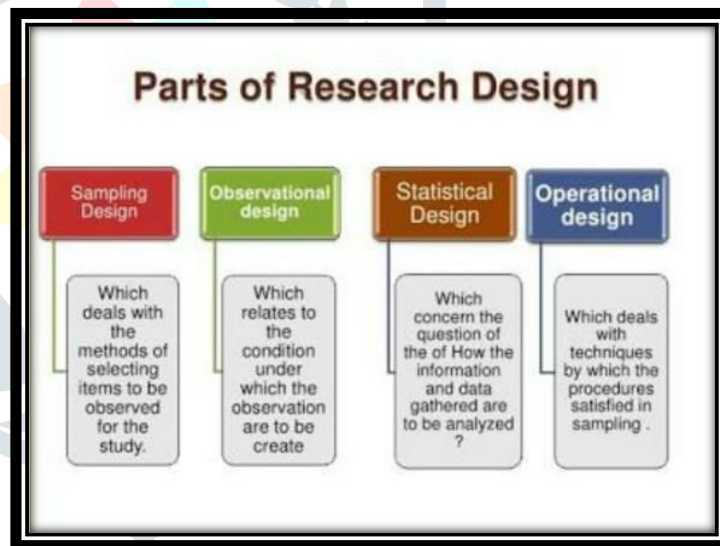
1. A programme of supplementary nutrition has been launched covering all children in particular locality. The researcher is interested in finding out how the weights of the children have been changing month on month during the year. He measures the weights of all children every month.
2. It is argued that use of heavy doses of chemical fertilisation result in gradual depletion of soil quality. A researcher examines this hypothesis on the basis of a study in the fields of a particular village, where such fertilizers are being used extensively. He conducts survey of farmers of the village year after year over a period of five years and finds out the change in the yields.
3. A teacher is asked it make a continuous assessment of the performance of the students in his class, he conducts test every fortnight to make an assessment of the comparative changes in performance over a Year.

In the examples mentioned above the researcher has to get the information on the variable of interest to him from the respondents a number of times

Thus it seems that research studies, depending in their objectives, involve collection of data either just once or just (before and after) or several times over a period of time. Based on this, research designs are called:

1. **Cross-sectional designs**, which involve collection of data just at time from a cross-section of respondents to assess the situation
2. **Before- After design**,(also called test and post test designs) which involve collection of data before the event and after the event to assess the change/impact or
3. **Longitudinal designs**, which trace the respondents over a long Period of time at regular intervals.

The following Table summarises the above discussion



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**Table 1.1: Research design types based on number of times data are collected**

DESIGN TYPE	FEATURES	WHEN TO USE	ADVANTAGES/DISADVANTAGES
CROSS SECTIONAL DESIGN	DATA COLLECTED Once about the desired variables as they are at the time of study	when the focus of research is to find out the existing situation regarding the variables of relationship between two or more variables	easy to execute and analyze/less costly/however it cannot provide any information about changes taking place over time
BEFORE AND AFTER DESIGN	data collected refer to two occasions- once before the event and once after the event	when the focus is on accessing the impact of an event , program or treatment on the variable under study is used often in evaluation studies	Can measure change. However, it cannot measure pattern of change. Involves collection of data at two points of time, hence costly. Further, some respondents who provided data on the first occasion may not be available on the second occasion. Moreover, care has to be taken to ensure that the change measured reflects the real change due to the event and excludes the effect of extraneous factors.
Longitudinal Design	data collected at a number of point in time	When the focus is on studying the pattern of change over a long Period	Can provide data on the pattern of change taking the variables over time, Involves collection of data several times over a long Period of time, hence costly Same respondents may not be effected by repeated visits Moreover, care has to be taken to ensure that the change measured reflects the real change due to the event and excludes the effect of extraneous factors

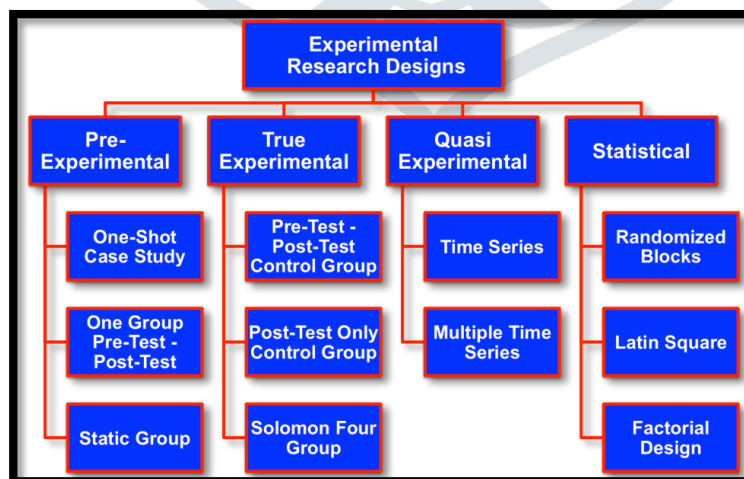
There may also be hybrids between the above three types of research designs. While a 'before-after' design is needed to assess the change in the values of the variables due to the impact of an event or programme or treatment. this feature can be built into a cross-sectional design by asking questions relating to the two points of time in the same survey instrument .

Research Design	Type of study	
	Exploratory of Formulative	Descriptive/Diagnostic
Overall design	Flexible design (design must provide opportunity for considering different aspects of the problem)	Rigid design (design must make enough provision for protection against bias and must maximise reliability)
(i) Sampling design	Non-probability sampling design (purposive or judgement sampling)	Probability sampling design (random sampling)
(ii) Statistical design	No pre-planned design for analysis	Pre-planned design for analysis
(iii) Observational design	Unstructured instruments for collection of data	Structured or well thought out instruments for collection of data
(iv) Operational design	No fixed decisions about the operational procedures	Advanced decisions about operational procedures.

There are two groups of research designs known as Exploratory design and Descriptive type design. In that two categories, again there are sub-sections as follows

Exploratory Design, Descriptive Design

1. Sampling Design
2. Probability sampling design
3. Statistical Design
4. Ovservational Design
5. Operational design
6. Structured design
7. Advanced decisions design



**FEATURES OF EXPERIMENTAL. DESIGNS**

Research design in case of hypothesis testing research studies. It is known as experimental studies it is usefull for agricultural studies.

There are two parts of experimental designs;--

(a) Informal experimental design:--

Before and after without control design:- In such design one of the test group is selected and the dependent variable is calculated before the introduction of treatment

1. After only with control design : Two groups are selected and the treatment is introduced into the test area particularly
2. Before and After with Control design:--two areas are selected and the dependent variable is measured in both the areas.

(b) Formal experimental designs :

1. Completely randomized design : It involves only two principles i.e. principle of replication and randomization of experimental designs. Such design is generally used in experimental areas
2. Randomized design : e.g. It yields two groups as representatives of the population. This type of design is useful in behavioural sciences.
3. Randomized block design:-- In this subjects are divided into groups, and they are relatively homogeneous in respect to some selected variable.

(iv) Latin squares design : In this, each row and each column represents equally but there are considerable difference between row and column.

(v) Factorial design : It is of two types,

(a) Simple factorial designs : In this the effects of varying two factors on the dependent variables are considered.

(b) Complex factorial designs : A design which considers more than three variables simultaneously is called Complex factorial designs. "

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