

## **3. Research Design**

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### **3.1 Introduction to Research Design:**

A research design is a broad plan that states objectives of research project and provides the guidelines what is to be done to realize those objectives. It is, in other words, a master plan for executing a research project. Research Design is important as it guides the researcher to identify the correct methods of data collection and analysis, conditions in which the activity of research shall be carried out and approximation of the funds to be utilized for it; maintaining its connectivity to the purpose of research. A good research design is characterized by its flexibility, effectiveness and suitability etc. A properly developed research design is the one that results in minimal or no error at all if everything goes as planned for. It is important to have clarity of the research question for the objectives to be achieved. Therefore, researcher may have to create mix of various design approaches to create a suitable one for the problem being addressed.

Research design is a broad framework that states the total pattern of conducting research project. It specifies objectives, data collection and analysis methods, time, costs, responsibility, probable outcomes, and actions. A research design is a broad plan that states objectives of research project and provides the guidelines what is to be done to realize those objectives. It is, in other words, a master plan for executing a research project. A research design is the arrangement of conditions for collection and analysis of data in a manner that aims to combine relevance to the research purpose with economy in procedure. Research design has following parts:

- Sampling design: Which deals with the methods of selecting items to be observed for the study
- Observational design: Which relates to the condition under which the observation are to be create.
- Statistical design: Which concern the question of the of How the information and data gathered are to be analyzed?
- Operational design: Which deals with techniques by which the procedures satisfied in sampling

### **3.2 Objectives of Research Design:**

- a. Research design makes research efficient by planning & formulating an outline of the research work.
- b. The aim is to economic and minimizes time energy and cost that would've been wasted if it was not present.

- c. It provides an accurate idea of where research has reached in his research journey.

### **3.3 Questions/ Consideration That Should be Undertaken in a Research Design:**

- a. What is the study about?
- b. Why is the study being made?
- c. Wherever are going to be the study be carried out?
- d. What type of data is required?
- e. Where can the required data be found?
- f. What periods of your time can the study include?
- g. How will the data be analyzed?
- h. What will be the sample design?
- i. What technique of knowledge assortment is going to be used?
- j. In what vogue can the report be prepared?

### **3.4 What is the Significance or Importance of the Research Design?**

- a. Research design provides the blueprint of research: A research faces many problems like what sample is to be taken, what method of data collection is to be used why is study being made and so on research plan or the blueprint minimize of all these problems of the research because all the decisions are taken beforehand.
- b. It dictates the boundary of research.
- c. The research design also offers a systematic approach to the research so that all step is executed in the right sequence.
- d. It offers a guide that direct the research action which reduces time and cost. Research design helps research to organize his idea in a proper form.
- e. Research design helps in the use of resources effectively with less no of error.
- f. It enabled the research to control the research operation most effectively.

### **3.5 What is the Need for Research Design?**

It is very important that it should be efficient, and appropriate. The design must be prepared before starting the research operation the need for Research Design can be explained in various points.

- a. Advance planning of the research is very essential without which the research may not yield the desired results.
- b. Research design is very important to get a reliable result.
- c. The need for a well thought out research design is not realized by much research don't serve the purpose for which they are undertaken. Due to which they give a misleading conclusion. Therefore, research design should be done with great care.
- d. Research design helps the researchers to organize his ideas in a proper form. It also provides the opportunity to evaluate the study.
- e. Research design is required for good understanding of the research. A Well written design demonstrates that the research has a good understanding of nature and purpose of the research.

- f. Research Design is needed because of it faculties Max information with a maximum expenditure of efforts time and money.
- g. 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.
- h. It reduces inaccuracy.
- i. It helps to get maximum efficiency and reliability.
- j. It eliminates bias and marginal errors;
- k. Research design stands for advance planning of the method to be adopted for collecting the relevant data and the techniques to be used in their analysis, keeping in view the objective of the research and the availability of staff, time and money.
- l. It minimizes wastage of time.
- m. It is helpful for collecting research materials.
- n. It is helpful for testing of hypothesis.
- o. It gives an idea regarding the type of resources required in terms of money, manpower, time, and efforts.
- p. It provides an overview to other experts.
- q. It Guides the research in the right direction.

### **3.6 Parts of Research Design:**

- a. Sampling design: - It deals with the method of selecting item which should be considered for adopting study.
- b. Observation design: - It relates to the condition under which observation is to be made.
- c. Statical design: - It corners with the question of how many items to be observed and how information and data gathered is to be analyzed.
- d. Operational style: - It subsumes the techniques by that the procedures laid out in the sampling applied math and empirical design may be distributed.

### **3.7 Features of Research Design:**

- a. It should be flexible appropriate efficient and economical.
- b. Good Research Design should be minimum bias and maximum base the reliability of the data collected.
- c. The design should give the smallest experimental error.
- d. A design should yield maximum information and should provide an opportunity to consider different aspects of a research problem.
- e. Good design should be suitable for the purpose or objective of the research problem.
- f. Good Research Design should be given due Weightage availability of time money skills of the research staff.

### **3.8 Contents of Research Design:**

- a. Statement of research objectives, i.e., why the research project is to be conducted
- b. Type of data needed
- c. Definition of population and sampling procedures to be followed
- d. Time, costs, and responsibility specification

- e. Methods, ways, and procedures used for collection of data
- f. Data analysis – tools or methods used to analyze data
- g. Probable output or research outcomes and possible actions to be taken based on those outcomes

Specifically, the **research design highlights decisions** which include:

- The nature of the study
- The purpose of the study
- The location where the study would be conducted
- The nature of data required
- From where the required data can be collected
- What time period the study would cover
- The type of sample design that would be used
- The techniques of data collection that would be used
- The methods of data analysis that would be adopted and
- The manner in which the report would be prepared

### **3.9 Types of Research Designs:**

The research design is a broad framework that describes how the entire research project is carried out. Basically, there can be three types of research designs – exploratory research design, descriptive research design, and experimental (or causal) research design. Use of particular research design depends upon type of problem under study.

#### ***3.9.1 Exploratory Research Design:***

This design is followed to discover ideas and insights to generate possible explanations. It helps in exploring the problem or situation. It is, particularly, emphasized to break a broad vague problem statement into smaller pieces or sub-problem statements that help forming specific hypothesis.

The hypothesis is a conjectural (imaginary, speculative, or abstract) statement about the relationship between two or more variables. Naturally, in initial state of the study, we lack sufficient understanding about problem to formulate a specific hypothesis. Similarly, we have several competitive explanations of marketing phenomenon. Exploratory research design is used to establish priorities among those competitive explanations.

The exploratory research design is used to increase familiarity of the analyst with problem under investigation. This is particularly true when researcher is new in area, or when problem is of different type.

**This design is followed to realize following purposes:**

- a. Clarifying concepts and defining problem
- b. Formulating problem for more precise investigation

- c. Increasing researcher's familiarity with problem
- d. Developing hypotheses
- e. Establishing priorities for further investigation

Exploratory research design is characterized by flexibility to gain insights and develop hypotheses. It does not follow a planned questionnaire or sampling. It is based on literature survey, experimental survey, and analysis of selected cases. Unstructured interviews are used to offer respondents a great deal of freedom. No research project is purely and solely based on this design. It is used as complementary to descriptive design and causal design.

### ***3.9.2 Descriptive Research Design:***

Descriptive research design is typically concerned with describing problem and its solution. It is more specific and purposive study. Before rigorous attempts are made for descriptive study, the well-defined problem must be on hand. Descriptive study rests on one or more hypotheses.

For example, "our brand is not much familiar," "sales volume is stable," etc. It is more precise and specific. Unlike exploratory research, it is not flexible. Descriptive research requires clear specification of who, why, what, when, where, and how of the research. Descriptive design is directed to answer these problems.

### ***3.9.3 Causal or Experimental Research Design:***

Causal research design deals with determining cause and effect relationship. It is typically in form of experiment. In causal research design, attempt is made to measure impact of manipulation on independent variables (like price, products, advertising and selling efforts or marketing strategies in general) on dependent variables (like sales volume, profits, and brand image and brand loyalty). It has more practical value in resolving marketing problems. We can set and test hypotheses by conducting experiments.

Test marketing is the most suitable example of experimental marketing in which the independent variable like price, product, promotional efforts, etc., are manipulated (changed) to measure its impact on the dependent variables, such as sales, profits, brand loyalty, competitive strengths product differentiation and so on.

## **3.10 Concepts Relating to Research Design:**

Some of the important concepts relating to Research Design are discussed below:

### **A. Dependent and Independent Variables:**

A magnitude that varies is known as a variable. The concept may assume different quantitative values like height, weight, income etc. Qualitative variables are not quantifiable in the strictest sense of the term. However, the qualitative phenomena may also be quantified in terms of the presence or absence of the attribute(s) considered.

The phenomena that assume different values quantitatively even in decimal points are known as 'continuous variables. But all variables need not be continuous. Values that can be expressed only in integer values are called 'non-continuous variables. In statistical terms, they are also known as 'discrete variables. For example, age is a continuous variable, whereas the number of children is a non-continuous variable. When changes in one variable depend upon the changes in other variable or variables, it is known as a dependent or endogenous variable, and the variables that cause the changes in the dependent variable are known as the independent or explanatory or exogenous variables. For example, if demand depends upon price, then demand is a dependent variable, while price is the independent variable. And, if more variables determine demand, like income and price of the substitute commodity, then demand also depends upon them in addition to the price of original commodity. In other words, demand is a dependent variable which is determined by the independent variables like price of the original commodity, income and price of substitutes.

### **B. Extraneous Variables:**

The independent variables which are not directly related to the purpose of the study but affect the dependent variables, are known as extraneous variables. For instance, assume that a researcher wants to test the hypothesis that there is a relationship between children's school performance and their self-confidence, in which case the latter is an independent variable and the former, a dependent variable. In this context, intelligence may also influence the school performance. However, since it is not directly related to the purpose of the study undertaken by the researcher, it would be known as an extraneous variable. The influence caused by the extraneous variable(s) on the dependent variable is technically called the 'experimental error'. Therefore, a research study should always be framed in such a manner that the influence of extraneous variables on the dependent variable/s is completely controlled, and the influence of independent variable/s is clearly evident.

### **C. Control:**

One of the most important features of a good research design is to minimize the effect of extraneous variable(s). Technically, the term 'control' is used when a researcher designs the study in such a manner that it minimizes the effects of extraneous variables. The term 'control' is used in experimental research to reflect the restraint in experimental conditions.

### **D. Confounded Relationship:**

The relationship between the dependent and independent variables is said to be confounded by an extraneous variable, when the dependent variable is not free from its effects.

### **E. Research Hypothesis:**

When a prediction or a hypothesized relationship is tested by adopting scientific methods, it is known as research hypothesis. The research hypothesis is a predictive statement which relates to a dependent variable and an independent variable. Generally, a research hypothesis must consist of at least one dependent variable and one independent variable.

Whereas, the relationships that are assumed but not to be tested are predictive statements that are not to be objectively verified, thus are not classified as research hypotheses.

### **F. Experimental and Non-experimental Hypothesis Testing Research:**

When the objective of a research is to test a research hypothesis, it is known as hypothesis-testing research. Such research may be in the nature of experimental design or non-experimental design. The research in which the independent variable is manipulated is known as ‘experimental hypothesis-testing research’, whereas the research in which the independent variable is not manipulated is termed as ‘non-experimental hypothesis-testing research’. For example, assume that a researcher wants to examine whether family income influences the school attendance of a group of students, by calculating the coefficient of correlation between the two variables. Such an example is known as non-experimental hypothesis-testing research, because the independent variable - family income is not manipulated here. Again, assume that the researcher randomly selects 150 students from a group of students who pay their school fees regularly and then classifies them into two sub-groups by randomly including 75 in Group A, whose parents have regular earning, and 75 in Group B, whose parents do not have regular earning. Assume that at the end of the study, the researcher conducts a test on each group in order to examine the effects of regular earnings of the parents on the school attendance of the student. Such a study is an example of experimental hypothesis-testing research, because in this particular study the independent variable regular earnings of the parents have been manipulated.

### **G. Experimental and Control Groups:**

When a group is exposed to usual conditions in experimental hypothesis-testing research, it is known as ‘control group’. On the other hand, when the group is exposed to certain new or special condition, it is known as an ‘experimental group’. In the afore-mentioned example, Group A can be called as control group and Group B as experimental group. If both the groups, A and B are exposed to some special feature, then both the groups may be called as ‘experimental groups. A research design may include only the experimental group or both the experimental and control groups together.

### **H. Treatments:**

Treatments refer to the different conditions to which the experimental and control groups are subject to. In the example considered, the two treatments are the parents with regular earnings and those with no regular earnings. Likewise, if a research study attempts to examine through an experiment the comparative effect of three different types of fertilizers on the yield of rice crop, then the three types of fertilizers would be treated as the three treatments.

### **I. Experiment:**

Experiment refers to the process of verifying the truth of a statistical hypothesis relating to a given research problem. For instance, an experiment may be conducted to examine the yield of a certain new variety of rice crop developed.

Further, Experiments may be categorized into two types, namely, ‘absolute experiment’ and ‘comparative experiment’. If a researcher wishes to determine the impact of a chemical fertilizer on the yield of a particular variety of rice crop, then it is known as absolute experiment. Meanwhile, if the researcher wishes to determine the impact of chemical fertilizer as compared to the impact of bio-fertilizer, then the experiment is known as a comparative experiment.

### **J. Experimental Unit(s):**

Experimental units refer to the pre-determined plots, characteristics or the blocks, to which different treatments are applied. It is worth mentioning here that such experimental units must be selected with great caution.

### **3.11 Why to Conduct Exploratory Research?**

The purpose of exploratory research is intertwined with the need for a clear and precise statement of the recognized problem. Three interrelated forms of exploratory research exist:

1. Diagnosing a situation.
2. Screening alternatives
3. Discovering new ideas.

#### ***3.11.1 Diagnosing a Situation:***

Much has already been said about the need for situation analysis to clarify a problem’s nature. Exploratory research helps diagnose the dimensions of problems so that successive research projects will be on target. It helps set priorities for research. In some cases, exploratory research provides an orientation for management by gathering information on a topic with which management has little experience. Although a research project has not yet been planned, information about an issue is needed before the appropriate action can be developed.

Personnel research managers often conduct exploratory research as a diagnostic tool to point out issues of employee concern’ or to generate possible explanations for motivational patterns. For example, preliminary interviews with employees may be utilized to learn current “hot” issues, as well as concerns about bread-and-butter issues such as wages, working conditions, career opportunities, and the like.

#### ***3.11.2 Screening Alternative:***

When several opportunities arise but the budget precludes investigating all possible options, exploratory research may be used to determine the best alternatives. Many crystallizes good investments were not made because a company chose to invest in something better. Some new organizational structures are found to be unworkable. In an exploratory look at market data (size, number, and so on), a product alternative, may informally not be feasible because the market is too small. Although this aspect of exploratory research is not a substitute for conclusive research, certain evaluative information can be acquired in exploratory studies.



The need for concept testing is a frequent reason for conducting exploratory research. Concept testing is a general term for many different research procedures, all of which have the same purpose. It refers to those research procedures that test some sort of stimulus as a proxy for a new or revised program, product, or service. Typically, test subjects are presented with an idea and asked if they liked it, and so on. Concept testing is a means of evaluating ideas by providing a “feel” for the merits and idea prior to the commitment of research and development, manufacturing, or other company resources. Researchers look for trouble in business signals in evaluations of concepts in order to avoid future problems in business research.

Concept testing may portray the functions, uses, and possible situations for a proposed product. For example, Del Monte conducted a concept test to determine if consumers would accept the idea of shelf-stable yogurt. The plan was scrapped after survey showed that buyers refused to accept the idea that yogurt could be kept unrefrigerated. Early research indicated that such a concept was viewed as desirable and unique, but the cost of achieving believability finally judged to be high.

In other cases, when subjects have expressed reservations about certain aspects of the idea but the general concept has not been evaluated negatively, researchers know that the concept needs to be refined. The intangibles influencing brand image, product appearance, name and price— as well as a description of the product simulate reality. Thus, prior to actual product development, the idea expressing the nature of the brand is conveyed to the test subjects.

### ***3.11.3 Discovering New Ideas:***

Exploratory research is often used to generate new ideas. Perhaps factory workers have suggestions for increasing production, or improving safety. Consumers may suggest new product ideas, or unthought-of problems might be identified.

For example, an automobile manufacturer might have drivers design their dream influencing cars on video screens using computerized design software adapted from programs used by automotive designers. This exploratory research generates ideas that would never have occurred to the firm’s design staff.

A manager may choose from four general categories of exploratory research methods: (1) experience surveys, (2) secondary data analysis, (3) case studies, and (4) pilot studies. Each category provides various alternative ways of gathering information.