

RESEARCH DESIGN

Session Outline

- 5.1 Introduction
- 5.2 Learning Outcomes
- 5.3 Concept of research designs
 - 5.3.1 Research design
 - 5.3.2 Study design
 - 5.3.3 Experimental design
 - 5.3.4 Sampling design
- 5.4 Importance of study design
- 5.5 Factors considered in research design
- 5.6 Types Research Design
- 5.7 Summary
- 5.8 Review activity
- 5.9 References and Further Reading

5.1 Introduction

You are welcome to our fifth session on Research Design. In this session, we shall have an opportunity to discuss important terms that go with research design as used in scientific research approaches. The aim of defining the terms is to have a solid foundation on why there is need for research design. We shall end our discussion by looking at the types of research designs in use in this modern era.



5.2 Learning Outcomes

At the end of this lecture, you should be able to:

1. Explain the concepts of research designs
2. Describe the types of research designs
3. Explain the factors considered in research design

5.3 Definitions

Let us begin our conversation by thinking of an architectural design and its relation to research.



Activity

Is there any relationship between architectural design and a research design?

Good observation! I am sure you have noted the analogy as provided by architectural designs. In architectural designs you design an architectural project by creatively suggesting ways of how your project will look like when built.

This is the exact work that happens in research design. You design a research project by creatively and methodically suggesting ways of how your research project will proceed until it is completed or "built". Research design therefore, may be different from architectural design in that the former relies more on substantive information and less on artistic talents and skills. To help demystify the design that takes place in research, we shall take some time to describe some of the concepts that we shall meet in the process of undertaking research designs

5.3.1 Research design

This is basically deciding on the structure of the exact steps or procedures that you need to take, in order to successfully carry out the research objectives. In the quest to

understand this activity, we shall take some time to develop an understanding of some of the pertinent concepts used in research design.

5.3.2 Study design

This is a framework, or the set of methods and procedures used to collect and analyze data on variables specified in a particular research problem. The type of study design used to answer a particular research question is determined by the nature of question, the goal of research, and the availability of resources.

5.3.3 Variable

A variable represents a measurable attribute that varies across study units, for example, individual participants in a study, or at times even when measured in an individual person over time. Some examples of variables include age, sex, weight, height, health status, alive/dead, diseased/healthy, annual income, smoking yes/no, and treated/untreated.

5.3.4 Experimental design

This is a way to carefully plan experiments in advance so that your results are both objective and valid. The terms “Experimental Design” and “Design of Experiments” are used interchangeably and mean the same thing. However, the medical and social sciences tend to use the term “Experimental Design” while engineering, industrial and computer sciences favour the term “Design of experiments.”

5.3.5 Sampling design

This is a fundamental part of statistics. Samples are collected to achieve an understanding of a population because it is typically not feasible to observe all members of the population. The goal is to collect samples that provide an accurate representation of the population. Constraints on time and money dictate that the sampling effort must be efficient. More samples are needed to characterize the nature of highly variable populations than less variable populations.

5.4 Importance of Research Study Design

Research design carries an important influence on the reliability of the results attained. It therefore provides a solid base for the whole research. It is needed due to the fact that it allows for the smooth working of the many research operations. This makes the research as effective as possible by providing maximum information with minimum spending of effort, money and time.

5.5 Factors considered in research design

The selection of a research design is based on the nature of the research problem or issue being addressed, the researchers' personal experiences, and the audiences for the study.

- i. **Type of research:** A research problem is an issue or concern that needs to be addressed. Certain types of social research problems call for specific approaches. For example, if the problem calls for (a) the identification of factors that influence an outcome, (b) the utility of an intervention, or (c) understanding the best predictors of outcomes, then a quantitative approach is best. It is also the best approach to use to test a theory or explanation.

On the other hand, if a concept or phenomenon needs to be understood because little research has been done on it, then it merits a **qualitative approach**. Qualitative research is exploratory and is useful when the researcher does not know the important variables to examine. This type of approach may be needed because the topic is new, the topic has never been addressed with a certain sample or group of people, and existing theories do not apply with the particular sample or group under study.

A **mixed methods** design is useful when either the **quantitative** or **qualitative** approach by itself is **inadequate** to best understand a research problem or the strengths of both quantitative and qualitative research can provide the best understanding. For example, a researcher may want to both **generalize** the findings to a population as well as develop a **detailed view** of the meaning of a

phenomenon or concept for individuals. In this research, the inquirer first explores generally to learn what variables to study and then studies those variables with a large sample of individuals.

Alternatively, researchers may first **survey** a large number of individuals and then **follow up** with a few participants to **obtain** their specific language and voices about the topic. In these situations, collecting both closed-ended quantitative data and open-ended qualitative data proves advantageous.

- ii. **Researchers' own personal training and experiences** also influence their choice of approach. An individual trained in technical, scientific writing, statistics, and computer statistical programs and familiar with **quantitative** journals in the library would most likely choose the quantitative design. On the other hand, individuals who enjoy writing in a **literary way** or conducting personal interviews or making up-close observations may gravitate to the qualitative approach. The mixed methods researcher is an individual familiar with both quantitative and qualitative research. This person also has the time and resources to collect both quantitative and qualitative data and has outlets for mixed methods studies, which tend to be large in scope.
- iii. Finally, researchers write for **audiences** that will accept their research. These audiences may be journal editors, journal readers, graduate committees, conference attendees, or colleagues in the field. You should consider the approaches typically supported and used by your advisers. The experiences of these audiences with quantitative, qualitative, or mixed methods studies can shape the decision made about this choice.

Reflect over the following question as we carry on with our discussion;



Activity

Given the possibility of research designs explain the factors that affect a choice of one approach over another for the design of a proposal?

5.6 Types of research design

As we discovered earlier, research designs are plans and the procedures for research that span the decisions from broad assumptions to detailed methods of data collection and analysis. This plan involves several decisions, and they need not be taken in the order in which they make sense to you and the order of their presentation.

The overall decision involves which design should be used to study a topic. Informing this decision should be the worldview assumptions the researcher brings to the study; procedures of inquiry (called strategies); and specific methods of data collection, analysis, and interpretation.

In this section, we shall advance three types of designs: qualitative, quantitative, and mixed methods.

A study tends to be more qualitative than quantitative or vice versa. Mixed methods research resides in the middle of this continuum because it incorporates elements of both qualitative and quantitative approaches



Take Note

Qualitative and **quantitative** approaches should not be viewed as **polar opposites** or **dichotomies**; instead, they represent different ends on a continuum.

Having identified the design types above, we are now in a position to discuss these research designs.

5.6.1 Qualitative research design

Qualitative research is a means for exploring and understanding the meaning individuals or groups ascribe to a social or human problem. The process of research involves emerging questions and procedures, data typically collected in the participant's setting, data analysis inductively building from particulars to general themes, and the researcher making interpretations of the meaning of the data. The final written report has a flexible structure. Those who engage in this form of inquiry support a way of looking at research that honors an inductive style, a focus on individual meaning, and the importance of rendering the complexity of a situation.

5.6.2 Quantitative research design

Quantitative research is a means for testing objective theories by examining the relationship among variables. These variables, in turn, can be measured, typically on instruments, so that numbered data can be analyzed using statistical procedures. The final written report has a set structure consisting of introduction, literature and theory, methods, results, and discussion (Creswell, 2008). Like qualitative researchers, those who engage in this form of inquiry have assumptions about testing theories deductively, building in protections against bias, controlling for alternative explanations, and being able to generalize and replicate the findings.

5.6.3 Mixed methods research design

Mixed methods research is an approach to inquiry that combines or associates both qualitative and quantitative forms. It involves philosophical assumptions, the use of qualitative and quantitative approaches, and the mixing of both approaches in a study. Thus, it is more than simply collecting and analyzing both kinds of data; it also involves the use of both approaches in tandem so that the overall strength of a study is greater than either qualitative or quantitative research (Creswell & Plano Clark, 2007).

Having looked at the research design types, we shall now ask ourselves the following question:



Activity

What distinguishes a quantitative study from a qualitative study?
Mention three characteristics.

Good attempt. You have been able to clear distinguish between the two research design types and mentioned the characteristics of each. This leads us to our next last subsection in this lecture on research design.

There are a number of subdivisions of the above designs, including the following;

5.6.4 Descriptive study Designs

This design attempts to describe and explain conditions of the present by using many subjects and questionnaires to fully describe a phenomenon. The aim is to Observe and Describe. They include Descriptive studies, Case studies, Naturalistic observation.

5.6.5 Surveys

These are brief interviews or discussions with individuals to obtain information about a specific subject/topic of study

5.6.6 Semi-Experimental Study Design

This aims to determine causes of certain issues. It includes Quasi-Experimental Designs and Twin Studies

5.6.7 Experimental Study Design

This aims at determining cause-effect relationships. It includes True Experimental Designs and Double-Blind Experiments. They directly establish cause-effect nature of relationships between variables. They establish cause via manipulation of cause (treatment), temporal precedence of cause (and no other factor) before effect, and control of all other extraneous factors. They decrease ambiguity.

They may include;

- a) **Field Studies:** Studies participants in their natural setting which gives maximizes realism

b) Laboratory Studies: Artificial settings with high control over variables. Procedures are followed to reduce bias and increase reliability. The researcher tests hypotheses of causal relationships between variables. This may involve quantitative research methods and analysis. Methods of data collection include Questionnaire, Interview (structured or unstructured), Observation, analysis of documents

5.6.8 Correlational Study design

This explores or tests relations between variables; determines whether or not two variables are correlated. This means to study whether an increase or decrease in one variable corresponds to an increase or decrease in the other variable. Then one “rules out” alternative variables that could play a role in relations between variables.

5.6.9 Case studies

These are qualitative research studies which adopt an interpretive approach to data. They use direct observation to give a complete snapshot of a case that is being studied.

They involve studying ‘things’ within their context and consider the subjective meanings that people bring to their situation. They use few subjects and are useful when not much is known about a phenomenon. Methods of data collection include Questionnaire, Interview (structured or unstructured), Observation analysis of documents

5.6.10 Longitudinal study design

This uses time as the main variable, and tries to make an in depth study of how a small sample changes and fluctuates over time. Methods of data collection include Questionnaire, Interview (structured or unstructured), Observation, Analysis of documents.

5.6.11 Cross-sectional study design

Takes a snapshot of a population at a certain time, allowing conclusions about phenomena across a wide population to be drawn. Methods of data collection include: Questionnaire, Interview (structured or unstructured), Observation, Analysis of documents.

5.6.12 Historical Research Design

The purpose is to collect, verify, synthesize evidence to establish facts that defend or refute a hypothesis. It uses primary sources, secondary sources, and lots of qualitative data sources such as logs, diaries, official records, reports, etc. The limitation is that the sources must be both authentic and valid.

5.6.13 Prospective studies

Attempts to explore relationships to make predictions. It uses one set of subjects with two or more variables for each. The aim is to predict. It includes Case Control Studies, Observational Studies, Cohort Studies, Longitudinal Studies, Cross Sectional Studies, Correlational Studies



5.7 Summary

In planning a research project, researchers need to identify whether they will employ a qualitative, quantitative, or mixed methods design. This design is based on bringing together assumptions about research, the specific strategies of inquiry, and research methods.

Decisions about choice of a design are further influenced by the research problem or issue being studied, the personal experiences of the researcher, and the audience for whom the researcher writes



5.8 Review Activity

1. Identify a research question in a journal article and explain the design that was used to study the question and why.
2. Identify a hypothetical research question in your study and explain the design that was used to study the question and why.



5.9 References and Further Reading

1. Paul D.L., Jeanne E.O., (2015). *Practical Research: Planning and Design*, Pearson Education Limited, ISBN 9780133741322.
2. Peter P., (2016). *Research Methodology: The Aims, Practices and Ethics of Science*, Springer International Publishing, Switzerland, ISBN 9783319271668, ISBN 9783319271675

