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6. Basic Concepts in Research Design

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Abstract:

Science, social science, and many other fields all use study design as a key component of their studies. However, because there is a lack of clarity in the literature regarding the approaches to research design, research methods, and research methodology in the social sciences, new public administration (PA) researchers and students may view the existence of multiple approaches as a source of confusion.

This three-part review series aims to guide readers through the tangle of periodontal research by clarifying and simplfying numerous problems with the conception, execution, and interpretation of various study designs frequently employed in the discipline.

This knowledge will make it easier for researchers to develop studies that more effectively transfer sound scientific phenomena into conclusions that have therapeutic significance. We shall talk about Fundamental Ideas in Research Design in this essay.

Keywords:

Research Design, Social Science, Development, Research Methods, Researcher, Semi-Experimental, Review, Experimental Design, Research Protocol, Study, Technique.

6.1 Introduction:

The main objective is for students to comprehend fundamental research ideas and recognize the significance of carrying out research in accordance with a predetermined plan. We expect that having a better understanding of research concepts and ethical procedures will improve the research's integrity and the significance of its findings. [1]

The program provides an introduction to the fundamental ideas of research and can be completed at one's own pace (for example). The information lays the groundwork for ethical and proper research conduct.

The subjects covered include how to plan and carry out research as well as how activities taken while conducting research can impact the project's integrity. In this training, ethical research topics are discussed, and it is urged that new research team members make decisions in line with responsible and ethical research methods. [2]

A research problem is presented in its entirety in the research design. It refers to the general approach you use to logically and cogently combine the various study components. It serves as a framework or guide for carrying out the research. It is, in essence, your overall plan for conducting your research.

A study's design identifies the study's type (descriptive, correlational, semi-experimental, experimental, review, and meta-analytic) and sub-type (for example, descriptive - longitudinal case study), research question, hypotheses, independent and dependent variables, experimental design, and, if necessary, data collection techniques and a strategy for statistical analysis.

A research design will typically outline how data will be gathered, the instruments to be used, how they will be used, and how the data will be analyzed. [3]

In order to improve the possibilities of gathering the data required to address a specific subject, research studies are specifically planned. Only when the research design is sound and the research protocol is followed is the data gathered during the study useful.

Research Design

The likelihood that the research findings will be precise and useful to others will rise if the processes and techniques indicated in the research protocol are carefully followed. Because the results can then be replicated by other researchers, following the research protocol and hence the study's design is also crucial.

The likelihood that researchers and the general public would accept these discoveries as true increases with the frequency with which outcomes are replicated. The techniques utilized to guarantee the protection of research subjects, whether human or animal, and to maintain the integrity of the data gathered in the study must also be made apparent in the research design. [4]

Research in common parlance refers to a search for knowledge. Once can also define research as a scientific and systematic search for pertinent information on a specific topic. In fact, research is an art of scientific investigation.

The Advanced Learner's Dictionary of Current English lays down the meaning of research as "a careful investigation or inquiry specially through search for new facts in any branch of knowledge." Redman and Mory define research as a "systematized effort to gain new knowledge."

Some people consider research as a movement, a movement from the known to the unknown. Research in common parlance refers to a search for knowledge. Once can also define research as a scientific and systematic search for pertinent information on a specific topic.

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Redman and Mory define research as a "systematized effort to gain new knowledge." Some people consider research as a movement, a movement from the known to the unknown. A research design is a plan for a scientific investigation. It contains the methods, equipment, and procedures used to conduct the research.

It aids in locating and solving potential issues that may come up while conducting research and analysis. The research procedures and approaches are often selected at the beginning of the study.

A research design is a document that describes a project's technique, methodologies, and other crucial information.

According to experts, the research design serves as the project's binding agent. It (research design) helps provide a structure and direction to the research, yielding favorable results. [5]

6.2 Main Elements of a Research Design:

Each element is important for a research design. If you keep these points in mind, you will conduct perfect research. Some of the main elements of research design are:

a. Purpose statement: This is a clear and concise statement of what you want to achieve with your research.

b. Data collection techniques: Many different data collection techniques are available, such as surveys, interviews, and experiments.

c. Data analysis methods: Different data analysis methods are available, such as statistical analysis and qualitative analysis.

d. Research Methodology: Many different research methodologies are available, such as quantitative research, qualitative research, and mixed methods research.

e. Possible objections to research: These are the potential problems or challenges that you may face in your research.

f. Research setting: This is the environment in which you will conduct your research. The research setting can have an impact on the research design.

g. Timeline: It is important to create a realistic timeline that allows you to collect and analyse data from time to time.

h. Measurement of analysis: It is important to choose a measure that is appropriate for the research questions that you are asking and then come to an analysis.

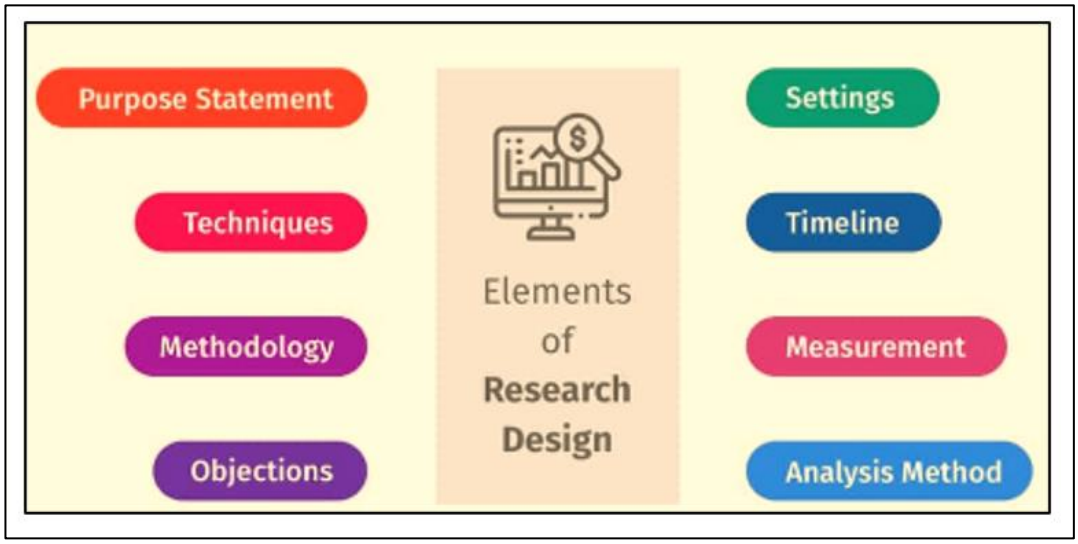


Figure 6.1: Elements of Research Design

6.3 Significance of Features and Concepts in Research Design:

When creating top-notch research projects, it's important to consider the characteristics and principles of research design. Researchers can create a well-designed research project that produces accurate and trustworthy results by assuring clarity and specificity, flexibility,

feasibility, and ethical considerations.

Additionally, researchers can make sure that the research is carried out in a rigorous and systematic manner and that the data collected is accurate and reliable by understanding the key concepts related to research design, such as research methodology, data collection methods, data analysis techniques, sampling, and validity and reliability. [7]

6.4 The Process of Research Design:

The method of doing research is known as the research design process. To guarantee that the study is legitimate, trustworthy, and yields valuable data, the procedure is crucial.

Consider your aims and approaches: Establish the study's goals and research questions, as well as the theoretical underpinnings and methods.

Choose a type of Research Design: Based on the research questions and objectives, choose the best research design, such as experimental, correlational, survey, case study, or ethnographic.

Identify your population and sampling method: Select the sampling technique, such as random, stratified random sampling, or convenience sampling, after determining the target population and sample size.

Pick your data collection techniques: Choose the best instruments or tools for data collection and decide on the methodologies, such as surveys, interviews, observations, or experiments.

Plan your data collection procedures: Create a plan for data collecting that specifies the duration, location, and personnel needed while also taking ethical considerations into account. [8]

6.5 Importance of Research Design:

The significance of research design is found in the fact that it specifies what must be done and how it must be done in order to accomplish the study objectives. It provides the bare minimum of data needed to plan the study project. It expresses the outcomes and analytical input required to transform data into research findings for the research exercise.

The activities that would need to be carried out in order to accomplish the research objective are clearly identified by the research design. It gives the researcher a frame of reference and keeps the investigation from straying. The study design aids in giving the computation and interpretation process direction so that a solution and recommendations can be reached. [9]

6.6 Benefits of Research Design:

The advantages of having a well-thought-out research plan are numerous. Including:

A. Clarity of research objectives: The research design helps to comprehend the goals and outcomes of the study.

Increased validity and reliability: Research design helps to reduce the danger of bias and helps to regulate auxiliary variables in order to assure the validity and reliability of results.

Improved data collection: Data collection is improved because of research design, which helps to guarantee that the right data is gathered and that it is gathered systematically and consistently.

Better data analysis: The proper analysis of the data acquired, leading to insightful findings, is made possible by excellent research design.

B. Improved communication: A well-designed research helps ensure that the findings are accurate and influential among the research team and external stakeholders, which improves communication.

C. Effective use of resources: Research design helps to ensure that resources are used effectively by minimizing the risk of waste and maximizing the effectiveness of the research. [10]

6.7 Research Design in Qualitative Research:

In its simplest form, qualitative research design refers to how you, as a researcher, describe, organize, and carry out your study. The general strategy used by a researcher (or research team) to link theory and concepts with the formulation of research questions and the design of data collecting and analysis techniques for a particular study is known as research design.

The theories, concepts, objectives, settings, beliefs, and networks of interactions that influence a particular issue are integrated into a research design.

Additionally, it is changed by how participants' experiences, views, and research contexts are addressed. A strong qualitative research design clearly explains framing theory and essential dimensions, and methodologies are developed from theory in a way that takes into account past knowledge. This theoretical analysis of the study's fundamental ideas and structures prepares the ground for a meticulous, orderly procedure of data collection and analysis.

Figure 6.2: Process of Research Design

Your research topic serves as the foundation for the qualitative research design process. This may occasionally be determined by a situation, population, or phenomenon that you are interested in researching.

After choosing your area of study, you investigate the fields, ideas, settings, and concepts that will help you understand both what you want to learn more about and what is already known about it.

All facets of research design revolve around the guiding research questions, which are developed through organized procedures of learning, reflecting, and dialoguing with a variety of thinking partners.

Since the entire research design process is inductive, real-time learning can be reflected in the way data collecting and analysis procedures change over time. Modifications to data collection techniques may be made as part of this.

It can also imply that data analysis is used as a generative design tool that starts with formative analysis early on and informs subsequent data gathering and continues throughout a study, rather than just being summative or occurring at the end of data collection (as is typically the case).

A. Types of quantitative research designs: Quantitative designs can be split into four main types. Experimental and quasi-experimental designs allow you to test cause-and-effect relationships

Table 6.1: Descriptive and correlational designs allow you to measure variables and describe relationships between them.

Type of design	Purpose and characteristics
Experimental	• Used to test causal relationships • Involves manipulating an independent variable and measuring its effect on a dependent variable • Subjects are randomly assigned to groups • Usually conducted in a controlled environment (e.g., a lab)
Quasi-experimental	• Used to test causal relationships • Similar to experimental design, but without random assignment • Often involves comparing the outcomes of pre-existing groups • Often conducted in a natural environment (higher ecological validity)
Correlational	• Used to test whether (and how strongly) variables are related • Variables are measured without influencing them
Descriptive	• Used to describe characteristics, averages, trends, etc • Variables are measured without influencing them

B. Create a Research Design: The research design has the following components:

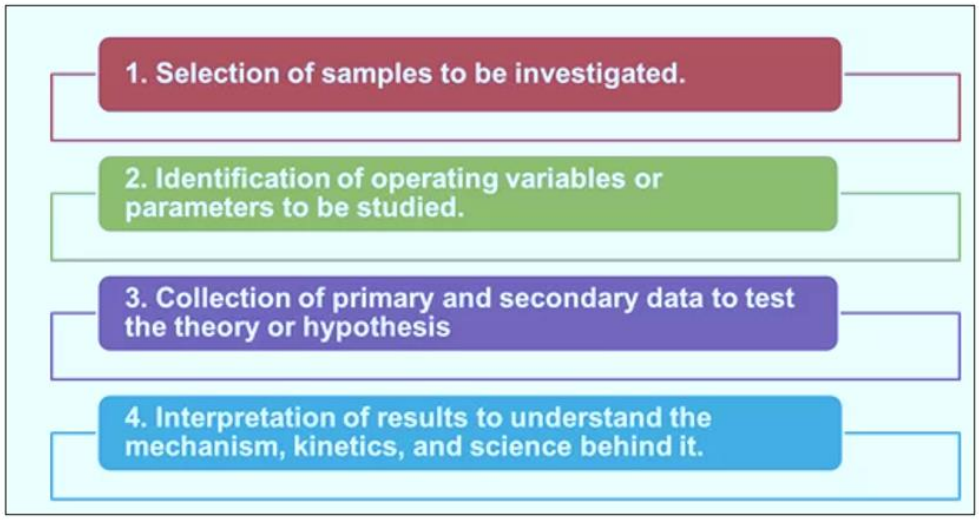


Figure 6.3: Research Design Components

- A researcher begins the study by framing the problem statement of the research work.
- Then, the researcher has to identify the sampling points, the number of samples, the sample size, and the location.
- The next step is to identify the operating variables or parameters of the study and detail how the variables are to be measured.
- The final step is the collection, interpretation, and dissemination of results.

C. Types of Research Design:

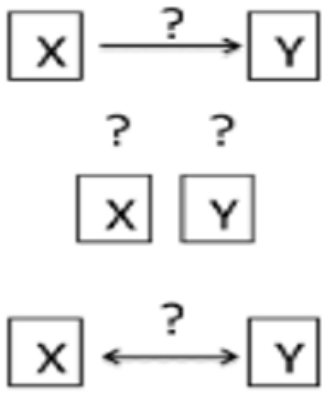
There are four main types of research designs: experimental, observational, quasi-experimental, and descriptive.

a. Experimental Design: Using experimental designs, causal linkages are tested. A researcher will modify one or more independent variables in an experiment and track the impact on a dependent variable.

b. Observational Design: Observational designs are used to study behavior without manipulating any variables. The researcher simply observes and records the behavior.

c. **Quasi-Experimental:** When the independent variable cannot be altered, quasi-experimental approaches are used. In addition to controlling for other variables, the researcher employs a naturally occurring independent variable.
d. **Descriptive Designs:** Designs that describe behavior or phenomena are known as descriptive designs. The researcher only watches the behavior and records it without changing any variables.

A study can be created in a variety of methods to test a theory. The sort of hypothesis (e.g., Does X cause Y?, How can I describe X and Y?, What is the link between X and Y?), the time and financial commitment required for the study, and the likelihood of recruiting participants all influence the research design that is adopted. Each of these factors was taken into account by the principal investigator (PI) when developing the study plan and research methodology.



There are many kinds of research, however, most of them fall into two categories: descriptive and experimental. [11]

6.8 Conclusion:

In conclusion, creating high-quality research projects requires careful consideration of study design. Questioner offers a flexible platform for planning and carrying out research projects thanks to its user-friendly interface, powerful data gathering and analysis capabilities, and

the capacity to incorporate results from many sources. You have all you need to get research findings from our comprehensive spectrum of research tools. A well-crafted research proposal always starts with a thorough comprehension of all the relevant data, identifying the objectives, creating a sound research question, and designing an acceptable study design for efficient study implementation. The hierarchy of evidence, the formulation of a research question and hypothesis, as well as the many research designs used, have all been introduced in this article. In order to ensure that the research is carried out in a rigorous and systematic manner and produces valid and reliable results, it is important to consider the features and concepts of research design, such as clarity and specificity, flexibility, feasibility, and ethical considerations, as well as research methodology, data collection methods, data analysis techniques, sampling, and validity and reliability.

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