

CHAPTER 2

Types of Research

Contents

1. Classification of Research

2. Basic and Applied Research

3. Descriptive, Explanatory and Exploratory Research

4. Qualitative and Quantitative Research

5. Other Classifications of Research

1. Classification of Research

- Research can be classified in terms of :-
 - Goal of research
 - Specific objectives of research
 - Approaches of research
 - Design of research
 - The types of data used in research
 - Fields of study
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2. Basic and Applied Research

- Generally the goal of research is problem solving
- The nature of the problem the research attempts to solve could be practical or theoretical
- The two classifications of research based on the goal of the research:-
 - basic research (example, pure mathematics)
 - applied research (example, applied mathematics)
- Pure mathematics is concerned with understanding underlying abstract principles and describing them with elegant theories
- Applied mathematics uses equations to explain real life phenomenon such as mechanics, ecology and gravity

2.1. Basic Research

- It is also called fundamental or pure research
- The primary objective is the advancement of knowledge and the theoretical understanding of the relations among variables
- It is designed to add to an organized body of scientific knowledge and does not necessarily produce results of immediate practical value
- It may take the following forms:-
 - a) Discovery
 - b) Invention
 - c) Reflection
- The driving force in basic research is a researcher's curiosity or interest in scientific questions (to expand human knowledge not to create or invent something that has practical significance)

2.2. Applied Research

- designed to solve practical problems of the modern world rather than to acquire knowledge (to improve the human condition)
- conducted to solve immediate practical problems and the goal of adding to the scientific knowledge is secondary
- The purpose is about testing theories, often generated by pure science and applying them to real situations
- The primary purpose for applied research is discovering, interpreting and the development of methods and systems for solving practical problems on a wide variety of real life situation of our world and the universe

3. Descriptive, Explanatory, and Exploratory Research

3.1. Descriptive Research

- Is set out to describe and interpret what is.
- The goal is to describe some aspects of phenomenon and help to understand a topic and lead to casual analysis
- The common research methods involved in this category are:-
 - Surveys
 - Correlation studies
 - Observation studies
 - Case studies

3.2. Exploratory Research

- Is conducted when there are few or no earlier studies to which references can be made for information.
- It provides insights into and comprehension of an issue or situation for more rigorous investigation later
- Is conducted because a problem has not been clearly defined (when new project is started)
- Exploratory research relies on:-
 - Secondary research (literature reviews, etc)
 - Qualitative approach (informal discussions, focus group discussions, pilot studies, case studies)
- The results are not usually helpful for decision making

3.3. Explanatory Research

- The purpose is to explain and desire to know “why”
- The continuation of descriptive research and builds on exploratory and descriptive research
- The explanatory or analytical research aims to understand phenomena by discovering and measuring casual relations among them
- The two types are:-
 - Experimental research
 - Ex-post facto research (after the fact)

4. Qualitative and Quantitative Research

4.1. Qualitative Research

- Involves studies that do not attempt to quantify their results through statistical summary or analysis
- It seeks to describe various aspects about behavior and other factors studied in the social sciences and humanities
- Data are in the form of descriptions (not numbers)
- The goal is to look for meaning
- It involves such as
 - In-depth interviews
 - Group discussions
 - Artifact studies
 - Observations without formal measurements.....
- It is much more time consuming but provides more richness to the data

4.1. Quantitative Research

- Is the systematic and scientific investigation of quantitative properties and phenomena and their relationships
- The purpose is to develop and employ mathematical models, theories, and hypotheses pertaining to natural phenomena
- The process of measurement is central to quantitative research because it provides the fundamental connection between empirical observation and mathematical expressions
- It uses methods mainly such as:-
 - Surveys
 - Experiments
- The approach concentrates on measuring or counting or statistical tests

Characteristics of Qualitative and Quantitative Research

Qualitative Research

- UNDERSTANDING (the aim is to complete and detailed description)
- Meaning for individuals
- Understanding of phenomena from individual perspective
- Coding (data is in the form of words, pictures or objects)

Quantitative Research

- EXPLANATIONAL (predicting, generalizing to other study)
- Objective
- Generalizable
- Numbers (Data is in the form of numbers and statistics)

5. Other Classifications of Research

5.1. Classification of research based on Design

- Experimental research,
- Quasi-experimental research
- Non-experimental research

5.2 Classification of research based on Type of Data

- Primary research (field research)
- Secondary research (desk research)

5.3. Classification of research by Field of Study

- Natural science research,
- Social science research,
- Educational research
- etc

Assignment-2

1. How do you choose a particular type of research?
2. Is applied research different from action research?
3. Assume that a researcher plans to develop a high strength material for power transmission gears that are used for vehicles gearbox. Considering on the different classifications of research, outline the most useful research approaches that serve the purpose?

