Scientific Research Methodologies

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Course Information

- Course Name: Scientific Research Methodologies
- Lecturer: Dr. Marwa Hussien
- Textbook:
  1. **Fundamentals of research methodology and data collection**
     https://www.researchgate.net/publication/303381524_Fundamentals_of_research_methodology_and_data_collection
  2. **Fundamentals of Research Methodology - Problems and Prospects**
     https://www.researchgate.net/profile/Jayanta-Nayak-2/publication/309732183_Fundamentals_of_Research_Methodology_Problems_and_Prospects/links/582056a208aeccc08af641dc/Fundamentals-of-Research-Methodology-Problems-and-Prospects.pdf
  3. **RESEARCH METHODOLOGY: TOOLS AND TECHNIQUES**
     https://www.euacademic.org/BookUpload/9.pdf

RESEARCH METHODOLOGY

Lecture 1

Outline

1. What is Research?
2. Methodology and Research Methodology
3. Why we Need Research?
4. Qualities of Good Research
5. Advantages of Research Methodology
6. Characteristics of Research
7. Types of Research

What is Research

- Research is the search for knowledge through objective and systematic method of finding solution to a problem.
- Research is the systematic method consisting of *defining the problem*, *formulating a hypothesis*, *collecting the facts or data*, *analyzing the facts* and *reaching certain conclusions* either in the form of solutions(s) towards the concerned problem or in certain generalizations for some theoretical formulation.
- Research is a process for *collecting*, *analyzing* and *interpreting information to answer questions*.

Methodology

- Methodology is the systematic, theoretical analysis of the methods applied to a field of study.
- It comprises the theoretical analysis of the body of methods and principles associated with a branch of knowledge.
- Typically, it encompasses concepts such as paradigm, theoretical model, phases and quantitative or qualitative techniques.
- A methodology does not set out to provide solutions - it is, therefore, not the same thing as a method.
- Instead, it offers the theoretical underpinning for understanding which method, set of methods which can be applied to specific case, for example, to calculate a specific result.

Research Methodology

- This is a set of systematic technique used in research.
- This simply means a guide to research and how it is conducted.
- It describes analysis methods, throws more light on their limitations and resources, clarify their assumptions and consequences, relating their potentialities to discover knowledge.

Methodology and Methods

Methodology	Method
• General research strategy that outlines the way in which a research project is to be undertaken and identifies the methods to be used in it. • It does not define specific methods, even though much attention is given to the nature and kinds of processes to be followed in a particular procedure or to attain an objective.	• Used in the methodology, they define the means or modes of data collection or how a specific result is to be calculated. • Any description of a means of calculation of a specific result is always a description of a method, and never a description of a methodology.

Example

- A research method is a process or tool that a researcher uses to conduct research.
  - For example, if you manage a research project, you may decide to use the *questionnaire method* to gather information from the target audience.
- A research methodology refers to the overall strategy or plan that establishes how researchers organize a research process.
  - For example, if you desire to gather accurate and detailed information from the target audience, you can use the *qualitative methodology*.

Why we Need Research?

- To acquire a degree.
- To face a challenge.
- To solve a problem.
- To Serve Society by increasing Standard of living for Science and technology.

Qualities of Good Research

- A good research method should lead to:
  - Originality/ Novelty
  - Contribution to knowledge
  - Significance iv Technical soundness
  - Critical assessment of existing work

Advantages of Research Methodology

1. Provision of tools for carrying out the research
2. Develops a critical and scientific attitude, disciplined thinking to observations
3. Enrichment of the research process and provision of chance for in-depth study and understanding of the subject
4. Helps to improve the ability to evaluate and use research results with reasonable confidence and in decision making
5. Inculcates the ability to learn to read and think critically.

Characteristics of Research

1. Research is directed toward the solution of a problem.
2. Research requires expertise.
3. Research emphasizes the development of generalizations, principles, or theories that will be helpful in predicting future occurrences.
4. Research is based upon observable experience or empirical evidences.
5. Research demands accurate observation and description.

Characteristics of Research

6. Research involves gathering new data from primary or first-hand sources or using existing data for a new purpose.
7. Research is characterized by carefully designed procedures that apply rigorous analysis.
8. Research involves the quest for answers to un-solved problems.
9. Research is characterized by patient and unhurried activity.
10. Research is carefully recorded and collected.

Types of Research

There are varieties of ways through which we may classify it into different categories:

A. On the basis of nature of information:

- *Qualitative Research*: When information is in the form of qualitative data.
- *Quantitative Research*: When information is in the form of quantitative data.

Types of Research

B. On the basis of utility of content or nature of subject matter of research:

- *Basic/ Fundamental /pure or Theoretical Research:* Its utility is universal.
- *Experimental or Applied Research:* Its utility is limited.

Types of Research

C. On the basis of approach of research:

- *Longitudinal Research:* follow the same sample of people over time. Examples of this category are historical, Case study and Genetic research.
- *Cross-Sectional Research:* studies interview a fresh sample of people each time they are carried out. Examples of this category are Experimental and Survey Research.

Types of Research

D. On the basis of research method:

- *Philosophical Research*: It is purely qualitative in nature and we are focusing on the vision of others on the content of research.
- *Historical Research:* It is qualitative as well as quantitative in nature and deals with past events.
- *Survey Research:* It deals with present events and is quantitative in nature. It may further be sub-divided into; correlational and exploratory type of research.
- *Experimental Research*: This is purely quantitative in nature and deals with future events.
- *Case-Study Research*: It deals with unusual events. It may be qualitative as well as quantitative in nature depending upon the content.