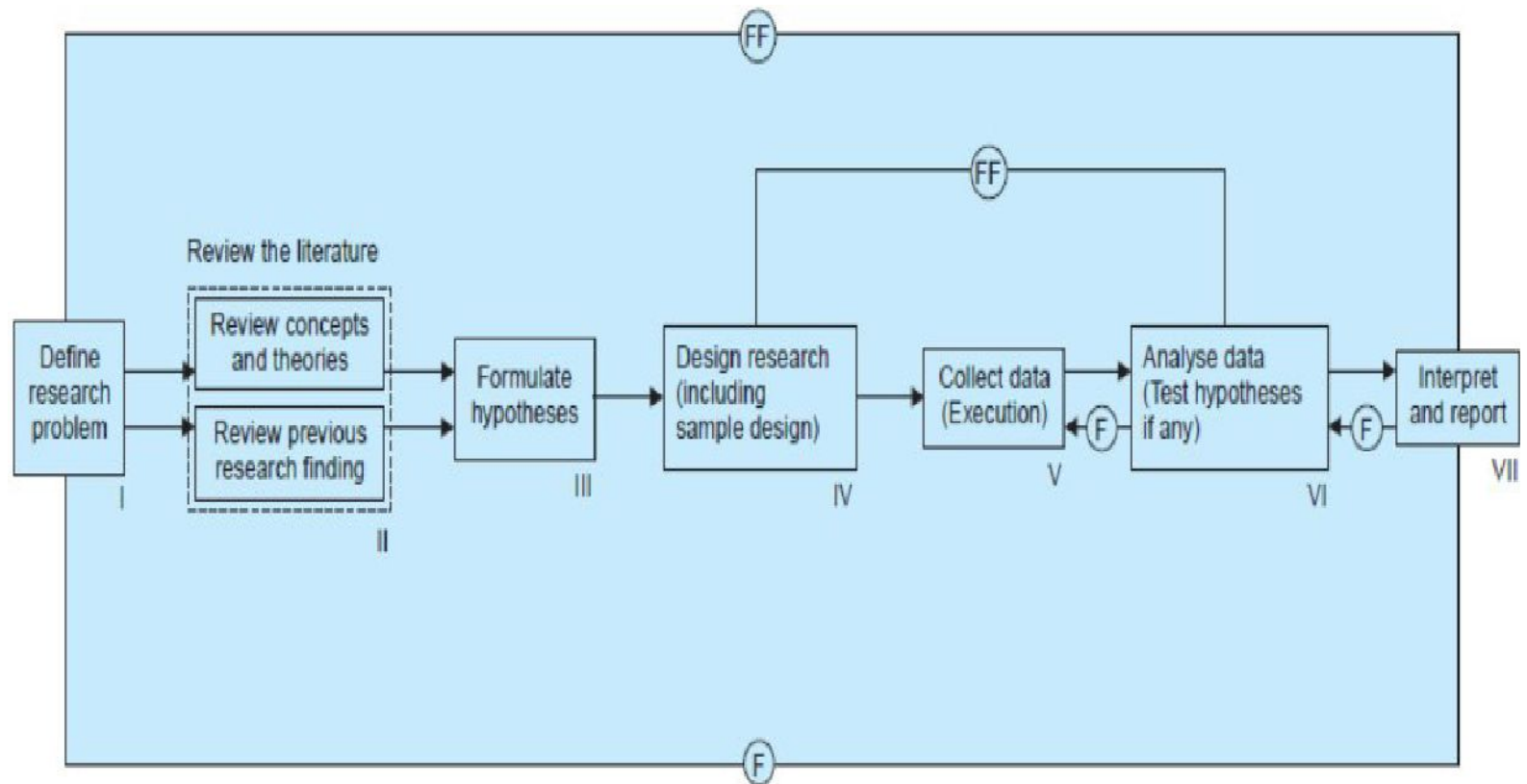


# RESEARCH METHODOLOGY\*

# Objectives

- The purpose of research is to **discover answers to questions** through the application of scientific procedures.
- The main aim of research is to **find out the truth** which is hidden and which has not been discovered as yet.



Where (F) = feed back (Helps in controlling the sub-system to which it is transmitted)  
(FF) = feed forward (Serves the vital function of providing criteria for evaluation)

# Steps

- Identifying the Research Question
- Literature Review
- Formulating Hypotheses or Objectives
- Designing the Study
- Data Collection
- Data Analysis
- Interpretation of Results
- Drawing Conclusions
- Communicating the Findings

# Research?

- A careful investigation for new facts in any branch of knowledge
- **Redman and Mory:** Research is a systematic effort to gain new knowledge

# Research?

- **Clifford Woody: Research-**
- **defining and redefining problems, formulating hypothesis/objectives;**
- **collecting, organizing and evaluating data;**
- **making deductions and reaching conclusions;**
- **testing the conclusions to determine whether they fit the formulating hypothesis/objectives**

# Why do research?

- ❑ **Desire to get a research degree along with its consequential benefits**
- ❑ **Desire to face the challenge in solving the unsolved problems**
- ❑ **Desire to get intellectual joy of doing some creative work**
- ❑ **Desire to be of service to society**
- ❑ **Desire to get respectability**
- ❑ **Directives of government, employment conditions etc.**

# Why do research?...

- **Validate intuition**
- **Improve methods**
- **Demands of the Job**
- **For publication/patent**



# Choose a subject

- ▣ **Based on an idea**
- ▣ **Based on your experience**
- ▣ **Based on your reading**
- ▣ **Originality**

# The important features of a research design

- **A plan**

Specify the sources & types of information relevant to the research problem

- **A strategy**

Which approach will be used for gathering and analyzing the data

- **The time and budgets**

Most studies are done under these two constraints

# CHARACTERISTICS OF RESEARCH

- **Systematic-** All steps must be inter related- one to another
- **Logical-** Agreeing with the principles of logic
- **Empirical-**Conclusions should be based on evidences/observations

# CHARACTERISTICS OF RESEARCH...

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\*

- **Objectivity-** It must answer the research questions
- **Replicable-** reproducible
- **Transmittable**
- **Quality control-** Accurate measurements
- **All well designed and conducted research has potential application**

# Define Your objectives

- Try to keep these simple
- The more variables the more difficult
- Use the opportunity
- Get help at this stage
  - Senior colleagues
  - Experienced researchers

# Literature search

- **Check to see if your idea is original**
- **Get articles**
- **Read articles and their references**
- **Most of these will be vital when writing up reports**
- **Find gap areas**
- **Find obsolete measurements and results**
- **Define objectives of the study**

# Steps involved in a research

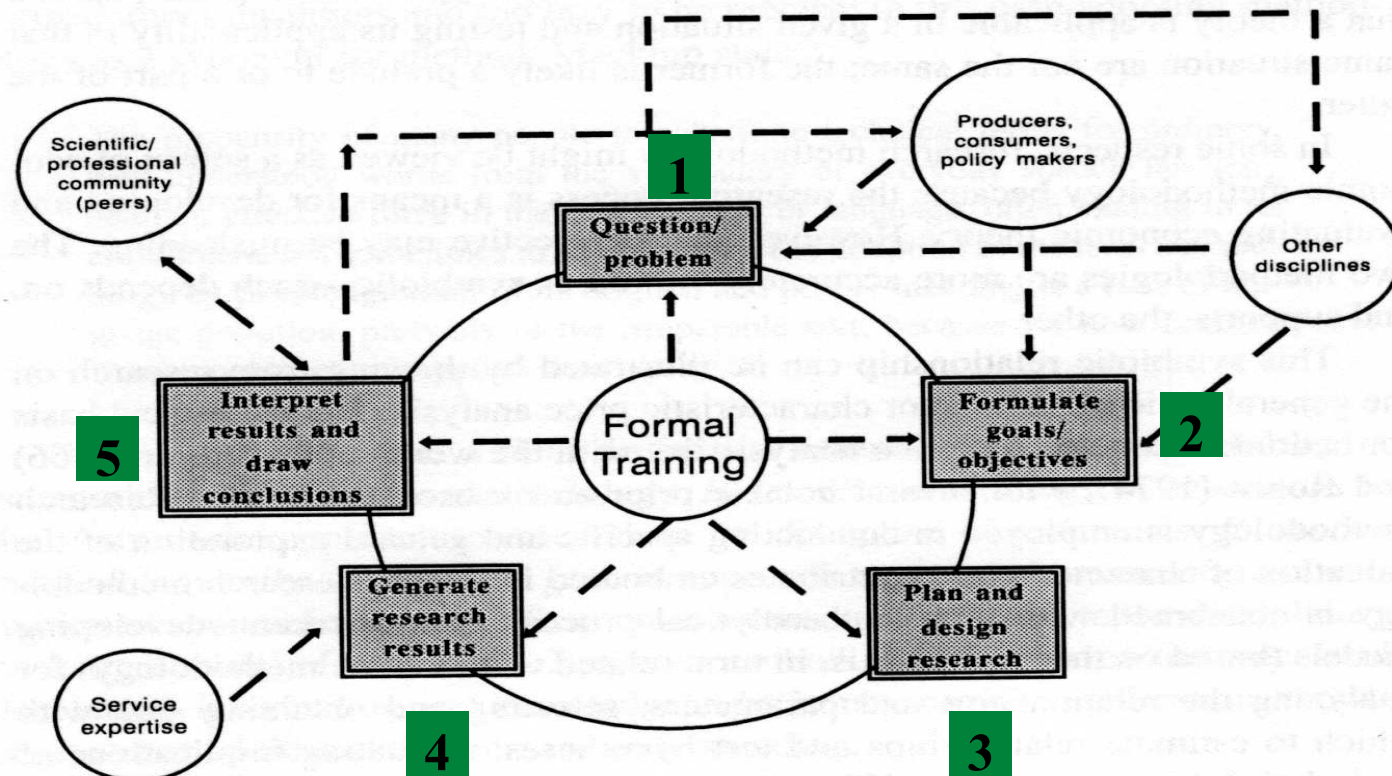
- ❑ **Choose a subject**
- ❑ **Literature survey**
- ❑ **Defining and formulation of specific objectives**
- ❑ **Prepare Synopsis**
- ❑ **Procuring of suitable apparatus/materials**
- ❑ **Design of experimental set up**
- ❑ **Preliminary experiments**
- ❑ **Execution of the project**
- ❑ **Accurate measurements/data collection**

# Steps involved in a research...

- ❑ **Data analysis and error compounding**
- ❑ **Hypothesis testing and verification**
- ❑ **Results and discussion**
- ❑ **Generalization, interpretation and drawing conclusions**
- ❑ **Preparation of the project report or writing thesis**



# The Process of Research



**Figure 2.2.** Schematic of research process.

# Research article writing

- ❑ Find suitable/specified journals
- ❑ Get copy of Instructions to authors
- ❑ Prepare article as per instructions
- ❑ Select suitable titles
- ❑ Authors and affiliations
- ❑ Abstract
- ❑ Highlights
- ❑ Novelty statements
- ❑ Introduction
- ❑ Materials and methods
- ❑ Results and discussion
- ❑ Conclusions
- ❑ Acknowledgements
- ❑ References

# Authorship/ethics

- **All authors should directly involved in entire study**
- **Article is free from plagiarism**
- **Should follow ethics**

# A Research Report

*A Research Report generally include:*

- Introduction and Statement of problem
- Review of relevant literature
- Statement of hypothesis or research objectives
- Theoretical resume
- Description of research design
- Description Experimental design
- Description of measurement and data analysis
- Error compounding
- Presentation of Results
- Discussion
- Conclusion, limitations, and implications
- Suggestions for future work
- Acknowledgements
- References cited
- Appendices

# Research Studies

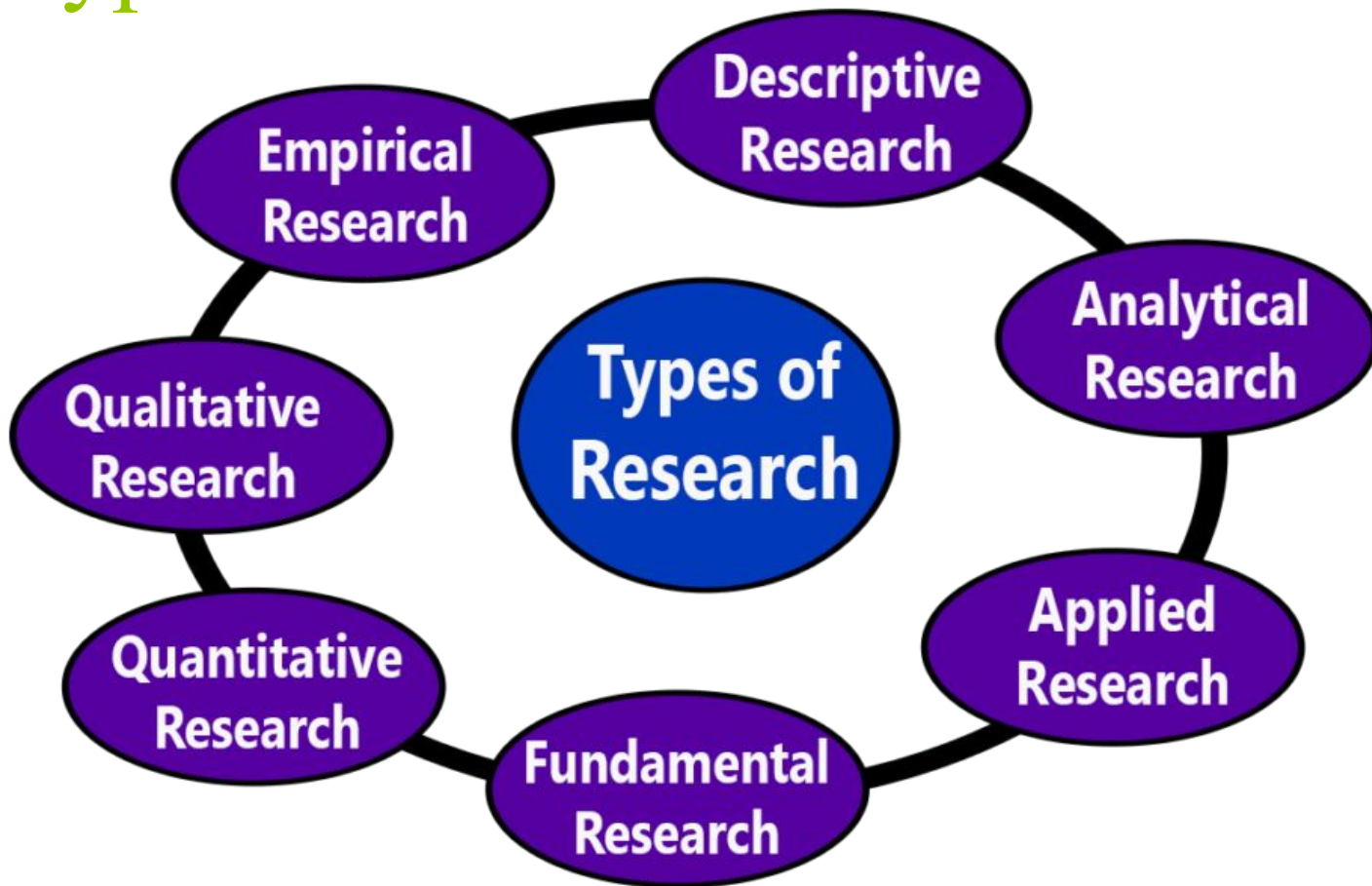
□ Based on research objectives:

- ❖ *Exploratory or formulative research*- To gain familiarity with a phenomenon or to achieve new insights into it
- ❖ *descriptive research*- To study accurately the characteristics of a particular individual, situation or a group-includes survey

# Research Studies

- ❖ *Diagnostic research-* To determine the frequency with which something occurs or with which it is associated with something else
- ❖ *hypothesis-testing research-* To test a hypothesis of a causal relationship between variables

# Types of research



## *Descriptive research*

- *Descriptive research* includes **surveys and fact-finding enquiries of different kinds.**
- *Ex post facto research* for descriptive research studies.
- The main characteristic of this method is that the researcher has no control over the variables; he can only report what has happened or what is happening.
- Most *ex post facto research* projects are used for descriptive studies in which the researcher seeks to measure such items as, **for example, frequency of shopping, preferences of people, or similar data.**
- *Ex post facto studies* - comparative and correlational methods.



## *Analytical research*

- The researcher has to use **facts or information already available**, and analyze these to make a critical evaluation of the material.

## *Applied vs. Fundamental*

- Research can either be applied (or action) research or fundamental (to basic or pure) research.
- ***Applied research*** aims at finding a solution for an **immediate problem facing a society or an industrial/business organisation**, whereas ***fundamental research*** is mainly concerned with generalisations and with the **formulation of a theory**.
- Research to identify social, economic or political trends that may affect a particular institution or the copy research (research to find out whether certain communications will be read and understood) or the marketing research or evaluation research are examples of applied research.

- central aim of **applied research** is to discover a solution for some pressing **practical problem**, whereas **basic research** is directed towards finding information that has a broad **base of applications**

## *Quantitative vs. Qualitative*

- **Quantitative research** is based on the **measurement of quantity or amount**.
- It is applicable to phenomena that can be expressed in terms of quantity.
- **Qualitative research** is specially important in the behavioural sciences where the aim is to discover the underlying motives of **human behaviour**.
- Through such research we can analyse the various factors which motivate people to behave in a particular manner or which make people like or dislike a particular thing.

## *Conceptual vs. Empirical*

- **Conceptual research** is that related to some **abstract idea(s) or theory**. It is generally used by **philosophers** and thinkers to develop new concepts or to reinterpret existing ones.
- **Empirical research** relies on **experience or observation** alone, often without due regard for system and theory.
- It is **data-based research**, coming up with conclusions which are capable of being verified by observation or experiment.
- **Evidence gathered through experiments** or empirical studies is today considered to be the most powerful support possible for a given hypothesis.

## Criteria of Good Research

- *Good research is systematic*
- *Good research is logical*
- *Good research is empirical*
- *Good research is replicable*

# Research methods and Research methodology

- ▣ *Research methods* may be understood as all those **methods/techniques** that are used for conduction of research.
- ▣ *Research methodology* is a way to **systematically solve the research problem**. It may be understood as a science of studying how research is done scientifically.

**“Science is not belief,  
but the will to find out.”**

**Thank you**