

# **Research Methodology**

MSc Program – Architecture  
First Semester

## **Types of Research**

Lecture No. 2

*Asst. Prof. Dr. Faris Ali Mustafa*

# TYPES OF RESEARCH

Research is broadly classified into two main classes:

- 1. Fundamental or basic research (Pure research)**
- 2. Applied research**

# 1. Basic Research

- Basic research is an investigation on basic principles and reasons for occurrence of a particular event or process or phenomenon.
- It is also called theoretical research.
- Study or investigation of some natural phenomenon or relating to pure science are termed as basic research.
- Basic researches some times may not lead to immediate use or application.

# 1. Basic Research

- It is not concerned with solving any practical problems of immediate interest.
- But it is original or basic in character.
- It provides a systematic and deep insight into a problem and facilitates extraction of scientific and logical explanation and conclusion on it.
- It helps build new frontiers of knowledge.

**The outcomes of basic research form the basis for many applied research.**

**Researchers working on applied research have to make use of the outcomes of basic research and explore the utility of them.**

# 1. Basic Research

- ❑ Research on improving a theory or a method is also referred as fundamental research.
- ❑ For example, suppose a theory is applicable to a system provided the system satisfies certain specific conditions.
- ❑ Modifying the theory to apply it to a general situation is a basic research.
- ❑ Attempts to find answers to the following questions actually form basic research:
  - Why are materials like that?
  - What are they?
  - How does a crystal melt?
  - Why is sound produced when water is heated?
  - Why do we feel difficult when walking on seashore?
  - Why are birds arrange them in '>' shape when flying in a group?

# 1. Basic Research

Fundamental research leads to a new theory or a new property of matter or even the existence of a new matter, the knowledge of which has not been known or reported earlier. For example, fundamental research on:

- (1) astronomy may lead to identification of new planets or stars in our galaxy,
- (2) elementary particles results in identification of new particles,
- (3) complex functions may lead to new patterns or new properties associated with them,
- (4) differential equations results in new types of solutions or new properties of solutions not known so far,
- (5) chemical reactions lead to development of new compounds, new properties of chemicals, mechanism of chemicals reactions, etc.,
- (6) medicinal chemistry leads to an understanding of physiological action of various chemicals and drugs,
- (7) structure, contents and functioning of various parts of human body helps us identify the basis for certain diseases.

## 2. Applied Research

- ✓ In an applied research one **solves certain problems employing well known and accepted theories and principles.**
- ✓ Most of the experimental research, case studies and interdisciplinary research are essentially applied research.
- ✓ Applied research is helpful for basic research.

## 2. Applied Research

- ✓ A research, the outcome of which **has immediate application** is also termed as applied research.
- ✓ Such a research is of practical use to current activity. For example, research on social problems have immediate use.

**Applied research is concerned with actual life: research such as research on increasing efficiency of a machine, increasing gain factor of production of a material, pollution control, preparing vaccination for a disease, etc. Obviously, they have immediate potential applications.**



# Differences between Basic and Applied Research

Some of the differences between basic and applied research are summarized in table 1. Thus, the central aim of **applied research** is to find a solution for a practical problem which demands solution for immediate use,

While **basic research** is directed towards finding information that has a broad base of applications and thus adding new information to the already existing scientific knowledge.

**Table 1: Differences between basic and applied researches.**

<b>Basic research</b>	<b>Applied research</b>
Seeks generalization	Studies individual or specific cases without the objective to generalize
Aims at basic processes	Aims at any variable which makes the desired difference
Attempts to explain why things happen	Tries to say how things can be changed
Tries to get all the facts	Tries to correct the facts which are problematic
Reports in technical language of the topic	Reports in common language

## Normal and Revolutionary Researches

Basic and applied researches are generally of two kinds: **normal research** and **revolutionary research**.

- ❑ In any particular field, normal research is performed in accordance with a set of rules, concepts and procedures called a paradigm (example, model), which is well accepted by the scientists working in that field.
- ❑ **Normal research** is something like puzzle-solving: interesting, even beautiful, solutions are found but the rules are remain same.

## Normal and Revolutionary Researches

- ❑ In normal research sometimes unexpected novel results and discoveries are realized which are inconsistent with the existing paradigm.
- ❑ A state of tension followed between scientists, and escalated until the arrival of the scientific revolution.
- ❑ This is marked by a **paradigm shift** and a **new paradigm** emerges according to which normal scientific activity can be resumed (restarted).

# Quantitative and Qualitative Research

The basic and applied researches can be quantitative or qualitative or even both.

## a. Quantitative Research

Is based on the measurement of quantity or amount. Here a process is expressed or described in terms of one or more quantities. The result of this research is essentially a number or a set of numbers.

## a. Quantitative research

Some of the characteristics of quantitative research/method are:

- It is numerical, non-descriptive, applies statistics or mathematics and uses numbers.
- It is an iterative process whereby evidence is evaluated.
- The results are often presented in tables and graphs.
- It is conclusive.
- It investigates the **what** , **where** and **when** of decision making.

## a. Quantitative Research

- Statistics is the most widely used branch of mathematics in quantitative research.
- It finds applications not only in physical sciences but also in economics, social sciences and biology.
- Quantitative research using statistical methods often begins with the collection of data based on a theory or hypothesis or experiment followed by the application of descriptive or inferential statistical methods.

## a. Quantitative Research

Is based on the measurement of quantity or amount. It is applicable to phenomena that can be expressed in terms of quantity.

- The emphasis of **Quantitative** research is on collecting and analyzing numerical data; it concentrates on **measuring** the **scale**, **range**, **frequency** etc. of phenomena.
- This type of research, although harder to design initially, is usually highly detailed and structured and results can be easily collated and presented statistically.



## b. Qualitative Research

Qualitative research is concerned with qualitative phenomenon involving quality. Some of the characteristics of qualitative research/method are:

- ❖ It is non-numerical, descriptive, applies reasoning and uses words.
- ❖ Its aim is to get the meaning, feeling and describe the situation.
- ❖ Qualitative data cannot be graphed.
- ❖ It is exploratory.
- ❖ It investigates the *why* and *how* of decision making.

## b. Qualitative Research

- We measure and weigh things in the study of material or structure...Can we measure or weigh patterns? We cannot measure or weigh patterns.
- But to study patterns we must map a configuration of relationships. That is, structures involve quantities whereas patterns involve qualities.

## b. Qualitative Research

- ✓ If one wishes to investigate why certain data are random then it is a qualitative research.
- ✓ If the aim is to study how random the data is, what is the mean, variance and distribution function then it becomes quantitative.
- ✓ Explaining how digestion of food takes place in our body is a qualitative description. It does not involve any numbers or data and quantities.

## b. Qualitative Research

- The detection of a particular compound is a qualitative analysis. This can be done by carrying out physical or chemical tests.
- Determination of exact amount of a particular compound present in a volume is essentially quantitative analysis.
- This can be done by volumetric, gravimetric and colorimetric methods or instrumental methods. Experimental and simulation studies are generally quantitative research.
- In fact, qualitative methods can be used to understand the meaning of the numbers obtained by quantitative methods.

## **Objectives:**

From the viewpoint of objectives, a research can be classified as follows:

- Descriptive**
- Correlational**
- Explanatory**
- Exploratory**

## Descriptive Research

Attempts to systematically describe a situation, problem, phenomenon, service or program, or to provide information about, for example, the living situation of a community, or to describe attitudes towards an issue.

# Correlational Research

Attempts to discover or establish the existence of a relationship/ interdependence between two or more aspects of a situation.

# Explanatory Research

- Attempts to clarify why and how there is a relationship between two or more aspects of a situation or phenomenon.
- Searching explanations for events and phenomena, for example finding answer to the question why are the things like, what they are?



# Exploratory Research

- ❑ Is undertaken to explore an area where little is known or research study (to investigate the possibilities of undertaking a particular *feasibility study/ pilot study*).
- ❑ The objective of exploratory research is the development of hypotheses rather than their testing,
- ❑ **In practice most studies are a combination of the first three categories: Descriptive, Correlational and Explanatory research.**

A **pilot study**, **pilot** project, **pilot** test, or **pilot** experiment is a small scale preliminary **study** conducted in order to evaluate feasibility, duration, cost, opposite events, and improve upon the **study** design prior to performance of a full-scale **research** project.

## Inquiry Mode:

From the process adopted to find answer to research questions – the two approaches are:

- ***Structured approach***
- ***Unstructured approach***

## ***Structured approach:***

The structured approach to inquiry is usually classified as ***quantitative research***.

Here everything that forms the research process, objectives, design, sample, and the questions that you plan to ask the respondents is predetermined (programmed, prearranged...).

- ❑ It is more appropriate to determine the extent of a problem, issue or phenomenon by quantifying the variation.
- ❑ e.g. how many people have a particular problem? How many people hold a particular attitude?

## *Unstructured approach:*

The unstructured approach to inquiry is usually classified as ***qualitative research***. This approach allows flexibility in all aspects of the research process.

- ❑ It is more appropriate to explore the ***nature of a problem, issue or phenomenon without quantifying it.***
- ❑ Main objective is to describe the ***variation in a phenomenon, situation or attitude.***
- ❑ e.g. description of an observed situation, the historical enumeration of events, an account of different opinions that different people have about an issue, description of working condition in a particular industry.

*Both approaches (**Structured & Unstructured**) have their place in research. Both have their strengths and weaknesses.*

In many studies you have to combine both **qualitative** and **quantitative** approaches.

For example, suppose you have to find the types of food / accommodation available in a city and the extent of their popularity.

Food types are the qualitative aspect of the study as learning them needs describing the culture and cuisine.

The extent of their popularity is the quantitative aspect as it involves estimating the number of people who visit restaurant serving such cuisine and calculating the other indicators that reflect the extent of popularity.

Basically types of research are as follows:

### ***Descriptive vs. Analytical Research***

#### ***Descriptive research***

includes surveys and fact-finding enquiries of different kinds. The major purpose of descriptive research is **description of the state of affairs** as it exists at present.

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.**

## *Descriptive research*

- In descriptive studies the researcher seeks to measure such items as, for example, frequency of shopping, preferences of people, or similar data.
- The methods of research utilized in descriptive research are survey methods of all kinds, including comparative and correlational methods.
- ***In analytical research***, on the other hand, the researcher has to use facts or information **already available**, and analyze these to make a critical evaluation of the material.

# ***Conceptual vs. Empirical Research***

## ***Conceptual research***

It is 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. We can also call it as experimental type of research.

- In such research, it is necessary to obtain facts directly, from their source, and to actively do certain things to stimulate production of the required information.
- In such research, the researcher must first provide himself with a working **hypothesis** or guess as to the probable results. He then works to get enough **facts (data)** to prove or disprove his hypothesis.
- Then he creates experimental designs that he believes will manipulate / control the people or materials involved in order to present the required information.

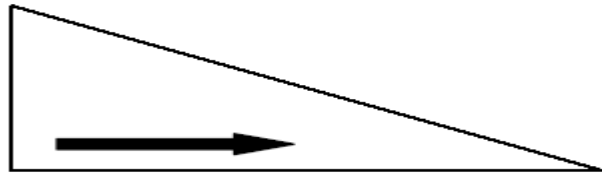
## *Empirical research*

- Such research is thus characterized by the experimenter's control over the variables under study and his deliberate manipulation of one of them to study its effects.
- Empirical research is appropriate when proof/evidence is required that certain variables affect other variables in some way.
- Evidence gathered through experiments or empirical studies is today considered to be the most powerful support possible for a given hypothesis.

# DEDUCTIVE/INDUCTIVE RESEARCH

## Deductive

General ideas

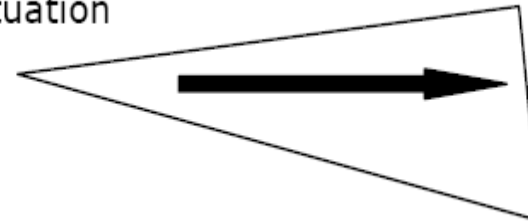


Particular Situation

**Deductive research** moves from general ideas/theories to specific and particular situations: the particular is deduced from the general, e.g. broad theories.

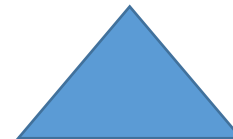
## Inductive

Particular Situation



General ideas

**Inductive research** moves from particular situations to make or deduce broad general ideas/theories.



## Examples of Deductive / Inductive Research in Action

Imagine you wanted to learn what the word **‘professional’** meant to a range of people.

### Deductive Approach

- It is clear that you would want to have a clear theoretical position prior to collection of data.
- You might therefore research the subject and discover a number of definitions of ‘professional’ from, for example, a number of professional associations.
- You could then test this definition on a range of people, using a questionnaire, structured interviews or group discussion.
- You could carefully select a sample of people on the basis of age, gender, occupation etc.

# Deductive Approach

- ❖ The data gathered could then be collated/compared and the results analysed and presented.
- ❖ This approach offers researchers a relatively easy and systematic way of testing established ideas on a range of people.

# Inductive Approach

If you adopted this approach

- You might start by talking to a range of people asking for their ideas and definitions of 'professional'. From these discussions you could start to assemble/collect the common elements and
- Then start to compare these with definitions gained from professional associations.
- The data gathered could then be collated/compared and the results analysed and presented.
- This approach might lead you to arrive at a new definition of the word – or it might not! This approach can be very time-consuming, but the reward might be in terms of arriving at a fresh way of looking at the subject.

## Types of Research (generally)

- |                                      |                                   |
|--------------------------------------|-----------------------------------|
| 1. Historical                        | Qualitative                       |
| 2. Comparative                       | Qualitative                       |
| 3. Descriptive                       | Qualitative-Quantitative          |
| 4. Correlation                       | Quantitative                      |
| 5. Experimental                      | Quantitative                      |
| 6. Evaluation                        | Qualitative                       |
| 7. Action                            | Qualitative                       |
| <b>8. Ethno-genic</b>                | <b>various - not quantitative</b> |
| <b>9. Feminist/Identity Politics</b> | <b>various - not quantitative</b> |
| <b>10. Cultural</b>                  | <b>various - not quantitative</b> |

Generally, interpretive methodologies include Postmodernism, Post Structuralism, Critical Theory, Discourse Analysis, Critical Linguistics, Semiotics (the study of signs and symbols and their use or interpretation).

# How do I Know which **research methodology** to choose?

- Ask your supervisor/s or others who have worked directly in the application domain that you are interested in it.
- Look at significant papers in your field and attempt to determine what methodology they are using.



# Can I mix research methodologies?

- In principle you do not need this. Within each methodology there are several schools, so it is likely that you may only need to become familiar with the range of methodology techniques and concepts within your current methodology.
- The term “mixed methods” refers to an emerging methodology of research that promotes the systematic integration, or “mixing,” of quantitative and qualitative data within a single investigation or continuous program of inquiry. The basic principle of this methodology is that such integration permits a more complete and cooperative utilization of data than do separate quantitative and qualitative data collection and analysis.

# Can I mix research methodologies?

- However, having said that if you can demonstrate that you need to do multi-methodology research and establish the condition for doing it then that will likely form a significant part of the originality for thesis.

# RESEARCH METHODS AND RESEARCH METHODOLOGY

Is there any difference between research methods and research methodology?

## Research methods

- ❑ Are the various procedures, schemes and algorithms used in research.
- ❑ All the methods used by a researcher during a research study are termed as research methods.
- ❑ They are basically planned, scientific and value-neutral.
- ❑ They include theoretical procedures, experimental studies, numerical schemes, statistical approaches, etc.
- ❑ Research methods help us collect samples, data and find a solution to a problem.
- ❑ Particularly, scientific research methods call for explanations based on collected facts, measurements and observations and not on reasoning alone.
- ❑ They accept only those explanations which can be verified by experiments.

# RESEARCH METHODS AND RESEARCH METHODOLOGY

Is there any difference between research methods and research methodology?

## Research methodology

- ❑ Is a systematic way to solve a problem.
- ❑ It is a science of studying how research is to be carried out.
- ❑ **Essentially, the procedures by which researchers go about their work of describing, explaining and predicting phenomena are called research methodology.**
- ❑ It is also defined as the study of methods by which knowledge is gained.
- ❑ Its aim is to give the work plan of research.

suPaS