

Chapter 1

Research : A way of thinking

Research is undertaken within most professions. More than a set of skills, research is a way of thinking: examining critically the various aspects of your day-to-day professional work; understanding and formulating guiding principles that govern a particular procedure; and developing and testing new theories for the enhancement of your practice. It is a habit of questioning what you do, and a systematic examination of the observed information to find answers, with a view to instituting appropriate changes for a more effective professional service.

What is research?

- Research is systematic, because it follows certain steps that are logical in order. These steps are:
- Understanding the nature of problem to be studied and identifying the related area of knowledge.
- Reviewing literature to understand how others have approached or dealt with the problem.
- Collecting data in an organized and controlled manner so as to arrive at valid decisions.
- Analyzing data appropriate to the problem.
- Drawing conclusions and making generalizations.

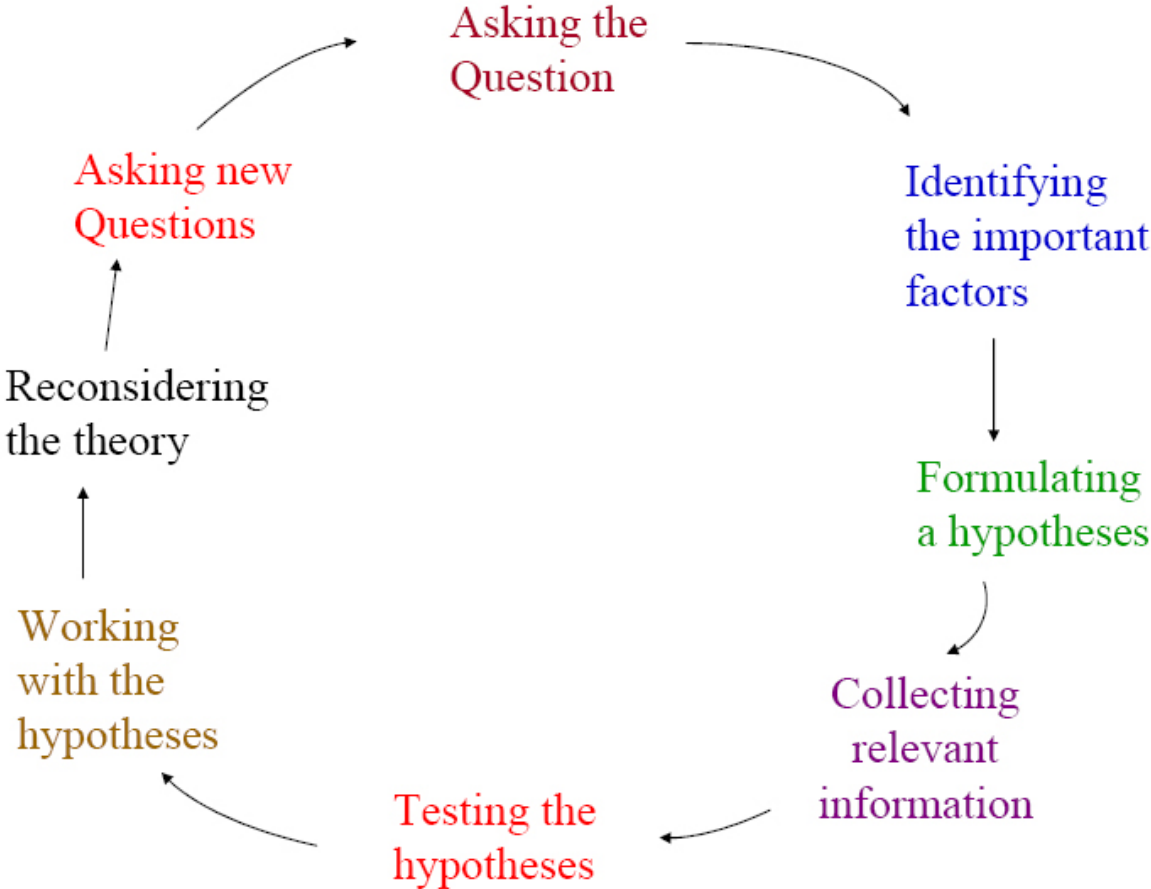
High quality research

- It is based on the work of others.
- It can be replicated (duplicated).
- It is generalizable to other settings.
- It is based on some logical rationale and tied to theory.
- It is doable!
- It generates new questions or is cyclical in nature.
- It is incremental.
- It is apolitical activity that should be undertaken for the betterment of society.

Bad research

- The opposites of what have been discussed.
- Looking for something when it simply is not to be found.
- Plagiarizing other people's work.
- Falsifying data to prove a point.
- Misrepresenting information and misleading participants.

Flowchart to do research



Why we do research?

- To get PhDs, Masters and Bachelors??
- To provide solutions to complex problems
- To investigate laws of nature
- To make new discoveries
- To develop new products
- To improve our life
- To save costs
- Human desires

Application of research

Very little research in the field is pure in nature. That is, very few people do research in research methodology per se. most research is applied research, which has wide application in many disciplines.

Definition of research

Research is one of the ways to find answers to your questions. As beginners in research you should understand that research is not all technical, complex, statistics and computers. It can be very simple activity designed to provide answers to very simple questions relating to day-to-day activities.

On the other hand, research procedures can also be employed to formulate intricate theories or laws that govern our lives. The difference between research and non-research activity is, as mentioned, in the way we find answers: the process must meet certain requirements to be called research.

The word research is composed of two syllables re and search. The dictionary defines the former as a prefix meaning again, anew or over again. And the latter as a verb meaning to examine closely and carefully, to test, to try, or to probe. Together they form a noun describing a careful, systematic, patient study and investigation in some field of knowledge, undertaken to establish facts or principles. Research also a structured inquiry that utilizes acceptable scientific methodology to solve problems and creates new knowledge that is generally applicable (Grinnell, 1993:4)

Research is a systematic investigation to find answers to a problem (Burns, 1994:2)

Scientific research is a systematic, controlled empirical and critical investigation of propositions about the presumed relationship about various phenomena (Kerlinger, 1986:10)

Characteristic of research

From the definitions it is clear that research is a process for collecting, analyzing and interpreting to answer questions. But to qualify a research, the process must have certain characteristic. It must, as far as possible, be controlled, rigorous, systematic, valid and verifiable, empirical and critical.

1. Controlled : The concept of control implies that, in exploring causality in relation of two variables, you set up your study in a way that minimizes the effects of other factors affecting the relationship. This can be achieved to a large extent in the physical sciences, as most of the research is done in a laboratory.

2. **Rigorous** : You must be scrupulous in ensuring that the procedures followed to find answers to questions are relevant, appropriate and justified.
3. **Systematic** : This implies that the procedures adopted to undertake an investigation follow a certain logical sequence. The different steps cannot be taken in a haphazard way. Some procedure must follow others.
4. **Valid and verifiable** : This concept implies that whatever you conclude on the basis of your findings is correct and can be verified by you and others.

5. Empirical : This means that any conclusions drawn are based upon hard evidence gathered from information collected from real-life experiences or observations.

6. Critical : Critical scrutiny of the procedures used and the methods employed is crucial to a research inquiry. The process of investigation must be foolproof and free from any drawbacks. The process adopted and the procedures used must be able to withstand critical scrutiny.

For a process to be called research, it is imperative that it has the above characteristic.

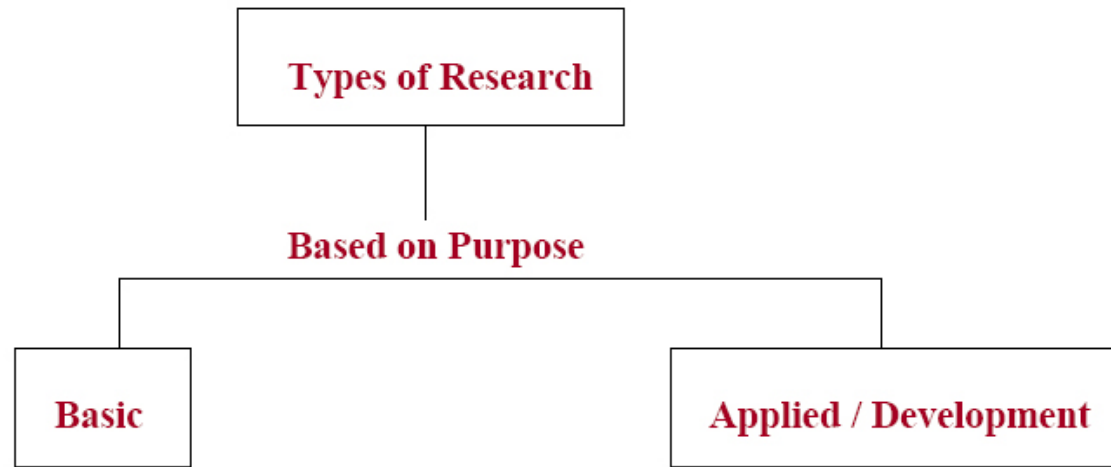
Classifying research

- Reviewing related past research studies is an important step in the process of carrying out research as it helps in problem formulation, hypothesis construction and selection of appropriate research designs.
- It is beneficial if you can classify a research study under a specific category because each category or type of research uses a specific set of procedures.

There are many ways of classifying research.

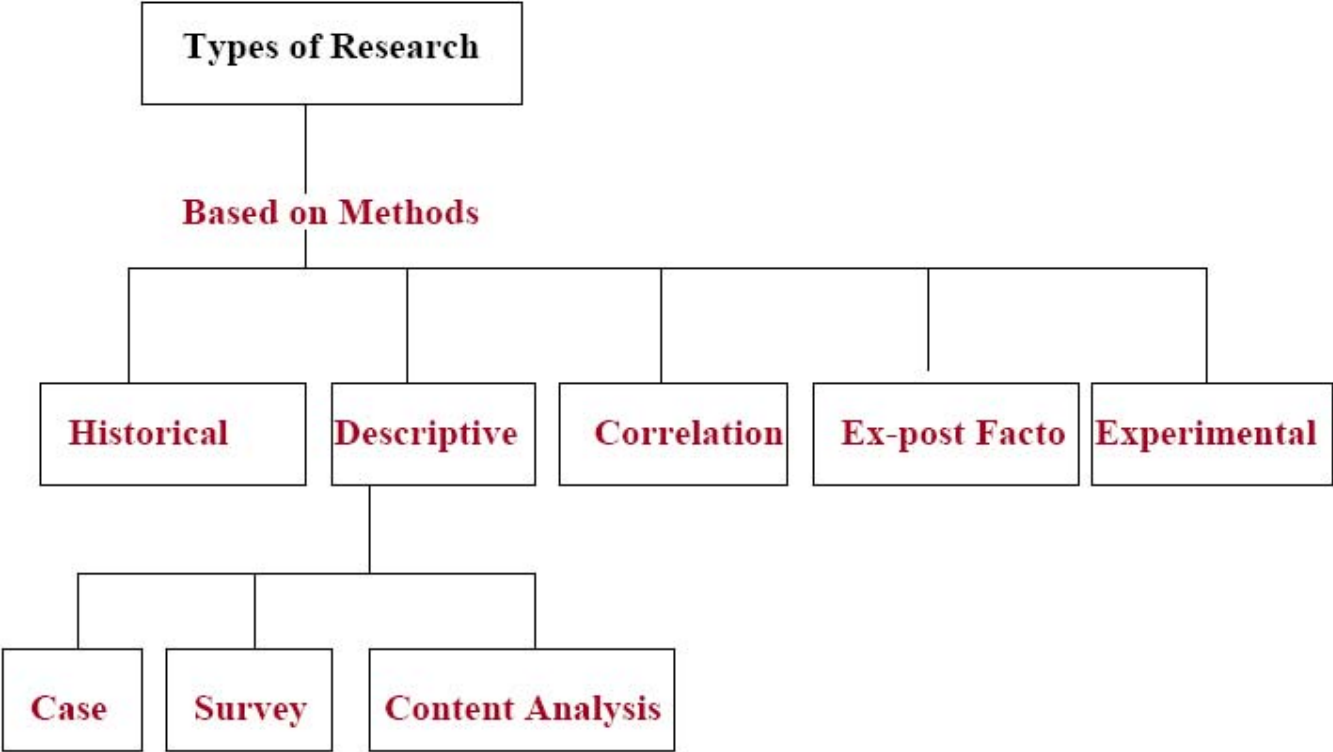
Classify research on the basis of its purpose

- Taking purpose as the basis of classification, research is considered to be two types-Basic and Applied (including Developmental research).



Classification of Research by Purpose

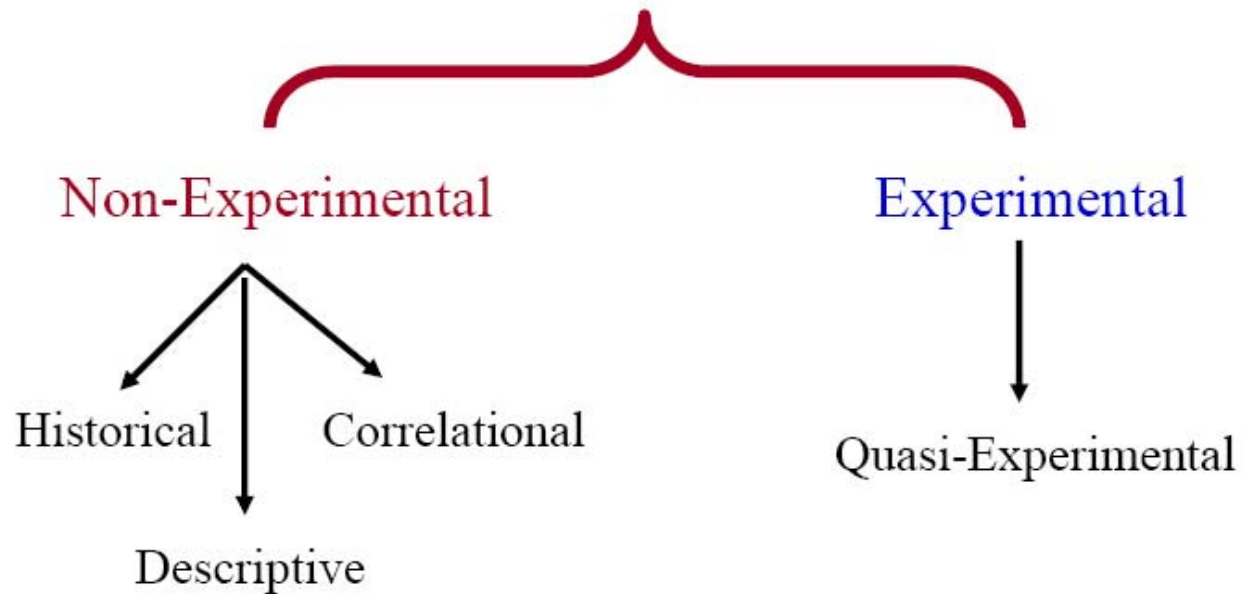
Classify research on the basis of the method employed in research.



Classification of Research by Method

Classify research on its physical method

Different Types of Research *(from Salkind)*



Historical research

- The purpose of historical research is to arrive at conclusions concerning trends, causes or effects of past occurrences.
- This may help in explaining present events and anticipating future events.
- The data are not gathered by administering instruments to individuals ,but rather, they are collected from original documents or by interviewing the eye-witnesses (primary source of information).
- In case primary sources are not available, data are collected from those other than eye-witnesses (secondary sources).
- The data thus collected are subjected to scientific analysis to assess its authenticity and accuracy.

Descriptive research

- Descriptive research studies deal with collecting data and testing hypotheses or answering questions concerning the current status of the subject of study.
- It deals with the question “WHAT IS” of a situation.
- It concerns with determining the current practices, status or features of situations.
- Another aspect of descriptive research is that data collection is either done through asking questions from individuals in the situation (through questionnaires or interviews) or by observation.

Correlation studies

- Descriptive and historical research provide a picture of events that are currently happening or have occurred in the past.
- Researchers often want to go beyond mere description and begin discussing the relationship that certain events might have to one another.
- The most likely type of research to answer the relationship among variables or events is called correlational research.
- A correlation study aims at determining the degree of relationship between two or more quantifiable variables.
- Secondly, the relationship thus determined could be used for making predictions.
- A high value of relationship, however, does not signify a cause and effect relationship which must be verified through and experimental study.

- Correlational research are studies that are often conducted to test the reliability and predictive validity of instruments used for decision making concerning selection of individuals for the likely success in a course of study or a specific job.
- Some authors consider this research as a type of descriptive research, since it describes the current conditions in a situation.
- However, the difference lies in the nature of conditions studies.
- A correlational study describes in quantitative terms the degree to which the variables are related.

Ex-post facto studies

- There is some research where both the effect and the alleged cause have already occurred and are studied by the researcher in retrospect.
- Such research is referred to as EX-POST FACTO (after the fact).
- Kerlinger (1973) defines Ex-post Facto research as :
“Systematic empirical inquiry in which the scientist does not have direct control of independent variables because their manifestations have already occurred or because they are inherently not manipulable”.
- Thus, in ex-post facto research or causal-comparative research the researcher has no control on the variables or he cannot manipulate the variables (independent variables) which cause a certain effect (dependent variables) being measured.

- Since this type of a study lacks manipulation of variables, the cause-effect relationship measured are only tentative.
- Some authors categorize Ex-post facto studies into the category of descriptive research.
- Though it too describes conditions that exist in a situation, it attempts to determine reasons or causes for the current status of the phenomena under study.
- The procedures involved in this study are quite different than those in descriptive research.

Experimental research

- We already know that correlational research can help establish the presence of a relationship among variables but not give us any reason to believe that variables are causally related to one another.
- How does one find out if the characteristics or behaviors or events are related in such a way that the relationship is a causal one?
- Two types of research can answer this: (1) quasi-experimental research and (2) experimental research.
- Experimental research is where participants are assigned to groups based on some selected criterion often called treatment variable.

- Quasi-experimental research is where participants are preassigned to groups based on some characteristic or quality such as differences in sex, race, age, neighborhood, etc.
- These group assignments have already taken place before the experiment begins, and the researcher has no control as to what the people will belong to each group
- The primary characteristic of experimental research is manipulation of at least one variables and control over the other relevant variables so as to measure its effect on one or more dependent variables.
- The variables (s) which is manipulated is also called an independent variables, a treatment, an experimental variables or the cause.
- Some of the examples of an independent variables could be: temperature, pressure, chemical concentration, type of material and conductivity.

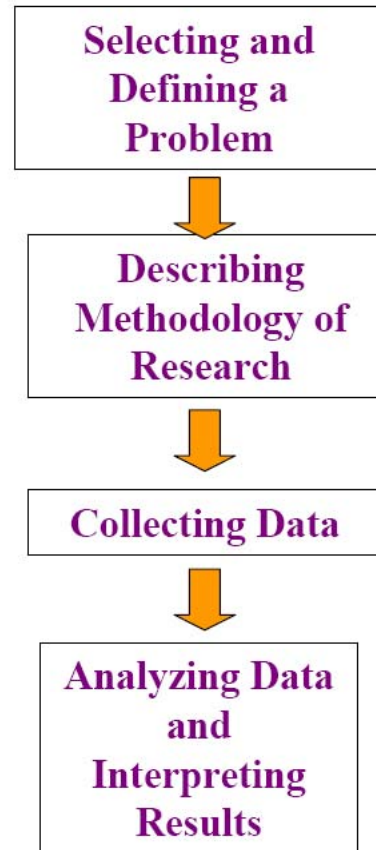
Applied research vs Basic research

- The most basic distinction between the two research is that basic research is research that has no immediate application, whereas applied research is research that does.
- However, such distinctions are somewhat ambiguous as almost all basic research eventually results in some worthwhile application in the long range.

Steps in conducting research

Steps in Conducting Research

Irrespective of the category of a research study, the steps followed in conducting it are the same. These steps are :



Selecting and Defining a Problem

This marks the beginning of a research study and is the most difficult and important step. This involves :

- Identifying and stating the problem in specific terms;
- Identifying the variables in the problem situation and defining them adequately; generating tentative guesses (hypotheses) about the relation of the variables or in other words the solution of the problem, or writing explicitly the questions (research questions) for which answers are sought; and evaluating the problem for its research ability.
- All this is not done in a vacuum.
- To achieve this, you review the literature related to the problem to know what other researchers have done and discovered and to identify the possible methodology for
- conducting the research.

Describing Methodology of Research

- You need to state the purpose of the study and to define the problem clearly. This guides you in deciding the methodology of research which involves :
- Identifying the method of research;
- Specifying the subjects of study (e.g. heat flow problem, etc.);
- Selecting an adequate representative sample of subjects;
- Selecting/constructing valid and reliable instruments for measuring the variables in the problem;
- Selecting a research design and describing the procedure to be employed

Collecting Data

- This step involves conducting the study as per the designed procedure (manipulating the experimental variables in the case of an experimental method), administering instruments for measuring variables and/or gathering information through observation.
- It also involves tabulating the data thus collected for the purpose of analysis.

Analysing and Interpreting Results

- The results of the study are generated at this stage.
- The data are summarized, in other words analysed to provide information for testing the hypotheses.
- Appropriate statistical methods of analysis are used to test the hypotheses.
- You can perform the analysis manually, by using a hand calculator or a computer as per the demands of the problem, and the available facilities.
- After completing the analysis results are tied together or summarized.

- The results are interpreted in the light of the hypotheses and/or the research problem.
- These are then discussed in relation to : the existing body of knowledge, consistencies and inconsistencies with the results of other research studies, and then the conclusions are drawn.
- This is followed by writing the research report.

ACKNOWLEDGEMENT:

Research Methodology Slides from Prof. Dr. Marzuki Khalid,
UTM.