

Research Methodology

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Learning Topics

- ☐ Meaning of Research
- ☐ Objectives and Characteristics of Research
- ☐ Research Categories
- ☐ Features of Good Research Study
- ☐ Types of Research Studies
- ☐ Scientific Method
- ☐ Comparison of Scientific and Non Scientific Method
- ☐ Research Methods and Research Methodology
- ☐ Organizing Research Function
- ☐ Issues and Trends in Research



Meaning of Research

Research in common parlance refers to a search for knowledge. Research is an art of scientific investigation.

Dictionary definition of research is a careful investigation or inquiry specially through search for new facts in any branch of knowledge.

Some people consider research as a movement from the known to the unknown

Meaning

- “Research is a systematized effort to gain new knowledge.”

Redman and o Mory

- “Research is the systematic process of collecting and analyzing information (data) in order to increase our understanding of the phenomenon about which we are concerned or interested.”

Dr. S.L. Gupta

- “Research is to re-search from available primary and secondary data into relevant information to form a substantial knowledge.”

Hitesh Gupta

- The manipulation of things, concepts or symbols for the purpose of generalizing to extend, correct or verify Knowledge, whether that knowledge aids in construction of theory or in the practice of an art.”

D. Slesinger and M. Stephenson

in the Encyclopedia of Social Sciences

- Research comprises defining and redefining problems, formulating, hypothesis or suggested solution: collecting , organizing and evaluating data: making deductions and formulating hypothesis.

- Clifford Woody

Objectives of Research



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. Through each research study has its own specific purpose, we mention some general objectives of research below:



1: To obtain familiarity of a phenomenon or to achieve new insights into it



2: To portray accurately the characteristics of a particular individual, situation or a group.



3: To determine the frequency with which something occurs or with which it is associated with something else.



4: To test a hypothesis of a casual relationship between variables.

Characteristic Of Research

- Research is directed towards the solution of a problem.
- Based upon observable experience or empirical evidence.
- Demands accurate observation and description.
- Involves gathering new data from primary sources or using existing data for a new purpose.
- Requires expertise
- Objective and logical
- Involves the quest for answers to unsolved problems.
- Requires courage.
- Should be carefully recorded and reported

Categories of Research

- Basic Research
 - Conducted to verify the acceptability of a given theory or to know more about certain concepts.
 - Also known as fundamental research, „theoretical“ research or „pure“ research.
- Applied Research
 - conducted when a decision must be made about a specific real-life problem.
 - It is of two types:
 - Applied Research can further be divided into two groups:
 - Problem Solving Research
 - Problem Oriented Research

CRITERION	BASIC RESEARCH	APPLIED RESEARCH
Meaning	Basic Research refers to the study that is aimed at expanding the existing base of scientific knowledge.	Applied Research is the research that is designed to solve specific practical problems or answer certain questions.
Nature	Theoretical	Practical
Utility	Universal	Limited
Concerned with	Developing scientific knowledge and predictions	Development of technology and technique
Goal	To add some knowledge to the existing one.	To find out solution for the problem at hand.



Criteria of Good Research

- Whatever may be the types of research works and studies, one thing that is important is that they all meet on the common ground of scientific method employed by them. One expects scientific research to satisfy the following criteria:
 1. The purpose of the research should be clearly defined, and common concepts be used.
 2. The research procedure used should be described in sufficient detail to permit another researcher to repeat the research for further advancement, keeping the continuity of what has already been attained.
 3. The procedural design of the research should be carefully planned to yield results that are as objective as possible.
 4. The researcher should report with complete frankness, flaws in procedural design and estimate their effects upon the findings.
 5. The analysis of data should be sufficiently adequate to reveal its significance and the methods of analysis used should be appropriate. The validity and reliability of the data should be checked carefully.
 6. Conclusions should be confined to those justified by the data of the research and limited to those for which the data provide an adequate basis.
 7. Greater confidence in research is warranted if the researcher is experienced, has a good reputation in research and is a person of integrity.

- we can state the qualities of a good research as under:

Good research is systematic: It means that research is structured with specified steps to be taken in a specified sequence in accordance with the well-defined set of rules. Systematic characteristic of the research does not rule out creative thinking, but it certainly does reject the use of guessing and intuition in arriving at conclusions.

Good research is logical: This implies that research is guided by the rules of logical reasoning and the logical process of induction and deduction are of great value in carrying out research. Induction is the process of reasoning from a part to the whole whereas deduction is the process of reasoning from some premise to a conclusion which follows from that very premise. In fact, logical reasoning makes research more meaningful in the context of decision making.



Types of Research

Types of research	
↓	↓
Non-experimental	Experimental
↓	↓
Historical, Descriptive, Correlational, Qualitative, Expost facto	True experimental, Quasi experimental

Types of Research : Observation Pattern Based

- ❖ Cross-sectional research : Different population groups are compared at a single point in time.
- ❖ Longitudinal research : Researchers conduct several observations of the same subjects over a period, sometimes lasting many years.

NON-EXPERIMENTAL RESEARCH

- A non-experimental research is one where independent variables can not be manipulated. The researcher does not have complete control over the conditions of the non-experimental research studies.
- For example, if you want to survey the television-watching behavior of adolescents, you could do so by having them maintain a diary in which they record what shows they watch and with whom. This descriptive study provides information about their television-watching habits but says nothing about why they watch what they do. You are not in any way trying to have an impact on their television watching behavior or investigate why they might watch a particular show.
- Census of any country, current unemployment rate of working single parents who have children under age 5 etc. are the examples of descriptive research.

Historical Research

- Historical research relates past events to one another or to current events. Basically, historical research (or historiography) answers the question: what is the nature of events that have happened in the past?
 - For example, one might want to examine trends in treatment of mental illness or how attitudes toward work and families have changed. All of these questions require the detective work of a historian, finding and collecting relevant data and then, just as with any other research endeavour, testing a hypothesis
- One significant difference between historical research and other types of research is the type of data collected and the method of collection.
- Researchers who do historical research often accomplish this goal through the use of primary sources (original documents or information from people who have personally experienced an event) and secondary sources (second hand documents or information from people who may have some knowledge about the event but did not experience it firsthand).
- Examining the trends in achievement level of Indian children compared with American children is an example of historical research.

PRIMARY SOURCES

Primary sources enable the researcher to get as close as possible to what actually happened during an historical event or time period. A primary source reflects the individual viewpoint of a participant or observer.

SECONDARY SOURCES

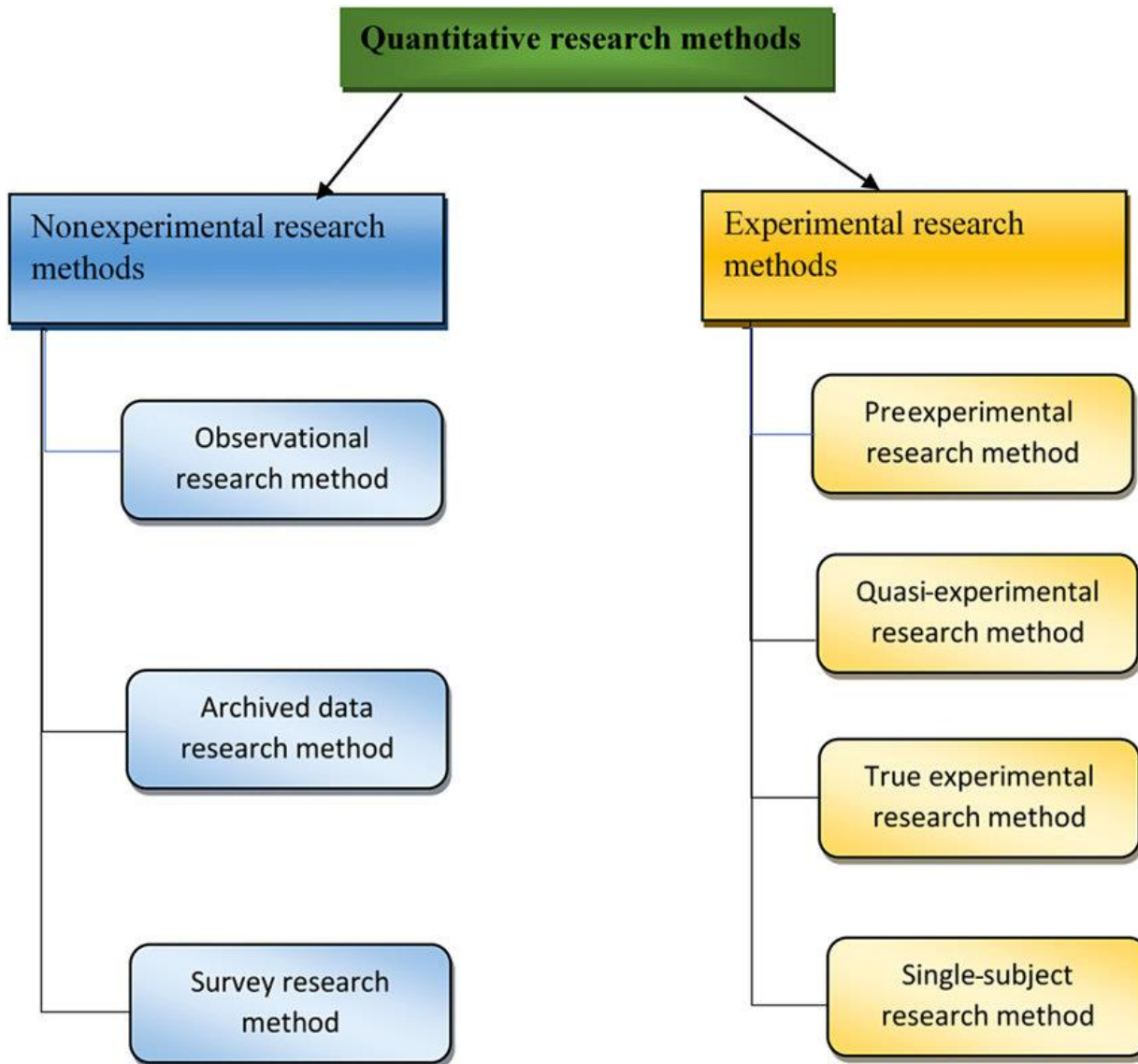
A secondary source is a work that interprets or analyzes an historical event or phenomenon. It is generally at least one step removed from the event. Textbooks and encyclopedias are examples of secondary sources.

Descriptive/Diagnostic vs. Analytical

- 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. In social science and business research we quite often use the term **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. The methods of research utilized in descriptive research are survey methods of all kinds, including comparative and correlational methods.
- In 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:

- Applied research aims at finding a solution for an immediate problem facing a society or an industrial/ business organization, whereas **fundamental research** is mainly concerned with generalizations and with the formulation of a theory.
- Research concerning some natural phenomenon or relating to pure mathematics are examples of fundamental research. Similarly, research studies, concerning human behavior carried on with a view to make generalizations about human behavior, are also examples of fundamental research. Research to identify social, economic or political trends that may affect a particular institution, marketing research, evaluation research are examples of applied research. Thus, the central aim of applied research is to discover a solution for some pressing practical problems, whereas basic research is directed towards finding information that has a broad base of applications and thus, adds to the already existing organized body of scientific knowledge.



Quantitative vs. Qualitative:

- Quantitative research is based on the quantitative measurements of some characteristics. It is applicable to phenomena that can be expressed in terms of quantities.
- Qualitative research, is concerned with qualitative phenomenon, i.e., phenomenon relating to or involving quality or kind. Attitude or opinion research i.e., research designed to find out how people feel or what they think about a particular subject or institution is also qualitative research. Qualitative research is specially important in the behavioral sciences where the aim is to discover the underlying motives of human behavior



- Qualitative research is relatively new to the social and behavioural sciences and, to a large extent its increasing popularity is due to a degree of dissatisfaction with other available research methods. Some scientists feel that the traditional experimental model is just too restrictive and narrow, preventing underlying and important factors and relationships from being revealed. But what's so valuable about this set of tools is that it allows you to answer a whole new set of questions in a whole new way.
- Qualitative research is the interpretive study of a specific issue or a problem in which the researcher is central to the research process. It's a naturalistic inquiry, which unfolds in a non-manipulative fashion. It lacks the predetermined constraints on outcome variables.
- Qualitative methods yield data in the form of words than numbers. Qualitative studies provide rich description and explanation of processes in specific local contexts. They provide a feel of the processes by focusing on the chronological flow or sequence of events leading to certain outcomes or consequences. The whole phenomenon is studied with a strategy of a detailed or elaborate (thick) description. Throughout the conduct of qualitative study interpretation and reflection on the part of researcher is required.
- Qualitative data can be obtained through a variety of methods such as case studies, interviews, discourse analysis, narratives, and ethnography and participant observation.

Conceptual vs. Empirical

- Conceptual research is that related to some abstract ideas 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. It is also called as experimental type of research. Empirical research is appropriate when proof is sought that certain variables affect other variables in some way. Evidence gathered through experiments or empirical studies are considered to be the most powerful support possible for testing a given hypothesis.

Ex-Post Facto Research


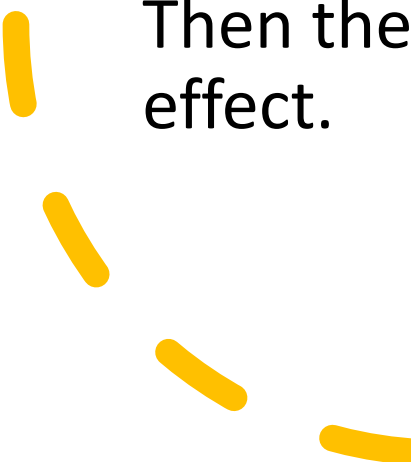
- The independent variable or variables have already occurred in which the researcher starts with observation of a dependent variable or variables.
- He then studies the independent variables in retrospect for their possible relations to and effects on the dependent variable or variables. The most important difference between experimental research and ex-post facto research is control. In the former, the investigator has a manipulative control on the independent variable, whereas in the latter this control is not possible, more than this, randomization is not possible.
- In the ex-post facto research, the researcher must take things as they are and try to collect data and analyse them in that context. In an ideal social scientific research, the possibility of finding random samples of subjects and randomly assigning them to groups and treatment to group would always be possible. However, these possibilities do not exist in the real situation.
- The ex-post facto research could be of a large scale or a small scale. This type of research has three weaknesses:
 1. the inability to manipulate the independent variables,
 2. lack of power to randomize
 3. the risk of improper interpretation.

Cross-sectional Research: Example

- The defining feature of a cross-sectional study is that it can compare different population groups at a single point in time.
- It allows researchers to compare many different variables at the same time.
- May not provide definite information about cause-and-effect relationships. This is because such studies offer a snapshot of a single
- moment in time; they do not consider what happens before or after the snapshot is taken.
- We intend to simply measure the cholesterol levels of daily walkers and non-walkers along with any other characteristics that might be of interest to us.
- We would not influence non-walkers to take up that activity or advise daily walkers to modify their behaviour. In short, we'd try not to interfere.
- We might choose to measure cholesterol levels in daily walkers across two age groups, over 40 and under 40, and compare these to cholesterol levels among non-walkers in the same age groups.
- We might even create subgroups for gender. However, we would not consider past or future cholesterol levels, for these would fall outside the frame. We would look only at cholesterol levels at one point in time.

Longitudinal Research: Example

- Researchers conduct several observations of the same subjects over a period of time, sometimes lasting many years.
- It is possible to detect developments or changes in the characteristics of the target population at both the group and the individual level.
- It is more likely to suggest cause-and-effect relationships than a cross-sectional study by virtue of its scope.
- We might choose to look at the change in cholesterol levels among women over 40 who walk daily for a period of 20 years.
- The longitudinal study design would account for cholesterol levels at the onset of a walking regime and as the walking behaviour continued over time.

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- Cross-sectional studies can be done more quickly than longitudinal studies.
 - Researchers might start with a cross-sectional study to first establish whether there are links or associations between certain variables. Then they would set up a longitudinal research to study cause and effect.



How do you choose the Research Design?

- Several factors determine the research design that suits your research the best.
- Objectives of the research which may be one of the following or something similar is a key factor:
 1. To gain some insight into a specific phenomenon.
 2. Describing a phenomenon, population or event where we can establish numerical relationships or determine the extent to which two variables covary.
 3. To establish a cause and effect relationships between two variables so we can understand how one changes when we vary the other

Research Design



A research design is a broad plan that states objectives of research project and provides the guidelines what is to be done to realize those objectives.



It is desirable that it must be in written form and must be simple and clearly stated.



The real project is carried out as per the research design laid down in advance.



It specifies objectives, data collection and analysis methods, time, costs, responsibility, probable outcomes, and actions.

Contents of Research Design

- Title of study
- Statement of the problem
- Review of literature
- Objectives of the study
- Formulation of hypothesis
- Materials and proposed methodology
- Collection of data
- Analysis of data
- Interpretation of results
- Proposed output
- Timelines and financial budgeting
- Bibliography

Types of Research Designs

- Exploratory research design
- Conclusive research design
 - Descriptive research design
 - Experimental (or causal) research design
- Research design is different from the method by which data are collected. How the data are collected is irrelevant to the logic of the design. Minimize the chance of drawing incorrect causal inferences from data.

Exploratory Research Design

- Exploratory research design does not aim to provide the final and conclusive answers to the research questions, but merely explores the research topic with varying levels of depth.
- It is the initial research, which forms the basis of more conclusive research.
- Unstructured interviews are the most popular primary data collection method with exploratory studies.

Exploratory Research Design-Advantages

- Flexibility and adaptability to change.
- Exploratory research is effective in laying the groundwork that will lead to future studies.
- It potentially save time and other resources by determining at the earlier stages the types of research that are worth pursuing.

Exploratory Research Design-Limitations

- Exploratory studies generate qualitative information and interpretation of such type of information is subject to bias.
- These types of studies usually make use of a modest number of samples that may not adequately represent the target population. Accordingly, findings of exploratory research cannot be generalized to a wider population.
- Findings of such type of studies are not usually useful in decision making in a practical level.

Conclusive Research Design

- It is applied to generate findings that are practically useful in reaching conclusions or decision-making.
- In this type of studies research objectives and data requirements need to be clearly defined.
- Findings of conclusive studies usually have specific uses.
- It provides a way to verify and quantify findings of exploratory studies.
- Involves the application of quantitative methods of data collection and data analysis.

Experimental Research

- The word experimental research has a range of definitions.
- The experimental method is a systematic and scientific approach to research in which the researcher manipulates one or more variables, and controls and measures any change in other variables.

True experiments:	Quasi-experiments:
Emphasize <u>internal validity</u> <ul style="list-style-type: none">▪ Assess cause & effect (in relatively artificial environment)▪ Test clear, a priori hypotheses	Emphasize <u>external validity</u> <ul style="list-style-type: none">▪ Describe “real” / naturally occurring events▪ Clear or exploratory hypotheses
Participants <u>randomly assigned</u> to exp. or control groups <ul style="list-style-type: none">▪ Participants & experimenter <u>Blind</u> to assignment	<u>Non-equivalent groups</u> <ul style="list-style-type: none">▪ Existing groups▪ Non-random assignment▪ Participants not blind▪ Self-selection
<u>Control</u> study procedures <ul style="list-style-type: none">▪ Manipulate independent variable▪ Control procedures & measures	Full control may not be possible <ul style="list-style-type: none">▪ May not be able to manipulate the independent variable▪ Partial control of procedures & measures

ADVANTAGES OF EXPERIMENTAL RESEARCH

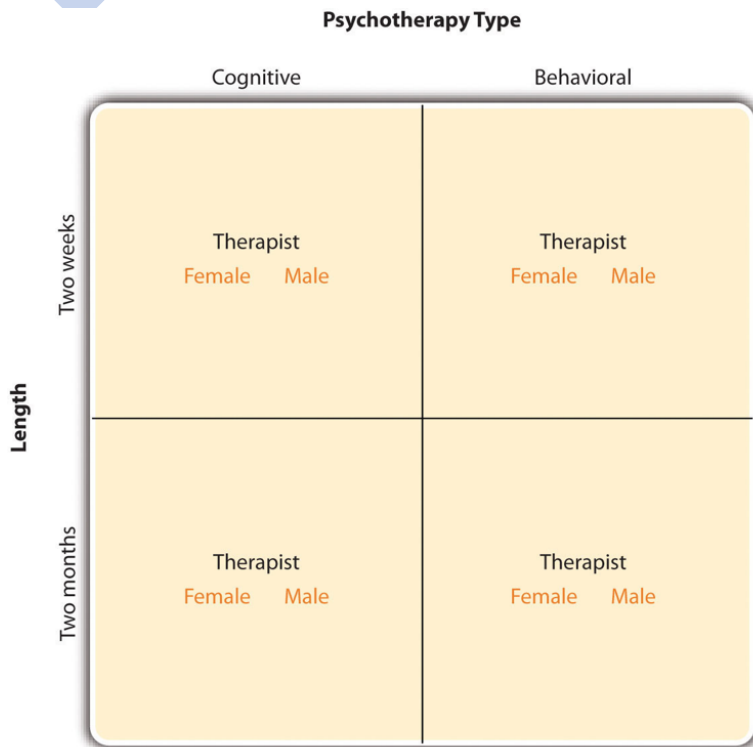


- Researchers have a stronger hold over variables to obtain results.
- Subject does not impact the effectiveness of experimental research.
- The results are specific.
- Research findings from same dataset can be repurposed for similar research ideas.
- Experimental research makes an ideal starting point.
- The collected data could be used as a foundation to build new research ideas for further studies.

Multiple Factorial design

- By far the most common approach to including multiple independent variables in an experiment is the factorial design. In a factorial design, each level of one independent variable (which can also be called a factor) is combined with each level of the others to produce all possible combinations.
- Each combination, then, becomes a condition in the experiment. Imagine, for example, an experiment on the effect of cell phone use (yes vs. no) and time of day (day vs. night) on driving ability. This is shown in the factorial design table in Figure
- In principle, factorial designs can include any number of independent variables with any number of levels

Cell Phone			
		No	Yes
Daytime			
Nighttime			



- Researchers often include multiple independent variables in their experiments. The most common approach is the factorial design, in which each level of one independent variable is combined with each level of the others to create all possible conditions.
- In a factorial design, the main effect of an independent variable is its overall effect averaged across all other independent variables. There is one main effect for each independent variable.
- There is an interaction between two independent variables when the effect of one depends on the level of the other. Some of the most interesting research questions and results in psychology are specifically about interactions.

Cohort studies

- **Cohort studies** are a type of research design. They are also called longitudinal studies because they follow groups of people over time. Results from cohort studies can help people understand human health and the environmental and social factors that influence it.
- Prospective cohort studies involve recruiting a group of participants and following them over time to gather new data. Retrospective studies involve using preexisting data.
- For a **prospective cohort study**, researchers identify a topic they want to study. They then design the study and recruit the participants that will best help them study the topic.
- For example, if they wanted to study rates of heart disease in older age, they would choose an age group of younger adults with similar characteristics who do not have heart disease to use as their baseline.
- For a **retrospective cohort study**, researchers analyze a group of people who already have certain characteristics. They then look at existing data to jump back in time. For example, they might look at a group of older adults with heart disease. Then they would analyze data about the group members' medical history to see what factors could have contributed.