UNIT-1

INTRODUCTION AND BASIC RESEARCH CONCEPTS RESEARCH

AGENDA

Introduction of Research

Definition

Concept of Construct

Postulate, Proposition, Thesis, Hypothesis, Law, Principle.

Research methods vs Methodology

Need of Research in Business and Social Sciences,

Objectives of Research ,

Issues and Problems in Research

INTRODUCTION OF RESEARCH & DEFINITION

RESEARCH?

- Research can be defined as the search for knowledge or as any systematic investigation to establish facts.
- A careful investigation for new facts in any branch of knowledge.
- Research – Organized study: methodical investigation into a subject in order to discover facts, to establish or revise a theory, or to develop plan of action based on the facts discovered.
- Nature of Research's Result – Innovation, Discovery and Re-search.

RESEARCH –DEFINITION

- Research can be defined as a systematic activity of exploration that attempts to find explanation and resolution to a problem.
- According to Plutchick R," Research has its origin in a term which means to go around and explore and it is a combination of Re + Search".
- According to Kerlinger, "Research is a Systematic, Controlled, Empirical and Critical investigation of hypothetical propositions about the presumed relations among phenomenon".
- Clarke & Clarke "Research is a organized and independent investigation conducted to cover valid facts, draw inferences and institute ideologies regarding and recognizable problem in certain arena of knowledge."
- Creswell defines it as "research approach which comprises strategies and methods for research that extend the decisions from general assumptions to thorough methods of data gathering and reasoning."
- A wide-ranging definition of research is given by Martyn S -In the widest sense of the word, the definition of research includes any gathering of data, info and facts for the progression of information and knowledge.

RESEARCH – PROCESS

The research process involves the various steps. However the order of steps may differ on the topic matter and investigator, the following steps are generally part of utmost recognized investigation whether it's basic research or applied research.

- Establishment of the subject
- Hypothesis
- Abstract or Concept definition
- Operational definitions
- Collection of data
- Scrutiny of data
- Testing
- Reviewing of hypothesis
- Conclusion

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

DIFFERENT RESEARCH AREAS

- Business Research- Research regarding production, finance, marketing, and management in for-profit corporations is business research.
- However, business research also includes efforts that assist nonprofit organizations.
- Social Research -Social researchers setup research for the purpose of gathering and analyzing information for their operations and for making in-depth studies on effective conditions of social subjects.
- Research in Academic - Academicians setup research to enrich reservoir of knowledge and improving the teaching learning pedagogy.
- Research in Science and Technology - Science and Technology conducts research to make the society more advance and prosperous.
- Research in Medicine - Research in medicine has increased the life expectancy period.
- Government agencies are also important user of research to address the way people view and use various G2C(Government to Citizen) services.
- Defence and Research Development organization carries research upon system and management of battlefield on land, sea and aerospace.

SOME TERM RELATED TO RESEARCH CONCEPT OF CONSTRUCT

CONCEPT OF CONSTRUCT

A construct is a theoretical concept or idea that researchers use to represent a phenomenon that can't be directly measured.

Constructs are often abstract ideas or images created for a specific research purpose.

Here are some examples of constructs:

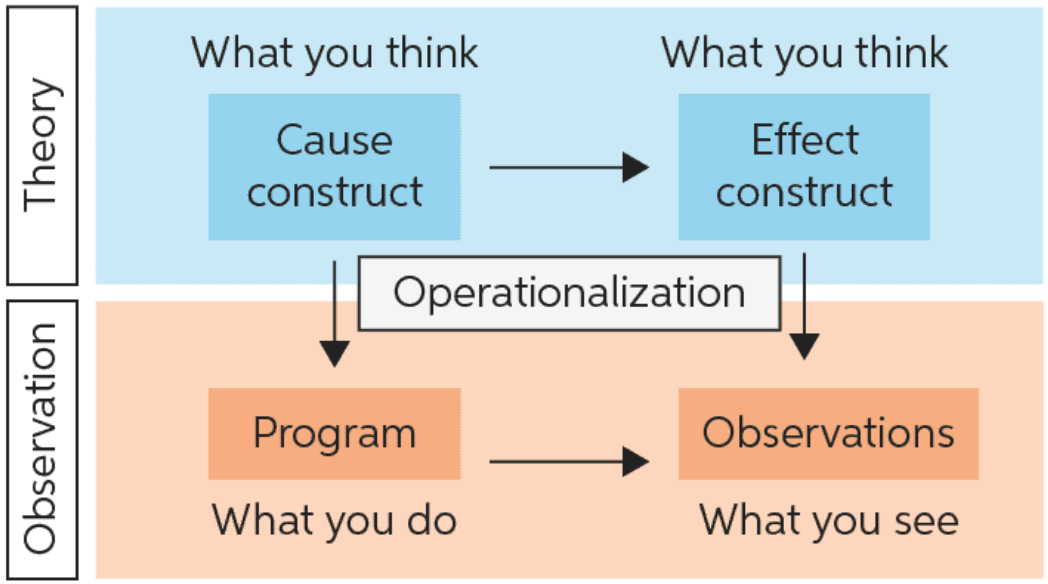
Intelligence, Anxiety, Happiness, Love, Stress, and Depression.

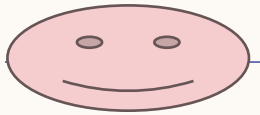
Constructs are different from variables, which are directly measurable and can take on different values or levels. For example, age, height, weight, and blood pressure are all variables.

Researchers use related, measurable variables to approximate constructs. This process is called operationalization.

To evaluate how well a construct measures what it's supposed to, researchers determine construct validity.

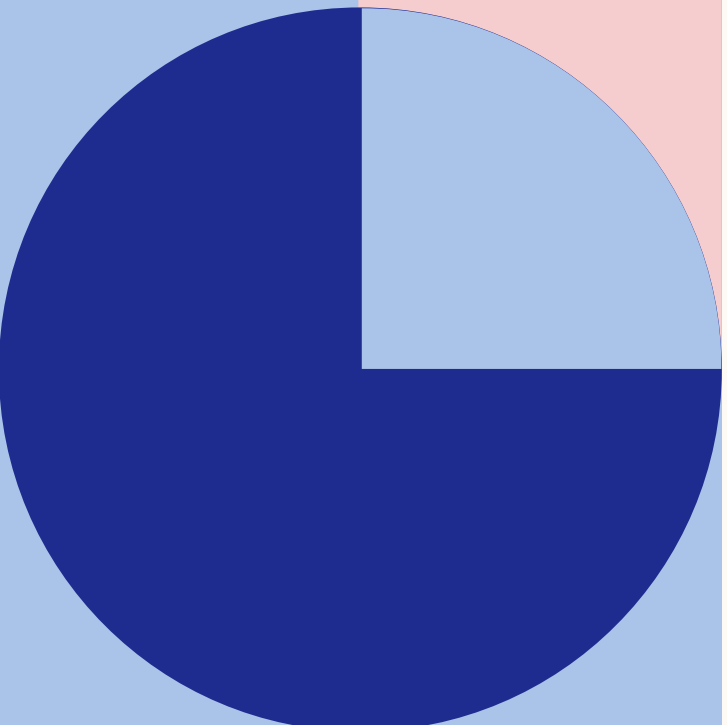
CONCEPT OF CONSTRUCT





https://www.youtube.com/watch?v=SaPxfqBDO0U

POSTULATE, PROPOSITION, THESIS, HYPOTHESIS, LAW, PRINCIPLE.



POSTULATE

- A postulate is a statement that is accepted as true without proof, and is used as a starting point for scientific research and mathematical proofs.
- Definition
- A postulate is a statement that is accepted as true, and is also known as an axiom. Postulates are often the basis for a larger theory or law.
- Purpose
- Postulates are used to create proofs in science and mathematics. They are also used as a starting point for proving theorems, which are statements that can be proven.
- *Example:* In Euclidean geometry, one postulate states that through any two distinct points, there is exactly one straight line. This assumption is accepted without proof and forms the foundation for further geometric reasoning.
- Another example of a postulates is "Parallel lines do not intersect each other." Postulates must be reliable, meaning that one should not contradict other. They are also self-determining, and independent.

PROPOSITION

- The term hypothesis and preposition both confer about the construction of a likely answer to a precise scientific question.
- Preposition pacts with pure thoughts and concepts for which no practical test is done.
- A systematic preposition is alike to a hypothesis, but its main purpose is to recommend relation between the concepts in a situation where the relation or link cannot be verified by experiment.
- A proposition in research is an explanation about the concepts that may be refereed as correct or incorrect if it states and refers to evident process.
- When a proposition is expressed for testing its empirical and it is termed as hypothesis.
- For any hypothesis to be valid, it must make calculations and prediction that scientist can test and validate using experiment mainly which is scientific theory.

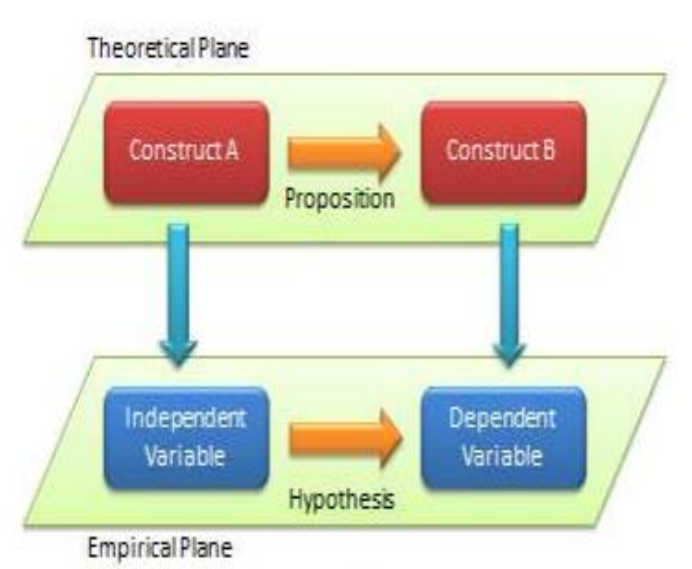


Figure. The theoretical and empirical planes of research

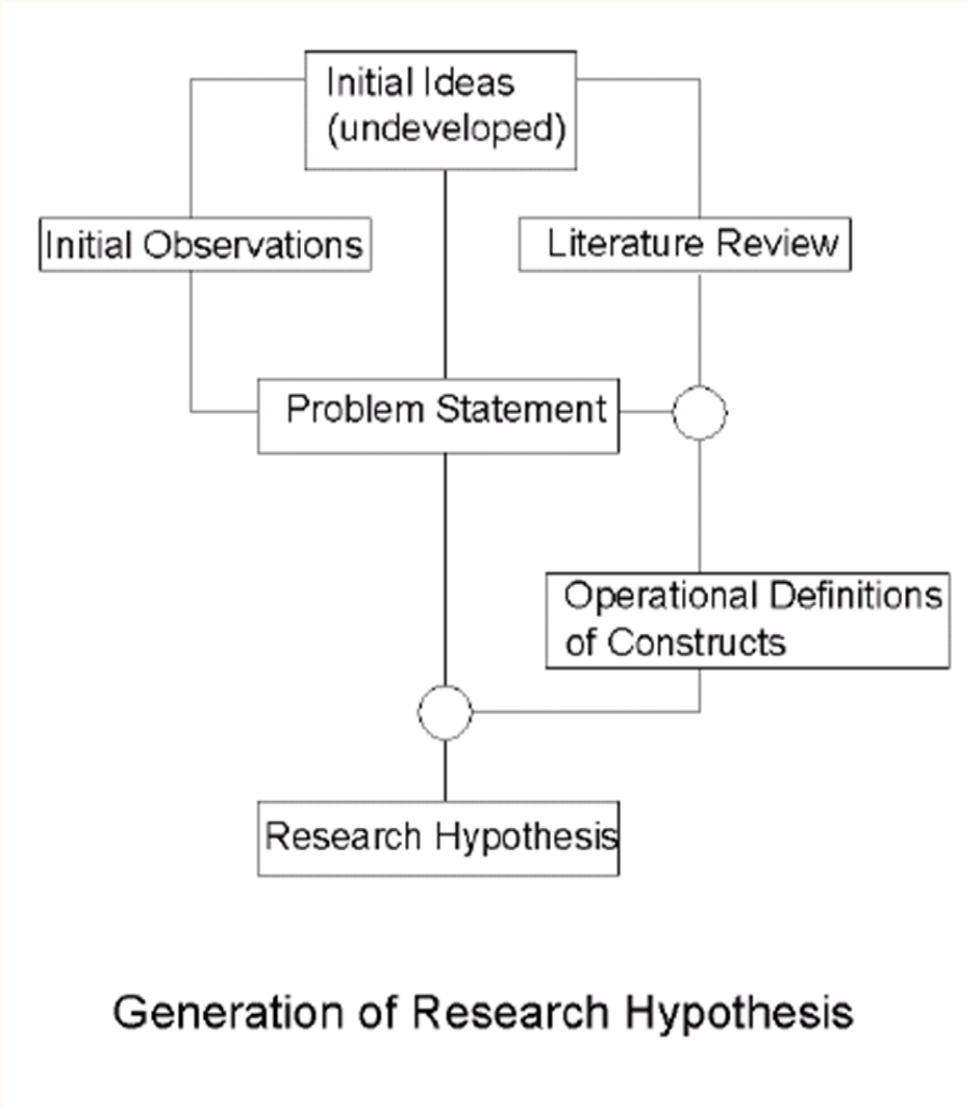
HYPOTHESES

- Once the selection and definition of the problem is over, the researcher needs a clear framework and guide for collecting and interpreting the data.
- His/her interest is now to determine the relationship between the variables.
- Hypothesis provides such a guideline.

hypo' -> Tentative or subject to verification.

'thesis' ->statement about solution of a problem.

- A hypothesis is an assumption that is made based on some evidence.
- This is the initial point of any investigation that translates the research questions into predictions.
- It includes components like variables, population and the relation between the variables.
- A research hypothesis is a hypothesis that is used to test the relationship between two or more variables.



Generation of Research Hypothesis

HYPOTHESES

Characteristics of a Good Hypothesis

1. **Testable**: Can be verified through experiments or observation.
2. **Specific**: Clearly defines variables and relationships.
3. **Relevant**: Aligns with the research problem or objectives.
4. **Simple**: Avoids unnecessary complexity.

- **Types of Hypotheses**

1. **Null Hypothesis (H_0)**
    1. States no relationship or effect exists between variables.
    2. Example: "There is no difference in execution time between Algorithm A and Algorithm B."
2. **Alternative Hypothesis (H_1)**
    1. States a relationship or effect exists between variables.
    2. Example: "Algorithm A is faster than Algorithm B."

Functions of Hypothesis

- A hypothesis is an important tool in the scientific research, they are derived from theory .
- A hypothesis pinpoints the problem for the investigator.
- Hypothesis builds the bridge between the problem and the location of the empirical evidence that solve the problem.
- Hypothesis helps the investigator with the most efficient instrument for exploring and explaining the unknown facts.
- Hypothesis provides the framework for drawing conclusions.
- Hypothesis simulate the investigator for further research studies.

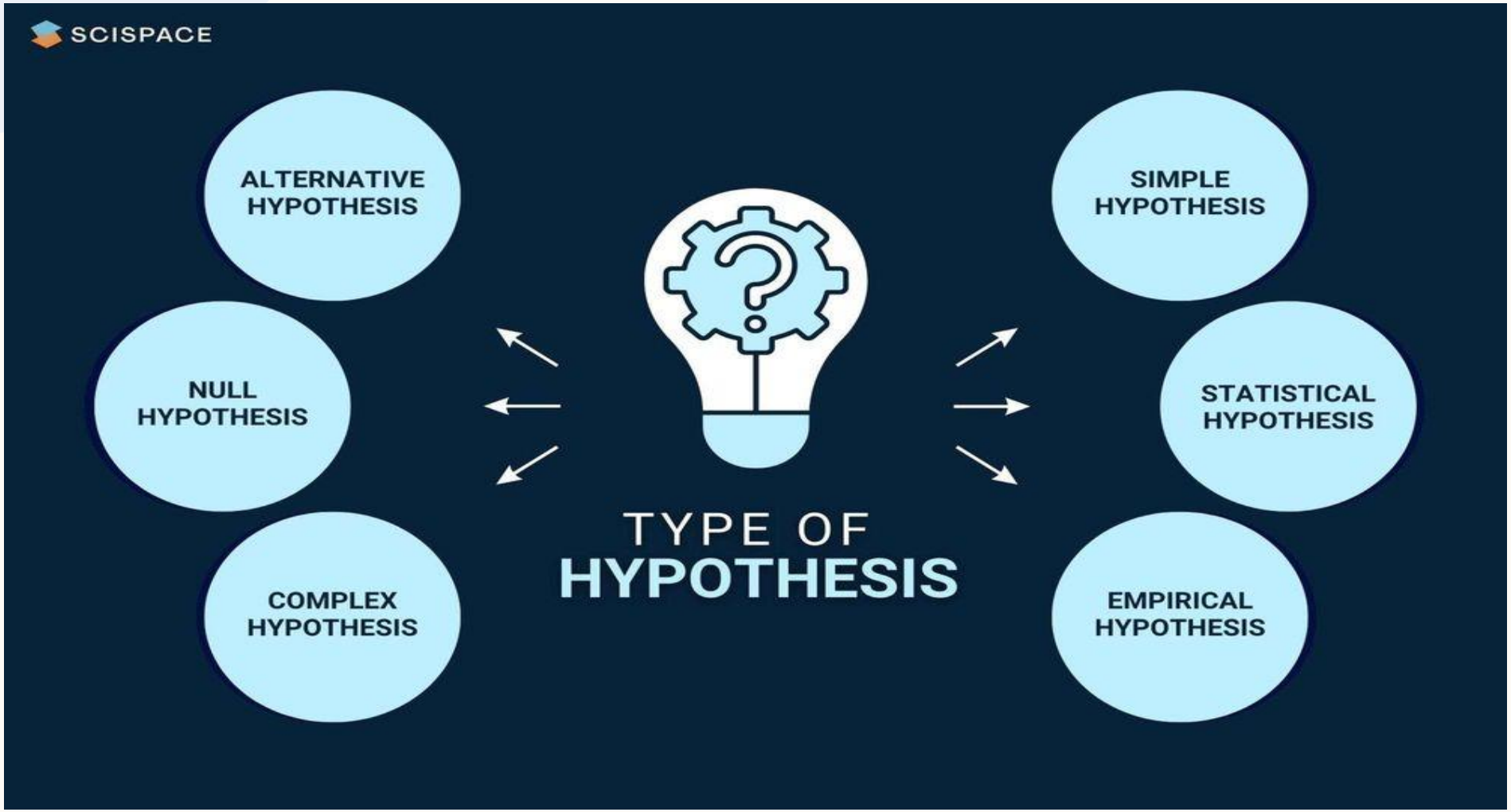
Formulation Steps

1. Identify the research problem.
2. Define variables (independent and dependent).
3. Make a prediction based on existing knowledge or theories.

HYPOTHESES -EXAMPLES

- **Examples-**
- **Performance Comparison**: "Machine learning Model A achieves higher accuracy than Model B."
- **System Efficiency**: "Database indexing reduces query processing time."
- **1. Performance Comparison**
- **Null Hypothesis** (H_0): "Machine learning Model A does not achieve higher accuracy than Model B."
- **Alternative Hypothesis** (H_1): "Machine learning Model A achieves higher accuracy than Model B."
- **2. System Efficiency**
- **Null Hypothesis** (H_0): "Database indexing does not reduce query processing time."
- **Alternative Hypothesis** (H_1): "Database indexing reduces query processing time."

TYPES OF HYPOTHESIS



TYPES OF HYPOTHESIS

1. Null hypothesis

- A null hypothesis proposes no relationship between two variables. No changes in dependent variable due to changes in the independent variable.
- Denoted by H0, it is a negative statement like “Attending physiotherapy sessions does not affect athletes' on-field performance.” Here, the author claims physiotherapy sessions have no effect on on-field performances. Even if there is, it's only a coincidence.
- e.g- There is a relationship between a family’s income and expenditure on recreation, a null hypothesis may state: There is no relationship between families income level and expenditure on recreation.
- There is no relationship between sugar intake and obesity.

TYPES OF HYPOTHESIS

2. Alternative hypothesis

Considered to be the opposite of a null hypothesis, an alternative hypothesis is donated as H1 or Ha.

It explicitly states that the dependent variable affects the independent variable.

A good alternative hypothesis example is “Attending physiotherapy sessions improves athletes' on-field performance.”.

There is strong relationship between sugar intake and obesity.

TYPES OF HYPOTHESIS

3. Simple hypothesis

- A simple hypothesis is a statement made to reflect the relation between exactly two variables. One independent and one dependent. Consider the example, “Smoking is a prominent cause of lung cancer." The dependent variable, lung cancer, is dependent on the independent variable, smoking.

4. Complex hypothesis

- In contrast to a simple hypothesis, a complex hypothesis implies the relationship between multiple independent and dependent variables. For instance, “Individuals who eat more fruits tend to have higher immunity, lesser cholesterol, and high metabolism.” The independent variable is eating more fruits, while the dependent variables are higher immunity, lesser cholesterol, and high metabolism.

RESEARCH METHODS &METHODOLOGY

- The process of research addresses two major questions i.e. what is to be found and how it is be found.
- It is like planning a journey where we first decide where we are going and then we decide how we shall be travelling. We have to identify important stopovers and routes, check points, modes available to reach the destination.
- The steps involved in finding responses to the research questions comprise research methodology.
- At each operational step in the research process one is required to choose from a variety of methods, procedures and models of research methodology which help you to best achieve the objectives.

RESEARCH METHODS & METHODOLOGY

1. Research Methods

Definition: Techniques or tools used to collect and analyze data in a study. The practical steps or procedures used to conduct research.

- **Examples**:
  - Surveys
  - Interviews
  - Experiments
  - Observations
  - Statistical analysis
- **Analogy**: Think of research methods as the "tools in a toolbox" you use to build something.

RESEARCH METHODS & METHODOLOGY

- **2. Research Methodology**
- **Definition**: The overall strategy or approach behind selecting and using research methods. It explains *why* certain methods are chosen.
- **Focus**: The rationale, logic, and philosophy of the research process.
- **Examples**:
  - Why choose a survey over an interview?
  - Justification for using qualitative vs. quantitative methods.
  - Frameworks like grounded theory or experimental research.
- **Analogy**: Methodology is the "blueprint" or "plan" guiding how to use the tools effectively.

RESEARCH METHODS & METHODOLOGY

Aspect	Research Methods	Research Methodology
Definition	Techniques for data collection and analysis.	Strategy and rationale behind the methods.
Focus	"How" to conduct research.	"Why" and "what approach" to conduct research.
Examples	Surveys, experiments, coding data.	Choosing between qualitative or quantitative.
Nature	Practical and procedural.	Theoretical and philosophical.

RESEARCH METHODS VS METHODOLOGY

Research methods are various actions, systems, stages or steps and algorithms used in research process. All the methods or means used by a researcher during a research progression are labeled as research methods.
They are fundamentally prearranged, scientific and methodical. Methods comprise of explanations, observations, measures, experiments, numerical, or can be a statistical method, etc.

Research methodology provides a systematic way to resolve a problem.
It is a discipline of perusal how research is to be supported and executed.
Essentially, research methodology is the procedure by which investigators go about their work of describing; explaining and forecasting phenomena are called research methodology.
It can also be defined as the learning of systems by which information is expanded. It is a science of studying how investigation is to be carried out. Principally, the measures by which investigators go about their effort of unfolding, explaining and forecasting phenomena are called research methodology.
It is also well-defined as the study of methods by which information is gained.
Its aim is to give the work plan of research.

RESEARCH METHODS VS METHODOLOGY

Research methods are useful to apply during the latter stage of the research process.	Research methodologies are applied in the initial stage of the research being conducted.
Research methods are small part of research methodology.	A Research methodology is a multi-dimensional concept.
Research methods consist of various techniques where various studies and experiments are used to conduct research and reach an appropriate conclusion.	Research methodologies are used applied during the initial stage of the research to explain the purpose of chosen methods and how they will serve its function.
Research methods consist of different investigation techniques.	Research methodologies is a systematic strategy to achieve the decided objective.
Research method encompasses of carrying out an experiment, survey, test and so on.	Research methodology encompasses different techniques which are used during the performance of the experiment, surveys, and test, etc.

THESIS

- Term dissertation is derived from the Latin word where dissertation means “path”.
- In few countries, dissertations are also stated to as a thesis.
- As per Oxford Dictionary, dissertations can also be defined as long essays on a particular subject or topic written especially for a college degree.
- A thesis is an extended academic paper that typically serves as concluding research work for university research degree.
- A research thesis is our anticipated answer to the research question, which we conclude only after finishing the research. Thesis is an extensive investigational, design, or theoretical report, with a problem methodology, outcomes, argument structure..
- Thesis can have body, which provides the introduction, narrative, and analysis of your work.

Structure of a Thesis.

- Title page/Cover page
- Table of contents
- Acknowledgements
- Abstract
- Introduction
- Literature Review
- Methodology
- Results
- Analysis/Discussion
- Conclusion
- Appendices
- References

1. TITLE PAGE - This is the first page of your thesis. The title page should include your name, the name of your advisor/ guide, your institute, and your topic. All these elements need to be written on separate lines. The formatting depends on Institutes/organization.

2. Table of Contents

The next section in your thesis is a table of contents. It is an index of all the sections in your thesis.

3. Acknowledgements

Be creative in this section. Include all those people who have been helpful to you in your thesis writing journey. Mention your friends, family, colleagues, and advisors, along with how they supported you. Be grateful for their help and understanding.

4. Abstract

The abstract is a summary of your thesis. It extracts the essence of your research and findings and presents it in a couple of paragraphs.

Structure of a Thesis.

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5. Introduction

it includes- (1) the purpose of the investigation, (2) the problem being investigated, (3) the background (context and importance) of the problem (citing previous work by others), (4) your thesis and general approach, and (5) the criteria for your study's success.

6. Literature review

This section can either be part of your introduction or separate from it. It has a list of all the research papers that you referred to or those that have contributed to the chosen topic in any way. You need to mention their contribution and the way your research adds new insights or revises their findings in any way. This makes your thesis appear well researched and aware of pre-existing papers in the field.

7. Methodology

The methodology chapter outlines which methods you choose to gather data, how the data is analyzed and justifies why you chose that methodology. It shows how your choice of design and research methods is suited to answering your research question. Make sure to also explain what the pitfalls of your approach are and how you have tried to mitigate them.

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8. Results

The results chapter outlines what you found out in relation to your research questions or hypotheses. It generally contains the facts of your research and does not include a lot of analysis, because that happens mostly in the discussion chapter. Clearly visualize your results, using tables and graphs, especially when summarizing, and be consistent in your way of reporting. This means sticking to one format to help the reader evaluate and compare the data.

9. Analysis/Discussion

The discussion chapter includes your own analysis and interpretation of the data you gathered, comments on your results and explains what they mean. This is your opportunity to show that you have understood your findings and their significance. The explanations should be in a logical order. The reader should be able to follow the analysis you come up with. Do not come up with new information in this section.

10. Conclusion

This is probably your most important chapter. This is where you highlight that your research objectives have been achieved. You can also reiterate any limitations to your study and make suggestions for future research.

Structure of a Thesis.

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11. Appendices

All the extra information that is not directly connected to your thesis can be included in the appendix. Different appendices can be created to organize extra information systematically. Points in your appendix should have proper references to the elements in your thesis, including page numbers, titles, sub-headings, etc. Tables, graphs, and charts can be included in the appendices to provide greater evidence on the topic of your thesis.

12. References

Citations need to be included towards the very end of your thesis. They need to be listed in order of their occurrence in the thesis. All the research papers, academic papers, dissertations, and websites that you refer to in your thesis, need to be referred to. In-text citations need to be added wherever necessary. Do not miss out on any references. The different citation formats are APA, MLA, Chicago, etc. Use the format specified in the guidelines given to you by your advisor/university/institute etc.

NEED OF RESEARCH IN BUSINESS AND SOCIAL SCIENCES,

- Research is the structure and a basic slab upon whose entire building of growth of mankind rests. It unlocks the gates of the mind which gives us understanding of what and why things are done and how it should be done.
- Industries, businesses, societies, and countries have a vested interest in research as it leaves a permanent mark on work that result in evolution. It is actually a prearranged process of finding somewhat precise that will support in work afterward in the close future.
- Research is backbone of nearly all businesses for example manufacturing, beverage, software, healthcare, pharmaceuticals, aerospace, robotics, energy, etc.
- All have adapted research and development cells to support in improving services and product. These research sectors assist to distinguish the products and services of one business from the other so that they can score extra points and increase competitive advantage over others.

NEED OF RESEARCH IN BUSINESS AND SOCIAL SCIENCES,

- Business research can be done for everything and anything. It's about research questions to identify where to invest for growth of company and for increased sales, profits. Research is critical to make prudent and up-to-date decisions.
- Example: A company wants to launch a new model smart phone in the market. But company is not cognizant of what are the proportions of a mobile that are in greatest demand. Therefore, the company conducts business research by means of various approaches to gather data and the same is then assessed and decisions are drawn, as to what proportions are most in-demand, this will allow the investigator to make wise choices to position his smart phone at the true price in the market and so that they can acquire a larger market share.

NEED OF RESEARCH IN BUSINESS AND SOCIAL SCIENCES,

- Social sciences refer to business, market, demography, psychology, sociology, etc. It directly involves people and mainly deals with the behavior of individuals in their different roles, such clients, competitors, manufacturers, administrators, salespersons, leaders, workers, followers, tutors, students, etc. Research in social sciences deals with the organized system of determining new facts or of authenticating old actualities, their arrangement, inter-relationship, and the accepted universal laws which cover them.

OBJECTIVES OF RESEARCH

Research is an innovative accumulation to the obtainable knowledge, which is actually to contribute knowledge for its further advancement. It is an effort to follow facts through the methods of learning, opinion, judgment and experimentation. In total, research is the search for facts, by means of objective and orderly methods to find solution to a problem.

A research objective is defined as a clear and concise statement of the specific goals and aims of a research study. It outlines what the researcher intends to accomplish and what they hope to learn or discover through their research.

The objectives of research should be prudently linked to the challenging and problem statement, giving way to precise and attainable goals.

Good and Robust research objectives should use SMART objective format. Smart objective makes objectives stronger and easier to understand, which can make you more likely to achieve them. Make sure your objectives meet these criteria like-

1. Specific: Clarify the specific goal or objective you would like to achieve.
2. Measurable: Include criteria for measuring success.
3. Achievable: Set realistic and attainable objectives.
4. Relevant: Ensure they are relevant to your research.
5. Time-bound: Include a timeframe for achieving each objective.

OBJECTIVES OF RESEARCH-EXAMPLES OF RESEARCH OBJECTIVES

Research objectives can vary widely depending on the field of study and the specific research topic.

Educational Research

- To examine the impact of technology integration in the classroom on students' academic performance in mathematics.
- To determine the effectiveness of a new teaching method for improving reading comprehension in elementary school children.
- To explore the factors that contribute to student dropout rates in a particular educational institution.

Business and Marketing Research

- To evaluate consumer preferences for eco-friendly packaging materials in the cosmetics industry.
- To analyze the market potential for a new product in a specific geographical area.
- To identify the key factors influencing customer loyalty in the fast-food restaurant industry.

RESEARCH OBJECTIVES BEST PRACTICES

OBJECTIVES OF RESEARCH

- . Specific,
- Measurable,
- Achievable,
- Relevant ,
- Time Based.

Apply the SMART criteria to your research objectives:
Specific: Clarify the specific goal or objective you would like to achieve.
Measurable: Include criteria for measuring success.
Achievable: Set realistic and attainable objectives.
Relevant: Ensure they are relevant to your research.
Time-bound: Include a timeframe for achieving each objective.

PROBLEMS IN RESEARCH- RESEARCH PROBLEM

- A research problem means discovery or finding answers to queries or consolidation prevailing findings to link the knowledge gap to resolve issues.
- One of the greatest components of a study is the research problem.
- In real, the research problem ambitions the entire study; if we do not have a research problem, then we do not have to study.
- Researchers have to understand the importance of the research problem and have to exactly identify research problem.
- The faces of a research problem statement are:
  - ● It's essential to address the gap in knowledge.
  - ● It required aid in further research work too.
  - ● Essentially it should provide noteworthy contribution.
  - ● With Data collected, it must give good understanding of the problem.

RESEARCH PROBLEM

- A research question or problem must be up-front, to the point, fixated, and suitably complex to capture the most pertinent information. Follow these examples to write a problem statement:
- **Inappropriate:** What are the effects of social media on people?
- **Precise:** What effect does using Twitter everyday have on adolescents?
- In the above example, the first investigation is not exact enough to capture precise response. It’s not clear what social media we are talking about and what people or age group we are stating.

CHARACTERISTICS OF RESEARCH:

Research is a procedure of gathering, investigating and interpreting data to answer questions. Nonetheless to meet the requirements as research, the method must have certain characteristics: essentially, as far as possible, it should be rigorous, systematic, methodical, valid and verifiable, empirical and critical.

Characteristics of Research:

1. **Systematic and Rigorous:** Systematic suggests that the techniques implemented to undertake the study follow a certain reasonable and logical arrangement and sequence. The diverse steps cannot be engaged in a chaotic way. Some proper measures must tail others. Here rigorous means we must be reliable in confirming that the procedures followed to find answers to questions are applicable, fitting and are justified.
2. **Valid and Verifiable:** It infers that whatever we achieve on the basis of our conclusions is correct and can be verified by researcher himself and others too.
3. **Empirical:** This characteristic which confirms inferences drawn are based on evidence collected from data collected from factual natural life practices or observations.
4. **Critical:** Examination of the procedures used and the systems employed is crucial to a research investigation. The process of investigation must be fool proof and restrict weaknesses. The procedure adopted and the measures used must be able to withstand critical scrutiny.

THANK YOU

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