Methodology

I- **Basic concept of scientific research**

Definition:

Scientific research is defined as **the systematic** investigation of scientific theories and hypotheses.

It is a **dynamic process** of a rational approach to verify hypotheses, observe and examine phenomena, solve problems, and to obtain precise answers.

It is designed to produce, develop and contribute to generalizable knowledge. This process is characterized by the fact that it is systematic, rigorous and leads to the acquisition of new knowledge.

example: in economics an statistics, it means using data, models, and analysis to understand social and economic behavior.

- **Main characteristics**:

1- Systematization: Attempting to collect all the relevant data or collecting data in a systematic and organized way (step by step process, not random) so that the conclusions drawn are reliable, generalisation of theories or models

Example : studing the effect of inflation on household spending requires a planned survey (case study).

2- Objective Approach: The scientific method is objective. It relies on facts and data, not opinion.

Example: using regression analysis to test the relationship between unemployment and GDP.

3- Empirical Observation: The scientific method is empirical; it relies on **direct observation** of the world, and experiments.

Example:

Collecting data from national statistics office. (word bank ……)

Collecting data or information about company bay conducting a case study .

4- Replicable Experiments: Scientific experiments are replicable; duplicated experiment gives the same results. Scientists are supposed to publish enough of their method so that another person, with appropriate training, could replicate the results.

Example: using the same dataset and methodology in another country.

General characteristics :

- Rigor: A good theoretical base and a sound methodological design add rigor to a purposive study. Rigor connotes carefulness, scrupulousness, and the degree of exactitude in research investigations.
- Verifiable or observable evidence: Factual observations can see and check.
- Purposive investigation: It is not merely a compilation of the information but a purposive investigation or search for a solution to a problem
- Accuracy: Describing what really exist. Truth or correctness of a statement or describing things exactly as they are
- Scientific Precision: Making it as exact as necessary. It avoids colourful literature and vague meanings. It requires applying some tools of data analysis
- Finding answer: It aims at finding answer to a question, or solution to a problem

Research Methodology vs Research Method

Research methodology

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

Research methods

- All the methods used by a researcher during a research study (the various procedures, schemes, tools, etc.)
- They include methods of data collection and data analysis.
- Particularly, scientific research methods call for explanations based on collected facts, measurements and observations and not on reasoning alone.

This table summarizes the differences between them:

Research methods	Research methodology
• Research methods are the methods used by researchers to collect data from researching a particular research topic. • The objective is to find a solution. • Research methods are useful to apply during the latter stage of research process. • It is a small part of research methodology. • It consists of various techniques where various studies and experiments are used to conduct research and reach an appropriate conclusion. (It consists of different investigation techniques.) • It includes of carrying out an experiment, survey, test and so on.	• A research methodology is a systematic approach to solve the research problem and to reach a new conclusion. • The objective is to determine the solution by applying correct procedures of research. • Research methodologies are applied in the initial stage of the research being conducted. • 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. • It is systematic strategy to achieve the decided objectives

II- Types of scientific research methodology:

- Classification by Research Goal (Purpose-Based Classification)
- Classification by Data Nature (Data-Based Classification)

1- Classification by Research Goal (Purpose-Based Classification) 🎯

These are the three fundamental frameworks used by researchers across various disciplines.

Arabic Term	English Translation	Detail and Application
المنهج الوصفي	**Descriptive Method**	Aims to **describe** a phenomenon or problem as it exists in reality. It focuses on gathering facts, characteristics, and patterns without exploring cause-and-effect. **Example:** A **survey** to determine the average age, income, and spending habits of customers in a specific market segment.
المنهج التجريبي	**Experimental Method**	Aims to establish a definitive **cause-and-effect relationship** between variables by controlling the research environment. This involves manipulating an independent variable to see its effect on a dependent variable. **Example:** Testing how a new drug (independent variable) affects a disease (dependent variable) by comparing a treatment group to a control group.
المنهج التاريخي	**Historical Method**	Aims to **study and analyze past events** and phenomena to understand current conditions and predict future trends. It relies on primary and secondary historical sources. **Example:** Analyzing political and economic decisions leading up to the Great Depression to draw lessons for modern policy.

2. Classification by Data Nature (Data-Based Classification)

This classification determines the type of evidence collected and the analytical techniques used.

Arabic Term	English Translation	Detail and Application
المنهج الكمي	**Quantitative Method**	Relies on **numerical data** and **statistical analysis** (e.g., means, regressions) to test theories and generalize findings to a larger population. Focuses on answering "What?" and "How much?". **Example:** Using **econometrics** to quantify the impact of a country's GDP growth on its unemployment rate.
المنهج النوعي / الكيفي	**Qualitative Method**	Relies on **non-numerical data** (e.g., text, interviews, observations) to gain an **in-depth understanding** of a phenomenon, context, or underlying motivations. Focuses on answering "Why?" and "How?". **Example:** Conducting **in-depth interviews** with political leaders to understand their decision-making process during a fiscal crisis.
المنهج المختلط	**Mixed Methods**	**Combines both quantitative and qualitative methods** in a single study. This approach leverages the breadth of numerical data and the depth of contextual understanding. **Example:** Using a large-scale survey (Quant.) to identify general trends in job satisfaction, followed by **focus groups** (Qual.) to explore *why* employees feel a certain way.