

A problem statement is not just a simple question but a declaration of a research problem observed in the state of the art and which has not yet been resolved. This statement is followed by a research question and a resulting hypothesis.

What is a research problem statement?

It is considered as the guiding cord or compass of the research work. It essentially defines the specific direction in which the research is supposed to go.

It represents the most important part of a research work. It indicates what the author aims to achieve in his research.

### 1-Research Problem

The problem statement is a set of ELEMENTS allowing to present a flaw or gap in existing knowledge:

2-Research Question

3-Hypothesis or Objective

### The research problem

It is *what we do not know* and therefore seek to find out. This problem concerns the major issues of the work as well as the intentions of the researcher.

It is the *affirmative form* of the problem statement which describes what research problem needs to be solved.

### The research question

It is the interrogative form of the problem statement. It is the central question that often consists of several sub-questions of descriptive and/or explanatory research.

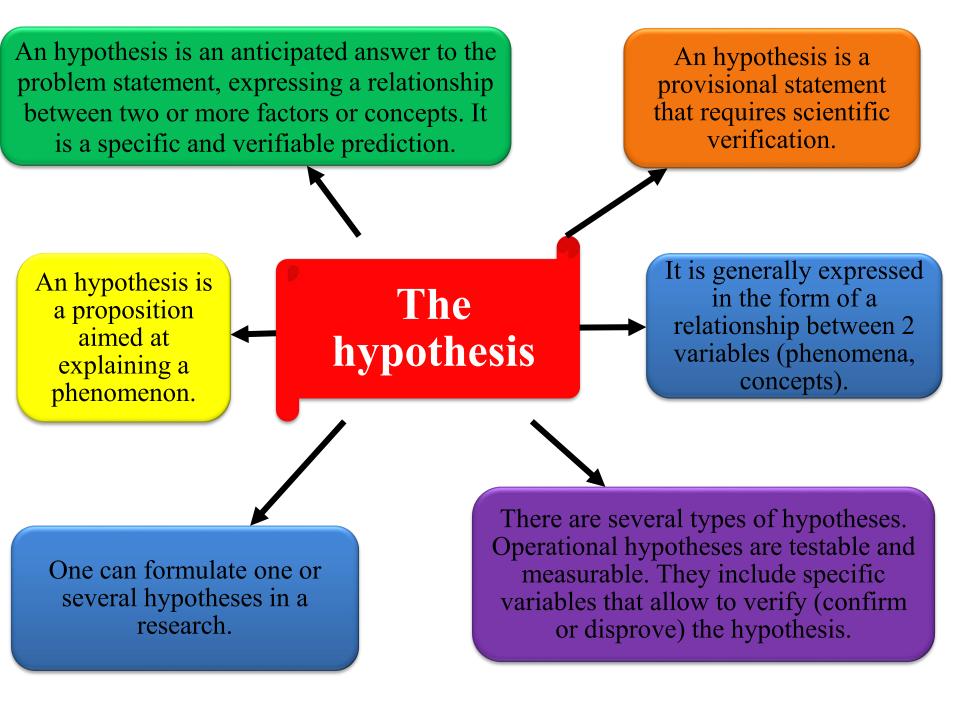
#### Example of a central question:

What is the impact of the microclimate on the thermoaerodynamic behavior of transitional spaces in a hot and arid climate?

#### **Example of sub-questions:**

What does thermo-aerodynamic behavior consist of?

What are the advantages and limitations that a transitional space in a hot and arid climate can bring?



At the end of the problem statement, it is necessary to formulate a hypothesis or an objective, preferably a hypothesis, if it is logically and empirically possible.

We set an objective when there is neither theory nor facts to rely on to specify the meaning of the relationship.

Like the hypothesis, the objective must stem from the problem statement.

Hypothesis or Objective?

A researcher who merely sets an objective when they have the opportunity to formulate a hypothesis commits a significant methodological error.

#### **Example of a hypothesis:**

The present study aims to verify the hypothesis that the number of men working in the construction sector is higher than that of women in the wilaya of Jijel.

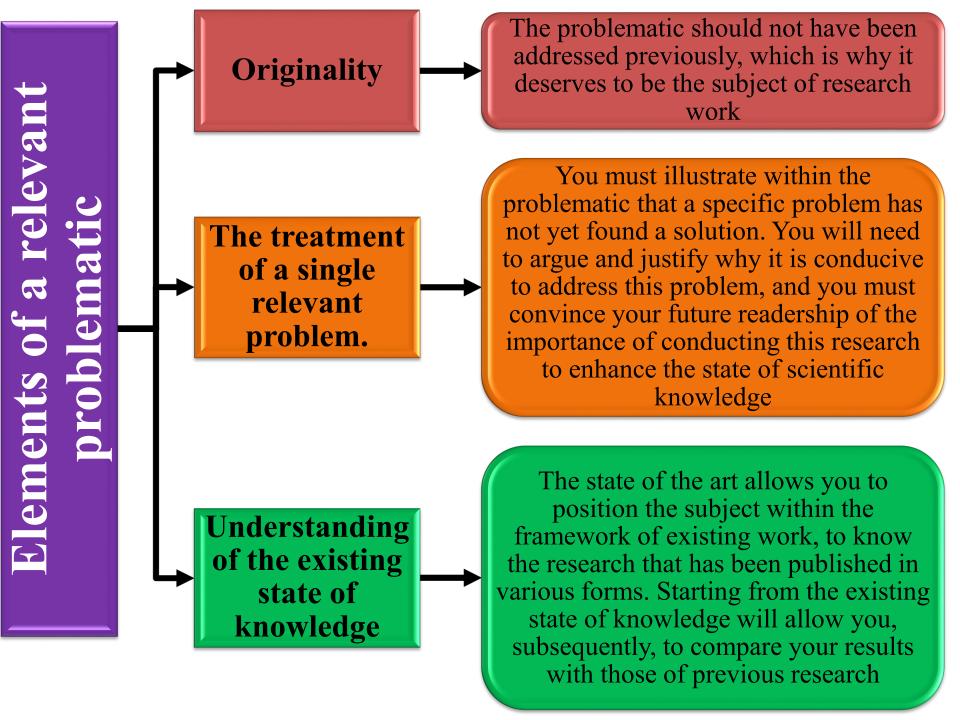
#### Example of an objective:

The objective of this research is to demonstrate that the number of employees in the construction sector is influenced by gender in the wilaya of Jijel.

# Difference between problem and problematic.

A problem is a question to solve, an obstacle to remove, a subject of controversy, etc.

A problematic is the set of problems related to a specific subject. It carries a central question to which you respond in your research work.



# How to search for a research problem?

First and foremost, it is important to know that without a knowledge gap, there is no scientific research.

There are several methods to arrive at identifying a research problem:

Review of narrative literature

Review of systematic literature

Limitations of the studies

Meta-analysis

# Method of Narrative Literature Review

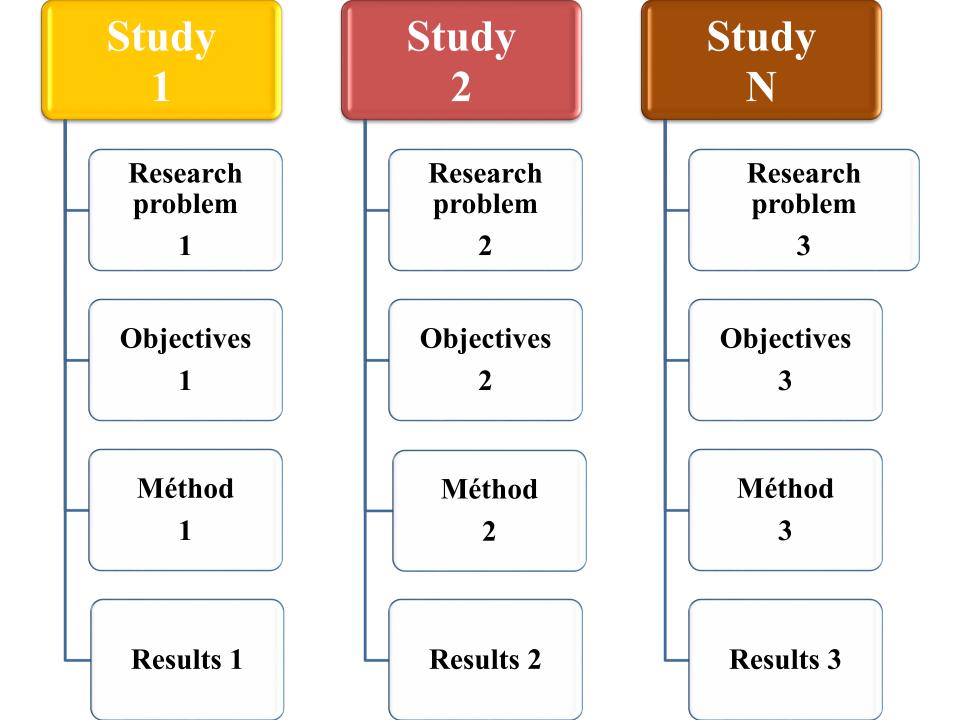
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Begin the literature review by starting from the most general to the most specific, reducing the studies to the most interesting on which you will focus.

This method is sometimes called the FUNNEL method.



Establish a comparative summary table in which you should include the objectives, issues, methods, results, and discussions.



# Perform a critical analysis of the studies

Define the shortcomings of each study. Identify disagreements among researchers. Establish a synthesis.

Identify a knowledge gap

The synthesis of the critiques of these studies clearly leads to the identification of a knowledge gap. Furthermore, if you observe that researchers have obtained different results, you can conduct research to resolve this controversy.

Formulate the research problem

If you manage to clearly identify a knowledge gap and a problem that arises from it, your problem is satisfactory.

# Method of Systematic Literature Review

#### **Definition:**

A systematic literature review is a methodical and comprehensive approach to gathering and analyzing existing research on a particular topic or research question. Unlike traditional literature reviews, which may be more informal and less structured, systematic reviews follow a strict protocol to ensure that all relevant studies are included and analyzed in a transparent and reproducible manner. This process involves clearly defining the research question, searching for relevant studies, selecting studies based on predetermined criteria, extracting data from selected studies, and synthesizing the findings to draw meaningful conclusions.

#### **Resources and Tools for Conducting a Systematic Literature Review:**

There are several resources and tools available to help researchers conduct a systematic literature review. One essential resource is academic databases such as PubMed, Scopus, and Web of Science, which provide access to a vast array of scholarly articles, journals, and other publications. These databases allow researchers to search for relevant literature using keywords, author names, publication dates, and other search criteria. In addition to academic databases, reference management tools like EndNote, Mendeley, and Zotero can help researchers organize, annotate, and cite the literature they collect for their review.

### Softwares that help for literature review and data analysis:

**VOSviewer** is a software tool that is commonly used in bibliometric and scientometric research to visualize and analyze complex networks of scholarly literature.

- -VOSviewer is designed to help researchers gain insights into the structure and dynamics of scientific fields. It allows users to create visualizations of bibliometric data, such as co-citation and co-authorship networks, to identify key research themes, influential authors, and emerging trends within a specific research area. One of the main features of VOSviewer is its ability to generate visualization maps that represent the relationships between different elements in a network.
- -VOS stands for 'Visualization Of Similarities',

## **Method of Study Limitations**

Review the final paragraphs of the conclusions of scientific articles to identify the study's limitations and future research perspectives or recommendations.

List the problems and questions that have not been fully or partially addressed.

Formulate your research problem to embark on a study aimed at addressing these gaps.

### Method of Meta-analysis

Meta-analysis is a statistical technique used in research to combine the results of multiple studies on a specific topic to produce a single overall estimate. By synthesizing the findings from various studies, researchers can gain a more comprehensive understanding of the subject matter and draw more robust conclusions. Meta-analysis allows for the pooling of data from different sources, which can help identify patterns, trends, and inconsistencies that may not be apparent in individual studies.

Here are the main steps to follow:

Collect Studies: that have investigated the same or similar research question.

**Extract Data:** Relevant data from each study, such as effect sizes, sample sizes, and other pertinent information, are extracted.

Calculate Effect Sizes: Researchers calculate effect sizes for each study. Effect sizes quantify the magnitude of the relationship between variables or the difference between groups.

Weighting Studies: Studies are weighted based on factors such as sample size and quality, with larger and more rigorous studies typically receiving more weight.

**Combine Results:** The effect sizes from individual studies are combined using statistical techniques, such as weighted averages, to obtain an overall estimate of the effect size.

**Assess Heterogeneity:** Researchers assess the heterogeneity or variability among the effect sizes of individual studies. This helps determine if the studies are sufficiently similar to warrant combining their results.

**Interpretation:** The results of the meta-analysis are interpreted, taking into account the combined effect size, confidence intervals, and any heterogeneity observed.

#### INTRODUCTION OR CONTEXT SETTING

Provide an overview of the issue (What is known about the phenomenon under study) and demonstrate the interest you have in the research theme by situating it within the current context of research and scientific knowledge in the field. This involves briefly introducing and framing the subject (theme + interest + general problem) while referencing key literature.

### STATE THE RESEARCH PROBLEM OR THE RESEARCH QUESTION

Express the gap

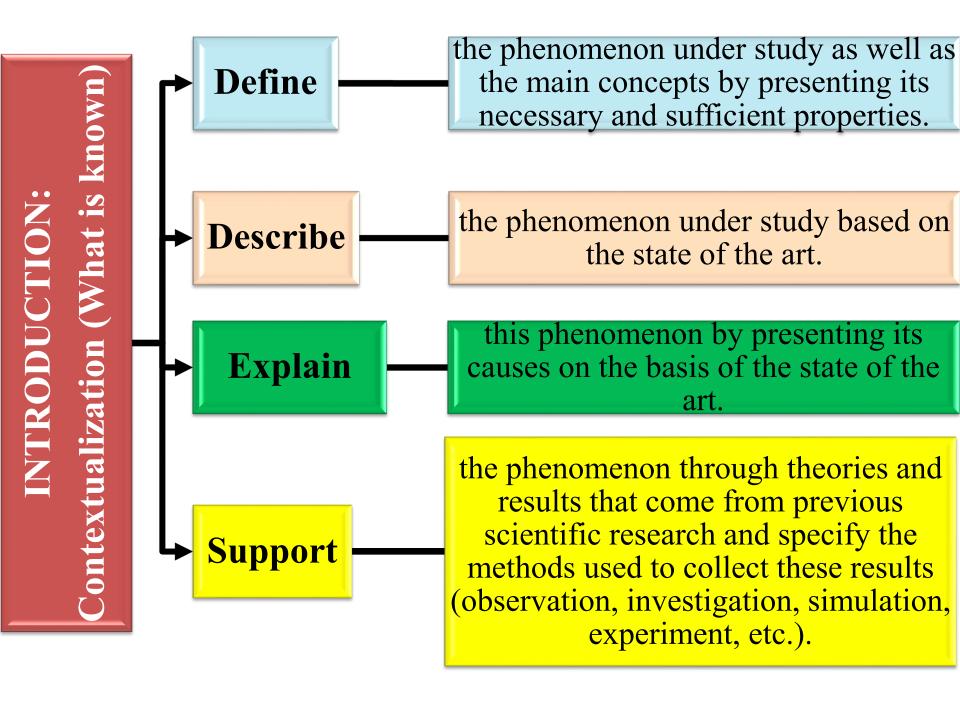
Demonstrate the relevance of addressing this gap

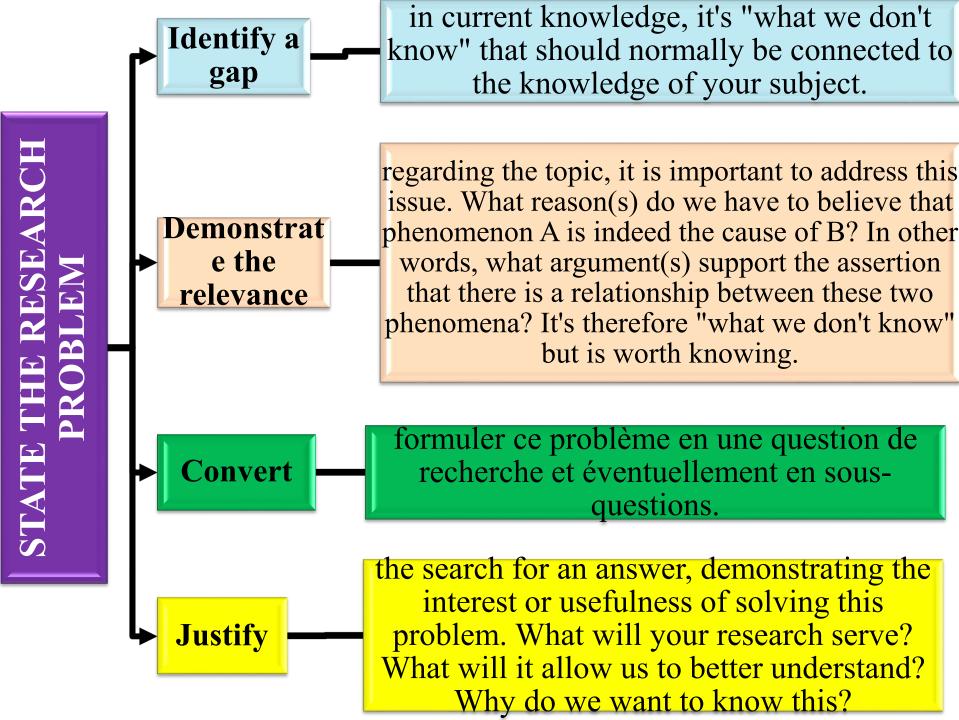
Pose the main research question and the subquestions

Justify the search for a solution

### CONCLUSION

Formulate the Hypothesis(es) or Objective(s)





Formulate a hypothesis (a provisional solution to your Alterna problem) or more.

tively

Formulate objectives

Formulate a provisional solution to your problem in the form of hypotheses or objectives. An hypothesis is a provisional statement to be verified. Is this statement true or false? Therefore, the verification of the hypothesis (or the achievement of the objective) constitutes the primary goal of any research.