

How to write a problem statement?

1. Contextualize the problem

Practical research problem

- Where and when does the problem arise?
- Who does the problem affect?
- What attempts have been made to solve the problem?
- Has it been an issue for a long time?
- What research has already been done?
- Have any solutions been proposed?

Theoretical research problems

- What is already known about the problem?
- Is the problem limited to a certain time period or geographical area?
- How has the problem been defined and debated in the scholarly literature?

- What are the current debates about the problem?
- What is missing from these debates?

2. Make a detailed description

- What the research will address
- What do we need to know?

3. Relevance. Why does it matter?

Specificity and relevance

- What particular place, time and/or people will be the focus?
- What aspects will not be possible to tackle?
- What will be the consequences if the problem is not resolved?
- Who will benefit from resolving the problem (e.g. the management of an organization or future researchers)?

Practical research problem

- What will happen if the problem is not solved?
- Who will feel the consequences?
- Does the problem have wider relevance (e.g. are similar issues found in other contexts)?

Theoretical research problems

- How will resolving the problem advance understanding of the topic?
- What benefits will it have for future research?
- Does the problem have direct or indirect consequences for society?

4. Formulate research questions

- Focus on practical problems for contributing to change?
- Focus on theoretical problems for expanding knowledge?

The most critical part of a research proposal, defining the proposal
Make sure each individual word of the research question has been researched, conceptualized and carefully stated

Form evocative innovative questions

Timely: extracted from very contemporary social or theoretical concerns

Can be framed as a provocative paradox

Research questions should be **Accurate, Clear, Evocative, Timely, Researchable, Attainable, Realistic**

5. Set aims and objectives

The aim is the overall purpose of the research

The objectives are the concrete steps to achieve the aim

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Objectives, just like research questions, should be SMART:

Specific, Measurable, Attainable, Realistic, Time-bound

- Specific: Not a "fishing expedition"
- Measurable: Testable (statistically)
- Attainable: Something that "we" can do.
- Realistic
- Time-bound: Can be done within the project time period
- Important
- Meaningful, whether the answer is "Yes" or "No."

HYPOTHESIS

A hypothesis is an educated guess.

A **scientific hypothesis** must meet two criteria:

- **It must be testable.**
 - It must be possible to make observations that agree or disagree with the hypothesis.
 - "*There are invisible creatures all around us that we can never observe in any way.*" is not testable.
- **It must be falsifiable.**
 - It must be possible to show that the hypothesis is false if it really is false.
 - If a hypothesis really is false, it should be relatively easy to disprove it.
 - It takes just one exception to disprove a hypothesis.
 - "*There are other planets in the universe where life exists*" and "*All ravens are black*" are not falsifiable because we cannot observe all possible planets and birds. Check induction.
- It is not possible to prove a hypothesis to be true. Although you can't prove conclusively that a hypothesis is true, the more evidence you gather in support of it, the more likely it is to be true.

A hypothesis states the predictions about what the research will find. It is a tentative answer to your research question that has not yet been tested.

1. **Formulate a hypothesis.** This starts with asking a question. The answer is the beginning of a hypothesis statement.
2. **Do preliminary research.** Look for theories and previous research to make assumptions of what you might find.
3. **Formulate a specific and testable hypothesis.**
 - Identify variables and their potential relationships.
4. **Refine hypothesis.**
 - Terms should be clearly defined.
 - Variables should be relevant.
 - State which groups are being studied.
 - State what the predicted outcome is.
5. **Hypothesis phrasing (in 3 ways).**
 - **Cause & effect.** Identify variables by simple prediction in *if...then* form.
 - **Effect direction.** Phrase hypothesis in terms of *correlations or effects*. State what the predicted relationship between variables are.
 - **Difference.** Comparisons between groups by looking at differences between them.

6. State null hypothesis – H_0 .

- For statistical hypothesis testing. Default position that there is no association between the variables.
- The alternative hypothesis, H_1 , states that there is an association and often in which direction.

Hypotheses proposes a relationship between two or more variables.

- The independent variable (the cause) is something you can change or control.
- The dependent variable (the effect) is something you can observe and measure.
- For example: CHIKV causes acute febrile illness.

Hypothesis examples

Research question	Hypothesis	Null hypothesis
What are the health benefits of eating an apple a day?	Increasing apple consumption in over-60s will result in decreasing frequency of doctor's visits.	Increasing apple consumption in over-60s will have no effect on frequency of doctor's visits.
Which airlines have the most delays?	Low-cost airlines are more likely to have delays than premium airlines.	Low-cost and premium airlines are equally likely to have delays.
Can flexible work arrangements improve job satisfaction?	Employees who have flexible working hours will report greater job satisfaction than employees who work fixed hours.	There is no relationship between working hour flexibility and job satisfaction.
How effective is high school sex education at reducing teen pregnancies?	Teenagers who received sex education lessons throughout high school will have lower rates of unplanned pregnancy than teenagers who did not receive any sex education.	High school sex education has no effect on teen pregnancy rates.
What effect does daily use of social media have on the attention span of under-16s?	There is a negative correlation between time spent on social media and attention span in under-16s.	There is no relationship between social media use and attention span in under-16s.

RESEARCH OBJECTIVES

- Research objectives should be closely related to the problem statement.
- They should summarize what you hope will be achieved by the study.
- Writing your research objectives clearly helps to:
 - Define the focus of your study
 - Clearly identify variables to be measured
 - Indicate the various steps to be involved
 - Establish the limits of the study
 - Avoid collection of any data that is not strictly necessary.
- Objectives can be general or specific.
 - The **general objective** of your study states what you expect to achieve in general terms.
 - **Specific objectives** break down the general objective into smaller, logically connected parts that systematically address the various aspects of the problem.
 - Specific objectives should specify exactly what you will do in each phase of your study, how, where, when and for what purpose.
- **Use action verb that are specific enough to be measured, e.g. to compare, to calculate, to assess, to determine, to verify, to calculate, to describe, to explain, etc.**

- **Avoid vague non-active verbs such as: to appreciate, to understand, to believe, to study,** etc., because it is difficult to evaluate whether they have been achieved.

TABLE 3.1 COMMONLY USED TERMS RELATED TO RESEARCH AIMS

Term	Definition
Research aim	A statement indicating the general aim or purpose of a research project. Usually a research project will have only one broad aim
Research objectives	Specific statements indicating the key issues to be focused on in a research project. Usually a research project will have several specific research objectives
Research questions	An alternative to research objectives, where the key issues to be focused on in a research project are stated in the form of questions
Research hypotheses	A prediction of a relationship between two or more variables, usually predicting the effect of an <i>independent variable</i> on a <i>dependent variable</i> . The independent variable is the variable assumed to have causal influence on the outcome of interest, which is the dependent variable

What Does the SMART Acronym Stand For?

Specific: Define your objectives clearly, in detail, leaving no room for misinterpretation. Think of the five w's (who, what, when, where, and why).

Measurable: State the measures and performance specifications you'll use to determine whether you've met your objectives.

Achievable or Attainable: Choose objectives that the team has a reasonable expectation of successfully completing.

Realistic: Set objectives the project team believes it can achieve. Relevant objectives align with group or company goals.

Time-bound: Include the date or specific period by which you'll achieve the objectives.

If you're interested in creating S.M.A.R.T. goals, use our [template](#) as a guide.

Objectives and Indicators

In some project management guides, you may also find reference to objectives and indicators. This is a different way of expressing the S.M.A.R.T. criteria. An objective may be stated as, Children in x county shall read better. The indicators would be, 60 percent of children under age 13 read at the appropriate reading level for their age.

The acronym stands for:

S – Specific

When setting a goal, be specific about what you want to accomplish. Think about this as the mission statement for your goal. This isn't a detailed list of how you're going to meet a goal, but it should include an answer to the popular 'w' questions:

- Who – Consider who needs to be involved to achieve the goal (this is especially important when you're working on a group project).

- What – Think about exactly what you are trying to accomplish and don't be afraid to get very detailed.
- When – You'll get more specific about this question under the "time-bound" section of defining SMART goals, but you should at least set a time frame.
- Where – This question may not always apply, especially if you're setting personal goals, but if there's a location or relevant event, identify it here.
- Which – Determine any related obstacles or requirements. This question can be beneficial in deciding if your goal is realistic. For example, if the goal is to open a baking business, but you've never baked anything before, that might be an issue. As a result, you may refine the specifics of the goal to be "Learn how to bake in order to open a baking business."
- Why – What is the reason for the goal? When it comes to using this method for employees, the answer will likely be along the lines of company advancement or career development.

M – Measurable

What metrics are you going to use to determine if you meet the goal? This makes a goal more tangible because it provides a way to measure progress. If it's a project that's going to take a few months to complete, then set some milestones by considering specific tasks to accomplish.

A – Achievable

This focuses on how important a goal is to you and what you can do to make it attainable and may require developing new skills and changing attitudes. The goal is meant to inspire motivation, not discouragement. Think about how to accomplish the goal and if you have the tools/skills needed. If you don't currently possess those tools/skills, consider what it would take to attain them.

R – Relevant

Relevance refers focusing on something that makes sense with the broader business goals. For example, if the goal is to launch a new product, it should be something that's in alignment with the overall business objectives. Your team may be able to launch a new consumer product, but if your company is a B2B that is not expanding into the consumer market, then the goal wouldn't be relevant.

T – Time-Bound

Anyone can set goals, but if it lacks realistic timing, chances are you're not going to succeed. Providing a target date for deliverables is imperative. Ask specific questions about the goal deadline and what can be accomplished within that time period. If the goal will take three months to complete, it's useful to define what should be achieved half-way through the process. Providing time constraints also creates a sense of urgency.

The Easiest Way to Write SMART Goals

When it comes to writing SMART goals, be prepared to ask yourself and other team members a lot of questions. The answers will help fine-tune your strategy, ensuring the goals are something that's actually attainable. While you should be as realistic as possible, it's important to approach writing SMART goals with a positive attitude. After all, this is something that you want to achieve.