Dr nourhane groun Nourhane.groun@univ-biskra.dz

Mohamed Khider University of Biskra

Faculty Economic Sciences, Management and Commercial Sciences
first-year Master of Business Management & RHM

Course: Methodology of Graduation Thesis Preparation.

# Lecture N 05

# Formulating the Research Problem and Research Hypotheses

**Introduction:**

The Research Problem represents the starting point of any scientific study, while Research Hypotheses translate the research problem into testable scientific statements.

**First: Concept of the Research Problem**

The Research Problem is a clear and specific scientific question that reflects a knowledge gap or an unexplained phenomenon requiring systematic investigation.

**Characteristics of a Good Research Problem:**

- Clarity and precision.
- Feasibility and measurability.
- Relevance to the research field.
- Scientific and practical significance.

**Second: Sources of the Research Problem:**

- Previous studies and literature.
- Practical experience and field observation.
- Reports and statistical data.
- Social, economic, or technological changes.

**Third: Formulating the Research Problem**

The research problem is fundamentally a structured logical reasoning process, not simply the formulation of a question.

It is a structured process that begins with presenting the study phenomenon and logically progresses toward the main research question.

**Step 1: Presenting the Study Phenomenon (Dependent Variable)**

The formulation begins with introducing the study phenomenon, which represents the dependent variable.

The researcher explains:

- What the phenomenon is.
- Its importance in theory and practice.
- Its relevance within the field of study.

**Example:**

If the dependent variable is organizational performance, the researcher first explains the concept of performance, its dimensions, and its importance for organizations.

**Step 2: Identifying the Problem within the Phenomenon**

After presenting the phenomenon, the researcher highlights the specific issue or challenge related to it.

For example:

Organizations seek to improve performance, yet many face declining efficiency, competitiveness, or productivity.

This stage clarifies what needs to be improved, explained, or solved in the dependent variable.

**Step 3: Introducing a Potential Explanatory Factor (Independent Variable)**

Next, the researcher introduces a potential explanatory or influencing factor (independent variable) that may help address the identified problem.

For example:

Digital transformation is increasingly considered a strategic tool that may enhance organizational performance.

Here, the independent variable is presented as a possible factor that could influence or improve the dependent variable.

**Step 4: Formulating the Main Research Question**

Only after the first three logical steps (phenomenon → problem → explanatory factor) does the researcher formulate the main research question.

Examples of Main Research Questions

- What is the impact of digital transformation on organizational performance?
- How does digital transformation affect organizational performance?
- What is the role of leadership in enhancing organizational performance?
- What is the importance of innovation in improving organizational competitiveness?
- What is the relationship between employee engagement and organizational performance?
- How are digital transformation and productivity correlated?

**Terminology, Usage, and Grammar Notes:**

**Impact / Effect:**

- Describe the influence of one variable on another.
- Always use “on”:
  - *The impact of X on Y.*
  - *The effect of X on Y.*

**Role / Importance / Contribution:**

- Describe the function, significance, or contribution of a variable.
- Use “in”:
  - *The role of leadership in improving performance.*
  - *The importance of innovation in organizational success.*

**Relationship / Correlation:**

- Describe how two variables are associated or related.
- Use “between” for relationships:
  - *The relationship between employee engagement and performance*
- Use “correlated” to indicate statistical association:

- *Digital transformation is positively correlated with productivity*

**Key Tip for Choosing Terms:**

- Impact / Effect: When testing or measuring influence.
- Role / Importance / Contribution: When discussing function or significance.
- Relationship / Correlation: When exploring associations or links between variables

**Fourth: Research Hypotheses**

A Research Hypothesis is a tentative and testable statement predicting a relationship between two or more variables.

- **Characteristics of a Good Hypothesis:**
- **clarity and precision** in formulation.
- **Testability through empirical methods.**
- **Logical consistency with the research problem.**
- **Structural consistency with the research problem variables:**

The hypothesis must include the same variables identified in the research problem, maintaining the same positioning. The independent variable in the research problem must remain the independent variable in the hypothesis, and the dependent variable must remain the dependent variable.

- **Falsifiability:**
  The hypothesis must be capable of being accepted or rejected based on empirical evidence.

**Fifth: Types of Research Hypotheses**

**1. Methodological (Research) Hypotheses**

- **Null Hypothesis (H0):** There is no significant impact of digital transformation on organizational performance.
- **Alternative Hypothesis (H1):** There is a significant impact of digital transformation on organizational performance.

**2. Statistical Hypotheses**

These hypotheses express the same impact relationship in statistical terms and are tested using quantitative analysis.

- **Statistical Null Hypothesis (H0):** Digital transformation has no statistically significant impact on organizational performance.
- **Statistical Alternative Hypothesis (H1**): Digital transformation has a statistically significant impact on organizational performance at a significance level of 0.05.

**Important Methodological Note:**

In social sciences and humanities, hypotheses are generally accepted or rejected based on a significance level of 5% ($\alpha = 0.05$).

A significance level of 0.05 means that there is a 5% probability of committing a Type I error (rejecting a true null hypothesis), and it corresponds to a 95% confidence level.

In other words, when $\alpha = 0.05$, the researcher works with 95% confidence in the results.

In exact sciences, however, hypotheses are often evaluated using stricter error thresholds, where acceptance or rejection depends on lower probability levels of error.

**Sub-Questions and Sub-Hypotheses:**

Each main research question can be broken down into sub-questions.

Sub-questions allow the researcher to explore specific dimensions or indicators of the independent or dependent variables.

For each sub-question, a corresponding sub-hypothesis can be formulated.

**Example:**

**Main Research Question**:

- What is the effect of digital transformation on organizational performance?

**Sub-Questions:**

1. What is the effect of digital transformation on employee productivity?
2. What is the effect of digital transformation on service quality?
3. What is the effect of digital transformation on decision-making efficiency?

**Main Hypothesis:**

- H1: Digital transformation has a positive effect on organizational performance.

**Sub-Hypotheses:**

- H1: Digital transformation has a positive effect on employee productivity.
- H2: Digital transformation has a positive effect on service quality.
- H3: Digital transformation has a positive effect on decision-making efficiency.

**Main Hypothesis (Statistical):**

- **Null Hypothesis (H0):** Digital transformation has no statistically significant effect on organizational performance at $\alpha = 0.05$.
- **Alternative Hypothesis (H1):** Digital transformation has a statistically significant positive effect on organizational performance at $\alpha = 0.05$.

**Sub-Hypotheses (Statistical):**

**Hypothesis 01:**

- **Null Hypothesis (H0a):** Digital transformation has no statistically significant effect on employee productivity at $\alpha = 0.05$.
- **Alternative Hypothesis (H1a):** Digital transformation has a statistically significant positive effect on employee productivity at $\alpha = 0.05$.

**Hypothesis 02:**

- **Null Hypothesis (H0b):** Digital transformation has no statistically significant effect on service quality at $\alpha = 0.05$.
- **Alternative Hypothesis (H1b):** Digital transformation has a statistically significant positive effect on service quality at $\alpha = 0.05$.

**Hypothesis 03:**

- **Null Hypothesis (H0c):** Digital transformation has no statistically significant effect on decision-making efficiency at $\alpha = 0.05$.
- **Alternative Hypothesis (H1c):** Digital transformation has a statistically significant positive effect on decision-making efficiency at $\alpha = 0.05$.

**Explanation:**

- Each main research question should have a corresponding main hypothesis, and each sub-question should have a corresponding sub-hypothesis. This is a fundamental methodological rule that ensures all hypotheses are derived logically from the research questions.
- Dividing variables into dimensions helps operationalize them. Whether dividing the dependent or independent variable, each dimension should have sub-questions and sub-hypotheses that reflect measurable indicators.
- Sub-questions focus on indicators or dimensions of the main variables. They can be based on the dependent variable, as in our example (employee productivity, service quality, decision-making efficiency), or on the independent variable, which is a commonly used approach in many studies.
- Each dimension of a variable corresponds to one sub-question, and each sub-question corresponds to one sub-hypothesis. Therefore:

Number of dimensions=Number of sub-questions=Number of sub-hypotheses

- The research model (conceptual framework) is the primary guide for writing both the main hypothesis and the sub-hypotheses. It ensures that:
    - Variables, dimensions, and indicators are systematically linked.
    - Hypotheses remain consistent with the theoretical and empirical structure of the study.