Mohamed Khider University of Biskra

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

Course: Methodology of Graduation Thesis Preparation.

Lecture N 04

Dependent and Independent Variables

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Introduction

Understanding research variables and the proper formulation of the research problem is fundamental to conducting sound scientific research. These elements form the logical foundation that connects the research topic, research problem, and hypotheses in a coherent and testable framework.

1/ The Concept of a Variable

A Variable is any characteristic, attribute, or phenomenon that can vary and can be measured, observed, or controlled in a research study.

2/ Independent Variable

The Independent Variable is the variable that the researcher assumes to be the cause or influencing factor. It is used to explain changes in another variable.

The independent variable is the cause. Its value is independent of other variables in your study.

Characteristics of the Independent Variable:

- It influences other variables but is not influenced by them within the research model.
- It is selected or manipulated by the researcher.
- It logically and temporally precedes the dependent variable.

3/ Dependent Variable:

The Dependent Variable is the variable that is affected by the independent variable and represents the outcome or result the researcher aims to explain.

It reflects the core phenomenon being investigated.

The dependent variable is the effect. Its value depends on changes in the independent variable.

Characteristics of the Dependent Variable:

- It changes as a result of variations in the independent variable.

- It represents the main phenomenon under investigation.
- It reflects the outcomes of the research.

4/ Relationship Between Independent and Dependent Variables

- Cause Effect.
- Influencing factor Outcome.
- Explains Is explained.

5/ mediating variable (or mediator):

is a variable that explains the mechanism through which an independent variable influences a dependent variable.

The mediator **transmits the effect** from the independent variable (IV) to the dependent variable (DV).

6/ Moderating Variables:

These are variables that affect the strength or direction of the relationship between IV and DV. They explain when or under what conditions an effect occurs.

7/Confounding / Control Variables:

Variables that may influence both IV and DV and distort or obscure the true relationship.

Often discovered in advanced stages of research, leading the researcher to refine the research problem or generate a new research problem incorporating the confounding variable.

8/ Dimensions (Dimensions)

Represent different aspects or sub-components of a variable, especially broad or conceptual variables.

Dimensions can themselves be considered as independent or dependent variables in sub-analyses.

They allow for the development of sub-questions and sub-hypotheses.

9/ Indicators:

The smallest measurable elements derived from dimensions.

They allow researchers to quantify and empirically test variables.

A variable can be split into dimensions, which are then divided into indicators, or directly into measurable indicators.

10/ Designing a Research Model

A research model (or **Conceptual Framework**) is a visual representation that illustrates the expected relationships between variables. It acts as the blueprint for your entire study.

A research model is not just a drawing; it is a **theoretical claim**. Every arrow must be justified by a solid rationale or a gap in previous literature.

1. Core Components of the Model:

Variables: The main concepts or constructs being studied.

Dimensions: The sub-elements that define a complex variable.

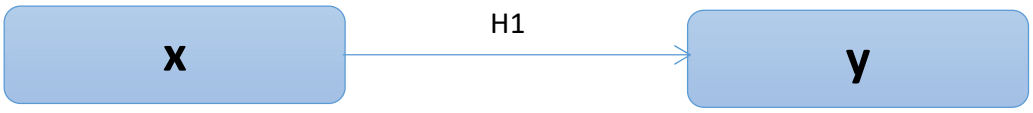
Hypotheses (Paths): Represented by arrows showing the predicted direction of influence.

2. Types of Variables & Their Roles:

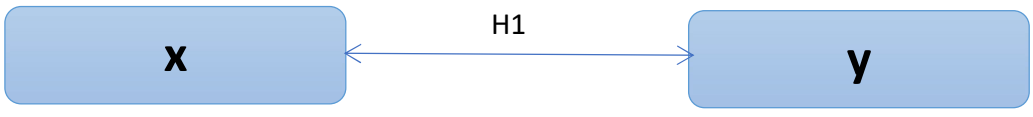
Variable Type	Role in the Model	Visual Position
Independent (IV)	The cause or predictor; the variable you manipulate.	On the **Left** side.
Dependent (DV)	The effect or outcome; the variable you measure.	On the **Right** side.
Mediating (MV)	The "middleman" that explains the mechanism of the relationship.	Placed **between** the IV and DV.
Moderating (MoV)	A factor that changes the strength or direction of the relationship.	Points an arrow to the **connection** between IV and DV.

Understanding Arrows and Logic:

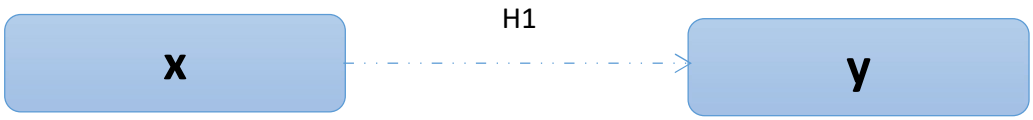
Direct Effect (→): A straight arrow indicates that one variable directly influences another.



Correlation (↔): A double-headed arrow indicates a mutual relationship without a specified cause-effect direction (Correlation does not imply causation).



Indirect or Moderated Effect (– – – →): A dashed arrow indicates a non-direct effect, such as an indirect relationship through a mediating variable or a conditional effect influenced by a moderating variable. It is often used to distinguish secondary or hypothesized relationships from primary direct effects.



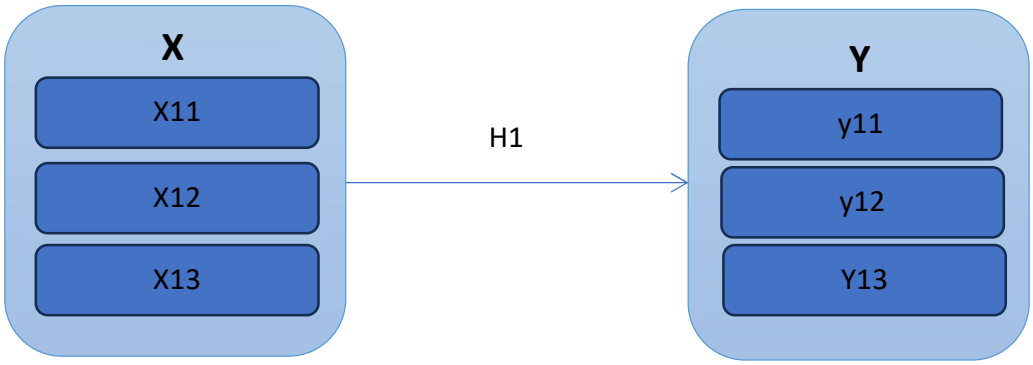
3. Steps to Construct Your Model:

1. **Identify the Problem:** What is the main outcome (DV) you are trying to solve or explain?
2. **Literature Review:** Look at existing theories to identify the most relevant predictors (IVs).
3. **Break Down Dimensions:** If a variable is too broad, break it into measurable dimensions to ensure accuracy.
4. **Draw the Paths:** Connect the variables based on your logical reasoning or previous studies.
5. **Refine:** Ensure the model is not overly cluttered. A good model is **Parsimonious** (simple yet powerful).

5. Types of Research Models

a. Simple Model

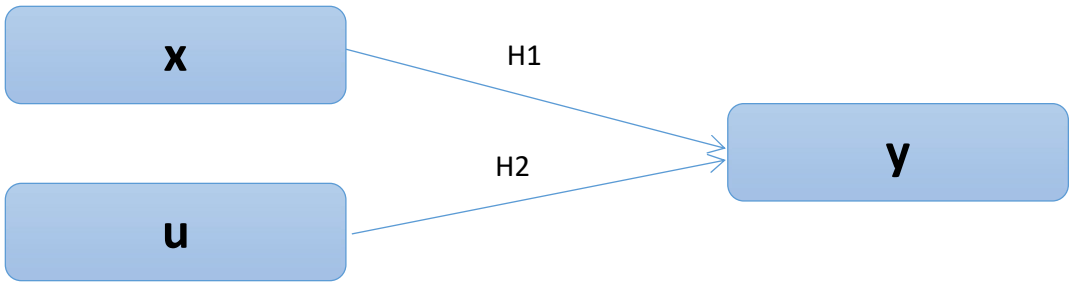
A simple research model includes one independent variable and one dependent variable only. It examines the direct effect of the independent variable on the dependent variable.



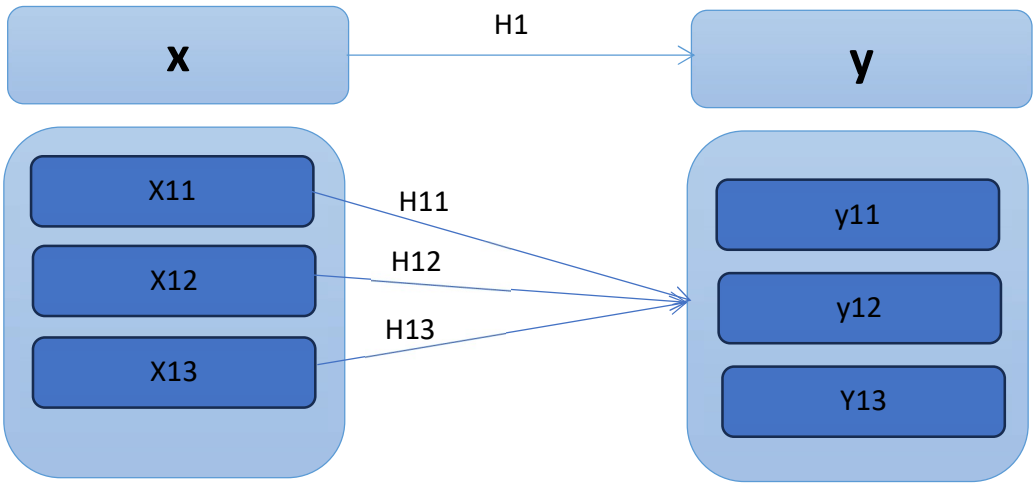
b. Multiple Variables Model

This model includes more than one independent variable, or several independent variables affecting one or more dependent variables.

It allows the researcher to study complex relationships between variables.



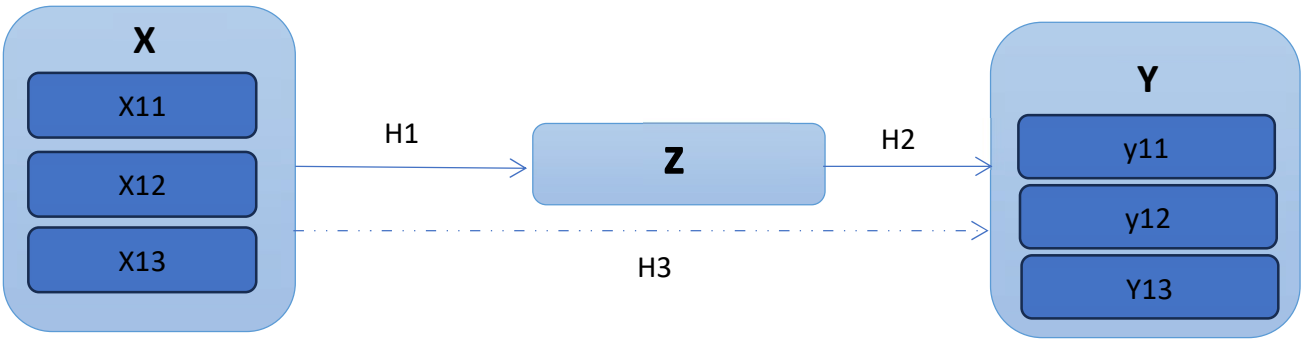
OR:



c. Mediation Model

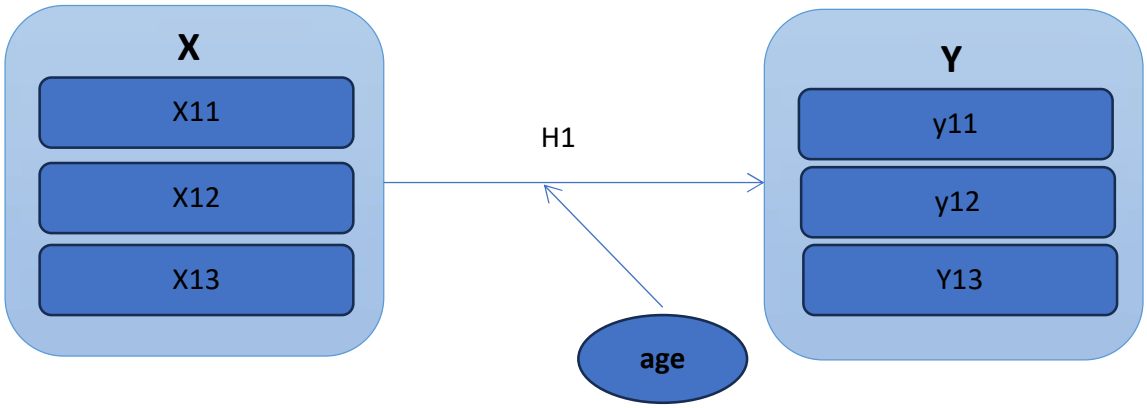
A mediation model includes a mediating variable that explains how or why the independent variable affects the dependent variable.

The mediator transmits the effect from the independent variable to the dependent variable.



d. **Moderation Model**

A moderation model includes a moderating variable that influences the strength or direction of the relationship between the independent and dependent variables.
The moderator answers the question: "When" or "Under what conditions" does the relationship occur?



f. Structural Equation Modeling (SEM) Model

Structural Equation Modeling (SEM) is an advanced statistical approach used to test complex relationships between multiple variables simultaneously.

It allows researchers to examine both direct and indirect effects, including mediation and moderation, within one comprehensive model.

SEM is typically used when the conceptual framework includes multiple paths, mediators, or moderators.

Example:

