Research Methodology
Chapter 5

Identifying Variables

Topics covered

- What is a variable?

- Difference between concepts and variables

- How to turn concepts into variables

- Types of variables

- Types of measurement scales

What is a variable?

- An image, perception or concept that is measurable

- Gender (male/female)

- Variables take on different values often expressed as numbers

- Age (x years, y months)

- Use of measurement scales to vary the degree of precision in measurement

RESEARCH METHODOLOGY
a step-by-step guide for beginners

Difference between concepts and variables

- Concepts cannot be measured (e.g. satisfaction has different meaning to different people)

- Variables can be measured (e.g. persons weight in kg)

- Convert concepts into variables using a set of indicators in order to subjectively measure (e.g. effectiveness, attitude)

RESEARCH
METHODOLOGY
a step-by-step guide for beginners

Converting concepts into variables

How can a concept be measured? What indicators can be identified? Convert into a measurement

- Concept: rich/poor
- Indicators: 1. Income, 2. value of assets
- Variables: 1. Total income per year, 2. Total value of a) home, b) cars, c) investments, etc.
- Working definition for rich if 1. Income is > 200,000, 2. considered rich if total value of assets is >2,000,000
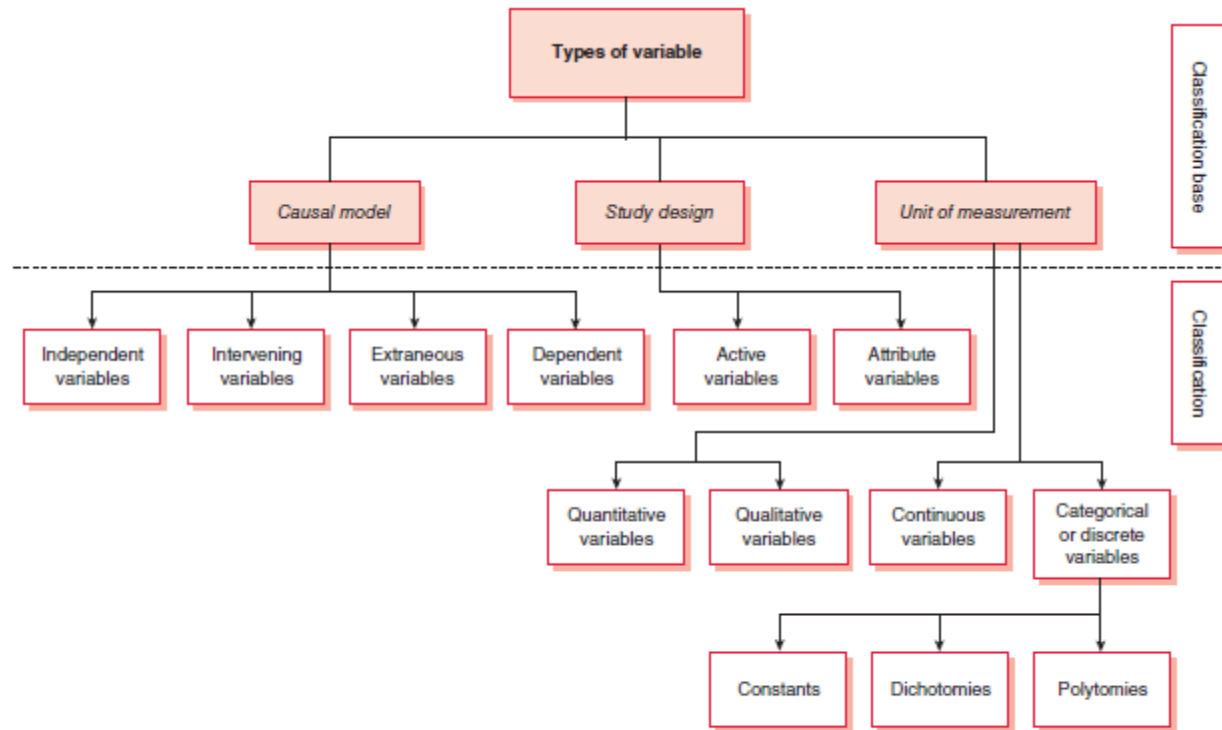
Figure 5.1 Types of variables

Figure 5.1 Types of variable

Note: Classification across a classification base is not mutually exclusive but classification within a classification base is. Within a study an independent variable can be an active variable, or a quantitative or a qualitative variable, and it can also be a continuous or a categorical variable, but it cannot be a dependent, an extraneous or an intervening variable.

Variables from a viewpoint of causal relationships

- Independent variable (bringing change in a situation)

- Dependent variable (outcome or change brought by the independent variable)

- Extraneous variable (several factors affecting the changes in the dependent variable)

- Intervening variable (confounding variable links independent and dependent variable)

Variables from a viewpoint of study design

- Active variables (that can be manipulated, changed or controlled in an experiment)
- Attribute variables (variables that cannot be manipulated and that reflect the characteristics of a study population)

Variable from the viewpoint of unit measurement

- Categorical variable (nominal and ordinal scales)
  - Constant variable (one category or value, e.g. taxi)
  - Dichotomous variable (two categories, e.g. yes/no)
  - Polytomous variable (more than two categories, e.g. religion: Christian, Muslim, Hindu, etc.)

  Or Continuous data (interval and ratio scales)

- Qualitative variables are like categorical variables such as gender: male/female

  Or Quantitative (interval and ratio scales)

Type of variable

"The way a variable is measured determines the type of analysis that can be performed, the statistical procedures that can be applied to the data, the way the data can be interpreted and the finding that can be communicated."

Types of measurement scales

- Nominal or classificatory scale, e.g. religion: Christian, Muslim, Hindu, Jew, etc.
- Ordinal or ranking scale (categories in order) e.g. socio economic status: upper/middle/low
- Interval scale (has equal units of measurements with an arbitrary starting point) e.g. Temperature in Fahrenheit
- Ratio scale (equal units of measurement with fixed starting point at zero) e.g. height in cm