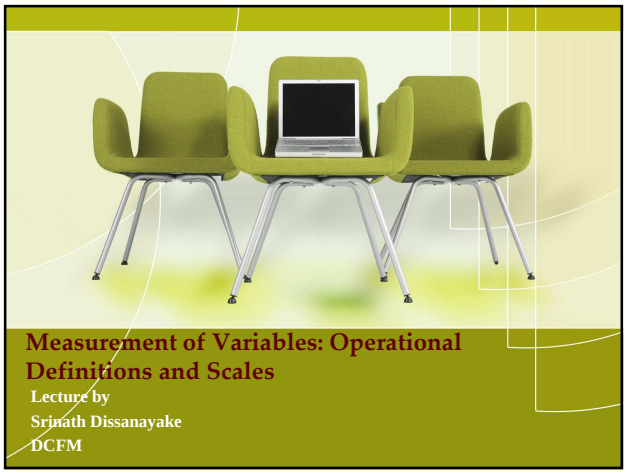

Measurement of Variables: Operational Definitions and Scales

Lecture by
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Introduction

- Measurement of the variables in the theoretical framework is an integral part of research.
- Unless the variables are measured in some way, we will not be able to test our hypothesis and find answers to our research questions.
- *Example:* To test the hypothesis that workforce diversity affects organizational effectiveness.
- *Example:* To test the hypothesis that entrepreneurial orientation and firm performance.

Introduction cont'd

- Attributes of objects that can be physically measured by some calibrated instruments pose no measurement problems.
- *Example:* Data representing some demographic variables.
  - *How long have you been working in this company?*
  - *What is your marital status?*
- The measurement of more ***abstract*** and ***subjective attributes*** is more difficult however..
- *Example:* Level of ***achievement motivation*** of office managers.
- *Example:* The ***shopping enjoyment*** of women.

Introduction cont'd

- **Important:** therefore, there are at least two types of variables.
  - One leads to itself to objective and precise measurements
  - The other is nebulous and does not lead to itself to accurate measurements because of its abstract and subjective nature.

Operationalization of variables

- Despite the lack of physical devices to measure the more nabulous variables, there are ways of tapping these types of variables:
  - One is to reduce the abstract/ subjective nature of the observable behavior. simply put, the abstract notions are broken down into observable behaviors.

Measuement: Scaling, Reliability and Validity

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Scales

- A scale is a tool or a mechanism by which individuals are distinguished as to how they differ from one another on the variables of interest to our study.
- Also, a scale is a fine –tuned tool that differentiates individuals on the variables with varying degrees of ***"sophistication"***.
- ***Four types of Scales***
  - ***Nominal Scale***
  - ***Ordinal Scale***
  - ***Interval Scale***
  - ***Ratio Scale***

Nominal Scale

- A nominal scale is one that allows the researcher to assign subjects to certain ***categories or groups***.
- Example: with respect to the variable of gender, respondents can be grouped into two ***categories – Male and Female***.
- There is no third category into which respondents would normally fall.
- Thus nominal scales categorize individuals or objects into ***mutually exclusive groups***.
- The information that can be generated from nominal scales is the calculation of ***descriptive data.***
- ***Exercise:*** ***suggest two variables that would be natural candidates for nominal scales.***

Ordinal Scale

- An ordinal scale not only categorizes the variables in such way as to denote differences among the various categories, it also ***rank-orders*** the categories in some ***meaningful way***.
- *Example:* respondents were asked to indicate their preferences by ranking the importance they attach to five distinct characteristics in a job that the researcher might be interested in studying in.
- ***Exercise:*** develop an ordinal scale for consumer preferences for a brands of beer.

Interval Scale

- An interval scale allows us to perform certain ***arithmetical operations*** on the data collected from the respondents.
- Nominal scale: ⟶ Quantitatively distinguish groups by categorizing them into mutually exclusive sets.
- Ordinal Scale: ⟶ Ranked order preferences.
- Interval Scale: ⟶ *Measure the distance between any points on the scale.*

Interval Scale cont'd

Interval	Temperature: • Celsius → 0 °C • Fahrenheit → 32 °F Attitudinal scale (Thurstone scale): • 10–20 • 21–30 • 31–40 • 41–50, etc.	It has all the characteristics of an ordinal scale (which also includes a nominal scale) PLUS It has a unit of measurement with an arbitrary starting and terminating point
	Height: cm Income: $ Age: years/months Weight: kg Attitudinal score: Guttman scale	It has all the properties of an interval scale PLUS It has a fixed starting point, e.g. a zero point

Ratio Scale

- A **ratio level of measurement** represents *fixed measuring units with an absolute zero point*. Zero, in this situation, means absolutely no amount of whatever the variable indicates.
- On a ratio scale, 10 is two points higher than 8 and is also two times greater than 5. Ratio numbers can be added and subtracted, and because the numbers begin at an absolute zero point, they can also be multiplied and divided (so ratios can be formed between the numbers).

Ratio Scale cont'd

The variable is "Number of pets on the couch"

Photo #1

Photo #2

There are 1/3 fewer pets in photo #2.

From Wienir

Rating Scales

- The following scales are often used in organizational research
  - Dichotomous variable
  - Semantic differential scales
  - Numerical scale
  - Itemized rating scale
  - Likert scale
  - Graphic rating scale
  - Consensus scale

Rating Scales

- ***Dichotomous variable***
  - Dichotomous variable is used to elicit a Yes or No answer.
  - Thus nominal scale is used to elicit the response.
- ***Category scale***
  - The category scale uses multiple items to elicit a single response.

References..

- Kumar, R 2011, *Research Methodology: A Step by Step Guide for Beginners*, 3rd edn, Sage Publications.
- Sekaran, U & Bougie, R 2009, *Research Methods for Business: A Skill Building Approach*, 5th edn, John Wiley & Sons.

16