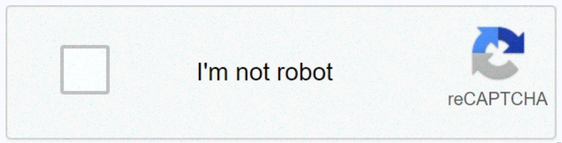

I'm not robot!

Operational definition of variables example

Operational definition of variables. Operational definition of variables in research examples.

An operational definition of a variable describes:What is observed.What is measured.These definitions are written quantitatively using:length, width, height, etc.timedistancetemperaturenumerical value of somethingTo gain a better understanding of what an operational definition is, consider the following example:Researchers in sports medicine and exercise physiology study the effects of various variables on a person's endurance.

	Operational Definition
	Decrease in users' knowledge due to the complexity of new I devices
	Privacy violation by IT devices
	Threat to users' work safety with the emergency of new IT d
	Increase in negative viewpoints due to the continued change update of IT devices
ing	Education for information technology users
	The IT experts should encourage users to frequently use info & telecommunications technology; supply of technical suppc as 'help desk' to solve possible problems
	Users' direct participation during the system design or implementation stage
k	Use of information technology to handle tasks or get involve colleagues during non-work hours
	Difficulties in maintain work-life balance due to heavy work

Each researcher might decide on a different way of measuring this variable. For example, if an experiment was conducted to test the effects of Vitamin E on endurance, the dependent variable being the person's endurance, might be operationally defined in ways such as:The distance a person could run without stopping.The number of hours a person could stay awake.The number of jumping jacks a person could do before getting tired. Operationalization means turning abstract concepts into measurable observations.

Name of variable	Kind of variable	Theoretical Definition	Operational Definition
Market Value of stocks	Independent	The price at which a security is trading and could presumably be purchased or sold. What investors believe a firm is worth, calculated by the number of shares outstanding multiplied by the current market price of a firm's shares.	Number of stocks *the latest price of the stocks
Book value of stocks	Independent	The book value of a stock is the value of its total assets less total liabilities. Any balance sheet is divided in 3 sections: Assets, Liabilities and Shareholders Equity. Since Asset **minus** Liability always equals Equity, getting the book value of the stock is as simple as reading off the value on the Total Equity line.	Book value of stocks = Total shareholders' equity - Stock benefit / Number of stocks
Level of company sale	Independent	Annual company sale is one of the main indexes to determine the performance of the company	
Trade volume of stocks	Independent	The measure how many trades take place for a security or on an exchange on a given trading day? A high trading volume is an indicator of a high level of interest in a security at its current price.	
P/E Ratio	Independent	The price of a security per share at a given time divided by its annual earnings per share. Often, the earnings are those of the last 12 months' earnings, but some analysts use other forms. The P/E ratio is a way to help determine a security's stock valuation, that is, the fair value of a stock in a perfect market. It is also a measure of expected, but not realized, growth.	Daily price of stock/the benefit of each stock
Systematic Risk Beta	Dependent	Also called undiversifiable risk or market risk. A good example of a systematic risk is market risk. The degree to which the stock moves with the overall market is called the systematic risk and denoted as beta. Systematic risk, also called market risk, is risk that's characteristic of an entire market, a specific asset class, or a portfolio invested in that asset class	$\beta i = \frac{Cov\ (R_i, R_m)}{VAR\ (R_m)}$

Although some concepts, like height or age, are easily measured, others, like spirituality or anxiety, are not. Through operationalization, you can systematically collect data on processes and phenomena that aren't directly observable. Operationalization exampleThe concept of social anxiety can't be directly measured, but it can be operationalized in many different ways. For example: self-rating scores on a social anxiety scale number of recent behavioral incidents of avoidance of crowded places intensity of physical anxiety symptoms in social situations Why operationalization matters In quantitative research, it's important to precisely define the types of variables that you want to study. Without transparent and specific operational definitions, researchers may measure irrelevant concepts or inconsistently apply methods. Operationalization reduces subjectivity, minimizes the potential for research bias, and increases the reliability of your study. Your choice of operational definition can sometimes affect your results. For example, an experimental intervention for social anxiety may reduce self-rating anxiety scores but not behavioral avoidance of crowded places. This means that your results are context-specific, and may not generalize to different real-life settings. Generally, abstract concepts can be operationalized in many different ways. These differences mean that you may actually measure slightly different aspects of a concept, so it's important to be specific about what you are measuring. Concept Examples of operationalization Overconfidence The difference between how well people think they did on a test and how well they actually did (overestimation). The difference between where people rank themselves compared to others and where they actually rank (overplacement). Creativity The number of uses for an object (e.g., a paperclip) that participants can come up with in 3 minutes. Average ratings of the originality of uses of an object that participants come up with in 3 minutes. Perception of threat Physiological responses of higher sweat gland activity and increased heart rate when presented with threatening images. Participants' reaction times after being presented with threatening images. Customer loyalty Customer ratings on a questionnaire assessing satisfaction and intention to purchase again. Records of products purchased by repeat customers in a three-month period. If you test a hypothesis using multiple operationalizations of a concept, you can check whether your results depend on the type of measure that you use. If your results don't vary when you use different measures, then they are said to be "robust." How to operationalize concepts There are 3 main steps for operationalization: Identify the main concepts you are interested in studying. Choose a variable to represent each of the concepts. Select indicators for each of your variables.

Variables	Definition	Measurement
A. Independent		
1. Size of the board of directors (X1)	Size board member responsible for the performance and management of the company	∑ The Board of Directors
2. Size of the audit committee (X2)	Group of people appointed by the board of commissioners responsible for helping the auditor to keep the independency of the management	∑ Audit Committee
3. Institutional ownership (X3)	Number of shares owned by the institution of the total shares outstanding. Including institution ownership shares owned by company.	(institutional ownership : outstanding stock) x 100%
4. Managerial ownership (X4)	Shareholder of the company in which the shares are owned by the management of the company who actively participate in the making of corporate decision (Director and Commissioner)	(managerial ownership : outstanding stock) x 100%
B. Dependent	Financial performance is measured by the profitability ratio, which focuses on the company's ability to get profit.	
Financial Performance	Financial Performance as measured by using Return On Assets (ROA)	(Income after taxes: Total Assets) x 100%

Source: Issarawornrawanich (2015), Xie et. al (2003), Ahmad and Jusoh (2014), Andow and David (2016).

1. Identify the main concepts you are interested in studying. Based on your research interests and goals, define your topic and come up with an initial research question. Research question exampleIs there a relation between sleep and social media behavior in teenagers? There are two main concepts in your research question: Sleep Social media behavior 2. Choose a variable to represent each of the concepts. Your main concepts may each have many variables, or properties, that you can measure. For instance, are you going to measure the amount of sleep or the quality of sleep? And are you going to measure how often teenagers use social media, which social media they use, or when they use it? Concept Variables Sleep Amount of sleep Quality of sleep Social media behavior Frequency of social media use Social media platform preferences Night-time social media use To decide on which variables to use, review previous studies to identify the most relevant or underused variables. This will highlight any gaps in the existing literature that your research study can fill. Hypothesis exampleBased on your literature review, you choose to measure the variables quality of sleep and night-time social media use. You predict a relationship between these variables, and state it as a null and alternate hypothesis. Alternate hypothesis (Ha or H1): Lower quality of sleep is related to higher night-time social media use in teenagers. Null hypothesis (H0): There is no relation between quality of sleep and night-time social media use in teenagers. 3. Select indicators for each of your variables. To measure your variables, decide on indicators that can represent them numerically. Sometimes these indicators will be obvious: for example, the amount of sleep is represented by the number of hours per night. But a variable like sleep quality is harder to measure. You can come up with practical ideas for how to measure variables based on previously published studies. These may include established scales (e.g., Likert scales) or questionnaires that you can distribute to your participants. If none are available that are appropriate for your sample, you can develop your own scales or questionnaires. Concept Variable Indicator Sleep Amount Average number of hours of sleep per night Quality Sleep activity tracker of sleep phases Social media behavior Frequency Number of logins during the day Preference Most frequently used social media platform Night-time use Amount of time spent using social media before sleep Indicators example To measure sleep quality, you give participants wristbands that track sleep phases. To measure night-time social media use, you create a questionnaire that asks participants to track how much time they spend using social media in bed. After operationalizing your concepts, it's important to report your study variables and indicators when writing up your methodology section. You can evaluate how your choice of operationalization may have affected your results or interpretations in the discussion section. Professional editors proofread and edit your paper by focusing on: Academic style Vague sentences Grammar Style consistency See an example Strengths of operationalization Operationalization makes it possible to consistently measure variables across different contexts. Scientific research is based on observable and measurable findings. Operational definitions break down intangible concepts into recordable characteristics. A standardized approach for collecting data leaves little room for subjective or biased personal interpretations of observations. A good operationalization can be used consistently by other researchers (high replicability). If other people measure the same thing using your operational definition, they should all get the same results. Limitations of operationalization Operational definitions of concepts can sometimes be problematic.

Source: Processing data, 2019.

Variable	Variable definition	Ratio	Scale
Credit risk (*NPL*) (*X*1)	Credit repayment rate given by a depositor to the bank	NPL	Ratio
Market risk (*NIM*) (*X*2)	The ratio of interest rate to average earning assets	NIM	Ratio
Liquidity risk (*LDR*) (*X*3)	The ratio describing the capability of deposits in lending support	LDR	Ratio
Operational risk (*BOPO*) (*X*4)	Comparison of operational costs and operational income	BOPO	Ratio
Financial performance (*ROA*) (*Y*)	The ratio of profit after tax to total assets	ROA	Ratio

Many concepts vary across different time periods and social settings. For example, poverty is a worldwide phenomenon, but the exact income-level that determines poverty can differ significantly across countries. Operational definitions can easily miss meaningful and subjective perceptions of concepts by trying to reduce complex concepts to numbers. For example, asking consumers to rate their satisfaction with a service on a 5-point scale will tell you nothing about why they felt that way. Context-specific operationalizations help preserve real-life experiences, but make it hard to compare studies if the measures differ significantly. For example, corruption can be operationalized in a wide range of ways (e.g., perceptions of corrupt business practices, or frequency of bribe requests from public officials), but the measures may not consistently reflect the same concept. Other interesting articles If you want to know more about statistics, methodology, or research bias, make sure to check out some of our other articles with explanations and examples. Frequently asked questions about operationalization What is operationalization? Operationalization means turning abstract conceptual ideas into measurable observations. For example, the concept of social anxiety isn't directly observable, but it can be operationally defined in terms of self-rating scores, behavioral avoidance of crowded places, or physical anxiety symptoms in social situations. Before collecting data, it's important to consider how you will operationalize the variables that you want to measure. What's the difference between concepts, variables, and indicators? In scientific research, concepts are the abstract ideas or phenomena that are being studied (e.g., educational achievement). Variables are properties or characteristics of the concept (e.g., performance at school), while indicators are ways of measuring or quantifying variables (e.g., yearly grade reports). The process of turning abstract concepts into measurable variables and indicators is called operationalization. If you want to cite this source, you can copy and paste the citation or click the "Cite this Scribbr article" button to automatically add the citation to our free Citation Generator. Bhandari, P.

Variable	Operational definition	Value
Intelligence	Score on the Verbal SAT test (a standardized test)	550
Age	Response to questionnaire (a self-report measure)	21
Intelligence	Speed of repairing engine (a behavioral definition)	2 hrs
Intelligence	Number of hairs on left thumb (a stupid definition)	7

(2023, June 22). Operationalization | A Guide with Examples, Pros & Cons.
Scribbr. Retrieved June 27, 2023, from "Researchers H. Heilman, Ph.D. and C. Peus, Ph.D. used a multidimensional framework to assess how people view men and women respectively. Their research results found that men and women consistently ascribe the same characteristics to each gender." Give it a whirl, take the "test." What do YOU think about how they have operationalized the concept of gender? Humor me and read the information below the start of the questions when you visit that link. This second link takes you to a different test but of the same basic concept. This is the one I referenced as "Bem's Sex Role Inventory." Ok, so take this one too (it really doesn't take long, I promise). What do you think about the questions? Did you "score" the same? If not, why do you think that is? What does that say about operationalizing the concept? In future chapters I'll ask you to think about what this would say about results and implications! I know – you are so excited!! First image is coordinates (IN the blue box), second is Bem's (under the blue box)