

Measurement in Psycho-Behavioral Science Research

Shuttawwee Sitsira-at
Faculty of Humanities, Srinakharinwirot University, Thailand
Email: shuttawwee@gmail.com

Article History

Received: 21 June 2018

Revised: 29 April 2019

Published: 30 June 2019

Abstract

Behavioral science studies human behaviors using scientific methods to solve problems for an individual to live happily and effectively. In doing research, regardless of the field of study, high quality measurement processes and tools are necessary for data collection which will lead to highly reliable results that are beneficial to human and society development. The measurement methods, conditions and samples must be appropriate and be of high quality. For a measurement to have a high standard and be acceptable, one must follow these four steps: planning, creating a measurement, conducting the measurement, presenting the results and improving. Creating a high-quality psycho-behavioral measurement is especially important to ensure reliable results that can be applied to further research. High quality and standard measurement will lead to accurate results that are useful for improving the quality of life and for classifying, selecting, developing and evaluating individuals. Finally, high quality and standard measurement lead to creating an accurate multilayered indicator in psycho-behavioral sciences.

Keywords: Research Tools, Psycho-Behavioral Science, Measurement

Introduction

Human has encountered problems in their life. Life will be smooth when the problems are thoroughly solved. Research is a scientific way to solve problems based on reliable methods. The search for answers to the human mind and behaviors requires knowledge and research skills in the field of behavioral sciences to solve problems and improve quality of life. The psycho-behavioral researchers therefore focus on the measurement tools and processes. Quality measurements will generate quality information leading to valid results that will be beneficial to human and society development. Psycho-behavioral research emphasizes the importance of developing measurement tools and processes by accurately designing the method of measuring variables according to the research principles with high standards. It is necessary for anyone who wants to acquire the answers to problems to have quality measurement tools and processes for classifying, selecting, evaluating and developing people (Bhanthumnavin, 2016). "Measurement" refers to processes that assign values, numbers or symbols to represent quantities for variables or features that need to be measured (Kerlinger & Lee, 2000). Researchers should not ignore doing thorough research on measurements (Reynolds, 2010; Soros, 2014) from creating the test, to testing, to adjusting the test, to rearranging the elements and to testing with other groups or repeating the experiments until the research results show good quality of the measurement. Behavioral and social science measurement tools measure behaviors or characteristics or opinions or attitude in response to sensory stimuli. This type of results may change when the situation or stimuli change. The error rate is higher than measurement in the field of physical sciences which mainly measure the physical characteristics such as weight, width and length of the material. The result of this

type is highly objective with very low rate of error. Measurement in the anthropological field is usually highly subjective since behaviors are more difficult to measure than materials. High quality measurements are definitely required (Wiratchai, 2008).

Psycho-behavioral science research that studies new concepts or new variables still lack measuring tools to measure such variables. What the psycho-behavioral researchers need to do is to create a high standard and acceptable tool, for example a multi-level psychological measurement in the context of sufficiency economy philosophy (Bhanthumnavin, 2008), a multi-dimensional psychological measurement in reasoning (Meekun, 2008), a measurement of motivation in terms of general and specific achievement for Thai adolescents and its validity assessment (Vanindananda, 2014). These researches are designed to measure variables accurately according to the research principles that are of high standards. Therefore, they provide a quality measuring tool that can precisely classify, select, evaluate and develop people.

Importance of Psycho-Behavioral Science Measurements

The research to having good measurement methods, conditions of measurement and appropriate samples, we also require quality measuring tools. In order to create a high standard and accepted tool, we need to follow the following four steps (Wiratchai, 2008).

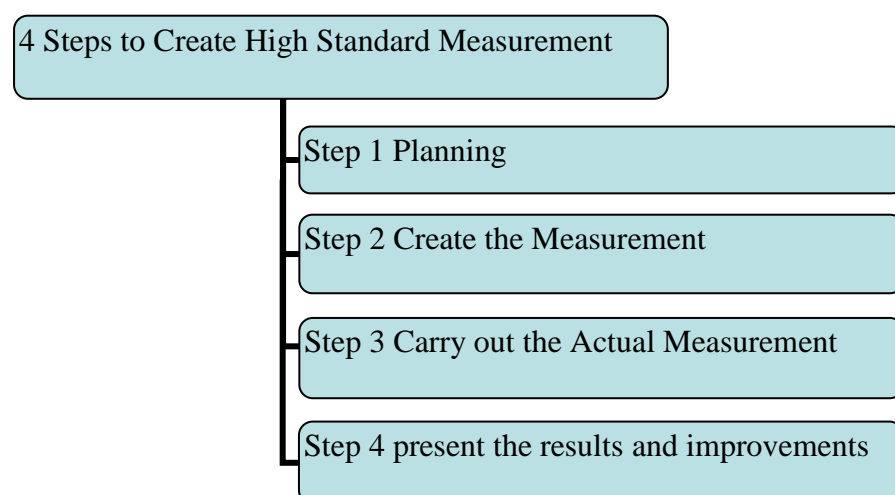


Figure 1 The Model of 4 Steps to Create High Standard Measurement

The first step is planning. At this stage, the measurement direction and system are laid out to answer the question of why, what, who and how to measure. The answers will lead to the purpose, definition, group of samples, type of measurement and criteria for scoring.

The second step is to create the measurement according to plan starting from literature review to find theories and models, identifying both theoretical and operational definitions of the measured items and then design the measurement. The measurement will be tested in a pilot study to find the quality of the indicator by assessing its discriminatory power, reliability, face validity, content validity, concurrence validity, construct validity, exploratory factor analysis (EFA) and/or confirmatory factor analysis (CFA) before conducting the actual measurement.

The third step is to carry out the actual measurement that has passed quality assessment. The tool and conductor were prepared and conducted with care in order for the results to be valid

with minimal bias or discrepancy. Once the measurement data has been obtained, it is checked for the quality before applying the measured results to the desired purpose.

The final step is to present the results and improvements. The results are presented in accordance with the intended objectives. The measurements are then improved for future use.

The quality of measurement is very important because it is a necessary condition to achieve quality results. Therefore, researchers must carefully create quality and suitable measuring tools. A quality measuring tool must meet the following criteria: discrimination power, reliability, validity, objectivity, unbiasedness, practicality and completeness.

This article will briefly discuss the importance of psycho-behavioral science measurements as follows:

1. If the tool is lacking in quality, the results will be unreliable. Seven aspects of research mistakes are: 1) research questions 2) literature review of existing research 3) quality of variable measurement 4) sampling method and suitability of comparative groups 5) research methodology, having strict control on factors and measurements 6) data analysis suitable for the hypotheses and 7) data interpretation and discussion (Bhanthumnavin, 2008; Allen & Yen, 1979). The quality of the measurement is the third aspect of the seven research mistakes: variable measurement. If any research is "weak" in one aspect, it will weaken the whole research and will have low validity (Bhanthumnavin, 2008). Conducting research projects without high standard measurement will lead to weak results that are difficult to synthesize (Wiratchai, 2008; Bhanthumnavin, 2001; Hedges & Olkin, 1985).

2. The creation of high-quality measurement will also result in high standard. Researchers can synthesize research results and apply them to further research. An example is found in research that integrated the results of high-standard research with psychological knowledge. The researcher has adopted a 10-dimensional psychological scale to Confirmatory Factor Analysis (CFA) and Exploratory Factor Analysis (EFA) elements, resulting in the fusion of questions in 6 measurements without duplicates. This new measurement is "gratitude intelligence" which is a new type of factor in Thai society (Bhanthumnavin, 2008).

3. High quality and standard measurement will yield accurate results. The data from such research are useful for planning to improve the quality of the people. For example, the research results from the creation of multi-level measuring tools are considered a research innovation. Thai researchers have created and developed the psychological measurements in the form of three loops and two conditions according to the philosophy of sufficiency economy. Measurements created from this new concept were created under the concepts, theories and examples, together with empirical data to verify theoretical accuracy by confirming with advanced statistics. Therefore, it achieves quality and standard resulting in the sufficiency mind among the target groups of various ages. The data from such research are useful for planning to develop the quality of Thai people according to the philosophy of sufficiency economy in adults, university students and young students (Bhanthumnavin, 2008; Meekhun, 2008; Liawwarin, 2008).

4. High quality measuring instruments can be used to classify, develop and evaluate people. Vanindananda (2008) pointed to the problem of academics and an executive of a research fund organization (Buasai, 2007) who discussed important problems of classifying people to assess the characteristics of educational personnel, especially the evaluation of thinking methods and teacher's immunity. If the tool lacks credibility in checking and selecting personnel, it will experience problems in evaluating the outcomes and results of various development projects such as the application of the philosophy of sufficiency economy in various development projects. This is due to the lack of indicators to clearly show whether the projects achieved the goal or not and at which level. So the tool with high standards will be able to be used in the selection and development of individuals to have appropriate

characteristics. The measurement will measure psycho-behavioral characteristics of the person who teaches this philosophy to young people.

5. High quality measurements can be applied to research that creates psycho-behavioral indicators. Due to the creation and development of psycho-behavioral measurement that will be used in research to measure groups of people of various ages, it can be accurate. If the measurement is not quantitative, it will lack many important features. Implementation without being developed as an indicator must be done carefully because it still lacks confirmation and proves that there is a high standard of conducting research in various aspects (Bhanthumnavin, 2008; Vanindananda, 2008).

In sum, research that creates indicator is important in psycho-behavioral sciences. An indicator is a measure that turns an abstract or qualitative characteristic of one thing into a concrete or quantitative one. It can be used to predict the change. One indicator can reflect only certain aspects of that thing.

Psychological indicator means a measurement that measures one or many aspects of psychological characteristics of an individual that can be used as the cause, core, or consequence in any topics. Psychological indicators can be derived from existing ones or created new because they refer to special psychological traits that have not been measured before. The main reason to use the central indicator to measure psychological traits is that most psychological traits can be the consequence of the things that precede them meanwhile they can be the cause of following behaviors that lead to other outcomes and results eventually (Bhanthumnavin, 2007; Bhanthumnavin, 2001; Vanindananda, 2008; Siegel & et al., 2000; Wilson & et al., 2006).

In creating psychological indicators, researchers in psycho-behavioral sciences usually create a hybrid measurement for example friendship intelligence, nutrition intelligence and social trust intelligence. Mindful risk is taking risks while having consciousness which is a new problem and a new variable and therefore the researchers have to create new measurements using various methods such as Piaget's development theory (1964, 1973) to assess different target groups such as high school or university students (Bhanthumnavin, 2013). In this paper, I will discuss two examples of such research.

Research Review

This paper discusses two research studies. The first one was conducted by Bhanthumnavin (2015) on psychological immunity to create an indicator to measure Thai teenagers. The second one was conducted by Phinpradit (2015, 2016) to construct an indicator system for social trust of undergraduate students in the three southern border provinces. Both studies constructed psychological indicators as detailed below.

The first research adopted the principles of immunity in self according to the philosophy of the sufficiency economy as the principle in constructing measurement of "psychological immunity" that combines the knowledge of modern behavioral science. An indicator is developed for students at the upper secondary level of Thailand. The research discusses psychological immunity under various theoretical concepts of psychological immunity. It helps readers to have a correct understanding of the meaning and guidelines of the indicators. It summarizes the causal factors and the consequential factors of psychological immunity. Then research hypotheses, methods, samples and tools are discussed. The analyses of data and summarizing and discussing results are presented with a range of scores of psychological immunity in high, medium and low.

The second research is on building trust in the southern border society by using the philosophy of sufficiency economy to develop people to have trust in society. According to the ethical tree theory, the ability to adjust oneself appropriately in different situations is considered a good characteristic of a citizen that help create reconciliation and unity in the

society especially in undergraduate students in the three southern border provinces. The content in the article consists of literature review relating to social trust theory, definition and method of measurement, a synthesis of causal factors of social trust, measurement and an analysis of the indicator of social trust. The social trust indicator is divided into groups of high, medium and low scores. There are five reasons why these two research studies demonstrate the academic quality of research to create psychological indicators.

First, both research studies follow all three research steps: 1) a conclusive literature review of various theories 2) a complete process of developing measurements in accordance with the principles of measurement development, especially factor analysis for its validity, reliability and structural validation and 3) validity test of the measurement. Both have confirmed component analysis to verify that the developed measurement consists of sub-components as proposed in the actual measurement model (Wiratchai, 2008) to ensure that the measurements used are of high quality and can be used reliably. Researchers must develop quality measurement that is valid and reliable (MacKenzie, Podsakoff, & Jarvis, 2005).

Second, the measurements of both studies have the characteristics of being an indicator, namely they divide the range of scores into high, medium and low range of psychological immunity and social trust. The differences of each range are clearly defined. Therefore, they are able to readily indicate the level of psychological immunity status and social trust of the sample based on research data (Bhanthumnavin, 2007; Vanindananda, 2008).

Third, the measurement of the research tools in both cases showed the results of scores that are meaningful in both direction and quantity. These two studies have gone through many aspects of research to prove and show evidence that is widely accepted. The psychological indicators from the research results have 3 important dimensions: the central indicators, the antecedent indicators and the consequential indicators (Bhanthumnavin, 2007; Siegel & et al., 2000).

Fourth, both studies measure the variables using central indicators to determine the score range of high, medium and low scores. The meaning of each range is related to important antecedent and consequential indicators which provide clear results and reliable information. These indicators are considered the academic progress of Thailand (Vanindananda, 2008; Vanindananda & et al., 2002)

Fifth, measurements in both research studies are useful in assessment that many scholars and Thai developers can use in further research. They help developers to decide which antecedent factors should be promoted and which parties will benefit from them. They can be used to select, watch and improve the group at risk. Both research studies found risk groups and protective factors. Measurements from both studies can also be used to evaluate the mental growth of the subjects and to assess the success of projects created to promote or develop psychological immunity and social trust.

Both research studies contain high quality and standard measurement tools and methods. Moreover, the indicators show levels of psychological immunity and social trust in high, medium and low. For those who want to use these measurements, they should not forget to recheck the quality, validity and reliability of individual items as well as the measurement invariance (MI) which is the factor analysis for the suitability of the test among different groups of samples (Kuhn & Holling, 2009). For example, the answers may be different depending on the gender of the respondent since they have different interpretations. This may lead to the factor which is not the real cause. The same measurement can result in A for male respondents and B for female respondents so we are unable to compare the results.

In conclusion, for research to have high standard measurements there must be sufficient literature review both in theories and research. There must also be the operational definition of the variables to be used as a guideline to create high quality measurements. The downsides of not having a variable definition are that it leads to outdated concepts and the measurements

that lack direction and quality. They cannot answer the research questions thoroughly. Researchers may be unaware of the restrictions of previous research. Moreover, they may create misunderstanding for the research successors who may not be aware of other theories. In order to create a high quality psycho-behavioral measurement, it is necessary to have a thorough literature review so that the direction of creating measurement can be found to meet with the things that need to be measured and will lead to high quality research results.

References

- Allen, M. & Yen, W. 1979. **Introduction to Measurement Theory**. California: Brooks/Cole Publishing Company.
- Bhanthumnavin, D. 2016. **Behavioral Science Research to Development of Individuals and Society**. Bangkok: Four Decades in the Shade of an Ethical Theory.
- Bhanthumnavin, D. 2008. **Research to Develop a Multi-level Psychological Measurement Instrument in the Context of Sufficiency Economy Philosophy**. Research Bangkok: National Research Council of Thailand.
- Bhanthumnavin, D. 2008. "Research to Develop a Multi-level, Self-sufficient Psychological Measurement." **Journal of Behavioral Science: Thai behavior System** 5 (1): 122-154.
- Bhanthumnavin, D. 2001. **Principles and Research Methods in Social Behavioral Science**. Bangkok: Faculty of Social Development, National Institute of Development Administration University.
- Bhanthumnavin, D. 2013. **Causal Factors and Effects of Conscious Risk Behavior of Secondary School Students**. Bangkok: Faculty of Social Development, National Institute of Development Administration University.
- Bhanthumnavin, D. 2007. "The Structure of Psychological Immunity: Research and Development with Component Analysis Methods." **Journal of Behavioral Science: Thai Behavior System** 5 (1): 49-77.
- Bhanthumnavin, D. 2015. "Psychological Immunity: Research to Develop an Index that Applies to Thai Adolescent Students." **Journal of Behavioral Science: Thai Behavior System** 12 (1-2).
- Buasai, S. 2007. **Sufficiency Economy Research Status in Thailand: Research and development direction**. Bangkok: National Research Council of Thailand.
- Hedges, L. & Olkin, I. 1985. **Statistical method for meta-analysis**. Orlando: Academic Press.
- Kerlinger, F. & Lee, H. 2000. **Foundations of behavioral research**. New York: Harcourt College Publishers.
- Kuhn, J. & Holling, H. 2009. "Measurement Invariance of Divergent Thinking across Gender, Age, and School Forms." **European Journal of Psychological Assessment** 25 (1): 1-7.
- Liawwarin, U. 2008. "Research to Develop a Multi-dimensional Awareness of Goodness in Thai Adults." **Journal of Behavioral Science: Thai behavior System** 5 (1): 78-121.
- MacKenzie, S., Podsakoff, P., and Jarvis, C. 2005. "The Problem of Measurement Model Misspecification in Behavioral and Organizational Research and Some Recommended Solution." **Journal of Applied Psychology** 90 (4): 710-730.
- Meekhun, K. 2008. **The Development of a Psychological Measurement Instrument, a Multi-Dimensional Rationality Style**. Bangkok: National Research Council of Thailand.
- Phinpradit, N. 2015. **Research on the Social Trust Index System of Undergraduate Students, Universities in the three southern border provinces**. Khon Kaen: Faculty of Education, Khon Kaen University.

- Phinpradit, N. 2016. "Research on the Social Trust Index System of Undergraduate Students, Universities in the Three Southern Border Provinces." **Journal of Behavioral Science: Thai behavior System** 12 (1-2).
- Piaget, J. 1964. "Part I: Cognitive development in children: Piaget development and learning." **Journal of Research in Science Teaching** 2 (3): 176-186.
- Piaget, J. 1973. **Main Trends in Psychology**. London: George Allen & Unwin.
- Reynolds, C. 2010. "Measurement and Assessment: an Editorial View." **Psychological Assessment** 27 (1): 1-4.
- Siegel, C. et al., 2000. "The Construction of Community Indicators of Mental Health and Social and Psychological Well-being and their Application to New York City." **Evaluation and Program Planning** 23: 315-327.
- Soros, B. 2014. "Review Sufficient Economy: Development of Psychological Measurement on The Way of Scientific Research." **Journal of Behavioral Science: Thai behavior System** 11 (1-2): 232-239.
- Vanindananda, N. 2014. "Research for Developing Achievement Motivation Measures and Validation: General and Special Forms for Use with Thai Adolescents." **Journal of Behavioral Science: Thai Behavior System** 11 (1): 66-120.
- Vanindananda, N. 2008. "Review Sufficient Economy: Development of Psychological Measurement for Adults." **Journal of Behavioral Science: Thai behavior system** 5 (1): 66-120.
- Vanindananda, N. et.al. 2002. **Analysis of the Cause and Effect Index of Marital Quality in Thai Families**. Bangkok: Institute of Behavioral Science Research, Srinakharinwirot University.
- Wilson, J. et al. 2006. "Contrasting and Comparing Sustainable Development Indicator Metrics." **Ecological Indicators** 7: 299–314.
- Wiratchai, N. 2008. "Introduction to Development of Psychological Measurement for Adults." **Journal of Behavioral Science: Thai behavior System** 5 (1): 155-186.