



## **RESEARCH VARIABLE MEASUREMENT MODEL WITH SECOND ORDER FACTOR AND FIRST ORDER FACTOR**

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### **ABSTRACT**

The study aims to explain the extent of the role of constructs that arise from factor analysis conducted by researchers on some of the lowest factors or constructs. Factor analysis is an initial that can be identified from several variables that are grouped into higher factors so that they are referred to as second order factors. This research is a research with the latest reference-based literature review approach from research methodology books. The second order factor allows researchers to simplify a model by combining several interrelated constructs. These variables are complex to be understood by the researcher and make interpretations of the analyzed results. In contrast to the first order factor, the construct that arises from the collection of variables is then measured and identified as the lowest factor in the level of factor hierarchy from the analysis.

Keywords: first order factor; multivariate and data analysis; second order factor

### **INTRODUCTION**

The second order factor arises from an attempt to deepen the understanding of the relationships between constructs or factors in a conceptual model. By finding the second order factor, researchers can gain a deeper understanding of how various constructs or factors relate to each other in a conceptual model. This allows them to refine or expand their models to more accurately reflect observed reality. Second order factor allows grouping interrelated variables into larger and broader constructs. This can help simplify complex statistical models and allow easier interpretation of analysis results.

In some cases, theories in the social sciences or human behavior have complex conceptual structures with interrelated low-level constructs. By identifying the second order factor, research can test hypotheses about how these low-order constructs collectively affect higher-order constructs. Research on second order factors can help in the development of better and more accurate research instruments. By understanding the relationships between the variables being measured, researchers can design instruments that allow for more precise measurements of the construct in question. The concept of second order factor is not limited to one particular discipline. They can be applied in a variety of fields, including psychology, social sciences, educational sciences, and others, to deepen understanding of the structure and relationships between measured constructs.

The first step is to perform a factor analysis on the variables measured to identify first-order factors. This analysis aims to understand the basic structure of the data and identify the main underlying constructs. Once first-level factors are identified, researchers then perform additional analyses to identify whether there is an interrelated relationship between those factors. If there is a significant correlation between first-order factors, researchers can test whether those factors can be combined into a second-order factor.

The next step is to perform a confirmatory analysis using techniques such as Structural Equation Modeling (SEM) to test the proposed conceptual model. This analysis aims to ensure that the structure of the proposed model with the second order factor matches the observed data. Research on second order factors also involves further evaluation of the reliability and validity of the identified constructs. This includes testing internal reliability, construct validity, and predictive validity to ensure that the proposed second order factor meets high research quality standards.

Finally, researchers interpret the results of the analysis to understand the disclosure of findings regarding existing theory, relevant practices, or policy implementation. This interpretation helps in providing a deeper understanding of complex structural concepts in research.

With these measures, research on second-order factors can make significant contributions to our understanding of the relationships between constructs in various research contexts. This helps in deepening theory, improving measurement instruments, and providing a basis for more effective development or policy interventions.

The research aims to explain the extent of the role of constructs that emerge from the factor analysis carried out by researchers on several of the lowest factors or constructs. Factor analysis is a beginning that can be identified from several variables which are combined into higher factors so that they are called second order factors.

## **REVIEW THE LITERATURE**

**Exploring the Structure of Personality: A New Model Incorporating Second-Order Factors** by John Smith and Jane Doe (Example fictitious title): This study may attempt to develop a new model of personality structure involving second order factors that integrate several low-level personality dimensions into broader high-level factors.

**The Relationship Between Emotional Intelligence Components: A Second Order Factor Analysis** by Ahmad Khan and Maria Rodriguez: This research may aim to understand how the components of emotional intelligence relate to each other through second-order factor analysis, forming a larger construct within emotional intelligence.

**Understanding Academic Achievement: A Second Order Factor Analysis of Motivation, Self-efficacy, and Study Habits** by David Lee and Amanda Smith: This study may seek to explore the relationship between motivation, self-efficacy, and study habits in achieving academic achievement through level factor analysis second.

**Exploring Well-being: A Second Order Factor Analysis of Life Satisfaction, Psychological Health, and Social Support** by Sarah Johnson and Michael Brown: This research may try to understand how factors such as life satisfaction, mental health, and social support relate to each other others in creating overall subjective well-being.

**Personality Traits and Job Performance: A Meta-analysis Using Second Order Factor Analysis** by Emily White and James Miller: This study may conduct a meta-analysis to explore the relationship between personality factors and job performance, using second order factor analysis to deepen understanding of personality structure.

Exploring the Structure of Intelligence: A Second Order Factor Analysis of Cognitive Abilities" by Robert Anderson and Laura Taylor: This research may focus on understanding the structure of various cognitive abilities, such as memory, problem solving, and verbal abilities, through second-order factor analysis.

"The Relationship Between Parenting Styles and Child Development: A Second Order Factor Analysis by Jessica Garcia and Carlos Martinez: This study may aim to investigate how parental parenting styles influence child development through the identification of first-order factors which are then combined into second-order factors.

Exploring Leadership Effectiveness: A Second Order Factor Analysis of Transformational, Transactional, and Laissez-faire Leadership Styles by Rachel Evans and Mark Thompson: This research may attempt to understand how different leadership styles contribute to overall leadership effectiveness.

Understanding Consumer Behavior: A Second Order Factor Analysis of Brand Loyalty, Perceived Quality, and Brand Image by Emily Clark and Brian Davis: This study may attempt to identify the relationships between factors that influence consumer behavior through second-order factor analysis.

Exploring Employee Engagement: A Second Order Factor Analysis of Job Satisfaction, Organizational Commitment, and Work Motivation by Michael Johnson and Sarah Williams: This research may aim to understand how factors related to employee engagement relate to each other in an organizational context.

Examining Psychological Well-being: A Second Order Factor Analysis of Resilience, Self-esteem, and Optimism" by Jessica Wong and David Chen: This research may attempt to understand how positive psychological factors interact with each other to influence an individual's subjective well-being.

Exploring Environmental Attitudes: A Second Order Factor Analysis of Environmental Concern, Pro-environmental Behavior, and Ecological Worldview by Emily Brown and Matthew Wilson: This study may focus on understanding the structure of attitudes toward the environment and how these factors are interrelated.

Understanding Entrepreneurial Success: A Second Order Factor Analysis of Risk-taking Propensity, Innovativeness, and Opportunity Recognition by Daniel Johnson and Laura Rodriguez: This research may aim to identify key factors that contribute to success in entrepreneurship through second-order factor analysis.

Exploring Cultural Intelligence: A Second Order Factor Analysis of Cultural Sensitivity, Cultural Adaptability, and Intercultural Communication by Maria Garcia and Juan Perez: This study may attempt to understand how individuals can develop their cultural intelligence through grouping interrelated factors.

Investigating Academic Achievement: A Second Order Factor Analysis of Cognitive Abilities, Motivation, and Study Skills by Sarah Smith and Michael Johnson: This research may focus on understanding the relationships between factors that influence academic achievement through second-order factor analysis.

## **Second Order Factors**

Researchers often use exploratory factor analysis (EFA) because they want to determine how many factors will later be used to understand the relationship between the variables being measured. Meanwhile, confirmatory factor analysis (CFA) is used by researchers to test whether or not the factor model to be created is suitable. Researchers have a theoretical model that is used to build confirmatory factors by comparing exploratory factors. Thompson (2004) explains that statistical analysis is used for confirmatory factor analysis because exploratory factor analysis is unable to answer. This is different from Confirmatory Factor Analysis (CFA) which is used to identify the most dominant model in clarifying the relationship between items and the construct being measured. The accuracy of the measured model can be detected through the measurement error value with the loading factor item.

Using Structural Equation Modeling (SEM) is a multivariate statistical technique used to assess the reliability and validity of a measurement model. The measurement model in SEM is often called confirmatory factor analysis (CFA). Confirmatory factor analysis aims to test whether data fits the hypothesized model. CFA is a model that connects latent variables with their indicators. Second order CFA analysis is a confirmatory factor with two orders. It is called second order because the latent variable is not directly measured through the indicator, but through a latent variable in the first order which is considered the indicator. In general, CFA is reflective. This analysis is often used to determine an influence or factors. If the data you have is ordinal size data, to estimate the parameters the Weighted Least Square (WLS) method is used. In CFA, the WLS method estimation consists of three stages, namely threshold estimation, polychoric estimation and parameter estimation by minimizing the WLS function. The first level analysis is carried out from the aspect latent construct to its indicators and the second analysis is carried out from the latent construct to its aspect constructs (Latan, 2012).

Confirmatory which shows the relationship between observed variables as indicators of latent variables. The second level is a Confirmatory Factor Analysis which shows the relationship between latent variables at the first level as indicators. In second level confirmatory factor analysis, the exogenous latent variable ( $\xi$ ) does not have a measurement model, so the exogenous latent variable ( $\xi$ ) is directly explained by the endogenous latent variable ( $\eta$ ).

## **METHOD**

Research methods use the identification of the underlying factor structure of observed variables or higher-order factor relationships, to understand the theoretical context, gain deep insight into the topic, identify deviations in existing knowledge, and establish a basis for further research. Evaluate the literature found based on relevance to the research topic, source credibility, and diversity of perspectives. Choose the most relevant, authoritative and methodologically sound literature.

## **RESULTS AND DISCUSSION**

Research Variable Measurement Models are an important concept in scientific research, especially in the fields of social sciences, economics, psychology, and so on. This relates to the way the variables in research are measured or mapped into operational forms that can be observed or measured. To be clearer, the results of the research using the literature review approach used to answer the Research Variable Measurement Model are as follows:

**Variable Construction:** The first result of developing a measurement model is the construction of variables. This involves identifying key variables relevant to the research topic and developing clear operational definitions for each of them.

**Indicator Development:** Each variable that has been identified is then connected to an indicator or question that can measure that variable. This may involve developing questionnaires, research instruments, or other measurement methods appropriate to the nature of the variable being measured.

**Validity Test:** After indicator development, research results may include validity tests of the measurement model. This involves testing the extent to which the selected indicators actually measure the variable in question, and whether the measurement model as a whole is valid for use in research.

**Reliability Test:** Apart from validity, research results can also include reliability tests of the measurement model. This involves testing the extent to which selected indicators are consistent in measuring the same variable over time or from sample to sample.

**Model Adjustment:** Research results may include adjustment of the measurement model based on the results of validity and reliability tests. This may involve adding, deleting, or modifying indicators to improve the quality of the measurement model.

**Interpretation of Findings:** Finally, research results may include interpretation of findings from the measurement model. This involves analysis of the relationships between measured variables and the implications of those findings for theory, policy, or practice in the field of study in question.

The results of research on Second Order Factor refer to findings related to the construction and analysis of factor models involving second order factors. In the context of factor analysis, second-order factors are factors that arise from lower primary or first-order factors. Here are some results that may emerge from research involving Second Order Factor:

**Identification of Second Order Factors:** The main result of this research is the identification of second order factors that emerge from factor analysis. This involves recognizing patterns of relationships between first-order factors that emerge from the data and then establishing second-order factors that reflect higher conceptual structures.

**Model Validity:** This research may test the validity of a second-order factor model, that is, the extent to which the model fits the observed data. This may involve using techniques such as confirmatory factor analysis (CFA) to evaluate how well the second-order factor model fits the empirical data.

**Influence of Second Order Factors:** The results of this study may also explore the influence of second order factors on other variables in the model or their relationship with external variables. This helps understand the role of second-order factors in organizing and explaining more complex conceptual structures.

**Connection to Theory:** Findings about second-order factors can make important contributions to theory development in relevant fields of study. This can help clarify more abstract or

complex concepts, and deepen understanding of the interactions between the variables involved.

**Practical Implications:** The results of this research may also have practical implications in certain fields. For example, in psychometrics, valid second-order factor models can be used to develop more effective measuring tools for measuring complex psychological constructs.

**Follow-up Research:** Findings about second-order factors often lead to more in-depth follow-up research. This research may include further validation of the model, development of new hypotheses, or further exploration of theoretical and practical implications.

The results of research on Second Order Factor contribute to a better understanding of the conceptual structure in certain fields of study, as well as providing a strong basis for the development of theory and practice in that context.

The results of research using First Order Factor refer to findings related to factor model analysis involving first order factors. First order factors are factors that are directly observed or measured in factor analysis. Here are some results that may emerge from research involving First Order Factor:

**Identification of Factors:** The main result of this research is the identification of first-order factors that emerge from factor analysis. It involves recognizing patterns of relationships between observed variables and establishing factors that reflect the underlying dimensions or constructs of the data.

**Model Validity:** This study may also test the validity of the first-order factor model. This is done by ensuring that the empirically identified factors conform to existing conceptual structures or previously proposed theories.

**Interpretation of Factors:** The results of this study may also include interpretation of the identified first-order factors. This involves understanding the meaning and implications of each factor in the context of the research topic, as well as how the factors relate to each other.

**Relationship between Factors:** This research can discuss the relationship between first-order factors and how they interact with each other. This helps understand the more complex conceptual structure and dynamics of the relationships between the observed dimensions.

**Theory Testing:** The results of research with First Order Factor can also be used to test previously proposed theories or hypotheses. Through factor analysis, research can explore the extent to which data supports the conceptual structure proposed by existing theory.

**Practical Implications:** The results of this research may also have practical implications in certain fields. For example, in psychology, the identification of relevant first-order factors can be used to develop more appropriate and effective measurement tools or interventions.

**Follow-up Research:** Findings about first-order factors often form the basis for follow-up research. This may include further theory development, cross-cultural research to validate the model, or exploration of the practical implications of research findings.

The results of research using First Order Factor help in understanding the conceptual structure and relationships between variables in a particular field of study, as well as providing a strong basis for further development of theory and practice.

## **CONCLUSION**

First Order Factor provides a better understanding of the structure and relationships between variables in research, as well as providing a basis for further development of theory and practice in a particular field of study. First Order Factor can vary depending on the context, research objectives, and findings found. First Order Factor can result in the identification of key factors that influence or are related to the phenomenon under study. First Order Factor allows researchers to evaluate the construct validity of observed variables.

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