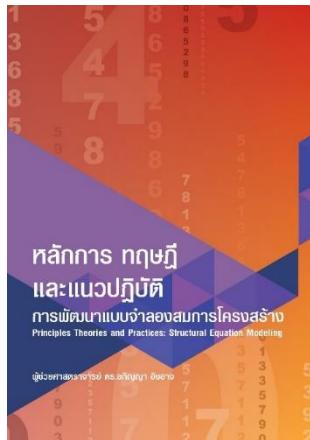


BOOK REVIEW



PRINCIPLES, THEORIES, AND PRACTICES: STRUCTURAL EQUATION MODELING

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About the Author

Assistant Professor Dr. Apinya Ingard is a distinguished scholar and practitioner within the realm of statistics and quantitative research methodologies, which positions her as an authoritative figure to author a comprehensive guide on structural equation modeling (SEM). Her extensive academic and professional background, characterized by notable scholarly accomplishments, a wealth of hands-on experience, and a prolific publication record, firmly establishes her credibility as a preeminent expert in this discipline.

Dr. Ingard's academic credentials are exemplary, comprising a Doctor of Philosophy (Ph.D.) in Research and Statistics in Cognitive Science obtained from Burapha University, a Master of Science (M.Sc.) in Applied Statistics from the National Institute of Development Administration, and a Bachelor of Science (B.Sc.) in Accounting from Bangkok University. This robust educational foundation in statistical theory and pragmatic application forms the bedrock of her expertise in SEM, a sophisticated statistical approach that necessitates an in-depth comprehension of both theoretical constructs and their empirical implementations.

Beyond her academic qualifications, Dr. Ingard possesses an extensive repertoire of professional experience. Currently, she holds the position of Associate Dean for Research and Development Cooperation at the Faculty of Information and Communication Technology, Silpakorn University. Her prior appointments include Associate Dean for Academic Affairs and Research at the same faculty, as well as Head of the Statistics Department at the Faculty of Science and Technology, Bangkok University. These leadership roles not only highlight her capacity to synthesize complex theoretical and empirical information but also underscore her ability to communicate such knowledge effectively and clearly to a diverse audience. Furthermore, her extensive teaching experience at several prestigious institutions in Thailand emphasizes her dedication to educational excellence and pedagogical innovation in advanced statistical methodologies.

Dr. Ingard's contributions to the field of quantitative research are substantial and widely acknowledged. She has received an array of accolades for both her research endeavors and presentations, including multiple Best Research and Best Presentation awards at renowned international conferences. Her publication record showcases numerous peer-reviewed articles in esteemed journals, reflecting both the quality and impact of her scholarly work. This enduring commitment to research and dissemination of knowledge illustrates her active engagement with

the dynamic and evolving landscape of quantitative research methodologies. In conclusion, Dr.Ingard's exceptional qualifications and comprehensive experience render her uniquely equipped to impart valuable insights and guidance on structural equation modeling to both students and researchers within the academic community.

About the Book

Apinya Ingard's text, "Principles, Theories, and Practices: Structural Equation Modeling," presents a systematic and accessible framework for comprehending and implementing Structural Equation Modeling (SEM). This publication is designed to facilitate a progressive understanding of SEM, from foundational concepts to practical applications, thereby serving both students with a foundational statistical background and researchers aiming to advance their methodological expertise. The text's principal strength resides in its balanced integration of theoretical constructs with pragmatic guidance, rendering complex statistical concepts more approachable.

The book is organized into nine distinct chapters.

Chapter 1, "Developing Structural Equation Models and the Design of Quantitative Research," establishes the importance of robust research design within a quantitative context. Ingard adeptly illustrates the process of constructing a coherent research framework through a systematic integration of pertinent literature, theoretical perspectives, and previous empirical findings. This chapter meticulously navigates diverse scenarios of variable relationships and interactions, elucidating the construction of appropriate research models, the definition of variables, and the formulation of testable hypotheses. Notably, the inclusion of clear diagrams enhances the reader's comprehension by visually representing various model structures.

Chapter 2, "Structural Equation Modeling and the Research Model," examines the interrelationship between SEM and overarching research models. This chapter clarifies the vital role of SEM in assessing and refining research models, emphasizing its capacity to unify confirmatory factor analysis and multiple regression techniques. Ingard effectively underscores SEM's utility in managing intricate relationships, especially those that involve latent variables along with direct and indirect effect identification. The inclusion of multiple illustrative case studies and model diagrams from a spectrum of disciplines serves as a substantive conduit from theoretical understanding to practical application, demonstrating SEM's efficacy in scrutinizing complex causal relationships across various social science realms.

Chapter 3, "A Basic Understanding of Structural Equation Modeling," offers a foundational introduction to essential terminology and concepts central to SEM. Ingard addresses potentially challenging statistical concepts with exceptional clarity and precision, providing well-structured definitions of essential terms such as latent variables, exogenous and endogenous latent variables, structural versus measurement models, observed variables, factor loadings, and the distinction between direct, indirect, and total effects. The chapter proceeds to elucidate core assumptions underlying SEM and the crucial process of evaluating model fit. Ingard meticulously delineates the significance of establishing model fit through discussions on the chi-square test and various fit indices (e.g., GFI, AGFI, CFI, TLI, RMSEA, RMR, SRMR), offering practical interpretations and thresholds for acceptable model fit levels. The chapter is further enriched by real-world examples and cogent guidelines for sample size determination, including practical applications of online calculators and Hoelter's critical N.

Chapter 4, "Approaches and Steps in Developing Structural Equation Models," delineates two predominant approaches to SEM analysis: the two-step approach proposed by Anderson and Gerbing (1988) and the four-step methodology articulated by Mulaik and Millsap (2000). Ingard provides a detailed exploration of the subtleties inherent in each approach, emphasizing critical considerations and procedural steps. The author's elucidations are particularly beneficial in clarifying the often-confounding concepts of model identification and specification. A noteworthy addition is the comprehensive examination of normality assessment and outlier management, wherein Ingard methodically guides the reader through techniques for detecting non-normality and identifying outliers. This discussion includes valuable recommendations for addressing violations of normality assumptions, enhanced by thorough explanations of the Jarque-Bera test for multivariate normality and the Mahalanobis distance measure for outlier identification. By contextually integrating these statistical

techniques within the broader SEM analysis framework, the author provides a balanced and pragmatically relevant treatment of this pivotal aspect of the research process.

Chapter 5, titled "Step-by-Step Guide to Analyzing Measurement Models Using AMOS," serves as a comprehensive practical resource for conducting Structural Equation Modeling (SEM) analyses utilizing AMOS software. The chapter's efficacy is largely attributable to its meticulous, sequential instructions, augmented by a plethora of illustrative screenshots of the AMOS interface. This structured instructional approach, coupled with extensive visual aids, renders the analytical process highly accessible to readers at varying levels of expertise. The author adeptly guides readers through the intricacies of data entry into AMOS, model specification, and the implementation of the analytical procedures. Such a pragmatic approach is pivotal in bridging the divide between theoretical constructs and practical application, thus empowering readers to confidently engage in their own SEM analyses. Notably, the chapter provides targeted guidance on model modifications informed by the modification indices generated by AMOS, which is particularly beneficial for novices in the software, ensuring proficient navigation of the model refinement process until an adequate model fit is attained. Additionally, the chapter furnishes pragmatic advice on the interpretation of AMOS output, encompassing model fit assessments, parameter significance, and data diagnostics, thereby establishing it as an invaluable resource for researchers embarking on SEM methodologies.

Chapter 6, "Guidelines and Examples of Reporting Results of Measurement Model Analyses," delves into the paramount task of interpreting and articulating the results derived from measurement model analyses. This chapter is particularly instrumental in illustrating how to distill complex statistical data into easily comprehensible formats suitable for diverse audiences. The author provides cogent guidance on the formulation of effective reports that integrate both numerical and visual representations of analytical findings. Building on the foundational concepts established in the preceding chapter, this segment presents practical methodologies for the computational analysis necessary to derive critical indices such as composite reliability (CR) and average variance extracted (AVE). The inclusion of work examples alongside clear computational explanations significantly enhances the chapter's practical applicability for researchers engaged in SEM.

Chapter 7, "Construct Validity and Discriminant Validity," addresses the essential considerations in the evaluation of measurement model validity. The author meticulously elucidates the significance of establishing both construct validity and discriminant validity, equipping readers with the tools necessary to determine whether their selected indicators accurately reflect the intended latent constructs and whether the latent variables are distinct entities. The chapter offers an in-depth exploration of two predominant methodologies for assessing discriminant validity: the correlation-fixing approach, which entails setting correlations between latent variables to 1.00, and the Fornell-Larcker criterion, which juxtaposes the average variance extracted (AVE) against the squared correlations between latent constructs. The author provides a thorough and systematic guide to executing these assessments within the context of research endeavors and interpreting the resulting data to ensure construct validity. This chapter adeptly synthesizes theoretical foundations with practical, step-by-step methodologies for conducting these analyses using AMOS software.

Chapter 8, "Step-by-Step Guide to Analyzing Structural Models Using AMOS," extends the practical applications of AMOS to the analysis of structural models. Building on the insights gained from the prior chapter's discussion of measurement models, this chapter presents a detailed tutorial on employing AMOS for hypothesis testing concerning the relationships among latent variables. The author systematically guides readers through the process of specifying the structural model within AMOS, incorporating residuals, and utilizing the software for the assessment of overall model fit while evaluating individual parameter estimates. Additionally, valuable practical insights are offered regarding the management of model misspecification issues and the application of modification indices, thereby facilitating model refinement to achieve an improved fit to the data. The chapter's comprehensive step-by-step guidance, supplemented by an abundance of AMOS output screenshots, markedly enhances its practical relevance for readers.

Chapter 9, "Guidelines and Examples of Reporting Results of Structural Equation Model Analyses," furnishes essential guidance on effectively articulating the outcomes of SEM analyses. The author meticulously navigates readers through the process of crafting coherent and informative research reports that encapsulate the findings of their investigations. Emphasizing the critical nature of presenting both overall model fit assessments and the granular details of individual hypothesis tests, the

chapter includes well-structured tables as templates for organizing and conveying the key findings from structural model analyses, encompassing standardized and unstandardized regression weights, direct and indirect effects, total effects, and the R-squared values for each dependent variable. The author's integration of these organizational tools, along with thorough explanations, ensures that readers are equipped to communicate their research findings with clarity and precision. The chapter's practical value is further reinforced by the inclusion of illustrative examples that demonstrate effective reporting practices.

Review

Apinya Ingard's work, "Principles, Theories, and Practices: Structural Equation Modeling," represents a significant contribution to the corpus of literature surrounding advanced statistical methodologies. This text adeptly bridges the chasm between theoretical frameworks and practical implementation of Structural Equation Modeling (SEM), a robust analytical technique increasingly employed across a multitude of research disciplines. The book's strength resides in its comprehensive and accessible approach, catering to both novices in SEM and experienced researchers seeking to augment their methodological toolkit.

One of the foremost strengths of the volume is its clear and systematically organized structure. The narrative unfolds logically, commencing with foundational principles and progressively advancing to sophisticated techniques, thus ensuring that readers, regardless of their prior exposure to SEM, can maintain comprehension. The author effectively harmonizes theoretical elucidations with practical demonstrations, employing myriad real-world examples to elucidate essential concepts. Particularly commendable is the integration of AMOS software throughout the discourse. This integration is executed with exceptional clarity, featuring detailed step-by-step instructions, abundant screenshots, and well-constructed diagrams that effectively illustrate the application of SEM using AMOS. Such an approach empowers scholars to not only grasp statistical procedures but also to engage actively in their own SEM analyses through the widely utilized AMOS platform. The inclusion of various work examples substantially enhances the text's practical utility, thereby enabling researchers to navigate the SEM process with confidence.

Another notable strength is the author's focus on model fit assessment and modification. The text meticulously explicates various fit indices—such as Chi-square, GFI, AGFI, CFI, TLI, RMSEA, and RMR—while providing clear guidelines for their interpretation. This rigorous treatment is further augmented by a thorough investigation of the assumptions that underlie SEM, which includes discussions on normality testing, outlier detection methods, and strategies for addressing assumption violations. The practical guidance on model modification, particularly the emphasis on utilizing modification indices provided by AMOS, constitutes an invaluable resource for researchers confronting intricate SEM models.

The author's detailed exploration of construct and discriminant validity is equally impressive. Navigating these often-complex topics skillfully, the author equips readers with the requisite knowledge and expertise to ensure the validity and reliability of their measurement models. This exploration is further enriched by an integration of both theoretical foundations and pragmatic advice concerning the accurate reporting of these components. The systematic and detailed approach to assessing these dimensions of validity enables readers to confidently establish the reliability of their research.

The book's provision of explicit guidance on interpreting and reporting SEM results is also noteworthy. The author presents clear templates for tables and figures, thereby facilitating the effective communication of complex statistical findings to diverse audiences, including both students and seasoned researchers. The presentation of statistical outputs is handled with commendable clarity, exemplifying the practical applications and interpretations of software-generated results.

Nevertheless, although the book is laudable in its comprehensive coverage, several areas could benefit from enhancement in future editions. For instance, while the exposition on the two-step and four-step approaches to SEM is thorough, a discussion on additional established model development strategies could further enrich the reader's methodological repertoire. Additionally,

while the focus on AMOS software is well-articulated, a brief overview of other prominent SEM software packages, such as Mplus or lavaan, would acknowledge the spectrum of available options and thus broaden the relevance of the text. Finally, the addition of an updated bibliography reflecting recent advancements in the field of SEM, particularly regarding software developments and methodological innovations, would further augment the text's value.

In conclusion, "Principles, Theories, and Practices: Structural Equation Modeling" serves as a valuable resource for both researchers and students engaged with SEM methodologies. The text effectively reconciles theoretical understanding with practical application, a feat significantly bolstered by the author's extensive expertise in statistics and quantitative research. The clarity of the author's explanations, coupled with numerous practical examples and meticulously detailed, step-by-step instructions on employing AMOS software, renders complex statistical concepts accessible. The book's comprehensive guidance on model construction, assessment, modification, and reporting empowers researchers to navigate the complexities inherent in SEM with confidence. While minor refinements could enhance future editions, the volume stands as a pivotal resource for both novice and advanced users, facilitating a deeper understanding of complex statistical techniques.