APPLYING PARTIAL LEAST SQUARES IN TOURISM AND HOSPITALITY RESEARCH

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Preface

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Partial least squares-structural equation modeling (PLS-SEM) is a multivariate statistical technique and its usage in various disciplines is increasing. Considering this increase in the application of PLS-SEM, numerous scholars have reviewed its usage in accounting, business research, strategic management, marketing, management information system, tourism and hospitality research, etc. Review studies on the usage of PLS-SEM in tourism (do Valle & Assaker, 2016) and hospitality research (Ali, Rasoolimanesh, Sarstedt, Ringle, & Ryu, 2018) indicate an increasing dissemination of PLS-SEM in tourism and hospitality research. Researchers in tourism and hospitality seem to be aware of sample size issues in PLS-SEM, which have attracted considerable attention in recent years. In addition, the reporting practices regarding the assessment of reflective measurement models are clearly above standard but still warrant improvement. This is particularly true regarding discriminant validity assessment, which draws on metrics that recent research has debunked as ineffective in a PLS-SEM context. Similarly, the structural model assessment practices compare well with those in other disciplines but should consider more recent metrics that allow for assessing a model's out-of-sample predictive power. However, other aspects, such as formative measurement model assessment, clearly require improvement. Hospitality researchers disregard fundamental validation steps such as convergent validity and multicollinearity assessment.

While these studies indicate an increase in the application of PLS-SEM in tourism and hospitality research over last few years, it is noteworthy that PLS-SEM is clearly under-utilized as compared to the extensively used covariance-based SEM in these disciplines. Apart from providing insights into reporting practices, these review papers (Ali et al., 2018; do Valle & Assaker, 2016) also indicated that tourism and hospitality researchers seem unaware of recent advances/complimentary analysis techniques in the field. These advances and techniques clearly extend the scope of the analyses and help researchers gain more insights from the model and the data. Extensions include, but are not limited to, the weighted PLS algorithm, consistent PLS, methods for uncovering unobserved heterogeneity and impact-performance map analyses. Hence, we are editing this

handbook to provide tourism and hospitality researchers with the foundations when adopting the PLS-SEM method in their research.

This handbook on the "*Applying Partial Least Squares in Tourism and Hospitality Research*" includes 10 chapters, representing a comprehensive application of the current, original and the most advanced research in the domain of PLS methods with specific reference to their use in tourism and hospitality research. While most of the chapters comprise a thorough discussion of applications to problems from tourism and hospitality research, others focus on some key aspects of PLS analysis with a didactic approach. This handbook serves as both an introduction for those without prior knowledge of PLS and as a comprehensive reference for researchers and practitioners interested in the most recent advances in PLS methodology.

The use of PLS-SEM in tourism and hospitality research is on the rise, a trend that is in line with what has been taking place in many other fields where advanced multivariate statistical methods are employed. One of the most fundamental issues in PLS-SEM is that of minimum sample size estimation, where the "10-times rule" has been a favorite due to its simplicity of application, even though it tends to yield grossly imprecise estimates. In Chapter 1, Ned Kock discuss two related methods, based on mathematical equations, as alternatives for minimum sample size estimation in PLS-SEM: the inverse square root method and the gamma-exponential method. The application of the methods is illustrated based on a model derived from a tourism and hospitality research study. Both the methods are implemented in one of the leading PLS-SEM software tools, WarpPLS, starting in version 6.0.

There are five types of research that can be distinguished in the context of PLS-PM: (1) confirmatory, (2) explanatory, (3) predictive, (4) descriptive, and (5) exploratory. Each research type needs to be considered to select the appropriate assessment criteria. Chapter 2, by Jörg Henseler, Tobias Müller, and Florian Schuberth, sheds some light to these five research types and explains the differences by presenting empirical examples from the literature in hospitality, travel, and tourism (HTT) research. This chapter introduces new guidelines and enhancements for the use of PLS-PM in causal HTT research to assess overall model fit by using consistent PLS (PLSc) in combination with the bootstrap-based test, to measure discriminant validity with the heterotrait-monotrait ratio of correlations and assess the reliability of reflectively measured constructs via Dijkstra and Henseler's ρ_A.

Apart from the theoretic explanations offered by the empirical models in the research papers, practitioners are also interested in the practical implications that they can apply to future cases. Being able to provide predictive diagnoses is an increasingly important issue linking theory and practice, and empirical researchers in tourism and hospitality should heed the call for predictive evaluations of their theoretical models. Fortunately, PLS path models are uniquely suited to predictive analytics. Chapter 3, by Nicholas P. Danks and Soumya Ray, offers a review of the emerging predictive methodology for PLS path models and a practical guide to what researchers can do to diagnose the predictive qualities of their models. These discussions are followed by a demonstration on a well-regarded model and dataset from the tourism literature.

Chapter 4 is contributed by Hengky Latan. It aims to update the field of knowledge regarding recent advances in PLS path modeling. This chapter uses eight assessment criteria that have been adapted in accordance with recent advances in PLS-PM. Specifically, this chapter explores all recent advances in the application of each PLS-PM technique. This chapter highlights serious misconceptions surrounding the use of PLS-PM in many disciplines, including hospitality and tourism research. This chapter also contributes to the improved practices and application of PLS-PM by proposing a new framework for reporting the results of PLS-PM.

Chapter 5 is contributed by Minwoo Lee, Kawon Kim, Kyung Young Lee, and Jung Hwa Hong. It is an application of PLS-SEM to identify smart-computing functions of smartphone's use at the workplace in the hospitality industry and examine the impact of using smart-computing functions on Mintzberg's managerial role performance and overall performance improvement. This chapter presents how both reflectively measured constructs and formatively measured constructs can be tested by using PLS-SEM.

Chapter 6, contributed by Mara Mataveli and Alfonso J. Gil, is an application of PLS-SEM to examine the impact of motivations on rural tourism on loyalty. In addition, this chapter also uses and reports moderating as well as mediation analysis.

Chapter 7, contributed by Palwasha Bibi, Ashfaq Ahmad, and Abdul H. A. Majid is also an application of PLS-SEM to measure the relationships between compensation, training and development, performance appraisal and employee retention, and the moderating role of work environment on the relationships between compensation, training and development, performance appraisal, and employee retention.

Chapter 8, contributed by Jesús García-Madariaga, Nuria Recuero Virto, María Francisca Blasco López, and Joaquin Aldas-Manzano, aims to identify how features of museum websites explain visitors' intentions to visit the museum as well as revisit intentions to the website. This chapter applies multigroup analysis (MGA) to assess visitors' intentions across the websites of the two most visited museums of Spain: Prado Museum and Reina Sofia Museum.

Chapter 9, contributed by Carlos Alberto Alves, Claudio José Stefanini, and Leonardo Aureliano da Silva, applies PLS-SEM and MGA to investigate if the presence or absence of an environmental conscious can change the relationship between environmental practices, environmental image, and attachment, and their effects on customer loyalty in restaurants based on the theory of reasoned action.

Chapter 10, contributed by Maja Šerić and Đurđana Ozretić-Došen, examines whether consumers' perceptions of online and offline communication consistency can increase their perceived service quality and brand loyalty in hospitality by applying PLS-SEM and MGA.

Even though the discussion on PLS method is increasing, its application in tourism and hospitality is under-whelming. Consequently, editors for this handbook selected high-quality papers for publication where some of them advance and explain the recent advances of PLS-SEM and others report application of

the method. The handbook provides a forum for topical issues that demonstrate PLS path modeming's usefulness in tourism and hospitality applications. A description of the method, its empirical applications, and potential methodological advancements, which increase its usefulness for research and practice, are specifically emphasized. The editors believe that this handbook will be the starting point for a more intensive use of PLS-SEM in the tourism and hospitality discipline and for additional advances that will exploit PLS's capabilities in this area. The editors and authors gratefully acknowledge Christian M. Ringle and Marko Sarstedt's comments, encouraging support, and suggestions during the preparation of this handbook. The reviewers also deserve the heartfelt recognition of the editors for their remarkable contribution to the quality of this handbook. As usual, they were diligent, meticulous, constructive, and extremely competent. The editors specifically express their gratitude to the following reviewers: Babak Taheri (Heriot-Watt University), Chritian M. Ringle (Hamburg University of Technology), Gabriel Cepeda-Carrión (Universidad de Sevilla), Hengky Latan (STIE Bank BPD Jateng), José L. Roldán (Universidad de Sevilla), Jun-Hwa Cheah (Universiti Teknologi Malaysia), Marko Sarstedt (Otto von Guericke Universität Magdeburg), Murad Ali (King Abdulaziz University), and Rob Hallak (University of South Australia).

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do Valle, P. O., & Assaker, G. (2016). Using partial least squares structural equation modeling in tourism research: A review of past research and recommendations for future applications. *Journal of Travel Research*, *55*(6), 695–708.

Foreword

Since its introduction by Herman O. A. Wold (1982) and Jan-Bernd Lohmöller (1989), partial least squares structural equation modeling (PLS-SEM) has undergone a broad adoption and numerous advances. The increasing dissemination of PLS-SEM in applied business is rooted in Wynne W. Chin's (1995, 1998) introductory articles and the availability of several software packages for PLS-SEM such as PLS-Graph, matrixpls, SmartPLS*, and WarpPLS, whereby a recent software review considers SmartPLS (Ringle et al., 2015) being "the most comprehensive" one (Kumar and Purani, 2018). Today, several textbooks (Garson, 2016; Hair, Hult, Ringle, & Sarstedt, 2017; Hair, Sarstedt, Ringle, & Gudergan, 2018; Ramayah, Cheah, Chuah, Ting, & Memon, 2016) and handbook articles (Esposito Vinzi, Chin, Henseler, & Wang, 2010; Henseler, Ringle, & Sarstedt, 2012; Rigdon, 2013; Sarstedt, Ringle, & Hair, 2017) provide researchers with the foundations when adopting the PLS-SEM method in their research. Numerous review studies on the use of PLS-SEM in various business research disciplines such as – accounting (Lee, Petter, Fayard, & Robinson, 2011; Nitzl, 2016), family business (Sarstedt, Ringle, Smith, Reams, & Hair, 2014), group and organization management (Sosik, Kahai, & Piovoso, 2009), hospitality management (Ali, Rasoolimanesh, Sarstedt, Ringle, & Ryu, 2018), human resource management (Ringle, Sarstedt, Mitchell, & Gudergan, 2018), information systems (Hair, Hollingsworth, Randolph, & Chong, 2017; Ringle, Sarstedt, & Straub, 2012), international marketing research (Henseler, Ringle, & Sinkovics, 2009; Richter, Sinkovics, Ringle, & Schlägel, 2016), marketing (Hair, Sarstedt, Ringle, & Mena, 2012), operations management (Peng & Lai, 2012), psychology (Willaby, Costa, Burns, MacCann, & Roberts, 2015), strategic management (Hair, Sarstedt, Pieper, & Ringle, 2012), supply chain management (Kaufmann & Gaeckler, 2015), and tourism (do Valle & Assaker, 2016) – not only substantiate the wide adoption of the method, but also provide an overview how researchers used PLS-SEM in their studies.

Accompanying the rapid pace of development, PLS-SEM has also witnessed controversies, with researchers sometimes even questioning the method's raison d'être (Rönkkö, Antonakis, McIntosh, & Edwards, 2016; Rönkkö & Evermann, 2013; Rönkkö, McIntosh, & Antonakis, 2015). However, most of the criticism has been refuted as inaccurate (Henseler et al., 2014) or grounded in different measurement philosophies (Rigdon, Sarstedt, & Ringle, 2017; Sarstedt, Hair, Ringle, Thiele, & Gudergan, 2016). These criticisms, however, helped furthering

* Christian Ringle acknowledges a financial interest in SmartPLS.

the method's theory base in terms of measurement and model estimation, triggering a wide range of follow-up research. New developments in PLS-SEM range from new estimators (e.g., Dijkstra & Henseler, 2015; Dolce, Esposito Vinzi, & Lauro, 2018; Schuberth & Cantaluppi, 2017) and model evaluation metrics (e.g., Aguirre-Urreta & Rönkkö, 2018; Franke & Sarstedt, in press; Henseler, Ringle, & Sarstedt, 2015; Sharma, Sarstedt, Shmueli, Thiele, & Kim, 2017; Shmueli, Ray, Velasquez Estrada, & Chatla, 2016) to complementary methods such as methods for uncovering unobserved heterogeneity (e.g., Ringle, Sarstedt, & Schlittgen, 2014; Schlittgen, Ringle, Sarstedt, & Becker, 2016), different multigroup analysis approaches (Matthews, 2018), testing measurement invariance of composites (Henseler, Ringle, & Sarstedt, 2016), and endogeneity assessment (Hult, Hair, Proksch, Sarstedt, Pinkwart, & Ringle, 2018). These advances have greatly extended researchers' methodological toolbox (Khan et al., 2018) and fueled the adoption of PLS-SEM in the social sciences and other fields.

This handbook by Faizan Ali, S. Mostafa Rasoolimanesh, and Cihan Cobanoglu on PLS-SEM application in tourism and hospitality research represents another important contribution to progress on the method. We would like to thank Faizan Ali, S. Mostafa Rasoolimanesh, and Cihan Cobanoglu for the effort of developing this important handbook. Congratulations to a job done well!

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