



ICIS 2019

Organizing Ancillary Meetings and Workshops (OAM)

WORKSHOP Advanced Issues in Partial Least Squares Structural Equation Modeling (PLS-SEM)

Jan-Michael Becker, Christian M. Ringle, and Marko Sarstedt

**Sunday, December 15, 2019
9 am to 5 pm**

Munich, Germany

Short workshop description

This pre-conference workshop focuses on advanced issues in partial least squares structural equation modeling (PLS-SEM):

- (1) PLS-SEM recap;
- (2) prediction-oriented assessment of PLS-SEM results;
- (3) predictive model comparison; and
- (4) uncovering unobserved heterogeneity (e.g., by using FIMIX-PLS and PLS-POS).

Case studies using the SmartPLS 3 software will be an integral part of the course (software licenses will be provided).

Workshop: Advanced Issues in Partial Least Squares Structural Equation Modeling (PLS-SEM)

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Partial least squares structural equation modeling (PLS-SEM) has recently received considerable attention in a variety of disciplines, including management information systems, marketing, strategic management, and many more. PLS is a composite-based approach to SEM, which aims at maximizing the explained variance of dependent constructs in the path model. Compared to other SEM techniques, PLS allows researchers to estimate very complex models with many constructs and indicator variables. Furthermore, PLS-SEM allows to estimate reflective and formative constructs and generally offers much flexibility in terms of data requirements.

This ICIS 2019 OAM workshop focuses on recent advance in PLS-SEM. More specifically, we introduce new model assessment criteria that assist researchers in adequately evaluating and presenting their results. The course will cover the following state-of-the-art topics:

- PLS-SEM recap;
- prediction-oriented assessment of PLS-SEM results;
- predictive model comparison; and
- uncovering unobserved heterogeneity (e.g., by using FIMIX-PLS and PLS-POS).

Practical applications and the use of the software program SmartPLS 3 are an integral part of the ICIS 2019 OAM workshop. Each course participant will get a *free two-months* professional license of the SmartPLS 3 software.

Place: ICIS 2019 in Munich, further details tba

Date: Sunday, December 15, 2019

Time: 9.00 am – 5.00 pm

Fee: 50 USD early bird (October 21), 75 USD regular, 100 USD on site

Registration: Participants need to register on the ICIS 2019 website.

Capacity: 50 participants.

Preliminary Schedule

Date	Time	Content
December 15, 2019 [SUN]	9:00 – 10:30	RECAP: Foundations of partial least squares structural equation modeling (PLS-SEM) & introduction to the SmartPLS software
	11:00 - 12:30	Prediction-oriented assessment of PLS-SEM results & SmartPLS exercises
	13:30 - 15:00	Predictive model comparison & SmartPLS exercises Uncovering unobserved heterogeneity part I (e.g., by using FIMIX-PLS and PLS-POS)
	15:30 - 17:00	Uncovering unobserved heterogeneity part II (e.g., by using FIMIX-PLS and PLS-POS) & SmartPLS exercises

Course set-up: The ICIS 2019 OAM workshop will introduce and explain the key concepts (i.e., why, when, and how to apply each criterion). In addition, most of the workshop will involve “hands-on” analysis of the dataset using the SmartPLS 3 software. The SmartPLS 3 software output diagnostics and interpretation of the results will be covered. Potential obstacles and “rules-of-thumb” to ensure appropriate application of the techniques will be addressed.

Requirements: Prior exposure to PLS-SEM is recommended. In any case, we recommend the following PLS-SEM literature:

- Sarstedt, M., Ringle, C. M., & Hair, J. F. (2017). Partial Least Squares Structural Equation Modeling. In C. Homburg, M. Klarmann, & A. Vomberg (Eds.), *Handbook of Market Research*. Heidelberg: Springer.
- Hair, J. F., Hult, G. T. M., Ringle, C. M., & Sarstedt, M. (2017). *A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM)* (2nd ed.). Thousand Oaks, CA: Sage.
- Hair, J. F., Sarstedt, M., Ringle, C. M., & Gudergan, S. P. (2018). *Advanced Issues in Partial Least Squares Structural Equation Modeling (PLS-SEM)*. Thousand Oaks, CA: Sage.

Participants must bring a laptop computer with the SmartPLS 3 software readily installed. The software is available from <http://www.smartpls.com> (click on the “Download” button). Participants will receive the two-months license key to run the professional version of the software from the course organizers a few days before the course starts. This is an advanced workshop. Participants should have basic experience with PLS-SEM and the SmartPLS software.

Who should attend? Individuals wishing to learn more advanced PLS-SEM topics and the SmartPLS software for their PhD research and/or top-tier journal publications.

Instructors

Jan-Michael Becker is a Postdoctoral Researcher and Lecturer in Marketing at the University of Cologne in Germany. He has been a visiting scholar at leading international business schools like Georgia State University, Atlanta, USA and University of Waikato, Hamilton, New Zealand. His research interests focus on data analytics, structural equation modeling (SEM), PLS path modeling, unobserved heterogeneity, and measurement theory, as well as bridging marketing and IS problems. His research has been published in several premier academic journals, including Information Systems Research, MIS Quarterly, Psychometrika, Long Range Planning, Multivariate Behavioral Research, and European Management Journal. He is a co-founder of the SmartPLS software application and regularly teaches doctoral seminars on multivariate statistics and structural equation modeling.

More information: <https://www.marketing.uni-koeln.de/de/team/jan-michael-becker/>

Christian M. Ringle is a Professor of Management and the Director of the Institute for Human Resource Management and Organizations at the Hamburg University of Technology (TUHH) and an Adjunct Professor of the Waikato Management School, New Zealand. His research addresses human resource management, organization, marketing, strategic management, and quantitative methods for business and market research. Dr. Ringle's research has been published in well-known journals such as Information Systems Research (ISR), International Journal of Research in Marketing (IJRM), Journal of Business Research (JBR), Journal of Service Research (JSR), Journal of the Academy of Marketing Science (JAMS), Long Range Planning (LRP), MIS Quarterly (MISQ), and Organizational Research Methods (ORM). Dr. Ringle has been included in the 2018 Clarivate Analytics' Highly Researchers list. He regularly teaches doctoral seminars on multivariate statistics, especially the PLS-SEM method, and the use of the statistical software such as SmartPLS.

More information: <https://www.tuhh.de/hrmo/team/prof-dr-c-m-ringle.html>

Marko Sarstedt is a Professor of Marketing at the Otto-von-Guericke-University Magdeburg (Germany) and an Adjunct Professor at the Monash University Malaysia (Malaysia). His main research interest is in the advancement of research methods to further the understanding of consumer behavior. His research has been published in journals such as Journal of Marketing Research, Journal of the Academy of Marketing Science, Multivariate Behavioral Research, Decision Sciences, Psychometrika, Journal of the Association for Information Systems, International Journal of Research in Marketing, MIS Quarterly, Organizational Research Methods, and Journal of World Business. Dr. Sarstedt has co-edited several special issues of leading journals and co-authored the textbook on PLS-SEM. He has been named member of Clarivate Analytics' 2018 Highly Cited Researcher List, which includes the "world's most impactful scientific researchers."

More information: <http://www.marketing.ovgu.de>

Suggested readings:

The Book on PLS-SEM: Hair, J.F./ Hult, G.T.M./ Ringle, C.M./ Sarstedt, M. (2017). [A Primer on Partial Least Squares Structural Equation Modeling \(PLS-SEM\) \(2 ed.\)](#). Thousand Oaks, CA: Sage.

The Advanced PLS-SEM Book: Hair, J.F./ Sarstedt, M./ Ringle, C.M./ Gudergan, S.P. (2018): [Advanced Issues in Partial Least Squares Structural Equation Modeling \(PLS-SEM\)](#). Thousand Oaks, CA: Sage.

Handbook Article on PLS-SEM: Sarstedt, M./ Ringle, C.M./ Hair, J.F. (2017): [Partial Least Squares Structural Equation Modeling](#). In Homburg, C., Klarmann, M., and Vomberg, A. (Eds.), *Handbook of Market Research*. Heidelberg: Springer, 1-40.

PLS-SEM Results Reporting: Hair, J.F./ Risher, J.J./ Sarstedt, M./ Ringle, C.M.: [When to Use and How to Report the Results of PLS-SEM](#), *European Business Review*, Volume 31 (2019), Issue 1, pp. 2-24.

PLS-SEM Results Assessment: Sarstedt, M./ Ringle, C.M./ Cheah, J.H./ Ting, H./ Moisescu, O.I./ Radomir, L.: [Structural Model Robustness Checks in PLS-SEM](#), *Tourism Economics*, forthcoming.

Weighted PLS: Becker, J.-M./ Ismail, I. R. [Accounting for Sampling Weights in PLS Path Modeling: Simulations and Empirical Examples](#), *European Management Journal*, Volume 34 (2016), Issue 6, pp. 606-617.

Discriminant Validity: Henseler, J./ Sarstedt, M./ Ringle, C.M. [A New Criterion for Assessing Discriminant Validity in Variance-Based Structural Equation Modeling](#). *Journal of the Academy of Marketing Science*, Volume 43 (2015), Issue 1, pp. 115-135.

Prediction: Shmueli, G./ Ray, S./ Velasquez Estrada, J.M./ Chatla, S.B.: [The Elephant in the Room: Evaluating the Predictive Performance of PLS Models](#), *Journal of Business Research*, Volume 69 (2016), Issue 10, pp. 4552–4564.

How to use PLSpredict?! Shmueli, G./ Sarstedt, M./ Hair, J.F./ Cheah, J.-H./ Ting, H./ Vaithilingam, S./ Ringle, C.M.: [Predictive Model Assessment in PLS-SEM: Guidelines for Using PLSpredict](#). *European Journal of Marketing*, forthcoming.

Predictive model selection: Sharma, P.N./ Shmueli, G./ Sarstedt, M./ Danks, N./ Ray, S.: [Prediction-oriented Model Selection in Partial Least Squares Path Modeling](#), *Decision Sciences* (2019), forthcoming.

More on predictive model selection: Sharma, P.N./ Shmueli, G./ Sarstedt, M./ Thiele, K.O.: [PLS-based Model Selection: The Role of Alternative Explanations in MIS Research](#), *Journal of the Association for Information Systems*, Volume 20 (2019), Issue 4, pp. 346-397.

Segmentation: Sarstedt, M./ Ringle, C.M./ Hair, J.F. (2017): [Treating Unobserved Heterogeneity in PLS-SEM: A Multi-method Approach](#). In H. Latan & R. Noonan (Eds.), *Partial Least Squares Path Modeling: Basic Concepts, Methodological Issues and Applications*. Cham: Springer, pp. 197-217.

FIMIX-PLS Segmentation: Hair, J.F./ Sarstedt, M./ Matthews, L./ Ringle, C.M.: [Identifying and Treating Unobserved Heterogeneity with FIMIX-PLS: Part I - Method](#), *European Business Review*, Volume 28 (2016), Issue 1, pp. 63-76.

FIMIX-PLS tutorial: Matthews, L./ Sarstedt, M./ Hair, J.F./ Ringle, C.M.: [Identifying and Treating Unobserved Heterogeneity with FIMIX-PLS: Part II – A Case Study](#), *European Business Review*, Volume 28 (2016), Issue 2, pp. 208-224.

Prediction-oriented Segmentation: Becker, J.-M./ Rai, A./ Ringle, C.M./ Völckner, F.: [Discovering Unobserved Heterogeneity in Structural Equation Models to Avert Validity Threats](#), *MIS Quarterly (MISQ)*, Volume 37 (2013), Issue 3, pp. 665-694.

Weighted Regression Segmentation: Schlittgen, R./ Ringle, C.M./ Sarstedt, M./ Becker, J.-M.: [Segmentation of PLS Path Models by Iterative Reweighted Regressions](#), *Journal of Business Research*, Volume 69 (2016), Issue 10, pp. 4583–4592.

Higher-order models: Sarstedt, M./ Hair, J.F./ Cheah, J.-H./ Becker, J.-M./ Ringle, C.M.: How to Specify, Estimate, and Validate Higher-order Constructs in PLS-SEM. Australasian Marketing Journal (AMJ), Volume 27 (2019), Issue 3, pp. 197-211.

More on higher-order models: Becker, J.-M. / Klein, K. / Wetzels, M.: Hierarchical Latent Variable Models in PLS-SEM: Guidelines for Using Reflective-Formative Type Models. Long Range Planning, Volume 45 (2012), Issue 5-6, pp. 359–394.

Endogeneity in PLS-SEM: Hult, G.T.M./ Hair, J.F./ Proksch, D./ Sarstedt, M./ Pinkwart, A./ Ringle, C.M.: Addressing Endogeneity in International Marketing Applications of Partial Least Squares Structural Equation Modeling, Journal of International Marketing, Volume 26 (2018), Issue 3, pp. 1-21.

Measurement invariance: Henseler, J./ Ringle, C.M./ Sarstedt, M.: Testing Measurement Invariance of Composites Using Partial Least Squares, International Marketing Review, Volume 33 (2016), Issue 3, pp. 405-431.

Moderation: Becker, J.-M./ Ringle, C.M./ Sarstedt, M.: Estimating Moderating Effects in PLS-SEM and PLSc-SEM: Interaction Term Generation*Data Treatment, Journal of Applied Structural Equation Modeling, Volume 2 (2018), Issue 2, pp. 1-21.

Mediation: Nitzl, C./ Roldán, J.L./ Cepeda Carrión, G.: Mediation Analysis in Partial Least Squares Path Modeling: Helping Researchers Discuss More Sophisticated Models, Industrial Management & Data Systems, Volume 119 (2016), Issue 9, pp. 1849-1864.

Importance-performance map (IPMA): Ringle, C.M./ Sarstedt, M.: Gain More Insight from Your PLS-SEM Results: The Importance-Performance Map Analysis, Industrial Management & Data Systems, Volume 119 (2016), Issue 9, 1865-1886.

Data from Experiments and PLS-SEM: Hair, J.F./ Ringle, C.M./ Gudergan, S.P./ Fischer, A./ Nitzl, C./ Menictas, C.: Partial Least Squares Structural Equation Modeling-based Discrete Choice Modeling: An Illustration in Modeling Retailer Choice, Business Research (2018).

Dynamic PLS: Schubring, S./ Lorscheid, I./ Meyer, M./ Ringle, C.M.: The PLS Agent: Predictive Modeling with PLS-SEM and Agent-based Simulation, Journal of Business Research, Volume 69 (2016), Issue 10, pp. 4604–4612.

PLS-SEM research networks: Khan, G.F./ Sarstedt, M./ Shiau, W.L., Hair, J.F./ Ringle, C.M./ Fritze, M.P.: Methodological Research on Partial Least Squares Structural Equation Modeling (PLS-SEM): An Analysis Based on Social Network Approaches, Internet Research, Volume 29 (2019), Issue 3, pp. 407-429 .

PLS-SEM software review: Sarstedt, M./ Cheah, J.-H.: Partial Least Squares Structural Equation Modeling Using SmartPLS: A Software Review. Journal of Marketing Analytics, forthcoming.

CB-SEM and PLS-SEM: Rigdon/ E. E./ Sarstedt, M./ Ringle, C. M. (2017). On Comparing Results from CB-SEM and PLS-SEM. Five Perspectives and Five Recommendations. Marketing ZFP, 39(3), 4-16.

CB-SEM and PLS-SEM: Sarstedt, M./ Hair, J.F./ Ringle, C.M./ Thiele, K.O./ Gudergan, S.P. Estimation Issues with PLS and CBSEM: Where the Bias Lies!, Journal of Business Research, 69 (2016), Issue 10, pp. 3998-4010.

PLS-SEM Performance: Hair, J.F./ Hult, G.T.M./ Ringle, C.M./ Sarstedt, M./ Thiele, K.O. Mirror, Mirror on the Wall: A Comparative Evaluation of Composite-based Structural Equation Modeling Methods, Journal of the Academy of Marketing Science, 45(5), 616-632.

PLS-SEM: Richter, N.F./ Cepeda Carrión, G./ Roldán, J.L./ Ringle C.M.: European Management Research Using Partial Least Squares Structural Equation Modeling (PLS-SEM): Editorial, European Management Journal, Volume 34 (2016), Issue 6, pp. 589-97.