A 3-day Course on PLS Path Modeling: Basic Concepts and Foundations, Advances and Applications

V. Esposito Vinzi – M. Tenenhaus – W. Chin

Goals : Learning about PLS Path Modeling techniques as well as their fields of application, and the effective usage of XLSTAT.

After a return to the origins of structural equation modeling (SEM), the PLSPM algorithm will be presented. A methodology to interpret results will then be suggested on the basis of real life cases. The training session will end by applications using XLSTAT-PLSPM.

This three-day course is divided as follow:

DAY 1: Basic Concepts and Foundations - Part 1

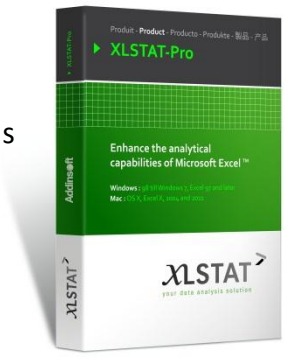
1. INTRODUCTION TO STRUCTURAL EQUATION MODELING (V. Esposito Vinzi) 9:00 – 9:45
- The LISREL Covariance-based World
- The PLS Component-based World (PLS Regression and PLS Path Modeling)

2. PLS PATH MODELING ALGORITHM – PART 1 (M. Tenenhaus) 9:45 – 11:00
- PLS Path Modeling algorithm for model estimation:
    - Measurement (Outer) Model Specification and Estimation: Reflective vs. Formative
    - Structural (Inner) Model Specification and Estimation
    - PLS algorithm for computing Latent Variable Scores
    - Basic Options: Mode A + Centroid Scheme

Coffee-break

3. PLS PATH MODELING ALGORITHM – PART 2 (M. Tenenhaus) 11:30 – 12:30
- Advanced Options: Mode B, Factorial and Structural Estimation Schemes
- PLS Algorithm for the case of one and two blocks:
    - Principal Component Analysis, Tucker's Inter-battery Analysis, Canonical Correlation Analysis, PLS Regression, Redundancy Analysis

Lunch





4. MODEL ASSESSMENT IN PLS PATH MODELING: DIAGNOSTICS AND SOLUTIONS (V. Esposito Vinzi) 14:00 – 16:00

- Convergent validity: composite reliability, eigenvalues, condition number, criticalvalue, weights and loadings, average variance extracted (AVE), communality
- Discriminant validity: cross-loadings vs. loadings, latent variables correlations vs.AVE
- Predictive relevance: Redundancy, R2, Absolute and Relative Goodness of Fit(GoF), Effect Size f2
- Statistical significance: Bootstrapping, Jackknifing, t-test, F-test, critical ratios
- Cross-validation: Blindfolding, CV-Communality, CV-Redundancy
- Handling Missing Data: Lohmöller's option, Impact on Latent Variable Scores

Coffee-break

5. INTRODUCTORY TUTORIAL ON XLSTAT-PLSPM 16:30 – 17:30

- Running a basic XLSTAT-PLSPM project with Excel 2007 – The ECSI model
- Model Specification: exploring graphical interface features
- Model Estimation: measurement and structural options
- Scaling Latent Variable Scores: standardized vs. normalized
- Output Retrieval (graphical and tabular) and Interpretation: Outer weights, normalized weights, standardized loadings
- Path coefficients (direct, indirect and total effects), R2, standardized path coefficients, contribution to R2, simple and partial correlations
- Latent variables scores (casewise values, summary statistics)

DAY 2: Basic Concepts and Foundations - Part 2

6. CASE STUDY 1 WITH XLSTAT-PLSPM: THE ECSI MODEL (M. Tenenhaus) 9:00 – 10:30

- Model Improvement

Coffee-break

7. CONTINUOUS MODERATING EFFECTS (W. Chin) 11:00 – 12:30

- Why & How to Investigate Moderating Effects?
- Discrete (categorical) vs. continuous moderator variable
- Methods for Assessing Interaction Effects: Product-Indicator, Two-Stage, Hybrid, Orthogonalizing
- Interaction with Formative Indicators
- Centering or Standardizing the Indicators
- Choosing the appropriate method
- Additional Methods for Non Linear Relations: Measurement and Structural Level

8. DISCRETE MODERATING EFFECTS: MULTI-GROUP COMPARISON (W. Chin) 14:00 – 15:00

- Bootstrap parametric approaches: t-test, empirical confidence intervals
- Permutation-based comparisons

9. MEDIATING EFFECTS (W. Chin) 15:00 – 16:00

- Mediator vs. Confounder
- Causal Steps for Testing Mediation
- Methods for Assessing Mediating Effects: Sobel, resampling
- Mediator versus Moderator
- Moderated Mediation

Coffee-break

10. CASE STUDY 2 WITH XLSTAT-PLSPM: THE ECSI MODEL (M. Tenenhaus) 16:30 – 17:30

- Moderating and Mediating Effects

DAY 3: Advances in PLS-PM

11. HIGHER DIMENSIONS AND MULTIPLE TABLE ANALYSIS (V. Esposito Vinzi) 9:00 – 10:30

- Second Order Constructs: Hierarchical PLS-PM and the super-block option
- Deflation Options
- Multi-block Data Analysis
- Auxiliary Variable in Hierarchical PLS Model
- Links to other Analysis for Multiple Tables

Coffee-break

12. CRITERION-BASED PLS APPROACH FOR STRUCTURAL EQUATION MODELING (M. Tenenhaus) 11:00 – 12:30

Lunch

13. HANDLING MULTIDIMENSIONALITY (V. Esposito Vinzi) 14:00 – 15:00

- Detection of Block Multidimensionality
- PLS Regression for Measurement Models
- Multicollinearity at the Structural Level
- PLS Regression for Structural Models

14. UNCOVERING SEGMENTS (V. Esposito Vinzi) 15:00 – 16:00

- Definition of Unobserved Heterogeneity
- Model-based Segmentation
- FIMIX-PLS, REBUS-PLS, PATHMOX

Coffee-break

15. ALGORITHMIC COMPARISON OF PLS PATH MODELLING WITH OTHER METHODS INCLUDING EMPIRICAL EXAMPLES (M. Tenenhaus) 16:30 – 17:30

- PLS-PM vs. LISREL-type models

The course instructors include:

Wynne W. CHIN

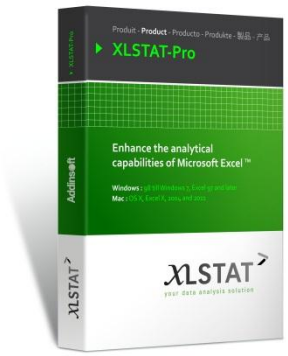
Wynne W. CHIN is the C.T. Bauer Professor of MIS in the department of Decision and Information Sciences in the C.T. Bauer College of Business at the University of Houston. He received his A.B. in Biophysics from U.C. Berkeley, MS in Biomedical/Chemical Engineering from Northwestern University, and an MBA and Ph.D. in Computers and Information Systems from the University of Michigan.
Wynne has also taught previously at the University of Calgary, Wayne State University, and the University of Michigan and has been a visiting fellow at the University of Canterbury, Queens University, City University of Hong Kong, and the University of New South Wales. Wynne's research includes sales force automation, IT adoption, outsourcing, acceptance, satisfaction, group cohesion and negotiation, and psychometric modeling issues. Wynne is on the editorial board of Structural Equation Modeling journal, Journal of AIS, Journal of Information Technology, IEEE Transaction of Management, and previously co-editor of Data Base and on the boards of Information Systems Research and MIS Quarterly. He is also the developer of PLS-Graph, the first graphical based software dating back to 1990 to perform Partial Least Squares analysis.

Vincenzo ESPOSITO VINZI

Vincenzo ESPOSITO VINZI is Professor of Statistics at ESSEC Business School - Paris and Singapore. He received a Ph.D. in Computational Statistics. Vincenzo is a Vice President of the International Society for Business and Industrial Statistics and the current scientific secretary of the International Federation of Classification Societies after being the Scientific Secretary of the European Board of Directors of the International Association for Statistical Computing. His research includes multivariate statistics, factorial methods, structural equation modelling, PLS regression and path modelling, multiple table analysis, with business and industry oriented applications. Vincenzo has delivered invited lectures, taught tutorials and organised specialised sessions on PLS and related methods to several international conferences and PhD programs around the world. He has been chairing a series of International Conferences on PLS and related methods and has co-edited several conference proceedings and special issues of international journals on PLS methods. Vincenzo is an Associate Editor of Computational Statistics and Data Analysis (Elsevier), Advances in Data Analysis and Classification (Springer) and Computational Statistics (Physica-Verlag). He is the Editor-in-Chief of the "Handbook of Partial Least Squares: Concepts, Methods and Applications" published recently with Springer.

Michel TENENHAUS

Michel TENENHAUS is Professor of Statistics at HEC School of Management - Paris. His main researches are concerned with multivariate data analysis: optimal scaling methods for categorical variables, PLS regression and PLS path modelling. He has published many papers in scientific journals and three books: Méthodes Statistiques en Gestion (Dunod, 1994), La régression PLS : théorie et applications (Technip, 1998) and Statistique: Méthodes pour décrire, expliquer et prévoir (Dunod, 2007). Michel Tenenhaus is also consultant for industrial companies. He has been chairman of PLS'99 at Jouy-en-Josas and co-chairman of the following symposia PLS'01 at Anacapri, PLS'03 at
Lisbon, PLS'05 at Barcelona and PLS'09 in Beijing.





- ***What people say about our PLSPM training:***

  - "I registered to the PLSPM course as using PLS was required for my current studies using multivariate analysis. I liked this training very much and especially the fact that it talked about practical use and proposed hands on exercises. I was very satisfied by the trainers who were both pedagogic and competent. I would definitely recommend that workshop especially to people who like me work in the medical/biomedical sector", Claude Wolf, UMPC.

  - "I decided to attend the PLSPM course to obtain more in-depth exposure to best practice model assessment techniques, and learn about future developments in the software. In particular, I liked the hands-on software examples and the fact that we were able to meet the academic thought leaders. I also obtained a more comprehensive perspective for using measurement model diagnostics to support applications of Mode PLS as an alternative to the established reflective and formative approaches. I would recommend this training to other marketing science practitioners", Stuart Drucker, Drucker Anaytics, Inc.