Structural Equation Modeling (SEM)

New Feature in JMP Pro 15

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STRUCTURAL EQUATION MODELING

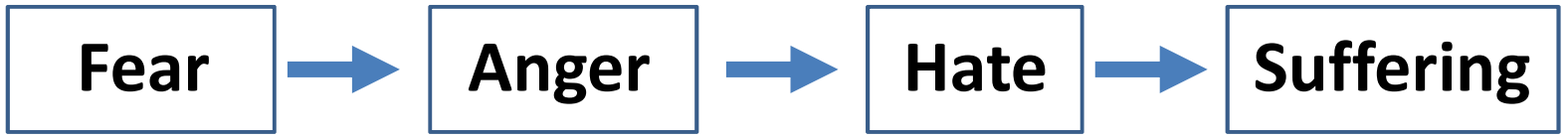
GOALS

- What it is
- What it offers
- How it’s done in JMP 15.0
- How it’s used

JEDI THEORY

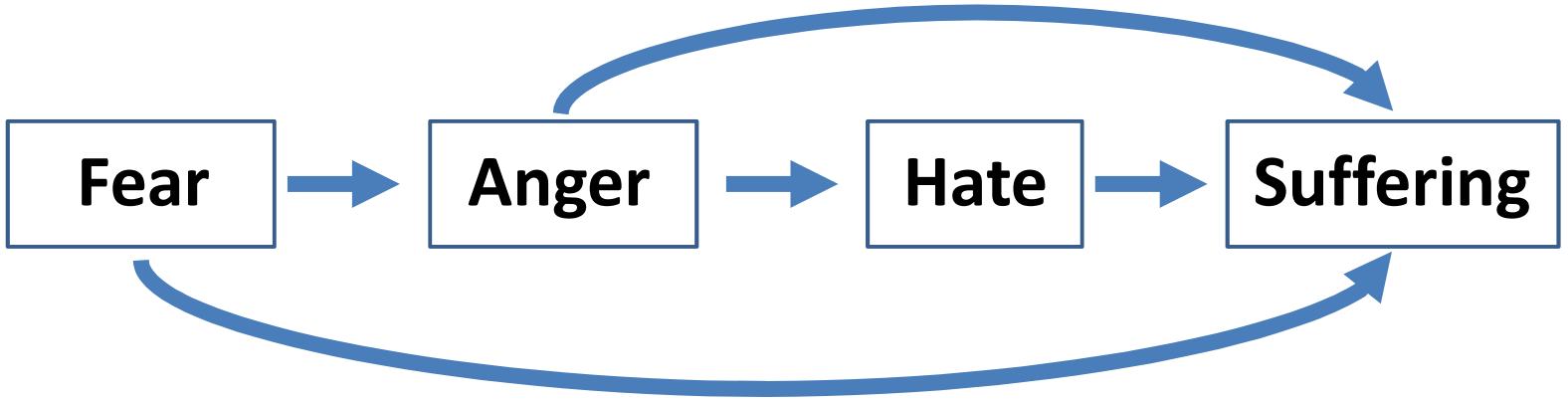
thehardestscience.com

Fear is the path to the dark side



STRUCTURAL EQUATION MODELING

JEDI THEORY



STRUCTURAL EQUATION MODELING

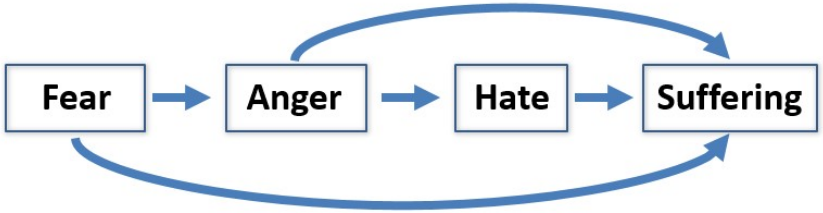
JEDI THEORY

STRUCTURAL EQUATION MODELING

COMPETING THEORIES

Theory 1

Theory 2



Theory 3

Path diagrams map onto statistical models (when drawn correctly)

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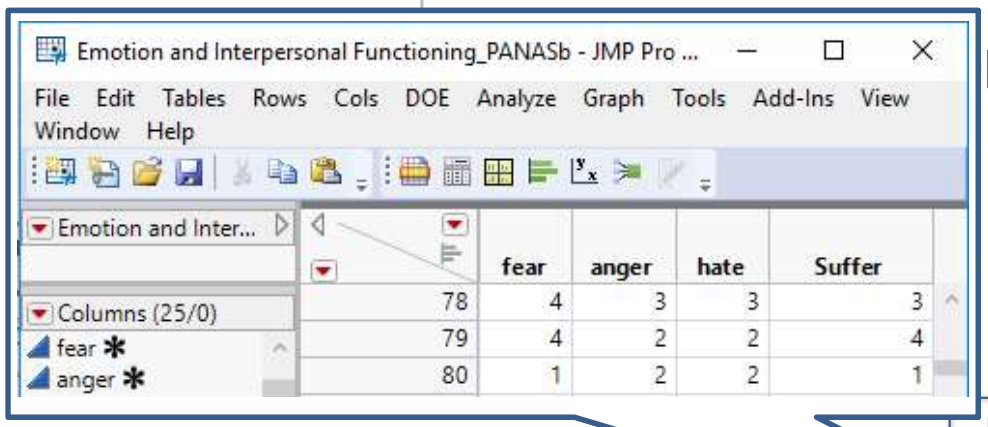
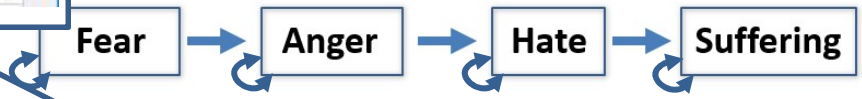


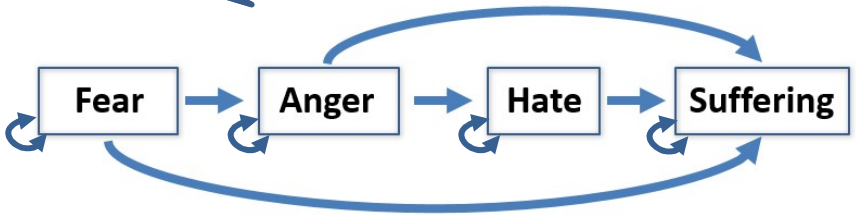


1) Squares are observed (manifest) variables

2) Circles are unobserved (latent) variables

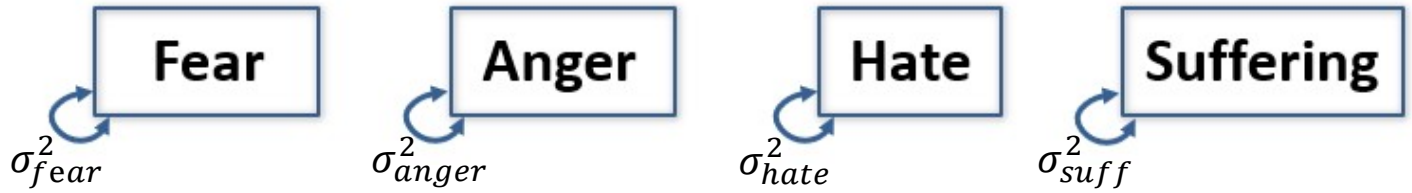
3) One-headed arrows are regressions

4) Two-headed arrows are variances or covariances



Path diagrams map onto statistical models (when drawn correctly)

DIAGRAMS IMPLY COVARIANCE STRUCTURE

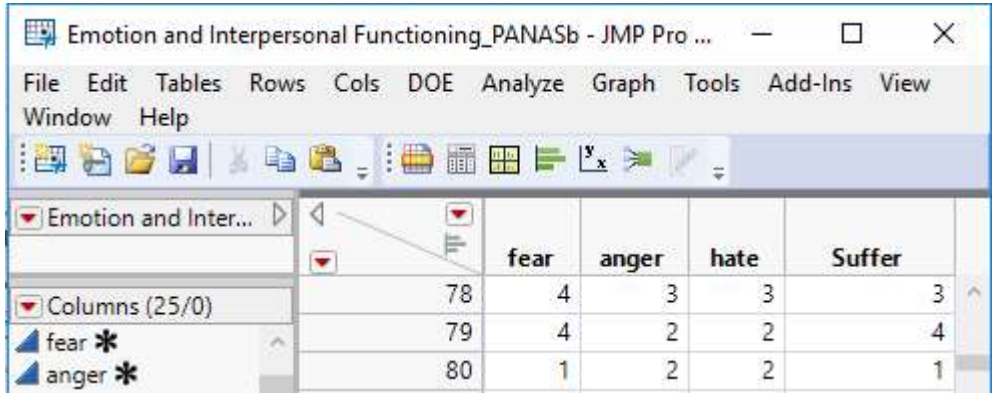


Model-implied covariance

	fear	anger	hate	suffer
fear	σ^2_{fear}			
anger	0.00	σ^2_{anger}		
hate	0.00	0.00	σ^2_{hate}	
suffer	0.00	0.00	0.00	σ^2_{suffe}

DIAGRAMS IMPLY COVARIANCE STRUCTURE

Sample covariance



Model-implied covariance

	fear	anger	hate	suffer
fear	σ^2_{fear}			
anger	0.00	σ^2_{anger}		
hate	0.00	0.00	σ^2_{hate}	
suffer	0.00	0.00	0.00	σ^2_{suffe}

Difference (Residuals)

	fear	anger	hate	suffer
fear	0.00			
anger	0.61	0.00		
hate	0.53	0.74	0.00	
suffer	0.78	0.62	0.48	0.00

STRUCTURAL EQUATION MODELING

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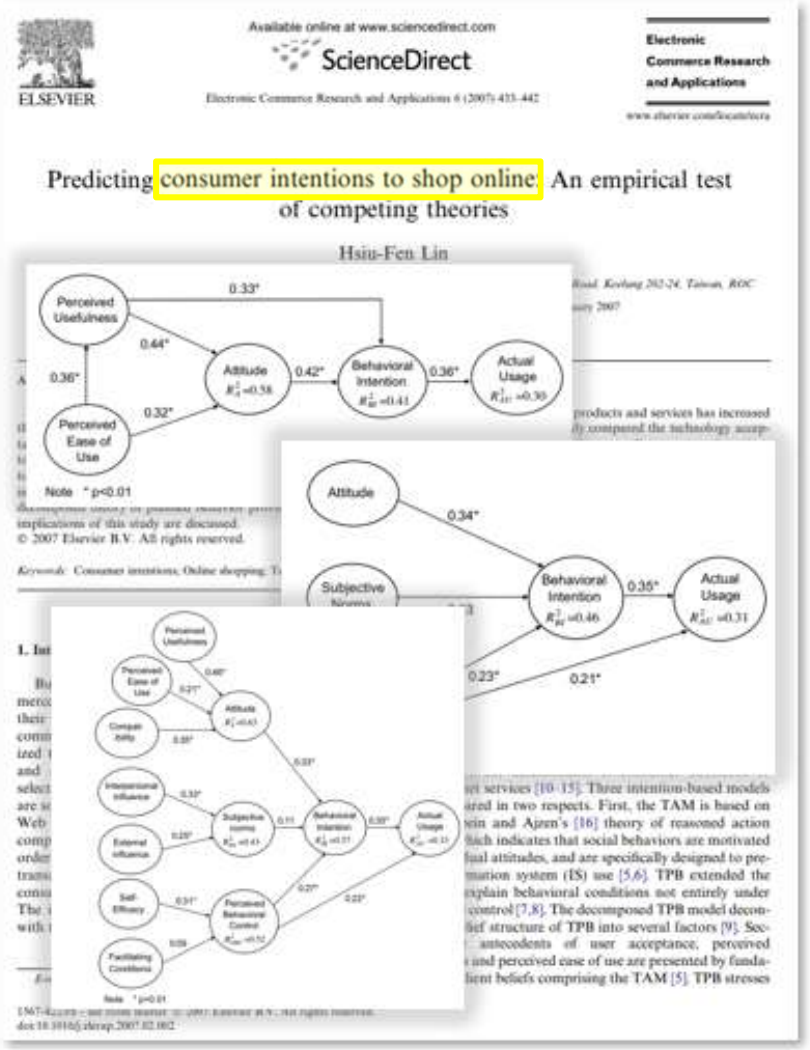
STRUCTURAL EQUATION MODELING

APPLICATIONS



Available online at www.sciencedirect.com

ScienceDirect

Electronic Commerce Research and Applications 6 (2007) 433–442

Electronic Commerce Research and Applications

www.elsevier.com/locate/ecra

Predicting consumer intentions to shop online: An empirical test of competing theories

Hsiu-Fen Lin

Perceived Usefulness

Perceived Ease of Use

Attitude

Behavioral Intention

Actual Usage

0.33*

0.44*

0.36*

0.32*

0.42*

0.36*

Note * p<0.01

Attitude

Subjective Norms

Behavioral Intention

Actual Usage

0.34*

0.35*

0.23*

0.21*

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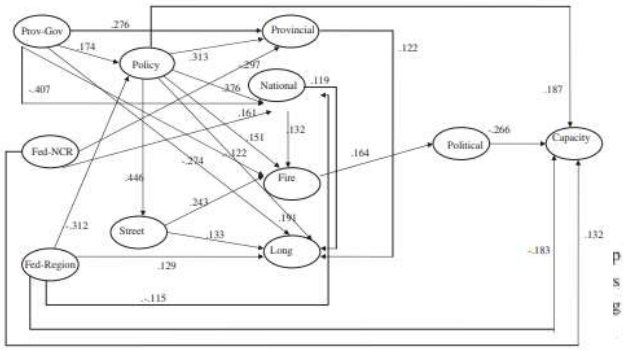
APPLICATIONS

0952-0767
201107 26(3) 353–373

Policy Analytical Capacity in Changing Governance Contexts: A Structural Equation Model (SEM) Study of Contemporary Canadian Policy Work

Adam M. Wellstead
Michigan Technological University, USA



Abstract

kinds of policy failures. Very little large-scale empirical research has been dedicated to the study of contemporary policy work, however, making it difficult to evaluate competing claims about the impact of changing conditions on practices of policy analysis. Using data derived from three large-scale surveys of Canadian policy analysts conducted during 2007 to 2008, this article

STRUCTURAL EQUATION MODELING

APPLICATIONS

MIS Quarterly

RESEARCH ARTICLE

TURNOVER OF INFORMATION TECHNOLOGY PROFESSIONALS: A NARRATIVE REVIEW, META-ANALYTIC STRUCTURAL EQUATION MODELING, AND MODEL DEVELOPMENT[1]

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Abstract

This study combines a narrative review with meta-analytic

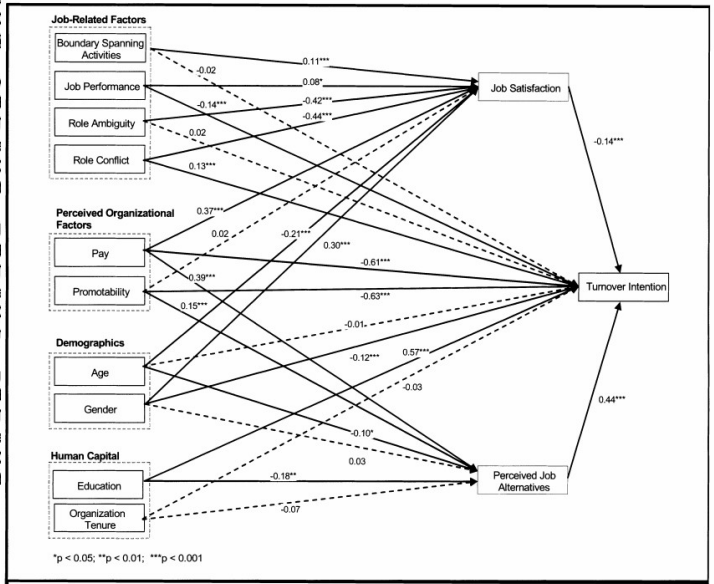

Figure 2. Results of the Meta-Analytic Structural Equations Modeling

[1]Jane Webster was the a
editor and three reviewe

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APPLICATIONS

Contents lists available at ScienceDirect

Computers & Education

journal homepage: www.elsevier.com/locate/compedu

Modeling educational usage of Facebook

Sacide Güzin Mazman*, Yasemin Koçak Usluel

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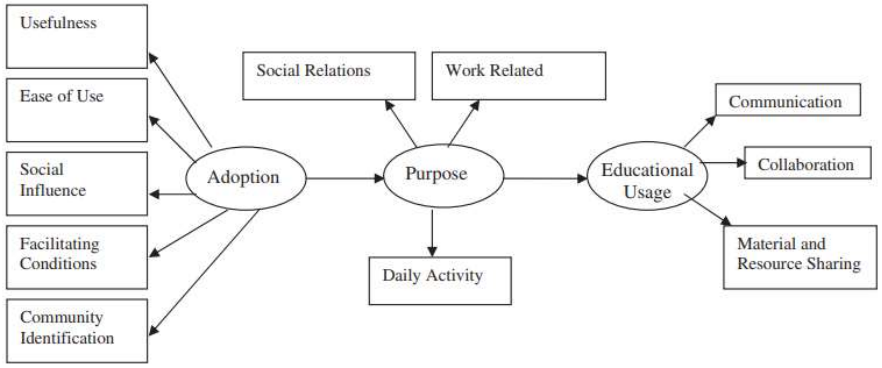
Keywords:
Social network
Adoption
Diffusion of innovation
Facebook
Educational context

ABSTRACT

The purpose of this study is to design a structural model explaining how users could utilize Facebook for educational purposes. In order to shed light on the educational usage of Facebook, in constructing the model, the relationship between users' Facebook adoption processes and their educational use of Facebook were included indirectly while the relationship between users' purposes in using Facebook and the educational usage of Facebook was included directly. In this study, data is collected from Facebook users with an online survey developed by the researchers. The study group consists of 606 Facebook users whose answers were examined by using a structural equation model. The analyses of the 11 observed and 3 latent variables provided by the model showed that 50% of educational usage of Facebook could be explained by user purposes along with the adoption processes of Facebook. It was also found that Facebook adoption processes could explain 86% of all user purposes. Finally, while Facebook adoption processes explained 45% of its educational usage, it could explain 50% of variance in educational usage of Facebook when the user purposes were added into the analyses.



users' purposes is fundamentally important to determine the factors influencing users' adoption of social networks in educational context.

Facebook, being one of the most popular and commonly used social networks is chosen in this study as the social network site to determine the factors influencing its users' adoption processes in an educational context. While determining the educational usage of Facebook, a structural equation model is constructed which examines the relationships between factors affecting this adoption process in relation to the user's existing purposes.

STRUCTURAL EQUATION MODELING

APPLICATIONS

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PMCID: PMC4138269
NIHMSID: NIHMS594663
PMID: 24909797

Confirmatory factor analysis of the Oral Health Impact Profile

Mike T. John,[1] Leah Feuerstahler,[2] Niels Waller,[2] Kazuyoshi Baba,[3] Pernilla Larsson,[4] Asja Čelebić,[5] Dóra Kende,[6] Ksenija Rener-Sitar,[7] and Daniel R. Reißmann[8]

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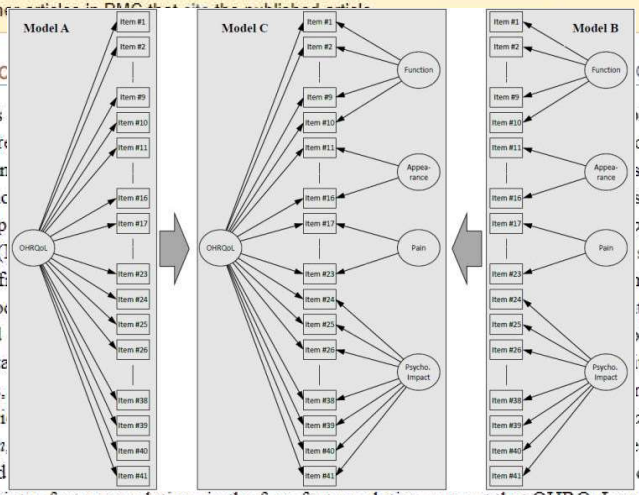

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the high inter-factor correlations in the four-factor solution suggest that OHRQoL can also be sufficiently described with one score.

Keywords: Oral health-related quality of life, Oral Health Impact Profile, dimensions, factor structure, confirmatory factor analysis

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APPLICATIONS

Emotion
2003, Vol. 3, No. 4, 344–360

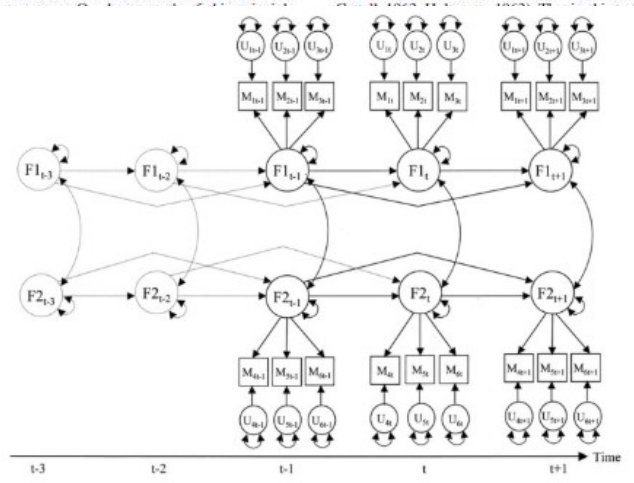
1528-3542/03/$12.00 DOI: 10.1037/1528-3542.3.4.344

Modeling Affective Processes in Dyadic Relations via Dynamic Factor Analysis

Emilio Ferrer and John R. Nesselroade
The University of Virginia

An intraindividual variability design, including application of dynamic factor models, was used to examine the affective processes of a husband–wife dyad over 182 consecutive days. Structural equation analyses indicated differences in the affective structure between the husband and the wife, and these differences were characterized in terms of their factorial configuration and temporal organization. Examination of the dyad's affective dynamics revealed unidirectional (i.e., from the husband to the wife) interpersonal influences with a defined structure over time.

The study of intraindividual variability is well recognized as a crucial premise to understanding indi-



directly information in the lag structure (e.g., auto- and cross-correlations) in the data (Anderson, 1963;

lenaar, 1985), permits modeling multivariate time series with latent variables that incorporate lagged effects. These effects are first represented in a lagged covariance matrix that is created by covarying data that are lagged on themselves. For example, if variables are covaried by pairing adjacent time points (t with t-1, t-1 with t-2, etc.), the result is a lag-1 co-

Hamagami, Jack McArdle, Liz Saft, and Dave Sbarra for their comments on earlier versions of this article.

Correspondence concerning this article should be addressed to Emilio Ferrer, who is now at the Department of Psychology, University of California, Davis, One Shields Avenue, Davis, California 95616-8686. E-mail: eferrer@ucdavis.edu

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ELSEVIER

Journal of Operations Management 17 (1999) 467–488

JOURNAL OF OPERATIONS MANAGEMENT

Methodological note

Testing a model of pull production: a paradigm for manufacturing research using structural equation modeling

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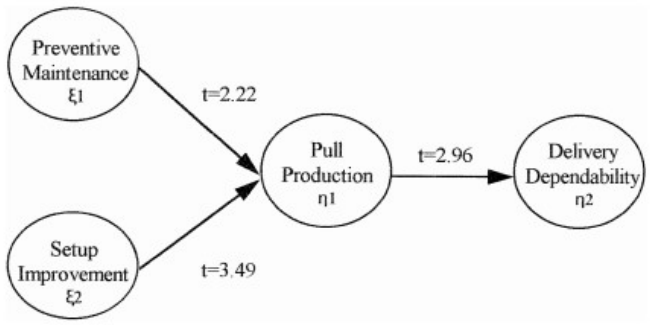
Received 11 September 1997; accepted 16 November 1998

Abstract

The measurement of unobservable (latent) variables has been a recent phenomenon in the manufacturing research area. Most available empirical research in manufacturing has been exploratory in nature and has borrowed its methods extensively from other fields such as psychology, sociology, and marketing. Traditional exploratory techniques have been used to provide oked the assessm ɛory. An explicit ndividual measure CFA for the asse s such as converg model is tested fi h two of its ante ne of its consequ l model.

Keywora



1. Intr iich are measure l multi-

Prog ed more gence (

have been several measurement instruments and hypotheses testing papers published while the level of sophistication in methods and analysis has increased than two items intended to be alternative indicators of the same variable or construct. The scores of the items intended to form a particular construct are frequently summed-up to form a composite score for the construct. This score is what is used as an estimate of a construct in hypotheses testing.

Manufacturing researchers now engaged in empirical research strongly believe that scales that exhibit

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PII: S0272-6963(99)00002-9

STRUCTURAL EQUATION MODELING

OFFERS NUMEROUS TOOLS

- Any general linear model can be fit in SEM (DOE too!)
- Test competing theories
- Specify and model error-free (latent) variables
- Handle missing data with cutting edge methods
  - Even simple linear regression!
- Increased control and sophistication
  - Equal / Fixed parameters
- Build complex models
  - Closer to reality
  - Simultaneous estimation

STRUCTURAL EQUATION MODELING

SEM in JMP Pro 15

- Favorite JMP features are now available for SEM
  - Intuitive user interface
  - Dynamic and interactive visualizations
  - Local data filter
  - Column switcher
- Model comparisons made simple
- High-quality, presentation-ready, path diagrams
- Ongoing error-checking facilitates correct model specification

STRUCTURAL EQUATION MODELING

CONCLUSION

THANK YOU!

Sanjay Srivastava, Ph.D.
thehardestscience.com

Steven A. Miller, Ph.D.
http://www.personalityandemotion.com/