

Structural Equation Modeling: A Recent Trend in Marketing Research

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Abstract

Every day marketing people need to take decisions relating to Product, Pricing, Promotion and Place etc. For taking decisions marketing people must consider multiple variables, in the present Liberalized, Privatized and Globalized world. But making sense from multiple variables at a time is difficult if you analyze them separately. Hence there a need to consider a single tool which analyze multiple variables at a time? Structural equation modeling (SEM) serves this purpose. The major objectives of are, to the study basic concepts related to Structural equation modeling and examine the Awareness and preferences of Structural equation modeling. The results revealed that majority of Academicians and Marketing Practitioners were aware of SEM and they prefer to use SEM for Research.

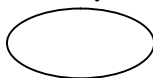
Keywords: Structural equation modeling (SEM), Liberalized, Privatized, Globalized, Multiple variables, Decision making.

1. Introduction

Structural equation modeling is a comprehensive statistical approach to testing hypotheses about relations among observed and latent variables (Hoyle, 1995). Structural equation modeling tests hypothesized patterns of directional and non directional relationships among a set of observed (measured) and unobserved (latent) variables (Mac Callum & Austin, 2000).Structural equation modeling (SEM) is a combination of exploratory factor analysis and multiple regressions. The purpose of SEM is to examine a set of relationships between one or more Independent Variables (IV) and one or more Dependent Variables (DV). Both IV's and DV's can be continuous or discrete. For understanding SEM the following elements have consider.

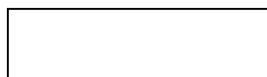
Latent Variable

- ❖ Un-observable variable
- ❖ Circles in the diagram
- ❖ Not directly measured

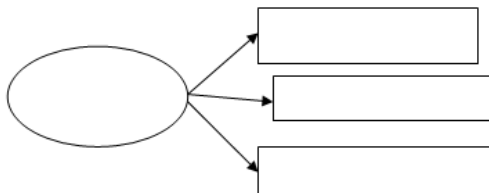


Measured variable

- ❖ Observed variables
- ❖ Squares in the diagram

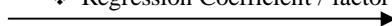


Latent Variable and Measured variable



Single Headed arrow

- ❖ Indicate prediction
- ❖ Regression Coefficient / factor loading



Double headed arrow

- ❖ indicates correlation



Missing Paths

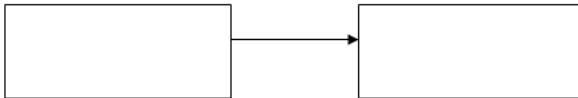
- ❖ Hypothesized absence of relationship

Notations

- ❖ η Latent Endogenous Variable
- ❖ ξ Latent Exogenous Variable
- ❖ ζ Unexplained Error in Model
- ❖ x & y Observed Variables
- ❖ δ & ε Measurement Errors
- ❖ λ , β , & γ Coefficients

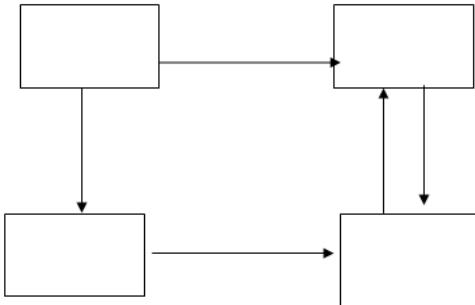
Recursive

- Direction of influence on only one direction



Non recursive

- Reciprocal causation, feedback loops, or correlated disturbances



Measurement model

- ❖ model that relates measured variables to latent factors
- ❖ factor analytic part of SEM

Structural model

- ❖ This is the part of the model that relates variable or factors to one another (prediction)
- ❖ If no factors are in the model then only path model exists between measured variables

Model Specification

- ❖ Creating a hypothesized model that you think explains the relationships among multiple variables

Model Estimation

- ❖ Technique used to calculate parameters

Model Identification

- ❖ Rules for whether a model can be estimated
- ❖ For example, For a single factor:
 - At least 3 indicators with non-zero loadings
 - no correlated errors
 - Fix either the Factor Variance or one of the Factor Loadings to 1

Model Evaluation

- ❖ Testing how well a model fits the data
- ❖ Just like with other analyses (e.g. ANOVA) we look at squared differences
 - SEM looks at the squared difference between the s and $s(q)$ matrices
 - While weighting the squared difference depending on the estimation method

Data Analysis:

Structural equation modeling Awareness in Academics

Table-1

Academic Position	Department	Aware	Unaware	Total
Research Scholar	Marketing	38	12	50
Assistant Professor	Marketing	46	4	50
Associate Professor	Marketing	47	3	50
Professor	Marketing	50	0	50

Source: Primary Data

From Table -1 it is concluded that 76% of research scholars were aware of Structural equation modeling and 14% were unaware, followed by 92% of assistant professors were aware and 8% were unaware, 94% of associate professors were aware and 6% unaware and 100% of professors were aware about Structural equation modeling.

Structural equation modeling Preference to use as a Multivariate technique in marketing research (Academics)

Table-2

Academic Position	Department	Prefer	Don't Prefer
Research Scholar	Marketing	23	15
Assistant Professor	Marketing	38	8
Associate Professor	Marketing	42	5
Professor	Marketing	47	3

Source: Primary Data

From Table -2 it is concluded that 60% of research scholars were Prefer of Structural equation modeling and 40% were Don't Prefer, followed by 82% of assistant professors were Prefer and 18% were Don't Prefer, 89% of associate professors were Prefer and 11% Don't Prefer and 94% of professors were Prefer Structural equation modeling.

Structural equation modeling Awareness in Marketing Practitioner

Table-3

Position	Department	Aware	Unaware	Total
Marketing Practitioner(all Who take decisions about Marketing)	Marketing	18	02	20

Source: Primary Data

From table-3 it is concluded that 90% of Marketing Practitioner (all who take decisions about Marketing) were aware about Structural equation modeling and only 10% were unaware.

Structural equation modeling Preference to use as a Multivariate technique in marketing research (Practitioner)

Table-4

Position	Department	Prefer	Don't Prefer	Total
Marketing Practitioner(all Who take decisions about Marketing)	Marketing	16	04	20

Source: Primary Data

From table-4 it is concluded that 80% of Marketing Practitioner (all who take decisions about Marketing) were prefer to use Structural equation modeling and only 20% were don't.

Software Packages for Structural Equation Modeling

Variety of Software packages are available for Structural Equation Modeling like

- ❖ AMOS in SPSS
- ❖ EQS software
- ❖ LISREL
- ❖ MPlus
- ❖ SAS software(Order is based on Alphabets)

The main difference between the packages is the presence of a graphical interface for model specification and presentation of results. Each package differs in terms of strengths, areas of improvement, and unique features that may dictate the choice of selection.

Conclusion:

The study revealed that majority of Academicians and Marketing Practitioners were aware of SEM and they prefer to use SEM for Research

Limitations

- ❖ The study is confined to only to basic issues in structural equation modeling
- ❖ Empirical study is confined to A.P Engineering colleges and organizations only
- ❖ It covers only awareness and Preferences only
- ❖ Responses may be chance of bias.

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