



Chapter IV

The Use of Structural Equation Modeling in IS Research: Review and Recommendations

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ABSTRACT

The structural equation modeling (SEM) technique has significant potential as a research tool for assessing and modifying theoretical models. There have been 139 applications of SEM in IS research published in major journals, most of which have been after 1994. However, despite its increasing use in the field, it remains a complex tool that is often difficult to apply effectively. The purpose of this study is to evaluate the previous IS applications of SEM and to suggest guidelines to realize the potential of SEM in IS research. The 72 empirical applications of SEM gathered from leading IS journals are reviewed and evaluated according to prescribed criteria. Avenues for improvement are suggested which can facilitate application of this important technique in IS theory development and testing.

INTRODUCTION

Structural equation modeling (SEM) has become an important and widely used research tool for theory testing and development in the social and behavioral sciences. One reason for the substantive use of SEM is that the confirmatory methods provide researchers with a comprehensive means for assessing and modifying theoretical models. In addition, the potential of SEM for comprehensive investigations of construct measurement is also generally acknowledged. Because of these merits of SEM, many researchers in the field of information systems (IS) have been using it for measuring constructs or developing and testing IS theories.

Anderson and Gerbing (1988) argue, however, that because of the relative sophistication of SEM, initial applications might be prone to misuse, which can inhibit theory development. This could be an acute problem in a younger field like IS, where erroneous theory development and testing could greatly inhibit the building of a cumulative tradition of research. Also, if the trend in more mature disciplines (e.g., marketing) is any indication, the use of SEM in IS research is only going to increase. Therefore, we believe it is important to take an introspective view of this important methodology.

The purpose of this study is to provide an in-depth analysis of a critical mass of SEM applications in seven leading IS journals and to suggest specific avenues for improvement. To our knowledge, no comprehensive survey of SEM applications in the IS field has been reported in the literature.

APPLICATIONS OF SEM IN THE IS FIELD

Seven widely regarded IS outlets were chosen for selection of SEM applications. These are *MIS Quarterly (MISQ)*, *Information Systems Research (ISR)*, *Journal of Management Information Systems (JMIS)*, *Information & Management (I&M)*, *Communication of the ACM (CACM)*, *Decision Sciences (DS)*, and *Management Science (MS)*. All issues of these seven journals between 1987 and 2001 were searched for empirical SEM applications. Theoretical papers dealing with issues related to SEM and papers using exploratory factor analysis, path analysis, structural modeling by regression analysis, and partial least square (PLS) models were excluded from the sample. The final sample of this study includes confirmatory measurement models, structural models with single indicator, and integrated measurement/structural models.

A total of 72 papers had applications that satisfied the selection criteria (see Table 1). The Appendix contains the listing of these papers. It seems apparent that the use of SEM in the leading IS journals has recently increased. More than 90% of the total number of papers were published after 1994. Most of these SEM application papers involve development of measures of system effectiveness and investigation of the relationship between system effectiveness and its antecedent variables. The SEM applications were fairly evenly published in six of the seven major IS journals (with the exception of *CACM*).

The vast majority of published studies have been conducted with cross-sectional data (96%). Only three studies were performed on longitudinal data (4%). It is generally believed that because of time-specific factors, using the cross-sectional data makes it difficult to establish causality (Malhotra & Grover, 1998). Therefore, the exclusive use of cross-sectional data to investigate structural relationships among constructs indi-

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