Validation in Supply Chain Decision Support Systems

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ABSTRACT

Decision Support Systems are used currently to support various high impact decisions in industry. This study explores the subcategory of DSSs related to Supply Chain Management. More precisely we explore the problem of integrating companies' strategic supply chain decision support systems to financial reporting systems for the purpose of validation. The study is done through literature survey, and inductive case studies. The author finds that integration is challenging because systems are typically disjoint and capture data at different levels of granularity. The author conceptualizes the present problem and proposes a generic solution framework.

Keywords: Decision Support Systems – DSS, Finance, Industry, Operations Management, Supply Chain Management

INTRODUCTION

Decision Support Systems (DSS) are computer-based interactive systems that support human decision makers through the use of data and models (Eom et al., 1998, p. 109). Decision Support Systems consist of three parts: data base, model base and user interface (Eom & Lee, 1994, p. 335). Data base contains the input data used in decision making. Model base contains possibly several analytic or simulation models that use input data to produce suggested optima. The decision maker interacts with data and models through the User Interface.

Decision Support System research has been ongoing since the 1970s and one of the first areas of application was logistics systems optimization (Eom & Lee, 1990a, p. 67). Literature contains several reports from the 1980s where small minicomputers have been programmed to solve mixed integer programs involving distribution networks (Geoffrion, Graves, & Lee, 1982). Supply Chain optimization has since moved to MS/OR domain where the focus has been in designing better algorithms (Thomas & Griffin, 1996). Decision Support System research requires that three parts are explored in detail: a semi-structured or unstructured problem; human-computer interface and the nature of computer-based support given to humans to make decision on the problem; the system landscape required to support the decisions (Eom & Lee, 1990b). As such DSS research has produced a plethora of research papers on design science and uses of DSS in specific applications (Eom & Lee, 1990a).

Recently, DSS research has been facing a crisis of confidence (Arnott & Pervan, 2005, p. 82). Professional relevance has suffered since DSS research is not addressing Data Ware-
housing and Business Intelligence adequately. The gap between DSS theory and practice is widening, and a need exists for case studies, especially interpretive ones, to bridge the gap (Arnott & Pervan, 2005).

An area of DSS research which has not received enough attention is the validation of results given by a particular DSS against the actual values. Many DSS’s are only haphazardly validated against outputs that are produced by the real-life system (Adelman, 1991; Kleijnen, 1995). Showing that the DSS results may be validated through a company’s own reporting system adds credibility to the decision support system (Kleijnen, 1995, p. 159). Literature on Supply Chain Management research suggests that supply chain cost is among the most important performance measures along with order fulfillment lead time and delivery performance (Gunasekaran & Kobu, 2007; Gunasekaran, Patel, & McGougey, 2004; Gunasekaran, Patel, & Tirtiroglu, 2001). Measurement of non-financial metrics such as cycle times and order fulfillment lead times is common in the industry today (Gunasekaran & Kobu, 2007; Gunasekaran, Patel, & McGougey, 2004; Gunasekaran, Patel, & Tirtiroglu, 2001). Still, the effect of Supply Chain Management on financial metrics is discussed only on high-level, with e.g., cash flow and operating profit (March & Hevner, 2007). The problem is that only high level executives possess information on cash flow, liquidity projections and ratios; Operational level managers typically do not have a way of assessing the impact of their day-to-day decisions on the company’s aggregate financial measures (Gunasekaran & Kobu, 2007; Gunasekaran, Patel, & McGougey, 2004; Gunasekaran, Patel, & Tirtiroglu, 2001). Without clear visibility to the effects of one’s decisions, people are not optimally attached to their jobs.

A clear need exists for tracking the success or failure of tactical decisions made through the support of DSS to the actual figures. This need is particularly evident in high-technology sector with its fast clock speed where supply chain management-type approach has been shown to positively correlate with aggregate financial metrics (Dehning, Richardson, & Zmud, 2007). To this end, the present article explores the research question: “Are there challenges in validating a company’s supply chain management decision support system with official reports? If yes, what are some ways of solving the issue?” The research question is approached inductively through one detailed case and six interviews.

The rest of this article is organized as follows. I present literature survey in the areas of Decision Support System and Supply Chain Management research, building a case for the need of better validation of DSSs and the importance of financial performance metrics. I present the inductive method used in this study. We present the empirical evidence through two case studies. Finally, I conclude with problem domain synthesis, recommendations and discussion.

**LITERATURE SURVEY**

M.S. Scott Morton first coined the term ‘Decision Support System’ (DSS) in 1971 (Eom & Lee, 1990b, p. 333). Since then there has been active research in the area, which has inspired several researches to its taxonomy and future directions (Eom & Lee, 1990a, 1990b; Benbasat & Nault, 1990; Eom et al., 1998; Arnott & Pervan, 2005). Decision Support System is a “computer-based interactive system that … supports decision-makers rather than replaces them … utilizes data and models … solves problems with various degrees of structure …. focuses on the effectiveness rather than the efficiency of decision processes” (Eom & Lee, 1990a, p. 66). DSS field has since been categorized to seven types of systems: File drawer systems, data analysis systems, analysis information systems, accounting models, representational models, optimization models and suggestion models (Alter, 1980, as cited in Eom et al., 1998, p. 115). *File drawer systems* only provide on-line access to particular data items without analyses. *Data analysis systems*...
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