DSS Model Usage in Public and Private Sectors: Differences and Implications

Anil K. Aggarwal
University of Baltimore, USA

Rajesh Mirani
University of Baltimore, USA

This research explored differences in DSS model usage between public and private sector organizations at the strategic, management control, and operational levels. Model usage was found to be greater in the private sector than the public sector, except at the operational level. This was supported by evidence that DSS models are used mostly at the lower levels of the managerial hierarchy in public sector organizations. In contrast to this, model usage in the private sector was greater at the upper levels. In addition, differences in modeling techniques and applications between the public and private sectors were more pronounced at upper hierarchical levels. These differences lend credence to the notion that senior decision makers in the private sector are autonomous, focus on well-defined objectives, and rely more on “rational” techniques. Senior decision-makers in the public sector are less autonomous, face complex objectives, and expend more energy in dealing with extraneous stakeholders such as supervisory agencies and the public. The implication for DSS designers is that decision models developed for the two sectors need to be different in terms of weights attached to various criteria.

Advances in information technology are creating turbulent environments in which individual events have shorter and faster cycles (Alberthal, 1995). Such events require rapid organizational responses. Managers at all hierarchical levels are increasingly turning to decision support systems (DSS) for assistance in solving problems. Although DSS were originally meant to provide interactive solutions for complex, nonrecurring decisions made by senior managers, they have evolved and are being increasingly used for semi-structured, recurring decisions such as periodic budgeting (Gallupe, 1991). What sets DSS apart from other kinds of information systems is their combined use of data and models (Sprague, 1980). DSS contribute to organizational effectiveness in many ways, such as cost effectiveness, improved decision quality, increased productivity, and enhanced competitiveness (Udo, 1992).

The research reported herein explores potential differences in the use of DSS models between the public and private sectors. These two sectors differ inherently in their objectives, processes, priorities, task environment, and success measures. Differences in the overall decision-making environments of the two sectors make it very likely that they also differ in their use of computerized decision support models, both in terms of modeling techniques as well as in the applications of these techniques. Therefore, our study focuses on differences in DSS model usage between the public and private sectors, seeks to make an important contribution to the literature, and has the potential to yield important implications for both practitioners and researchers. For example, DSS designers could use the knowledge of differences between the two
sectors to better tailor their development efforts to the needs of organizations in the respective sectors. Management practitioners and consultants could use this knowledge to help organizations understand their needs and target resources in a more appropriate manner. For management researchers, sectoral differences in DSS model usage would serve as further validation of the theory that decisions and decision processes of public and private sectors are different.

**Literature Review and Research Hypotheses**

**Public and Private Sector Decision-Making Environments**

The rationale for exploring differences between the public and private sectors’ use of DSS models stems from inherent differences between the two sectors. There are many differences between public and private sectors in terms of goals, decision-making, fund allocations, job satisfaction, accountability, and performance evaluation (Hickson, Butler, Cray, Mallory, and Wilson, 1986; Kenny, Butler, Hickson, Cray, Mallory, and Wilson, 1987; Ross, 1988; Kingsley and Reed, 1991). According to Woodrow Wilson, the purpose of the government is to be an “instrument of humanity, of social betterment.” Ronald Moe of the Congressional research Service states that “the measure of good administration is ... the effectiveness with which legislative intent, however wise or unwise, has been fulfilled” (Pegnato, 1995). The public sector’s goal, then, is social amelioration or the identification, assessment, control, and improvement of social conditions (Rainey, Backoff, and Levine; 1976; Wamsley & Zald, 1976; Lachman, 1985). Typically, public organizations have little flexibility in terms of fund allocations and very little incentive to be innovative. Budgeting for different activities are predetermined and managers must follow rigid procedures in spending these budgets. Decision-making is relatively structured and rule-oriented. Managers must consider public opinions and be politically correct as they are constantly scrutinized and monitored from people within and outside their agencies. Public, special interest groups, congress and administration demands high level of accountability. There is endless scrutiny from inspector general audits. Top managers are “temporary” and “political appointees,” and in many cases have little or no management experience (Pegnato, 1995). Public managers have less autonomy and fragmented authority and organizational decisions are often opposed or influenced by congress. Personnel decisions and merit system limits public manager’s human resource management capabilities.

Private sector organizations, on the other hand, seek to enhance shareholders’ value and maximize profits. They are more flexible than public organizations in terms of budget allocation, personnel decisions and organizational procedures. Job satisfaction is higher (Lachman, 1985). Merit and award systems are well defined and new ideas that maximize firm’s value are encouraged. Their emphasis on producing results and meeting bottom-line results in efficiency and effectiveness. Managers have more control in terms of reward and punishment structure. Some attempts have been made to study the differences in public and private sectors in terms of their policies, missions, goals, rewards, job satisfaction and decision-making environment (Rainey, Backoff, and Levine, 1976). These studies have clearly shown the differences in needs, decision-making, focus, and constraints among the two environments.

**DSS Model Usage Literature**

Despite the potential value of uncovering differences in DSS model usage between the two sectors, there has been little empirical research on this subject. One study that focused on the use of computer modeling in the public sector was published a few years ago (Wood and Smith, 1988) and recently there have been isolated examples of system development in the public sector (Watson, Houdeshel, and Rainer, 1997). Much of the research literature on DSS models has focused on assorted issues such as specific tools and methodologies (e.g., Aggarwal, 1990; Raghunathan, 1996) and specific applications (e.g., Schutzelaars, Engelen, Uljee, and Wargnies, 1994; Madu, Kuei, and Chen, 1995; Chen and Sinha, 1996; Kusters and Groot, 1996). Other researchers have offered prescriptions for DSS design (e.g., Bonczek, Holsapple, and Whinston, 1980; Dutta and Basu, 1984; Elam and Konsynski, 1987; Angehrn, 1991; Banerjee and Basu, 1993), assessed DSS performance (Gardner, Marsden, and Pingry, 1993), and explored associations of performance with different variables (Le Blanc and Kozar, 1990; Alavi and Joachimsthaler, 1992; Guimaraes, Igbaira, and Lu, 1992; Ramamurthy, King, and Premkumar, 1992; Kivijarvi and Zmud, 1993; Igbaira and Guimaraes, 1994; Udo, 1994; Palvia and Chervany, 1995). Yet others have focused on the development/implementation of DSS (Salmela and Ruohon, 1992; Kaula, 1994; Hoch and Schkade, 1996) and the roles of humans and computers in DSS applications (Te’eni and Ginzberg, 1991; Todd and Benbasat, 1992).

**Research Hypotheses**

All the differences between the decision-making environments of public and private sectors logically imply that the two sectors are also likely to differ in their applications of computerized decision support systems. Since the “workhorses” of DSS are widely acknowledged to be their mathematical modeling components (Dutta, 1996). DSS model usage in the two sectors is expected to differ both in terms of modeling techniques incorporated in these systems (e.g., forecasting) as well as applications of these models (e.g., financial analysis). The general research question for our study may therefore be phrased as follows: Do public and private sector decision makers differ in their use of DSS models? To address this question, we adopted Anthony’s classic framework in which decision processes are classified into three organizational levels: strategic, management control, and operational control (Anthony, 1965). The strategic