Can DSS Technology Improve Group Decision Performance for End Users?: An Experimental Study

David E. Gundersen
Stephen F. Austin University

Donald L. Davis
University of Southern Mississippi

D. F. Davis
University of Southern Mississippi

The pervasiveness of end–user computing in organizations coupled with the expanded scope of end–user information system activities and the fact that DSS is an end–user application argues strongly for the exploration of the effect of DSS on end–users. A particular area of interest that has not been examined is the role of DSS in end–user group decision making. To address that interest, this study investigates the benefits of DSS technology in supporting end–user group decision making. An experiment was conducted which required groups to reach a consensus on human resource related decisions. The results of the experiment provide implications for the use of group DSS (GDSS) in organizations and for future study.

End–user computing is pervasive in modern organizations. The scope of activities thought of as end–user related has expanded to encompass almost every class of applications except corporate wide transaction processing systems (McLean and Kappelman, 1993). This finding becomes more important when one considers the diffusion of information systems (IS) technology within the organization, as evidenced that IS equipment has reached the same level of per capita penetration in the few decades since its introduction that the telephone book did in 75 years (Gantz, 1986). Accordingly, the expanded end–user community will be increasingly concerned with the value added to the organization by applications under their administration.

One category of application utilized by many organizations is Decision Support Systems (DSS). In a recent survey of manufacturers, McLean and Kappelman (1993) found that more than 70 percent of the respondents indicated that DSS was an end–user application, with about the same percentage reporting that its contribution to organizational effectiveness was significant and expected to increase in the future. Considering the prominence of DSS technology in combination with the tendency of managers to spend an increasing percentage of their time in meetings in order to cope with the complexity and turbulence of today’s organizational environment (Huber, 1984), it follows that the end–user community will increasingly explore the use of DSS to support group decision making.

The objective of this study is to examine the effects of DSS technology (Expert Choice software was used in this study) upon group decision making by focusing on the availability of computerized data analysis tools to support a task which requires negotiation to arrive at consensus on a group
preference (Turoff, Hiltz, Bahgat and Rana, 1993). In the following sections the distinctive features of group decision making are reviewed, and the various DSS configurations related to group support are discussed. An analysis of existing studies related to group DSS’s are summarized, and hypotheses developed. The study is described and the results presented for discussion. Finally, implication for the end–user community are explored.

**Group Decision Processes**

A universal feature of modern organizations is the use of groups to solve problems and make decisions (Hampton, Summer and Webber, 1982). The face to face meeting has long been viewed as an effective means for discussing problems and making decisions within organizations (Hiltz, Johnson, and Turoff, 1986). Complex problems that require many different types of input are, in general, more accurately solved by groups than by individuals (Middlemist and Hitt, 1981). Situations that require generating many ideas, estimating or evaluating ambiguous or uncertain information, are often more effectively addressed by a group process (Dennis, George, Jessup, Nunamaker & Vogel, 1988). An open exchange of information, opinions, and criticism has been supported as a rationale for improved decisions on complex tasks by groups (Burelson, Levine, and Samter, 1984). While improved accuracy of group decision making is generally supported for complex tasks (Argyle, 1957; Taylor and Faust, 1951; Middlemist and Hitt, 1981), decision speed and individual satisfaction are not considered advantages of group decision making.

Several studies have found that group decision making takes longer than individual decision making (Maier, 1967; Middlemist and Hitt, 1981; Webber, 1974), and others have stated that there is reduced satisfaction and lost motivation among individuals who participate in the group process but feel their time could have been better spent in other pursuits (Hellriegel and Slocum, 1979).

**DSS to Aid Group Decision Making**

The concept of DSS involves a blend of human intelligence, information technology, and software which interact to solve complex problems (Gerrity, 1971). DSS’s may be configured in many ways, and typically include database access, models for analyzing data and a user interface. Most DSS’s have been designed for use by single decision makers (DeSanctis and Gallupe, 1986), and only recently has the concept of DSS been expanded to include group decision support (GDSS).

GDSS’s provide support for effective group problem formulation and decision making by combining communication, computer, and decision technologies with the objective of improving the meeting outcomes (DeSanctis and Gallupe, 1987). There are many different configurations for GDSS’s, with varying levels of software capabilities as well as differing hardware arrangements. Software support can provide capabilities to communicate and structure the meeting, access to a model base, and machine–guided group communication patterns (DeSanctis and Gallupe, 1987). The DSS utilized in this study provided decision–analytic and communication aids for the preference task with the objective of reducing uncertainty and “noise” that occurs in group decision making tasks (DeSanctis and Gallupe, 1987).

Group DSS’s are designed to provide support to groups which vary in member size and proximity (DeSanctis and Gallupe, 1987). A typical arrangement for small groups in close proximity provides each member of the group with a view of the public screen as well as a private terminal for access to database and model–base management capabilities (DeSanctis and Gallupe, 1987). For groups which are physically dispersed, remote area group decision making enables participants to communicate through terminals from remote locations (Straub and Beauplain, 1987). The remote location format lacks face to face communication and thus negatively affects interaction and decision making quality (Siegel, Dubrovsky, Kiesler, and Mcguire, 1986).

**Effects of GDSS on Group Decision Making**

The availability of a DSS to a decision making group could be expected to affect both the processes employed during problem solution at hand as well as the outcomes. The processes include information processing, the type of decision technique employed and the group dynamics which arise (Gray, 1987).

The outcomes are characterized by Gray (1987) as performance and secondary. Performance measures are decision quality and speed, while secondary outcomes include level of consensus, decision confidence, commitment (DeSanctis and Gallupe, 1987) and satisfaction. Previously reported studies and field research indicate conflicting results with regard to both types of outcomes. In general, case and field studies indicate high degrees of satisfaction and effectiveness for those using GDSS as compared to those with no computer support (Dennis, et al., 1988; George, Easton, Nunamaker and Northcraft, 1988; Nunamaker, Grohowski, Heminger, Martz and Vogel, 1989; Vogel & Nunamaker, 1988). In contrast, experimental research reports that satisfaction increased when GDSS was used (Steeb & Johnson, 1981), was reduced with GDSS (Bui & Sivasankaran, 1987; Gallupe, DeSanctis and Dickson, 1988; Watson, DeSanctis and Poole, 1988) or had no effect (Lewis, 1982). Decision quality was found to increase in some studies (Steeb & Johnson, 1981; Gallupe, et al., 1988; Zigurs, 1987), to decrease in one study (Watson, et al., 1988) and to have no effect in several studies (Ruble, 1984; Eason, 1988; Turoff and Hiltz, 1982).

GDSS effects upon decision consensus are equally confounding. Consensus was found to be less likely (Eason, 1988; Turoff and Hiltz, 1982) or to have no effect (Watson, et al., 1988). The only outcome with fairly consistent findings is decision time. Researchers have found that time to decision is
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