Chapter 1.10
Decision Support Systems and Decision-Making Processes

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INTRODUCTION

Decision support systems (DSS) deal with semi-structured problems. Such problems arise when managers in organisations are faced with decisions where some but not all aspects of a task or procedure are known. To solve these problems and use the results for decision-making requires judgement of the manager using the system. Typically such systems include models, data manipulation tools, and the ability to handle uncertainty and risk. These systems involve information and decision technology (Forgionne, 2003). Many organisations are turning to DSS to improve decision-making (Turban, McLean, & Wetherbe, 2004). This is a result of the conventional information systems (IS) not being sufficient to support an organisation's critical response activities—especially those requiring fast and/or complex decision-making. In general, DSS are a broad category of IS (Power, 2003).

A DSS is defined as "an interactive, flexible, and adaptable computer-based information system, specially developed for supporting the solution of a non-structured management problem for improved decision-making. It utilises data, it provides easy user interface, and it allows for the decision maker's own insights" (Turban, 1995). There is a growing trend to provide managers with IS that can assist them in their most important task—making decisions. All levels of management can benefit from the use of DSS capabilities. The highest level of support is usually for middle and upper management (Sprague & Watson, 1996). The question of how a DSS supports decision-making processes will be described in this article. This article is organised as follows: The background to decision-making is introduced. The main focus (of this article) describes the development of the DSS field. Some future trends

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for the DSS field are then suggested. Thereafter a conclusion is given.

BACKGROUND TO DECISION-MAKING

H. A. Simon is considered a pioneer in the development of human decision-making models (Ahituv & Neumann, 1990). His individual work (Simon, 1960) and his joint research with A. Newell (Newell & Simon, 1972) established the foundation for human decision-making models. His basic model depicts human decision-making as a three-stage process. These stages are:

- **Intelligence:** The identification of a problem (or opportunity) that requires a decision and the collection of information relevant to the decision
- **Design:** Creating, developing, and analysing alternative courses of action
- **Choice:** Selecting a course of action from those available.

The decision-making process is generally considered to consist of a set of phases or steps which are carried out in the course of making a decision (Sprague & Watson, 1996). Decision-making can be categorised as:

- Independent
- Sequential interdependent
- Pooled interdependent (Keen & Scott Morton, 1978).

Independent decision-making involves one decision-maker using a DSS to reach a decision without the need or assistance from other managers. This form of DSS use is found occasionally. Sprague & Watson (1996) contend that it is the exception because of the common need for collaboration with other managers. Sequential interdependent decisions involve decision-making at a decision point and are followed by a subsequent decision at another point. In this case the decision at one point serves as input to the decision at another point. A practical example is corporate planning and budgeting where a department formulates a plan which then serves as input to the development of the budget. Sprague & Watson (1996) indicate that DSS are frequently used in support of sequential dependent decision-making but not as frequently as pooled interdependent decision-making.

Pooled interdependent decision-making is a joint, collaborative decision-making process whereby all managers work together on the task. A group of product marketing managers getting together to develop a marketing plan is an example of this type of decision. Specialised hardware, software, and processes have been developed to support pooled interdependent decision-making but for the purposes of this study, these are not explored.

PROBLEMS AND DECISION-MAKING PROCESSES

Ackoff (1981) cites three kinds of things that can be done about problems—they can be *resolved, solved,* or *dissolved*:

- **Resolving:** This is to select a course of action that yields an outcome that is good enough that satisfices (satisfies and suffices).
- **Solving:** This is to select a course of action that is believed to yield the best possible outcome that optimises. It aspires to complete objectivity and this approach is used mostly by technologically oriented managers whose organisational objective tends to be thrival than mere survival.
- **Dissolving:** This to change the nature and/or the environment of the entity in which it is embedded so as to remove the problem.