

# Agribusiness Management Series: Decision Support Systems in Agribusiness Firms



Oklahoma Cooperative Extension Service • Division of Agricultural Sciences and Natural Resources

F-201

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The environment in which agribusiness firms operate is highly complex. Information plays a key role in dealing with the challenges associated with the basic functions of management: planning, organizing, leading, and controlling. Recent developments in information and computer technologies have provided many opportunities for enhancing the effectiveness of agribusiness managers. Decision support systems (DSS) represent one such recent development.

The purpose of this publication is to answer a series of practical questions regarding decision support systems. Attention is given specifically to defining DSS, identifying potential benefits of DSS, describing potential decisions addressed by DSS, and summarizing existing and potential DSS applications.

## What is a decision support system?

A decision support system is defined as "a computer-based system (say a data base management system or a set of financial models) which is used personally on an ongoing basis by managers and their immediate staffs in direct support of managerial activities - that is, decisions."<sup>1</sup>

In assisting managers in decision making activities, decision support systems typically: 1) attempt to combine the use of models or analytical techniques with traditional data access and retrieval functions; 2) focus on user-friendly, interactive features; and 3) emphasize flexibility and adaptability to accommodate changes in the environment and the decision making approach of the user.<sup>2</sup>

<sup>1</sup>Keen, P. G. and G. R. Wagner, "DSS: An Executive Mind-Support System," Datamation, November 1979, p. 117.

<sup>2</sup>Sprague, R. H., "A Framework for the Development of Decision Support Systems," MIS Quarterly, Vol. 4, No. 4 (December), 1980, p. 1.

## What has given rise to the demand for decision support systems?

Interest in decision support systems can be attributed to three factors: a recognition of the importance of information in decision making, an attempt to avoid problems which arise as a result of information mismanagement, and an increased availability and use of microcomputers in management.

Information is as much a resource to an agribusiness as are more traditionally recognized resources such as physical facilities, human capital, and financial assets. Porter and Millar indicate that "information technology must be conceived of broadly to encompass the information that businesses create and use as well as a wide spectrum of increasingly convergent and linked technologies that process the information."<sup>3</sup> Decision support systems facilitate the use of information for decision making.

Information mismanagement, a problem frequently faced by managers, refers to the ineffective use of information. While determining information needs is difficult, managers often are presented with too much of the wrong kind of information and too little of the needed information. Even when information needs are correctly identified, many firms have information so scattered throughout the organization that it is difficult to locate answers to even the most simple questions. Moreover, while information critical to key decisions may be available, it may arrive too late to be considered in making decisions. In solving management problems, information must be of the right type, available in a timely manner, and presented in a clear, understandable form. Decision support systems reduce information mismanagement by assisting in the collection and processing of information.

Much of the current interest in decision support systems has developed in response to increased availability of microcomputer technology in the workplace. Typical microcomputer applications include word processing and accounting. A decision support system is frequently viewed as an additional application to be used in enhancing firm performance.

<sup>3</sup>Porter, M. E. and V. E. Millar, "How Information Gives You Competitive Advantage," Harvard Business Review, July-August 1985, p. 149.

## What types of decisions are addressed by decision support systems?

Decision support systems have been found useful in dealing with problems which are too complex to be easily solved by hand, problems which continue to change with a high degree of uncertainty, problems for which answers are needed in a short time relative to the nature of the analysis, and problems which call for an interactive person/computer relationship.<sup>4</sup>

## For whom are decision support systems designed?

Decision support systems are intended to be used by managers, rather than staff personnel. Since decision support systems are designed for less structured or well-understood problems, key design characteristics include a high degree of user interaction and system flexibility. Hence, effective use of decision support systems is a function of the degree to which managers are involved in their design and use.

## Are decision support systems intended to replace managers?

Decision support systems are not intended to replace managers. They neither make management decisions nor provide recommendations. They do, however, serve a useful purpose in assisting managers in making decisions by reducing the effort spent in collecting and analyzing data.

## What are the potential benefits and limitations of using decision support systems?

Users of decision support systems frequently benefit from improved information processing and retrieval, assistance in evaluating decision alternatives, and enhanced reporting capabilities in communicating with others in the organization. At times, however, these benefits are not realized due to failures in DSS design, construction, and implementation.

A survey of senior-level executives indicates that decision support systems often are associated with "better" and improved decision making. DSS are also thought to provide more complete analyses of decision situations than otherwise might be possible. However,

DSS are sometimes viewed as possibly requiring the use of awkward decision making techniques and approaches. Moreover, DSS are occasionally considered to inadequately fit management needs in certain situations.<sup>5</sup>

A decision support system can enhance management, planning, and decision making in the following ways:<sup>6</sup>

1. It allows managers to better understand their business.
2. It improves communications and overall management control.
3. It is educational and provides new insights into using computers in planning activities.
4. It contributes to more effective teamwork and assists management in quickly responding to unexpected situations.
5. It encourages the consideration of a number of alternatives and supplements contingency planning.
6. It improves the use of internal and external data.

## What design guidelines might be suggested in developing effective decision support systems?

First, and foremost, managers must be involved in the development of decision support systems. Otherwise, the resulting design most likely will fail to adequately capture the essence of problems faced by managers. Input should be solicited on the types of problems typically faced by managers, the nature of inputs available for decision making, and the desired form of output. Second, managers must be able to articulate the process applied in solving problems. Finally, emphasis must be placed on designing user-friendly interfaces to minimize the distraction that often results from using microcomputers.

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<sup>4</sup>Ayers, A. F., "Decision Support Systems - New Tool for Manufacturing," *Focus on Technology, Computerworld Focus*, June 19, 1985, Vol. 19, No. 24A, p. 35

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<sup>5</sup>Alavi, M., "An Assessment of the Concept of Decision Support Systems as Viewed by Senior-Level Executives," *MIS Quarterly*, Vol. 6, No. 4 (December), 1982.

<sup>6</sup>Donnelly, R. M., "Enhancing Management & Planning with Decision Support Systems," *Managerial Planning*, Vol. 32, No. 5, March-April 1984, p. 16.

## What is the potential of using decision support systems in agribusiness firms?

Potential decision support application areas include:<sup>7</sup>

### Financial/Budgeting:

- \* Cash flow and pro formas
- \* Lease/purchase (lease analysis)
- \* Financial structuring (debt structure)
- \* Profitability
- \* Investment optimization
- \* Investment spread sheets

### Human Resource:

- \* Manpower leveling
- \* Wages and salary impact analysis
- \* Routing and dispatch

### Marketing:

- \* Sales forecasting
- \* Territorial assault (market penetration)
- \* Pricing and product profitability

### Engineering:

- \* Design simulation
- \* Alternative material cost evaluation

### Manufacturing:

- \* Capacity planning
- \* Scheduling
- \* Blending and mixing
- \* Manpower leveling

### Purchasing and Inventory:

- \* Make or buy
- \* Optimization
- \* Physical distribution

### Planning:

- \* Acquisition analysis
- \* Economic forecasting

## Are examples of decision support systems available from Oklahoma State University?

CoopSim is a decision support system for agricultural cooperatives developed by the Department

of Agricultural Economics at Oklahoma State University under contract with the Agricultural Cooperative Service. Its primary objectives are to assist managers in developing financial forecasts and examining financial performance. The program uses predefined or user-designed financial statements and analysis screens and assists users to:

- \* Examine a variety of financial statements in tabular or graphical formats.
- \* Develop financial forecasts based on historical patterns.
- \* Explore alternative corporate strategies regarding reorganization, merger, acquisition, and/or liquidation.
- \* Access a selection of financial tools including capital investment analysis and loan amortization.
- \* Determine the impact of uncertainty on possible financial results.

For additional information on CoopSim characteristics and availability, write:

Department of Agricultural Economics  
513 Agricultural Hall  
Oklahoma State University  
Stillwater, Ok. 74078

## Where can I obtain additional information on decision support systems?

It is anticipated that decision support systems will become more widely used in management as advances in microcomputer hardware and software continue. Additional information on decision support systems in agribusiness firms is available from the following sources: 1) agribusiness magazines, 2) microcomputer magazines, 3) educational books, 4) newsletters of professional associations, and 5) publications of educational institutions.

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<sup>7</sup>Rector, R. L., "Decision Support Systems - Strategic Planning Tool," Managerial Planning, Vol. 32, No. 6, May-June 1984, p. 37.

## The Oklahoma Cooperative Extension Service *Bringing the University to You!*

The Cooperative Extension Service is the largest, most successful informal educational organization in the world. It is a nationwide system funded and guided by a partnership of federal, state and local governments that delivers information to help people help themselves through the land-grant university system.

Extension carries out programs in the broad categories of agriculture, natural resources and environment; home economics; 4-H and other youth; and community resource development. Extension staff members live and work among the people they serve to help stimulate and educate Americans to plan ahead and cope with their problems.

Some characteristics of the Cooperative Extension system are:

- The federal, state and local governments cooperatively share in its financial support and program direction.
- It is administered by the land-grant university as designated by the state legislature through an Extension director.
- Extension programs are nonpolitical, objective and based on factual information.
- It provides practical, problem-oriented education for people of all ages. It is designated to take the knowledge of the university to those persons who do not or cannot participate in the formal classroom instruction of the university.
- It utilizes research from university, government and other sources to help people make their own decisions.
- More than a million volunteers help multiply the impact of the Extension professional staff.
- It dispenses no funds to the public.
- It is not a regulatory agency, but it does inform people of regulations and of their options in meeting them.
- Local programs are developed and carried out in full recognition of national problems and goals.
- The Extension staff educates people through personal contacts, meetings, demonstrations and the mass media.
- Extension has the built-in flexibility to adjust its programs and subject matter to meet new needs. Activities shift from year to year as citizen groups and Extension workers close to the problems advise changes.



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