DECISION SUPPORT SYSTEMS AND THE EVALUATION OF REAL ESTATE SALES

by Jack T. Hogue

In recent years real estate value, particularly in downtown metropolitan areas, has increased dramatically. As the U.S. workforce continues to engage in information handling at an accelerating rate, the concentration of such workers in metropolitan office towers and complexes will continue. These trends serve to focus attention on an increasingly important and complex decision for companies which buy and sell corporate office properties—the terms of sale or acquisition.

The case study of this research is a large multi-industry corporation with headquarters in Dallas, Texas. Annual revenue exceeds eight billion dollars and company employment exceeds 68,000. In 1982 corporate management was in a position to sell one of its properties, a large downtown Dallas office tower. As management began to investigate terms of sale for the property, it became apparent that there were too many factors which work in concert or opposition to one another for the human mind to be able to consider them all jointly.

In such situations it is common to simplify the problem by reducing the number of variables to be considered, thus providing a more easily identifiable set of solutions. However, management wished to be able to consider all of the variables relevant to the future financial value of the property, and in terms of the hundreds of perceived variations of the future, all believed to be possible. Of added importance was a time limit for the decision which would have made a strictly human evaluation of the property's financial value limited in scope. Management did not believe the property could be adequately evaluated without a computerized financial model enabling any "what-if" scenario to be considered.

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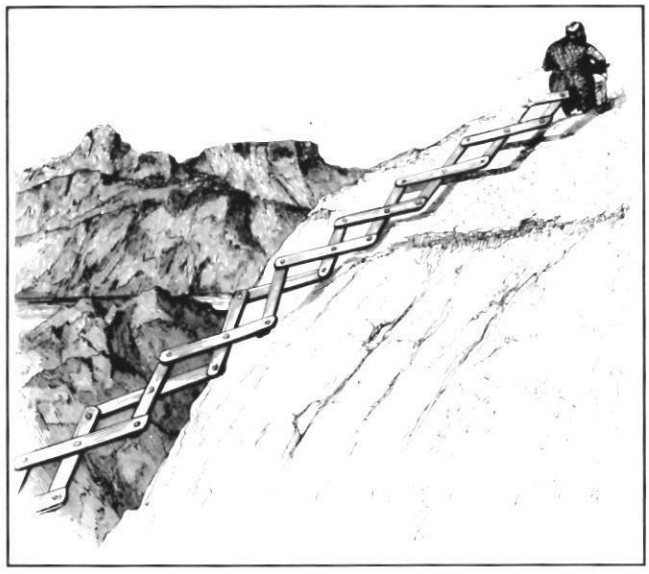

Decision Support Systems

A decision support system (DSS) is defined as "interactive computer based aids designed to assist managers in complex tasks requiring human judgment."[1]

Such decision support systems (DSSs) differ from traditional computer systems in several ways.[2] First, they are often developed by the user (management or staff) for a specific decision utilizing computer software which is very user-friendly, thus requiring little to no prior computer expertise. The decision supported by the DSS may be a recurring decision of continued importance (financial planning) or a one-time decision of major importance (sale of a multimillion dollar office building). DSSs may be developed separately from the data processing (DP) department, thus bypassing the typically long turnaround time for DP applications development. As the DSS is developed it can be changed quite easily and quickly as the user determines needed modifications. A DSS is

heavily dependent on its using decision maker, since its accuracy will be dependent on the accuracy of the computer model specified, and this model often exists only in the decision maker's mind.

In addition to a DSS being quickly and easily developed by users, it must be easy to operate during the process of examining potential decision outcomes. This means that users should be able to interact on a one-to-one basis with the DSS, using unimposing technology. Commands should be simple and logical extensions of the decision maker's vocabulary. Response by the DSS to the user's commands should be rapid. Equally important to these other characteristics of a DSS is its ability to provide informational responses to the decision maker in any form desired. Examples include graphical and tabular output, and a variety of levels of detail in the output. Figure 1 provides a fairly complete summary of typical DSS characteristics.

FIGURE 1

Decision Support System Characteristics

1. Supports but does not replace decision making.
2. Directed toward semistructured and/or unstructured decisions.
3. Directed toward upper and/or middle management.
4. Data and models organized around the decision(s).
5. Easy to use software interface.
6. Interactive processing.
7. Use and control is determined by the user.
8. Flexible and adaptable to changes in the environment and decision maker style.

A Decision Support System for Real Estate Evaluation

Management chose the DSS approach to acquiring computer assistance as opposed to using normal channels through the DP department due to factors previously mentioned. In particular, management wanted a system which could be developed fast (less than one month) and under the complete control of the decision maker who was trying to determine the details of the building's terms of sale. The Management Information Systems department already had a "package" of financial modeling software, Interactive Financial Planning System (IFPS), which was available for independent users/decision makers, and was chosen as the mechanism for developing the needed DSS. IFPS is an example of what is referred to as a DSS Generator.[3] This software provides a simple means of assembling the DSS. With IFPS, and other DSS Generators, instructions are English-like with an emphasis on business-oriented terminology. Physical interaction is very unimposing (via terminal screen prompting). Tabular as well as graphical outputs may be requested. Other facilities are available, depending upon the particular DSS Generator.

The DSS was approved, developed, and utilized exclusively by only two individuals, the upper manager (in finance) responsible for the decision and a senior financial analyst. The logical content was thus under the direct control of the users, as were all data in support of the model. Other resources required in support of the DSS were available (controlled) through the Management Information System department. These included all hardware, supporting system software, and communications facilities.

There was no formal evaluation performed to assess the financial desirability of developing the DSS. No projections of cost or benefit were performed either before development or after the model's use. Management "knew" that the return over the cost of model development, whatever it would be, would be very beneficial. The reason was the huge amount of revenue to be generated over the life of the building. Any improvement in the decision was seen as out-weighing the cost. This is fairly typical for DSS projects and often referred to as "value analysis."[4] Given a relatively low cost threshhold for development, the project will be accepted if there is a potential for very high returns.

DSS Development

During development the manager and analyst worked together closely in the initial stage to define the relevant components for evaluating this building's worth. Such a decision had not been required before and there was, therefore, no predefined procedure or technique. The components were identified by the manager by thinking through and verbalizing what he believed to be the relevant issues and relationships. After such a session the analyst would develop algorithms representative of the manager's specifications. Three weeks were required to develop the final model.

As the DDS was evolving into its final format, the manager was using the model to evaluate the building. Thus, the model was in use as it was being developed. It was this use which enabled the manager to specify additions and refinements. The final model was then a reflection of the decision making process utilized by the manager. Later, as the model was used, the manager was further able to maintain an individual approach in that questions could be presented to the model in any sequence, and information could be presented in summary or detailed form.

Only the financial analyst dealt directly with the IFPS DSS Generator during model building. Neither manager nor analyst was required to interact with any other more basic tools such as FORTRAN or systems software. This was because IFPS maintained its own interaction with the computer system and IFPS offered all components needed by the DSS. Other capabilities available in support of the DSS were printing and CRT terminals, and the various capabilities of the computer's operating system.

DSS Operation And Use

Once the DSS was available to assist in evaluating the terms of sale for the building, both the analyst and the manager operated the model anywhere from 5-20 times per week (for three weeks). The analyst had taken one computer course in school and the manager none. Neither had used the computer directly as a tool before. Company training was and is available for use of IFPS. The analyst had received this training (two days) but, of course, there is no training available for the DSS since it was relevant for use only the one time.

Maintaining the decision making approach of the manager was easy in this case because of several factors. Frequently, the manager did his own operation and could thus direct the DSS as he pleased. Also, if the analyst were operating, the manager would occasionally be there to direct the analyst's actions. If not physically present during the analyst's operation, the manager was usually next door and thus readily available to the analyst. Further, turnaround time for output was usually instantaneous, thus allowing for rapid feedback.

The impact of the DSS on both the analyst and manager was similar. Both are now using the computer and computer output as a part of their job. For the upper manager, an increased self-assurance has been possible since much faith is placed in the model. More think time was available for considering the decision and the decision could be made more quickly. Management believes that use of the DSS significantly improved the terms of sale of the Dallas office tower. Many more factors were considered than could have been without the DSS, and in a time frame which was considered prohibitive before the DSS.

Conclusions

Decision support systems are computer-based information systems designed to assist decision makers in the task of making upper level, ill-structured decisions. The terms of sale of corporate office properties is a decision which requires considerable analysis due to the large number of relevant variables and the unpredictability of the future. For this reason, such decision making can be aided through the use of a DSS.

The true case presented in this study is one example of the application of such technology to the determination of terms of sale of a major property. In a four week period of time, two non-computer oriented individuals (one management and one staff) developed a DSS of perceived high quality which had a major impact on the sale terms decision. The DSS consists of hundreds of financially interrelated equations, each representative of some facet of the building's potential value. Interaction with the DSS is quite simple since commands are very English-oriented. The user must simply respond to menu prompts in using the model, and then supply required data. Its greatest impact on management's decision making comes in its ability to react with a scenario to questions posed by management. Once the model was defined, management was able to pose "what-if" types of questions to get a financial picture representative of the "what-if" proposition.

The development of decision support systems in the real estate field should not be restricted to such high price properties. Similar systems would be of major value in any situation where a similar single high priced property were involved, or whenever the terms of sale (or acquisition) decision is made on a regular basis. If such a DSS were developed for a recurring buy-sell decision, the DSS would need to be more general in its ability to evaluate any property rather than designed for a single application, as in this case.

NOTES

1. Richard Hackathorn and Peter Keen, "Organizational Strategies for Personal Computing in Decision Support Systems," *MIS Quarterly*, Vol. 5 no. 3 (September 1981), 21-27.

2. For a more complete examination of DSS characteristics and deviations from traditional information systems refer to: Peter Keen and M. S. Scott Morton, *Decision Support Systems: An Organizational Perspective*, Addison-Wesley, Reading, Mass., 1978; and Ralph Sprague, "A Framework for the Development of Decision Support Systems," *MIS Quarterly*, Vol. 4 no. 4 (December 1980), 1-26.

3. Ralph Sprague, "A Framework for the Development of Decision Support Systems," *MIS Quarterly*, Vol. 4 no. 4 (December 1980), 1-26.

4. Peter Keen, "Value Analysis: Justifying Decision Support Systems," *MIS Quarterly*, Vol. 5 no. 1 (March 1981), 1-16.