Integrating an Expert System and DSS for Strategic Decision Support: A case study

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This article describes the methodology, design, and evaluation of an integrated strategic decision support and expert system (called SUCCESS) for use by senior management. It was developed to assist top managers of strategic business units (SBU's) in business strategy formulation. SUCCESS allows managers to evaluate their own and their competitor's strategy in terms of nine well-known typologies. Furthermore, it can be used to assist managers in determining the implications of proposed strategy changes. SUCCESS uses an expert knowledge base which defines each of the potential strategies in terms of 28 variables to determine which strategy is matched most closely.

Introduction

Very few computer-based systems have reached top management, and even fewer are directly used by Chief Executive Officers (Fersko-Weiss, 1985; Young, 1987). For strategic decision making, top-level managers need future-oriented, qualitative, external, personal forecasts and evaluations in addition to the objective, quantitative, in-house, past-oriented data usually provided by the firm's information resources (Aguilar, 1970; Isenberg, 1985).

Computer-based decision support systems (DSS) have gradually filtered up the organization, focusing on less recurrent, more unstructured decision making (Ariav & Ginzberg, 1985; Neumann & Hadass, 1980). Although computer-based information resources have been used in strategic planning, they have served primarily as an aid for staff in preparing briefings for top management. Strategy, however, is the final responsibility of senior management, not staff. To make intelligent strategic decisions, senior management must have direct access to information resources, and not just rely on the alternatives offered by their staff. The purpose of this paper is to report on how information resources were used to develop a strate-
gic decision support system, incorporating an expert knowledge base, that assists senior managers in assessing and selecting the appropriate business strategy for their business units. The system, dubbed SUCCESS (Strategic business Unit Comprehensive Computer-based Expert Support System), integrates the concepts of information systems, knowledge-based systems, and strategic management.

The information systems base is a highly interactive computer program that allows executives to explore alternatives without requiring computer or keyboarding skills. The knowledge base was obtained by operationalizing the research results of experts through the use of judges. The management concepts are based on the use of strategic archetypes. The system allows managers to choose among nine well-known strategic typologies.

The following sections of this paper present the management problem, the information resource management solution, and the applications of the system. The methodology used for developing the expert data base and integrating it into the decision support system are presented in Appendices A and B.

The Management Problem

Any ongoing business has a strategy, whether it thinks so or not. Even if the strategy is undocumented, informal, or unplanned, and even if the business is unaware of, unconscious of, or flatly denies it, a strategy exists. A strategy is created because a working organization cannot be totally flexible and turn around instantly. Location, premises, facilities, technology, employees, product lines, target markets, supply and distribution channels, reputation, standards, and procedures, to name just a few, are chosen, created, and adhered to for various lengths of time. The decisions and investments made in the past create organizational inertia and momentum.

The concept of strategy has evolved over time, although the basic concept has not changed. For example, a 1962 definition states that strategy is "the determination of the basic long-term goals and objectives of an enterprise, and the adoption of courses of action and the allocation of resources necessary for carrying out these goals" (Chandler, 1962). That is, strategy is the alignment of goals and courses of action of an organization.

Strategy is created at the topmost level of an organization. This level, intentionally or not, sets the organization's goals and decides on its investments and the deployment of its resources. It is the mandate of top management to define strategy. Management need not be without help in this task. A number of distinguished authors and experts have examined the spectrum of business strategies and divided the spectrum into a fixed set of representative (archetypical) strategies. Each such division is referred to as a typology. Best results are achieved with these typologies if they are applied to individual strategic business units (SBUs), that focus on one product-market combination. When a business operates in a number of distinct product/markets, each product/market needs to be analyzed separately.

In SUCCESS, we use nine such typologies involving a total of 53 strategies (Table 1). Analysis of the typologies indicates that they can be described in terms of 28 variables (Table 2), although not all variables are needed to describe each typology. The result, then, is a matrix of 53 strategies and 28 variables, a quite reasonable number to handle computationally. The values associated with these strategy-variable combinations has been determined through the operationalization of the work of experts and are provided as inputs. A manager can, by selecting a typology and determining the values of the variables for his/her own firm and for those of competitors:
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