

# Strategic Assessment Model (SAM): A Multiple Criteria Decision Support System for Evaluation of Strategic Alternatives\*

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## ABSTRACT

The evaluation of strategic alternatives is a particularly difficult task. This difficulty is due to the complexities inherent in the evaluation process and the lack of structured information. The evaluation process must consider a multitude of relevant information from both the internal and external environments of the organization. Various analytical and normative models have helped decision makers utilize large volumes of information in strategic evaluation; however, most of these models have some limitations. We present a multiple criteria decision support system, called strategic assessment model (SAM), that addresses some of the limitations inherent in the existing models. SAM captures the decision maker's beliefs through a series of sequential, rational, and analytical processes. The environmental forces—decomposed into internal, task, general opportunities, and threats—are used along with the analytic hierarchy process (AHP), subjective probabilities, the entropy concept, and utility theory to enhance the decision maker's intuition in evaluating a set of strategic alternatives.

*Subject Areas: Decision Analysis, Decision Processes, Decision Support Systems, and Strategy and Policy.*

## INTRODUCTION

Strategic management is the process of aligning the internal capabilities of an organization with the demands from its environment to achieve an effective allocation

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of corporate resources. Effective strategic management requires effective strategy formulation, evaluation of alternative strategies, and implementation of the selected strategy. Strategy formulation deals with “what to do” whereas strategy implementation deals with “how to get” the intended result. While both are integral parts of the same process, their nature and purposes are different. Because it is difficult to incorporate the entire strategic management process under one framework or model, the literature discusses different stages of the strategic management process separately. We focus on effective evaluation of strategic alternatives. The principal components of this evaluation process include: (1) generating alternative strategies, (2) identifying relevant factors along with their probabilities of occurrence, and (3) selecting the most attractive strategy based on an evaluation of the potential risks and returns associated with each alternative [52].

Many analytical and normative models have been developed to help a decision maker (DM) deal with the strategy evaluation process. Such models include strategic program evaluation (SPE) [18] [19] [26], quantitative strategic planning matrix (QSPM) [10] [11] [12], Electre II method (EII) [17], the McKinsey matrix [23], competitive strength assessment [55], the scenario-strategy matrix [37], and decision situation outcomes evaluation [39]. These techniques have made definite contributions to the strategy evaluation process, but they also have some limitations. For example, many of these techniques do not use comprehensive environmental data in the selection process. In addition, they do not consider the risk associated with a potential strategy. Finally, they use weights and subjective probabilities in the evaluation process but do not provide any systematic procedure to develop such weights and probabilities nor to verify their internal consistency.

We present a multiple criteria decision support system called Strategic Assessment Model (SAM) which overcomes some of the limitations of existing strategic evaluation models. SAM evaluates both environmental opportunities and threats, along with their probabilities of occurrence and their importance weights, to select a strategy based on the risk-adjusted strategic value. It also promotes comprehensive scanning of the environment by decomposing it into internal, task, and general environments as suggested by many researchers [9] [18] [40] [45]. Furthermore, SAM uses the Analytic Hierarchy Process (AHP) [41] [42] [44] for developing importance weights of the environmental factors, the entropy concept [60] for developing intrinsic weights of the environmental factors, and an exponential utility function [20] for calculating the risk-adjusted strategic value. These features make SAM a desirable tool for the evaluation of strategic alternatives.

Thus, SAM provides a greater level of analytical comprehensiveness than is provided by existing models. Initially, DMs may be overwhelmed by the number of different techniques and concepts that are integrated in SAM. However, they could be convinced to use SAM through patient assistance and training by experts, particularly when all the number crunching is performed by the computer. After all, DMs recognize that strategic decision making is complex and requires the use of several different analytical techniques to supplement managerial intuition, knowledge, and judgment.

## CURRENT STRATEGY EVALUATION MODELS

An organization's strategy determines the degree of fit between the external environment and its internal structure and processes [25]. Many researchers have argued that such a match is best achieved by using a formal decision-making process [2] [7]. However, the lack of structure in the decision-making paradigm presents a major difficulty in developing a decision support system for the evaluation of strategic alternatives. This lack of structure is attributed to the novelty, complexity, and open-endedness of the strategic decision process [33]. Furthermore, the vast amount of information that must be considered for solving the inherently unstructured (or ill-structured) strategic problems creates a need for systematic and generic techniques for the evaluation of strategic alternatives [15] [28] [57].

Many analytical and normative models have been developed to aid DMs with the strategy evaluation process. Quantitative methods and approaches such as linear programming, game theory, Markov analysis, decision theory, and marginal analysis are among the methods recommended for strategic evaluation. These techniques, when properly used, can be extremely helpful [14]. However, such analytical techniques are more appropriate at the functional level where the parameters are relatively more specific and decision variables more quantifiable [8].

Other techniques for strategy evaluation include dialectical inquiry, devil's advocacy, and the consensus approach [49] [50] [51]. Although these techniques have a theoretical appeal, their application seems to be ad-hoc, and they do not present a structured framework for a systematic evaluation of different strategic alternatives. Schoemaker and Russo [47] describe four general approaches to decision making ranging from intuitive to highly analytical. These methods include intuitive judgments, rules and shortcuts, importance weighting, and value analysis. They argue that analytical methods such as importance weighting and value analysis are more complex but also more accurate than the intuitive approaches [47].

The literature reports three models for strategic evaluation that are similar to SAM. These are SPE [18] [19] [26], QSPM [10] [11] [12], and EII [17]. These models are easy to understand and apply, but they tend to oversimplify the problem description by ignoring critical details. For example, the importance of dividing the external environment into task and general environments is well-discussed in the literature [9] [18] [40] [45]. Yet, none of these techniques implement such a separate treatment of the task and general environments. Similarly, while risk is widely recognized as a very important criterion for strategy selection [27] [34], all of these techniques fail to incorporate a systematic treatment of risk and risk-averse management behavior. Furthermore, most of these techniques are variations of the decision matrix [24]. Although Hill et al. [24] did not incorporate the DM's utility function in the decision matrix, they emphasized the importance of utility consideration in the decision process. None of these methods use the DM's utility function in their model. In addition, these models use subjective probabilities and weights without defining a systematic procedure to develop them or to verify their internal consistency. Finally, all of these models utilize importance weighting. While they are useful for important and complex decisions such as strategic decisions, a more comprehensive assessment is needed. Value analysis approaches such as multi-attribute utility (MAU) improve importance weighting by considering the DM's utility [29]. These limitations of the existing models provided the motivation for developing SAM.

## THE STRATEGIC ASSESSMENT MODEL

### Background

The strategic decision-making environment is defined as the set of factors inside and outside the boundary of an organization that should be considered during strategic decision-making process. Environmental scanning is the process of seeking information about this environment. Many environmental scanning models treat the external environment as a single entity [35] [36] [38]. A major limitation of this approach is that task and general environments are not evaluated independently of one another.

We decompose the environment into internal, task, and general environments as suggested by many writers [9] [18] [40] [45]. These environments are defined as:

1. Internal Environment: The set of relevant factors that form the profile of the internal operations of the organization,
2. Task Environment: The set of relevant factors that have direct transactions with the organization. The influence between these factors and the organization is reciprocal, and
3. General Environment: The set of relevant factors that can exert considerable influence on the organization. The organization, however, has little or no impact on such factors.

A major advantage of decomposing the environment is that the relative weights of different environments can be specified independently of the relative weights of the factors within the environment. SAM uses both environmental opportunities and threats along with subjective probabilities and weights to provide additional information about each alternative. Opportunities and threats are positive and negative factors within the internal, task, and general environments.

### The Procedure

SAM uses an eight-step procedure to systematically evaluate potential strategies by calculating the expected utility associated with each alternative. The risk-adjusted strategic value of an alternative is directly related to the expected utility of the alternative through the utility function. Below are the eight steps used in SAM followed by a description of each step.

1. Generate strategic alternatives.
2. Identify the relevant opportunities and threats and group them into internal, task, and general sets of environmental factors.
3. Define environmental weights.
4. Calculate the initial weights associated with the opportunities and threats.
5. Develop subjective probabilities for each alternative.
6. Calculate the overall importance weight for the opportunities and threats.
7. Measure the DM's risk-aversion constant for the opportunities and threats.
8. Calculate the risk-adjusted strategic value for each alternative.

1. *Generate strategic alternatives.* Alternatives are the set of potential means by which the stated objectives may be attained. There must be at least two mutually

exclusive alternatives in the set to permit a choice to be made [60]. Alternatives can be generated using various brainstorming and intuitive methods.

2. *Identify the relevant opportunities and threats and group them into internal, task, and general sets of environmental factors.* We use “scanning” and “interpretation” to identify relevant opportunities and threats and group them into environmental sets. Scanning involves searching the environment to identify the information that is pertinent to the organization. Interpretation is the process of comprehending the information and deciding which factors to include in each environmental set [47] [54]. The set of opportunities and threats included in SAM is not necessarily the entire set of opportunities and threats that could be realized by the firm but consists only of those that can be “exploited” by the strategic alternatives. In other words, an opportunity such as a 2 percent decrease in energy costs would not be included in the model if it was not relevant to the strategic problem under consideration. The internal environment consists of opportunities and threats within functional areas of a firm such as organization, personnel, and marketing. The task environment includes opportunities and threats associated with competitors, customers, regulatory agencies, labor market, creditors, and suppliers which have direct transactions with the organization. The general environment includes mainly uncontrollable international, economic, political, legal, social, cultural, and demographic factors. Aguilar [1] presents a detailed discussion of environmental factors to be considered during the strategic decision-making process.

3. *Define environmental weights.* Several approaches such as point allocation, paired comparisons, trade-off analysis, and regression estimates could be used to specify the relative importance of the internal, task, and general environments [29]. Paired comparisons were used because it captures the ratio of importance for every conceivable pair of environments, and it is found to be trustworthy and easy to use [29]. SAM utilizes AHP, developed by Saaty [41] [42] [44], to estimate environmental weights for opportunities ( $W_{u_i}$ ) and threats ( $W_{t_i}$ ) factors. The advantage of

AHP is its capability to elicit judgments and scale them uniquely using a valid procedure that measures the consistency of these scale values [43]. AHP is a widely used technique, and an earlier survey listed well over 200 applications of AHP in the literature [59]. Some researchers have questioned the theoretical basis underlying AHP. However, Harker and Vargas [21] show that AHP does have an axiomatic foundation, the cardinal measurement of preferences is fully represented by the eigenvector method, and the principles of hierarchical composition and rank reversal are valid. While several variations of AHP have been introduced [3] [32] [48] [58], the original AHP developed by Saaty [42] is still being widely used. In addition, the software package Expert Choice [16] utilized in SAM is based on the original methodology.

4. *Calculate the initial weights associated with the opportunities and threats.* The initial weights associated with each opportunity ( $W_{u_{ij}}$ ) and threat ( $W_{t_{ij}}$ ) are calculated next. AHP is used to simplify the estimation process by confining the estimates to pairwise comparisons of factors within each environment. The measure of inconsistency provided by AHP allows for the examination of inconsistent priorities. In step 6, this initial weight is adjusted to capture the amount of intrinsic information transmitted by each factor.