AN INTEGRATIVE METHODOLOGY BASED ON THE ANALYTIC HIERARCHY PROCESS TO STRATEGIC DECISION MAKING

By

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DEDICATION

I would like to dedicate this work to my lovely wife, newly born baby, and all my family members

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TABLE OF CONTENTS

ABSTRAK

Pembuatan keputusan strategik telah muncul sebagai satu daripada bidang kajian yang aktif dalam penyelidikan pengurusan masa kini. Ia merupakan keputusan yang penting dan kompleks yang dihadapi pengurus di dalam dunia perniagaan yang dinamik hari ini. Walaupun keputusan diselubungi segala jenis kompleksiti dan ketidakpastian, seseorang pengurus harus membuat keputusan ini. Kajian lampau yang menjawab bagaimana bidang pengurusan sains dapat membantu pihak pengurusan membuat keputusan strategik secara sistematik amatlah sedikit sekali. Kebanyakan penyelidikan tertumpu kepada kajian deskriptif yang bertujuan menetapkan struktur dan model teori sahaja. Walaupun kajian-kajian tersebut telah menyumbang kepada pemahaman pilihan strategik dan faktor-faktor yang mempengaruhinya, sangat sedikit usaha dibuat untuk menggabungkan penemuan-penemuan ini dengan alat-alat pengurusan sains, yang boleh menentukan strategi optimal secara analitik.

Keputusan strategik adalah kompleks, tidak jelas bentuknya dan sukar dikawal. Ia meliputi pertimbangan tentang pelbagai objektif yang bertentangan antara satu sama lain. Kedua-dua ciri ini menyebabkan kesukaran dalam membangunkan suatu alat untuk menilai alternatif-alternatif strategic. Tambahan lagi, kesan penyederhana *(moderator)* dari faktor persekitaran merumitkan lagi pembuatan keputusan strategik. Tesis ini tertumpu kepada pembangunan suatu metodologi untuk membuat keputusan-

keputusan strategik secara lebih sistematik dengan mengambilkira pengaruh penyederhana dari faktor persekitaran.

Metodologi yang bersepadu ini dibangunkan untuk membuat keputusan strategik. Metodologi yang disarankan menyelesaikan dua aspek penting keputusan strategik; masalah kepelbagaian objektif yang tersirat dalam keputusan-keputusan strategik, dan kesan penyederhana faktor persekitaran. Metodologi yang disarankan adalah gabungan tiga teknik. Analisis senario digunakan untuk menyahkan kesan faktor persekitaran dengan memecahkannya kepada senario-senario diskrit (discrete). Proses analisis berhirarki, yang merupakan sokongan keputusan pelbagai kriteria menangani masalah keputusan yang bentuknya tidak jelas, yang mengambil kira pelbagai objektif yang bertentangan, digunakan untuk menyelesaikan masalah pelbagai kriteria yang tersirat dalam keputusan-keputusan strategik. Kriteria domain Starr's digunakan untuk memilih keputusan strategik yang optimal berdasarkan pelbagai senario yang diberikan. Metodologi yang disarankan memecahkan masalah strategik kepada langkah-langkah yang jelas. Perisian komputer disediakan untuk menangani pengiraan matematik yang diperlukan. Untuk tujuan menilai metodologi yang disarankan, pilihan strategic bagi mod kemasukan (*entry mode)* dipilih sebagai rujukan untuk masalah penyelidikan. Satu ujikaji telah dijalankan ke atas satu sampel pelajar MBA Pusat Pengajian Pengurusan, Universiti Sains Malaysia. Ujikaji ini menunjukkan yang metodologi ini boleh digunakan ke atas keputusan mod kemasukan. Secara keseluruhan peserta ujikaji bersetuju tentang kebaikan metodologi ini. Metodologi ini didapati baik dari segi proses membuat keputusan dan kepuasan terhadap hasil keputusannya. Keupayaan metodologi ini didapati tidak sensitif kepada pembuat keputusan, tetapi lebih kepada masalah keputusan yang ditangani.

ABSTRACT

Strategic decision making has emerged as one of the most active areas of current research in management. It is an important and complex decision that faces managers in today dynamic global business world, and despite the complexity and uncertainty inherent in strategic decision-making, managers have to make such decisions. There is a small body of literature on how management science tools can be used to help managers make their strategic decisions in a systematic manner. Most of these researches focus on descriptive studies, which are directed at establishing theoretical structures and frameworks. Although these studies have made good contributions in understanding strategic choices and factors influencing them, few attempts have been made to incorporate these findings with management science tools which can analytically determine the optimal decision strategy.

Strategic decisions are complex, illstructured, and uncontrollable. They involve the consideration of multiple and conflicting objectives. These characteristics present a major difficulty in developing a tool for evaluating strategic alternatives. The moderating effect of environmental factors is another difficulty in making strategic decisions. This thesis focuses on developing a methodology to make strategic decisions more systematic in the light of the moderating influence of environmental factors.

An integrative methodology is developed to facilitate strategic decision-making. The proposed methodology addresses two important aspects of strategic decisions - the multiple objective problems inherent in strategic decisions and the moderating effect of the environmental factors. The proposed methodology is a combination of three techniques. Scenario analysis is used to incorporate the effect of the environmental factors by decomposing them into discrete scenarios. The analytic hierarchy process, which is a multiple criteria decision support deals with illstructured decision problem that account for multiple and conflicting objectives, is used to solve the multiple criteria problem inherent in strategic decisions. And, Starr's Domain Criterion is used for the selection of the optimal decision strategy, given the various scenarios. The proposed methodology decomposes the strategic problem into clearly defined steps. Computer softwares are provided to handle all the mathematical computation required.

For the purpose of evaluating the proposed methodology, the strategic choice of market entry mode was chosen as a reference for the research problem. An experiment was conducted on a sample of MBA students at the School of Management, University of Science Malaysia. It has been demonstrated that the proposed methodology can be effectively applied to the entry mode decision. There was relative consensus on the goodness of the methodology among the participants. The methodology, as perceived by the participants, was found to be good in term of satisfaction of the decision making process and the satisfaction with the outputs. It was shown that the goodness of the methodology is not sensitive to the decision maker but more to the decision problem.

LIST OF TABLES

LIST OF FIGURES

CHAPTER1: INTRODUCTION

1.1 Background

Strategic decision-making has emerged as one of the most active areas of current research in management. However, despite a substantial body of literature, it is still widely recognized that our knowledge of strategic decision making processes is limited and is mostly based on normative or descriptive studies (Bateman & Zeithaml, 1989; Langley, 1990; Rajagopalan, Rasheed, & Datta, 1993). Mark (1997) concluded that for many reasons, the hardest part of managing an organization today is making appropriate decisions. Strategic decision making is defined as the process of gathering intelligence, setting directions, uncovering alternatives, assessing these alternatives to choose a plan of action, and implementing the plan (Eisenhardt & Zbaracki, 1992; Harrison & Phillips, 1991). Strategic management is defined as the set of decisions and actions resulting in the formulation and implementation of strategies designed to achieve the objectives of an organization (Pearce II & Robinson, 1994). Often, strategy formulation is treated as a decision making process (Mintzberg, 1978; Fredrickson, 1983).

Decision makers consider several alternatives to ensure that a preferred alternative meets performance expectations (Starbuck, 1983). Studies of organizational decision making often describe the practices used to evaluate alternatives as a part of a strategic

decision making process (e.g., Mintzberg, Raisinghani, & Theoret, 1976; Nutt, 1984). A number of research efforts have been carried out to shed light on how the merits of alternatives have been and should have been determined during decision-making. The descriptive literature offers insight into how decision makers make evaluations during strategic decision-making. The prescriptive (normative) literature offers tools and techniques to make an evaluation and discuss the benefits that stem from their use (Nutt, 1998).

A number of research efforts have investigated the approaches used by decision makers to assess alternatives to make a strategic decision (e.g., Mintzberg et al., 1976; Nutt, 1984; Hickson, Butler, Gray, Mallory, & Wilson, 1986). Mintzberg et al. (1976) did a content analysis of twenty-five strategic decisions and found that judgmental, bargaining, and analytic approaches were used to evaluate alternatives. Judgment was used when decision makers apply their intuition to select among alternatives without explaining (or be able to explain) their reason or rationale. Bargaining had parties to the decision reach a consensus about the preferred alternative via discussion. Analysis produced a more objective or criterion based evaluation. Judgment was used frequently in the case studies, and analysis least frequently (less than one in five decisions).

Strategic management research focuses on the relationships among strategy, environment, and performance (Summer, Bettis, Duhaime, Grant, Hambrick, Snow, & Zeithaml, 1990). Each of these constructs is multidimensional. The multidimensionality of these constructs creates a conceptual challenge in that a vast array of specific combinations could be developed along these dimensions to describe organizations.

Currently, there is a little research, in the area of strategic management, on how prescriptive tools of management science can be adapted to derive optimal strategic decision. Most of the research focus on relationships between strategic choices, factors influencing them, and performance, which is the predominant paradigm of strategic management (Summer et al., 1990). The primary reason for the lack of application of systematic rationale by corporate executives in the real world is that the studies conducted on strategic management still remains at the theoretical level. Most research effort is directed at refining the theoretical structure and framework. In pointing out the problem for the functional area of management, Van de Ven (1989) said, "we now have many theories competing with each other to explain a given phenomenon. Proponents for each theory engage in activities to make their theory better by increasing its internal consistency, often at the expense of limiting its scope. As a result, a way of seeing is not seeing. Such impeccable micro logic is creating macro nonsense!". Daniel (1990) advocated more prescriptive research than descriptive research.

A fundamental question in the field of strategic management is how firms achieve sustainable competitive advantage, or what is the implication of a chosen strategy on performance. The answers to these questions have been explained in the literature by developing a contingency theory. The relationship between strategy and performance is contingent on the environment within which they are implemented (Miller, 1988; Aulakh, Kotabe, & Teegen, 2000). Contingency theory does not tell what optimal strategy to choose under given conditions, but instead gives implications for each alternative strategy under the given conditions. What is actually needed is a distinctive prescriptive approach that can systematically steer the decision maker to arrive at an optimal strategy given all the factors and conditions involved.

Andrews (1971) dealt with this issue by articulating the need for strategic alignment. Hofer & Schendel (1978) also enunciated the centrality of alignment by defining strategy as the match an organization makes between its internal resources and skills (competencies) and the opportunities and risks created by its external environment (1978: 12). Thus, strategic alignment entails the need to build, continuously, distinctive firm competencies in time to capture emerging opportunities.

Other streams of research articulated the concept of strategic "fit" to explain the contingency theory. In contingency theory an assertion of fit implies a relationship between two variables, which in turn predicts a third variable (Schoonhoven, 1981). Strategic fit is a core concept in normative models of strategy formulation, and the pursuit of strategic fit has traditionally been viewed as having desirable performance implications (Ginsberg & Venkatraman, 1985; Miles & Snow, 1994). Miles & Snow (1994: 12) suggested that the process of achieving fit begins, conceptually at least, by aligning the company to its market place. This process of alignment defines the company's strategy. Contingency theorists (e.g., Thompson, 1967; Lawrence & Lorsch, 1969), and management theorists (e.g., Miles & Snow, 1978; Peters & Waterman, 1982; Galbraith & Kazanjian, 1986), have long emphasized the importance of fit between the different internal elements of the firm (strategy, structure, technology, systems, processes) and its environment.

Neither strategic fit nor strategic alignment has offered the conceptual or methodological tools needed to predict and assess whether an organization's strategy will fit with changing environmental and organizational circumstances (Zajac, Kraatz, & Bresser, 2000).

Contingency theorists argue that organizations must match their strategy with the requirements posed by the environment to achieve superior performance (Miller, 1991). Organizational ecologists also claim that an appropriate match between organization and environment will increase the survival chances of the organization (Hannan & Freeman, 1989). Some studies (e.g., Prescott, 1988; Venkatraman & Prescott, 1990) focus on the nature of the moderating relationship between strategy and performance. Prescott concluded that environment served as a homologizer, which moderates the strength but not the form of the strategy-performance relationships. On the other hand Venkatraman and Prescott (1990) found that environment moderated the form of the strategy-performance relationships. Emphasizing the multidimensional nature of the environment and strategy, they argued that separate bivariate interactions with components of environment and strategy might fail to capture the complex nature of coalignment between strategy and performance.

But what is the appropriate role for top managers to play in choosing a particular strategy? The role of top managers in making strategic decision has long been studied in the literature. The literature on top management team consensus indicated that agreement among top managers, about strategic goals and competitive strategies, is an important predictor of firm performance (Bourgeois, 1980; Hrebiniak & Snow, 1982; Dess, 1987). Porter (1996) argued that strategic position is not sustainable unless there is trade-offs with other positions. Trade-off means that more of one thing necessitates less of another.

Research in strategic management has been classified into two broad categories: research which deals with the "content" of strategies, and research on the "process"

which investigates the strategic decision process and factors influencing it (Schwenk, 1995). This can be classified as descriptive or qualitative research, which has not been carried further to provide tools and methods for the business world.

Qualitative researchers can be found in many disciplines and fields, using a variety of approaches, methods and techniques. Orlikowski and Baroudi (1991) suggested two underlying paradigms for qualitative research; positivist and interpretive. Positivist generally assumes that reality is objectively given and can be described by measurable properties which are independent of the observer (researcher) and his or her instruments. Positivist tradition generally attempts to test theory, in an attempt to increase the predictive understanding of phenomena (Walsham, 1995; Chua, 1986).

Interpretive tradition starts with the assumption that access to reality (given or socially constructed) is only through social constructions. Interpretive studies generally attempt to understand phenomena through the meanings that people assign to them (Chua, 1986). Interpretive research does not predefine dependent and independent variables, but focuses on the full complexity of human sense making as the situation emerges (Kaplan & Maxwell, 1994; Berger & Luckman, 1967).

Decision science researchers have created many tools and methods, which can be incorporated into the decision process provided that many descriptive researches have been done to identify the factors that influence the strategic management decision. The problem of the current research, in the area of strategic management, is the lack of efforts to link the findings of the descriptive research with prescriptive tools of

management science, which can determine the optimal decision strategy, rather than intending to provide some insights into competitive strategies.

To round up the discussion, strategic decision-making is an important decision process that faces managers in today dynamic global business world. Despite the complexity inherent in the strategic decision-making, managers have to make such decision, which is expected to meet a particular level of performance. Performance is a multidimensional measure, and the desirable measure of performance in based on the organizational goals and objectives. In the intensely global competitive economy, decision makers have to make decision that satisfies a set of objectives or goals. This makes the strategic decision more complex whereas most of the traditional decision models were developed to tackle a decision with one objective. The moderating effect of environmental factors is another difficulty facing the decision maker in making a strategic decision, where the traditional theories in strategic management did not provide any systematic tool for making strategic choices under these situations. The other perspective of the strategic decision is that decision makers have multiple alternatives to choose from, which are compared/evaluated on a number of criteria that are often conflicting in nature.

1.2 Statement of the Research Problem

Human mind can only handle a limited amount of complexity (Schwenk, 1984). It can deal with only a small number of dimensions (variables). As the problem gets bigger and more variables are involved, they need help to reorganize the problems and solve them in a systematic manner. Thus, the first research problem is:

Can existing management science tools be used to help make strategic decision systematically?

Evaluation of alternative strategies is an important part in the strategic management process. The principal components of this evaluation process include generating alternative strategies, identifying relevant factors along with their probabilities of occurrence and the uncertainty related to each factor, and the selection of the most attractive strategy. We argue that strategic decision making can be thought of as a multicriteria decision making (MCDM) problem where the decision maker(s) has to choose an alternative from among a given set of alternatives (strategies), provided a set of conflicting objectives from which the alternatives are to be compared. The decision maker is responsible for the selection of the best solution from among the set of alternatives that would give the best overall objective, taking into account the moderating role of the environmental factors. This leads us to the second following problem statement:

Can current MCDM techniques be applied to strategic decision-making? If not, how can we modify it to accommodate strategic decision-making?

1.3 Objective of the Study

The objective of this research is to investigate how strategic decision-making can be improved by developing a tool that systematically analyze strategic decision and identify the best strategy. This leads us to the following three objectives:

1. To analyze strategic decisions from the perspective of multicriteria decision-making (MCDM),
2. To evaluate the applicability of MCDM techniques to strategic decision-making, and
3. To develop a tool that systematically analyzes strategic decision and identifies the best strategy, considering all the relevant factors that are involved.

1.4 Significance of the Study

The significance of this research is to investigate how managerial strategic decisions are made and how MCDM techniques, in particular the analytical hierarchy process (AHP), can be modified as a tool to strategic decision making. An extension in the theory of the AHP is anticipated to account for the moderating effect of the environmental factors that influence the choice of strategy, and the subsequent performance. The developed tool should help managers make strategic decision more systematically.

This research focuses, in particular, on the area of strategic decision making, in other words, on the selection of a strategy from an existing set of alternative strategies. In particular, this research will focus on developing a methodology to make strategic decisions in the light of moderating influence of environmental factors.

1.5 Research Questions

1. How strategic decisions can be understood from the MCDM point of view?
2. Since the choice of strategy is a discrete choice, is the AHP applicable to make this choice?
3. If somewhat, what are the obstacles from using the AHP, and how to tackle them?

1.6 Organization of the Thesis

The remaining part of the thesis is organized as follows. The following chapter, Chapter 2, reviews the literature on strategic decision-making and the various characteristics of strategic decision. Some theories of the strategic decision-making will be discussed briefly. The applicability of MCDM techniques, in particular the AHP, as a tool for strategic decision-making would be discussed. The various problems, if any, in applying the techniques to strategic decision would be highlighted. The entry mode decision, as an example of a strategic decision, will be adopted as a reference for our research problem. Chapter 3 reviews the various steps involved in the AHP technique and the axioms on which the AHP methodology is based. Various critics and limitations of the technique and how these are being dealt with in the literature would also be discussed. Chapter 4 discusses the development of our proposed methodology, and Chapter 5 focuses on the methodology of entry mode strategic decision. Chapter 6 discusses the evaluation of the proposed methodology and Chapter 7 draws some conclusions and highlights some future research.

CHAPTER 2: STRATEGIC DECISION MAKING

2.1 Introduction

Strategic decision is an important and complex decision that faces managers in today dynamic global business world. Despite the complexity inherent in making such strategic decision, managers have to make such decision. Many decision models have been developed in the past fifty years, including both quantitative and qualitative models to deal with the difficulties involved in making strategic decision. Decision models are simply a means to an end (Ignizio, 1976). Analysis of the model then should yield results that indicate optimal or preferred choice to be taken as the solution of the actual problem. To make a good decision, we not only have to choose the right decision model, but also have to follow a rational decision process. The process, which is commonly used in making decisions, would be discussed in the second section. In the third section, we will review some theory of strategic decision-making, and in the fourth section, we shall shed light on the various characteristics of strategic decision.

Real world problems do not always have a single criterion goal. When a problem has multiple goals and multiple conflicting criteria, multicriteria approaches provide a means by which the problem situation can be more accurately incorporated into an optimization model (Lee & Schniederjans, 1983). The fifth section introduces

the concept of multicriteria decision-making (MCDM) and the applicability of this concept to strategic decision-making. The sixth section discusses various MCDM techniques that were highlighted in the literature, and the applicability of these techniques as tools to strategic decision. In the seventh section, we round up the discussion of the various obstacles, if any, arising from the application of MCDM techniques to strategic decisions.

To have a closer look at the nature of strategic decisions and the various factors that are involved in making such strategic decisions, the last section introduces one particular strategic decision problem, namely the entry mode decision, which will be adopted as a reference for our research problem (this will only be used for the evaluation purpose in Chapter 6). The rationale for choosing this particular strategic problem will also be discussed.

2.2 Decision Making Process

A decision process traces the logical path of each of the steps used by the decision maker in the decision-making. The actual arrangement of the steps may vary; a rational decision process usually consists of the following series of steps (Bazerman, 1998):

Step 1: Define the problem. Understanding all the relevant information related to the problem. Then, identify the objectives of making the decision.

Step 2: Identify the criteria. Most decisions require the decision maker to accomplish more that one objective. The rational decision maker will identify all relevant criteria in the decision making process.

Step 3: Weight the criteria. The foregoing criteria are of varying importance to a decision maker. The rational decision maker will know the relative value that he/she puts on each of the criteria identified.

Step 4: Generate alternatives. An appropriate amount of search time is often spent seeking alternatives. This step requires the identification of possible courses of action.

Step 5: Rating each alternative on each criterion. This is often the most difficult part of the decision making process, since this stage requires forecasting future events.

Step 6: Compute the optimal decision. This is where the decision tool's task comes. Decision models can assist decision maker compute the optimal decision.

2.3 Theories of Strategic Decision Making

Different perspectives of strategic decision-making have been advanced in the literature. Three perspectives of strategic decision-making were discussed in the literature to shed light on how strategic decision is made. Early development of the strategic management literature advances the rational normative models of strategic choice (Andrews, 1971). The dominant theme in this approach suggests that managers must analyze the firm's external environment and conditions (Pearce II & Robinson, 1994). From these analyses, lists of external opportunities and threats and internal strengths and weaknesses are derived. A strategy is then formulated in the context of these opportunities and threats, and the firm's strengths and weaknesses. This strategy, to the extent possible, should be designed to optimize achievement of the firms' goals (Porter, 1980). Thus, according to this approach, strategic decision-making involves a series of sequential, rational, and analytical processes (Huff & Reger, 1987) whereby a set of objective criteria is used to evaluate strategic alternatives (Ansoff, 1986). Some suggest

that this process involves strategic choice. However, Bourgeois (1984) argued that this rational normative model is quite deterministic. While there may be some choices, the process is designed to narrow strategic alternatives to the best one or at least, a small feasible set. Therefore, the choice is highly constrained and is guided by a rational process.

Most advocates of the rational normative perspectives realize that strategic decisions are not without constraints, both environmental and organizational. For example, Bourgeois (1984) argued that the theory of organizational functioning must account for the possibility of reciprocal causation among external factors, strategic decisions, and internal organizational factors. The works by Hambrick and Mason (1984) and Schwenk (1986) suggest that the human actors (e.g., top executives) also affect the strategic choices made. Thus, we also examine the external control and the upper managers strategic choice perspectives.

The external control perspective (Romanelli & Tushman, 1986) suggests that the success of strategic decisions is largely determined by characteristics of external environment. This perspective has developed from two theories: organizational theory and industrial economics. Organizational researchers established that the environment is a source of critical contingencies (e.g., Lawrence & Lorsch, 1969). Organization theorists (e.g., Duncan, 1972; Lawrence & Lorsch, 1969) proposed that environment turbulence and uncertainty have major effects on organizational functioning. From this early works grew resource dependence and natural selection models (Aldrich, 1979; Pfeffer & Salancik, 1978). These approaches suggest that the design and choice of an organization are based on the complexity of the environment (Bourgeois, 1984). For

example, natural selection models argue that an organization's potential for survival and superior performance is dependent on the match or fit between organizational design variables and environmental demands (Aldrich, 1979).

Industrial organization economics argue that an industry's structure is a major determinant of the profitability in the industry and thus serves as a powerful influence on strategic decisions (Hirshleifer, 1988). The industry structure characteristics believed to have the most influence on strategic choices are concentration, heterogeneity, and size of entry barriers (Hirshleifer, 1988; Porter, 1980). The industry's structural characteristics are also believed to have a major effect on firm's profitability (Bourgeois, 1984). Bourgeois noted that the deterministic nature of external control theories evolved from classic microeconomic theory whereby firm survival requires the firm to develop long-run economies-of-scale and focus financial resources and managerial attention on manufacturing efficiencies. Therefore, industrial characteristics are likely to have direct effects on strategic decisions.

Strategic choice perspective emphasizes the effects that executives can have on strategic decisions (Child, 1972). Child suggested that top managers make strategic decisions regarding the goals, domains, technologies and structure of the firm. Kumar (1997) stated that decision strategy choice is dependent on the decision maker's characteristics. Therefore, the manager's knowledge, ability, and motivation influence the strategic decision process. This is supported by Nutt (1999), who stated that strategic decision process is based on individual's abilities of bargaining, judgment, and analysis. Behavioral decision theory assumed that rational economic actors maximize their utility based on full, complete, and perfect information (Sebora, Crant, & Shank, 1990; Walsh,

1989). Behavioral decision research suggests that people violate the rational normative utility maximization model (Sebora et al., 1990).

Much of the work integrating behavioral decision theory into the strategic decision making literature has been based on the early notions of Tversky and Kahneman (1974). They stated that when faced with uncertain, complex and/or ill-structured problems (that largely describe strategic decisions), individuals develop and use heuristics to simplify the decision process. By using heuristics, decision makers can make fairly accurate interpretations and evaluations without having to examine all available information (Starbuck & Milliken, 1988). Schwenk (1984) suggests that individual characteristics affect the heuristics and cognitive maps used to make strategic decisions. Work by behavioral decision theorists and strategists (e.g., Hambrick & Mason, 1984; Walsh, 1989) suggest that executives do not follow a totally rational model in making strategic decisions. Thus, the introduction of human factor into strategic decisions alters the strategic decision process.

In summary, the rational normative perspective suggests that executives examine the firm's external environment and internal conditions and, using the set of objective criteria derived from these analyses, decide on the strategy. The external control perspective argues that strategic decisions are largely constrained by the external environment. The strategic choice perspective suggests that strategic choices are the result of both the objective situation and the subjective characteristics of the top executives.

2.4 The Characteristics of Strategic Decision

One of the central features of the strategic decisions is their lack of structure (Mintzberg et al., 1976). Mintzberg et al. (1976) stated that the strategic decision process is characterized by novelty, complexity, and open-endedness. Decision makers usually begin with little comprehension of the situation and their understanding deepens as they work on the problem (1976: 265). They use the term *ill-structured* to describe strategic decisions. Strategic decision makers are seldom able to obtain or interpret complete information (Simon, 1976). Thus, decision makers tend to try what has worked before, and to limit their information search to a few factors and/or paths. In doing so, they construct simplified models of reality (Simon, 1976), which in turn produce decisions heuristics. Nisbett and Ross (1980) noted that decision makers typically use such heuristics to solve complex problems, an adaptation required by their limited cognitive abilities.

Mason and Mitroff (1981) observe that the lack of structure in strategic decision-making is due to the complexity of strategic problems. They stated that strategic problems have no clear formulation and that it is extremely difficult to describe the problem and to determine the criteria by which solutions should be judged. Complex problem involves uncertainty and ambiguity for decision makers. The literature on strategic decision-making suggests a large number of factors, which may contribute to the complexity of a problem such as rarity, openness, seriousness, endurance, radicality of consequences, involvements, and diversity (Cray, Mallory, Butler, Hickson, & Wilson, 1991).

Strategic decisions are those important decisions that typically require a large amount of organizational resources, and firm's environmental consideration (Mason & Mitroff, 1981; Pearce II & Robinson, 1994). So, from among the different types of decisions, strategic decision may be the most important and the most risky. This is simply because strategic decision not only affect the organization in which they are taken but also affects the society as a whole (Colignon & Cray, 1980).

Successful strategies are often characterized as those, which outdistance the competition (Porter, 1985). Strategy can be captured along many dimensions (e.g., Hambrick, 1983; Porter, 1980; Miles & Snow, 1978). It can be classified as Hambrick's generic approach: Cost efficiency, Asset Parsimony, Differentiation, and Scale/Scope; it can be classified using Porter approach: Cost Leadership, Differentiation, and Focus; or it can be classified as Miles and Snow typology of strategic types: prospector, defender, and analyzer. Decision maker is faced with a strategic decision, which is to choose one of the alternative strategies that should give him a sustainable competitive advantage compared to rivals. This is a clear notion of discrete choice. Thus, strategic decisions are one of a discrete choice in nature. For example, Porter (1980, 1986) suggested that a firm must make a choice between the three generic strategies (differentiation, cost leadership, or focus), as achieving cost leadership and differentiation are mutually exclusive, because differentiation is usually costly.

To round up the discussion, the strategic decision-making is an unstructured and ill-defined decision that requires a large amount of organizational resources and environmental consideration. It also requires the participation of top managers. This is also supported by Pearce II and Robinson (1994), who stated that strategic issues

typically have the following characteristics; require large amount of firms' resources, often affects the firm's long term prosperity, they are future oriented, usually have multifunctional consequences, they require the consideration of the external environment, and they require the participation of the top managers. It is a risky decision as it relates to future states that are largely unknown or uncertain. Strategic decision-making is a multiple objective decision problem. This refers to the many criteria on which the different alternatives are to be evaluated. An organization has to choose a strategy from a set of alternative strategies, which give the organization a desirable level of performance. Performance is a multidimensional measure. It consists of several dimensions such as profitability, growth, and so forth. The choice among a set of alternative strategies is a discrete choice and alternatives are compared on a set of criteria, which are often conflicting in nature.

In summary, we can look at the concept of strategic decision-making from the following perspectives:

1. Strategic decision-making is all about making strategic choices,
2. Decisions are more descriptive and qualitative in nature,
3. It involves multiple and conflicting objectives and sub-objectives,
4. It requires tradeoffs among the various objectives and sub-objectives,
5. It involves multiple decision makers, and
6. It involves consideration of environmental factors.

It is obvious from item number 3 that strategic decision-making requires a tool that can handle multiple criteria decision problem, which is the subject of the next section.

2.5 Multicriteria Decision Making (MCDM)

Over the past two decades, multicriteria decision making (MCDM) has developed into a discipline in its own right, with specialized conferences or specialized streams at OR/MS conferences, and with the publication of the first MCDM journal in 1992. MCDM is an extremely important discipline that deals with decision-making problems with multiple objectives, which are often conflicting in nature. The decision maker is the key player in the MCDM process, who is responsible for the selection of the best solution (best compromised solution) from among all the generated alternatives. MCDM is a human managerial task. The aim of any multicriteria decision making technique is to provide help and guidance to the decision maker in discovering his or her most desired solution to the problem, in the sense of the course of action which best achieves the decision maker's long term goals (Stewart, 1992). Charnes and Cooper (1961) recognized multicriteria decision making as a process, which explicitly recognizes the existence of multiple goals.

A further feature of the MCDM model is, of course, the set of criteria by which alternatives are to be evaluated. Criteria are commonly developed in a hierarchical fashion, starting from some general but imprecise goal statement, which are refined into more precise sub- and sub-sub goals. A useful general definition of a criterion is that view by Bouyssou (1990) "as a tool allowing comparison of alternatives according to a particular significance axis or point of view". Perhaps the most distinct difference between the normal decision-making techniques and the MCDM tools is the existence of multiple goals and the incorporation of both group as well as individual in the decision-making process (Stewart, 1992).

Management science (MS) can help managers make better decision, systematically by using mathematical tools. In situations when multiple criteria need to be considered by the decision maker, management science offers appropriate approaches that can deal with such situations. For example, consider a company that is involved in selecting a location for a new manufacturing plant. Since the cost of land and construction may vary from location to location, one criterion in selecting the best site would be the total cost involved in building the plant. Management would simply select the location where the land cost plus the construction cost is the minimum. Sometimes management would consider other criteria in making their decision, such as, the availability of transportation from the plant to the company's distribution centers, the attractiveness of the proposed location in term of hiring employees, energy costs at the proposed site, and state and local taxes. In such situation, the complexity of the problem increases since one location can be more desirable on some criteria but undesirable on some other criteria.

Behavioral process is another important factor in multicriteria decision-making, as the decision-maker must use his/her own judgment in coordinating each criterion to make a good decision. This is supported by French (1984) who stated that a good decision aid should help the decision maker explore not just the problem but also himself. Hening and Buchanan (1996) also agree with this view, as they stated that a good decision is one where the decision-maker understands his preferences. If one understands the decision process, one would correctly predict the outcome (Affisco & Chanin, 1990).

Simon (1957) developed his idea of satisficing (sufficiency). This has a great deal to do with the theory of human behavior and played an important role in developing and

understanding the theory of MCDM. The appeal of Simon's satisficing approach is the principle of bounded rationality. Bounded rationality diverges from rationality in four ways (Simon, 1957):

1. Limited Perspective: decision makers do not consider all alternative or goals.
2. Satisficing: decision makers look at a small number of familiar solutions that produces 'good enough' decisions.
3. Judgmental Heuristic and Bias: decision-makers use rules of thumb that reduce information processing demands.
4. Sequential alternative evaluation: alternatives are considered sequentially rather than simultaneously.

In summary, what is needed is a distinctive and integrative analytical approach that is quantitative in nature, which simultaneously considers the effects of the environmental factors in choosing strategy from a given set of strategies, to have a sustainable or desirable level of performance. This approach should account for consensus among top management team about strategic goals and competitive strategies, and an explicit trade-off among a given set of criteria, that are conflicting in nature. We review, in the following section, some of the existing MCDM techniques.

2.6 Various MCDM Techniques

MCDM problems are commonly categorized as continuous or discrete (Belton, 1986). A discrete problem is one in which the decision maker is faced with a choice between a number of discrete alternatives. A continuous problem is one in which the solution

space is continuous and defined by constraints. Generally, MCDM techniques can be classified into two types: The first type is the multiple criteria discrete optimization approaches, which have deterministic outcomes and discrete alternatives. The problem of this type is to select the best alternative or rank all alternatives from among a fixed number of alternatives. The most common approaches under this type are the analytic hierarchy process (AHP), the multiattribute utility theory (MAUT), and the outranking methods. The second type of approach is called multicriteria mathematical programming models. They have infinite number of alternatives with deterministic outcomes. The problem of this type is to generate a set of feasible alternative solutions. These approaches are of a continuous solution type. The most common model that is developed to solve multicriteria mathematical programming problems with multiple objectives is the goal programming model (GP). For more details about the classification of MCDM techniques refer to Zeleny (1982), Klein, Moskowitz, and Ravindran (1990), and Keeney and Raiffa (1976). Our aim, in this section, is to scope up the theoretical basis on which these three methods are developed. The applicability of these approaches to strategic decision would be discussed. Shortcomings of these three methods are also discussed and some conclusions are drawn.

2.6.1 The Analytic Hierarchy Process (AHP)

The analytic hierarchy process (AHP) is a technique (tool) developed by Saaty (1977, 1980, 1986) for dealing with problems, which involve the consideration of multiple criteria simultaneously. Decision implies choice among alternatives based on a set of criteria. If a criterion is tangible, then choice can be made using measured quantities, whereas, in the case of intangible criterion, decision would depend on a successful

judgment. The purpose of the theory is to develop a methodology for modeling unstructured problems in the economic, social and management science (Saaty, 1980). AHP has been specially developed to deal with quantitative and qualitative criteria. These criteria can be incorporated in the same analysis producing an overall ranking of the choices available.

Two features of AHP that differentiate it from the other decision making techniques are; (1) the ability to handle both known (absolute) measurements and subjective (relative) judgments, and (2) the ability to monitor the consistency with which a decision maker makes his/her judgment. The core of the methodology concerns the translation of inconsistent (verbal) evaluations by a decision maker or an expert into a numerical (ratio) scale that closely approximates his/her judgments.

The basic problem of decision-making is to choose the best one from a set of competing alternatives that are evaluated using a number of conflicting criteria. The AHP provides us with a comprehensive framework for solving such problems. It enables us to cope with the intuitive, the rational, and the irrational, all at the same time, when we make multicriteria and multifactor decisions with or without certainty for any number of alternatives (Saaty, 1986). We can use the AHP to integrate our perceptions and purposes into an overall synthesis. The AHP does not require that judgments be consistent or even transitive (e.g., if $A \succ B$ and $B \succ C$ then $A \succ C$). The degree of consistency (or inconsistency) of the judgments is tested at the end of the AHP process. The basic contribution of the AHP is how to derive relative scales using judgment or data from a standard scale, and how to perform the subsequent arithmetic operation on such scales.