



6-1986

Decision Making of Chief Executives in Relation to Strategic Issues: An Empirical Study of the Impact of Industry Stability and Industry Complexity Upon the Complexity of Decision Making Behavior of Chief Executives of Manufacturing Firms in the Southeastern United States

Charles Steven Arendall
University of Tennessee - Knoxville

Follow this and additional works at: https://trace.tennessee.edu/utk_graddiss



Part of the [Strategic Management Policy Commons](#)

Recommended Citation

Arendall, Charles Steven, "Decision Making of Chief Executives in Relation to Strategic Issues: An Empirical Study of the Impact of Industry Stability and Industry Complexity Upon the Complexity of Decision Making Behavior of Chief Executives of Manufacturing Firms in the Southeastern United States." PhD diss., University of Tennessee, 1986.
https://trace.tennessee.edu/utk_graddiss/2982

This Dissertation is brought to you for free and open access by the Graduate School at TRACE: Tennessee Research and Creative Exchange. It has been accepted for inclusion in Doctoral Dissertations by an authorized administrator of TRACE: Tennessee Research and Creative Exchange. For more information, please contact trace@utk.edu.

To the Graduate Council:

I am submitting herewith a dissertation written by Charles Steven Arendall entitled "Decision Making of Chief Executives in Relation to Strategic Issues: An Empirical Study of the Impact of Industry Stability and Industry Complexity Upon the Complexity of Decision Making Behavior of Chief Executives of Manufacturing Firms in the Southeastern United States." I have examined the final electronic copy of this dissertation for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Doctor of Philosophy, with a major in Management Science.

Max S. Wortman, Jr., Major Professor

We have read this dissertation and recommend its acceptance:

Michael C. Rush, H. Dudley Dewhirst, Alan Lasater

Accepted for the Council:

Carolyn R. Hodges

Vice Provost and Dean of the Graduate School


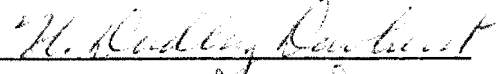

(Original signatures are on file with official student records.)

To the Graduate Council:

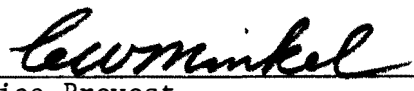
I am submitting herewith a dissertation written by Charles Steven Arendall entitled "Decision Making of Chief Executives in Relation to Strategic Issues: An Empirical Study of the Impact of Industry Stability and Industry Complexity upon the Complexity of Decision Making Behavior of Chief Executives of Manufacturing Firms in the Southeastern United States." I have examined the final copy of this dissertation for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Doctor of Philosophy, with a major in Management.


Max S. Wortman, Jr., Major Professor

We have read this dissertation
and recommend its acceptance:

Accepted for the Council:


Vice Provost
and Dean of The Graduate School

DECISION MAKING OF CHIEF EXECUTIVES IN RELATION TO STRATEGIC
ISSUES: AN EMPIRICAL STUDY OF THE IMPACT OF INDUSTRY
STABILITY AND INDUSTRY COMPLEXITY UPON THE COMPLEXITY
OF DECISION MAKING BEHAVIOR OF CHIEF EXECUTIVES OF
MANUFACTURING FIRMS IN THE SOUTHEASTERN
UNITED STATES

A Dissertation

Presented for the

Doctor of Philosophy

Degree

The University of Tennessee, Knoxville

Charles Steven Arendall

June 1986

ACKNOWLEDGMENTS

In the long and arduous course of completing the dissertation research and previous doctoral studies, there are a number of people who deserve special thanks.

I would like to specifically thank the members of my dissertation committee. Professor Max S. Wortman, my chairman, provided a great deal of insight in giving me direction on the various rewrites of the dissertation in attaining the finished product. He also was a constant source of professional advice and a conscientious teacher and leader. Professor Dudley Dewhirst is most fondly remembered as a very efficient and knowledgeable administrator who provided a great deal of "behind the scenes" support to the early stages of my career without ever asking for or receiving proper thanks. Thanks. Professor Mike Rush has my utmost respect and admiration as an excellent researcher and a good friend. Professor Alan Lasater was instrumental in the final stages of the dissertation. He has also been, for the past six years, one of the people whose example as a professional person and a good human being I have tried to follow.

I would also like to thank the other faculty members at Tennessee for their assistance in my professional development. Specifically, Dr. Mike Gordon, Dr. Jack Larson, and Dr. Tom Ladd.

In addition, I would like to acknowledge the support of the faculty members at Louisiana State University and I would specifically like to single out the contributions of Brenda Gatlin

and Patti Gunter. Brenda typed the manuscript, and without a doubt is the most efficient typist and one of the nicest people. Patti has also been very supportive and has made my transition from Tennessee to Louisiana much easier.

Special thanks also go to Laura Matherly and Lane Fitzgerald. Both made by graduate career both interesting and enjoyable. Laura was also very helpful in giving some guidance on the dissertation and has given me some good advice; even when I didn't want to listen.

On a personal level, I would like to thank Pamela Arendall, my mother, Peter Read, and Pauline and Henry Earl Littlefield. These are the people who are responsible for my personal development and who take great pride in my accomplishments -- as I do in theirs.

Finally, a very special note of thanks to my wife, Vivian, and my daughter, Dena. Their love and support has been a constant source of inspiration and motivation. The completion of this dissertation would not have been nearly as meaningful without them at my side.

ABSTRACT

Recent studies on the organizational level of strategy have concluded that environmental factors have a significant impact on the strategic decision processes of organizations, and that the contingent nature of this relationship has implications for the performance of firms operating under various industry conditions. In addition, studies on individual decision making have shown that characteristics of the decision task affect the type of decision making behavior utilized by the individual. This study integrates these two bodies of literature in examining the decision making behavior of chief executives in relation to the strategic issues which face their organizations.

The sample used in the study consisted of thirty-two interviews with chief executives of publicly-held manufacturing firms in the southeastern United States. In conjunction, secondary data were gathered on the firms and the industries in which they operated. Two sets of hypotheses were formulated. The first set dealt with the impact of complexity of the industry, stability of the industry, and number of alternatives generated upon the complexity of decision making behavior of the chief executive. The second set of hypotheses focused on the relationship between complexity of decision making and economic performance of the firm, and incorporated, as contingent variables, industry complexity and industry stability.

The data analysis consisted of Pearson product-moment correlation, multiple regression, hierarchical analysis, and partial correlation.

The results suggest that there is a relationship between the complexity of decision making behavior of chief executives and the number of alternatives generated to address a given strategic issue. Subsequent analysis indicated that the size of the organization may affect the chief executive's perception of the stability of the industry and also, some degree of "conservatism" may have been operating in the search for additional alternative solutions.

In conclusion, this study implies that: (a) there is a tendency for chief executives to use some type of simplifying process when addressing a complex strategic issue; (b) it is possible that, in some cases, the chief executive may not be selecting the best solution for the organization; and (c) potential alternative solutions are not always actively searched out.

TABLE OF CONTENTS

CHAPTER	PAGE
I. INTRODUCTION.....	1
Background.....	2
Purpose of the Study.....	5
Significance of the Project.....	6
Project Outline.....	9
Summary.....	10
II. LITERATURE REVIEW.....	12
Individual Decision Making.....	12
Strategic Decision Making.....	29
The Model.....	44
Summary.....	52
III. SOURCES AND METHODS.....	54
Definitions.....	54
Research Hypotheses.....	58
Measures.....	68
Pilot Test.....	76
Sample.....	85
Procedure.....	86
Data Analysis.....	89
Summary.....	94

CHAPTER	PAGE
IV. RESULTS OF THE STUDY.....	96
Descriptive Statistics.....	96
Inferential Tests of the Hypotheses.....	98
Post Hoc Analysis.....	145
Summary.....	165
V. SUMMARY AND CONCLUSION.....	167
Purpose of the Study.....	167
Literature Review.....	168
Theoretical Hypotheses.....	170
Methodology.....	171
Major Results.....	172
Implications of the Study.....	175
Limitations of the Study.....	178
Suggestions for Future Research.....	180
LIST OF REFERENCES.....	184
APPENDIXES.....	192
A. Measures of Economic Performance.....	193
B. Structured Interview Questionnaire.....	195
C. Quantitative Measures of the Stability of the Industry...	210
D. Quantitative Measures of the Complexity of the Industry..	212
E. Calculation of Power Analysis.....	215
F. Calculation of Power Analysis for Hierarchical Model.....	218

APPENDIXES (Continued)	PAGE
G. Telephone Interview.....	220
H. Interview Letter.....	222
VITA.....	224

LIST OF TABLES

TABLE	PAGE
2.1. Comparison of Synoptic and Incremental Processes.....	31
2.2. Comparison of Rational-Comprehensive and Successive Limited Comparisons.....	35
2.3. Categorization of Managers.....	37
3.1. Variables Used in the Study of Decision Making of Thirty- two Chief Executives in Southeastern U.S., 1979-1983.....	68
3.2 Descriptive Statistics of Measures Used in a Pilot Test of a Study of Decision Making of Chief Executives in the Southeastern U.S., 1979-1983.....	80
3.3 Publicly Held Manufacturing Firms Headquartered in the Southeastern U.S., 1984: Breakdown of Firms Used in A Study of Decision Making by Thirty-two Chief Executives.....	88
4.1 Descriptive Statistics of Variables Used in a Study of Decision Making by Thirty-two Chief Executives of Manufacturing Firms in the Southeastern U.S., 1979-1983..	97
4.2 Pearson Product-Moment Correlations Variables Used in a Study of Decision Making by Thirty-two Chief Executives of Manufacturing Firms in the Southeastern U.S., 1979-1983.....	99
4.3 Frequency Count for Relationship Between Decision Making Behavior and Alternatives Generated in a Study of Decision Making by Thirty-two Chief Executives of Manufacturing Firms in the Southeastern U.S., 1979-1983.....	102
4.4 Full Regression Results for Complexity of Decision Making Behavior with Perceptual Industry Stability and Alternatives Generated in a Study of Decision Making by Thirty-two Chief Executives of Manufacturing Firms Headquartered in the Southeastern U.S., 1979-1983..	107
4.5 Hierarchical Analysis of Complexity of Decision Making with Perceptual Industry Stability and Alternatives Generated in a Study of Decision Making by Thirty-two Chief Executives of Manufacturing Firms Headquartered in the Southeastern U.S., 1979-1983.....	108

TABLE OF CONTENTS (Continued)

TABLE	PAGE
4.6 Full Regression Results for Complexity of Decision Making Behavior with Objective Industry Stability and Alternatives Generated in a Study of Decision Making by Thirty-two Chief Executives of Manufacturing Firms Headquartered in the Southeastern U.S., 1979-1983.....	111
4.7 Hierarchical Analysis of Complexity of Decision Making with Objective Industry Stability and Alternatives Generated in a Study of Decision Making by Thirty-two Chief Executives of Manufacturing Firms Headquartered in the Southeastern U.S., 1979-1983.....	113
4.8 Full Regression Results for Complexity of Decision Making Behavior with Perceptual Industry Complexity and Alternatives Generated in a Study of Decision Making by Thirty-two Chief Executives of Manufacturing Firms Headquartered in the Southeastern U.S., 1979-1983.....	117
4.9 Hierarchical Analysis of Complexity of Decision Making with Perceptual Industry Complexity and Alternatives Generated in a Study of Decision Making by Thirty-two Chief Executives of Manufacturing Firms Headquartered in the Southeastern U.S., 1979-1983.....	119
4.10 Full Regression Results for Complexity of Decision Making Behavior with Objective Industry Complexity and Alternatives Generated in a Study of Decision Making by Thirty-two Chief Executives of Manufacturing Firms Headquartered in the Southeastern U.S., 1979-1983.....	122
4.11 Hierarchical Analysis of Complexity of Decision Making with Objective Industry Complexity and Alternatives Generated in a Study of Decision Making by Thirty-two Chief Executives of Manufacturing Firms Headquartered in the Southeastern U.S., 1979-1983.....	123
4.12 Full Regression Results for Change in Total Sales, Return on Total Assets, and Asset Turnover with Complexity of Decision Making Behavior and Perceptual Industry Stability in a Study of Decision Making by Thirty-two Chief Executives of Manufacturing Firms Headquartered in the Southeastern U.S., 1979-1983.....	131

LIST OF TABLES (Continued)

TABLE	PAGE
4.13 Independent Variable Analysis of Complexity of Decision Making Behavior and Perceptual Industry Stability in a Study of Decision Making by Thirty-two Chief Executives of Manufacturing Firms Headquartered in the Southeastern U.S., 1979-1983.....	132
4.14 Full Regression Results for Change in Total Sales, Return on Total Assets, and Asset Turnover with Complexity of Decision Making Behavior and Objective Industry Stability in a Study of Decision Making by Thirty-two Chief Executives of Manufacturing Firms Headquartered in the Southeastern U.S., 1979-1983.....	135
4.15 Independent Variable Analysis of Complexity of Decision Making Behavior and Objective Industry Stability in a Study of Decision Making by Thirty-two Chief Executives of Manufacturing Firms Headquartered in the Southeastern U.S., 1979-1983.....	136
4.16 Full Regression Results for Change in Total Sales, Return on Total Assets, and Asset Turnover with Complexity of Decision Making Behavior and Perceptual Industry Complexity in a Study of Decision Making by Thirty-two Chief Executives of Manufacturing Firms Headquartered in the Southeastern U.S., 1979-1983.....	139
4.17 Independent Variable Analysis of Complexity of Decision Making Behavior and Perceptual Industry Complexity in a Study of Decision Making by Thirty-two Chief Executives of Manufacturing Firms Headquartered in the Southeastern U.S., 1979-1983.....	141
4.18 Full Regression Results for Change in Total Sales, Return on Total Assets, and Asset Turnover with Complexity of Decision Making Behavior and Objective Industry Complexity in a Study of Decision Making by Thirty-two Chief Executives of Manufacturing Firms Headquartered in the Southeastern U.S., 1979-1983.....	143
4.19 Independent Variable Analysis of Complexity of Decision Making Behavior and Objective Industry Complexity in a Study of Decision Making by Thirty-two Chief Executives of Manufacturing Firms Headquartered in the Southeastern U.S., 1979-1983.....	144

LIST OF TABLES (Continued)

TABLE	PAGE
4.20 Post Hoc Correlation Matrix of Variables in a Study of Decision Making by Thirty-two Chief Executives of Manufacturing Firms Headquartered in the Southeastern U.S., 1979-1983.....	148
4.21 Multiple Regression Results for Complexity of Decision Making Behavior with Organizational Size and Perceptual Industry Stability in a Study of Decision Making by Thirty-two Chief Executives of Manufacturing Firms Headquartered in the Southeastern U.S., 1979-1983.....	149
4.22 Partial Correlation Matrix of Variables Controlling for Organizational Size in a Study of Decision Making by Thirty-two Chief Executives of Manufacturing Firms Headquartered in the Southeastern U.S., 1979-1983.....	150
4.23 Multiple Regression for Number of Alternatives Generated with Search for Additional Alternatives and Objective Industry Complexity in a Study of Decision Making by Thirty-two Chief Executives of Manufacturing Firms Headquartered in the Southeastern U.S., 1979-1983.....	154
4.24 Multiple Regression for Number of Alternatives Generated with Search for Additional Alternatives and Objective Industry Stability in a Study of Decision Making by Thirty-two Chief Executives of Manufacturing Firms Headquartered in the Southeastern U.S., 1979-1983.....	155
4.25 Post Hoc Analysis of Economic Performance of the Firm in a Study of Decision Making by Thirty-two Chief Executives of Manufacturing Firms Headquartered in the Southeastern U.S., 1979-1983.....	157
4.26 Independent Variable Analysis of Asset Turnover for the Firm in a Study of Decision Making by Thirty-two Chief Executives of Manufacturing Firms Headquartered in the Southeastern U.S., 1979-1983.....	158
4.27 Post Hoc Hierarchical Analysis for Economic Performance of the Firm in a Study of Decision Making by Thirty-two Chief Executives of Manufacturing Firms Headquartered in the Southeastern U.S., 1979-1983.....	160

LIST OF TABLES (Continued)

TABLE	PAGE
4.28 Independent Variable Analysis of Asset Turnover for the Firm in a Study of Decision Making by Thirty-two Chief Executives of Manufacturing Firms Headquartered in the Southeastern U.S., 1979-1983.....	161
4.29 Partial Correlation Matrix of Variables Controlling for Organizational Size in a Study of Decision Making by Thirty-two Chief Executives of Manufacturing Firms Headquartered in the Southeastern U.S., 1979-1983.....	163
4.30 Partial Correlation Matrix of Variables Controlling for Objective Measure of Industry Stability in a Study of Decision Making by Thirty-two Chief Executives of Manufacturing Firms Headquartered in the Southeastern U.S., 1979-1983.....	164

LIST OF FIGURES

FIGURE	PAGE
2.1. Ordering of Decision Making Processes.....	18
2.2. Hodgetts & Wortman Model of the Strategic Management Process.....	45
2.3. Hambrick & Snow Model of Strategic Decision Making.....	47
2.4. Relationship of a Leader to the Environment.....	49
2.5. Relationship of the Study to the Field of Strategic Management.....	51
3.1. Hypothetical Relationships of Variables in the Study.....	60

LIST OF EXHIBITS

EXHIBIT	PAGE
3.1 Questionnaire Items on Complexity of Decision Making Used in the Pilot Test.....	83
3.2 Questionnaire Items on Complexity of Decision Making Amended Based on Pilot Test.....	84

CHAPTER I

INTRODUCTION

The process of strategic management of a corporation falls under the purview of top management. An organization's strategy is generally defined as the organizational effort or direction that results from the match an organization makes between its external environment and its internal structure and processes (Ansoff, 1979; Galbraith & Nathanson, 1978; Hodgetts & Wortman, 1980; Hofer & Schendel, 1978; Mintzberg, 1978; Pearce & Robinson, 1982; Uytterhoeven, Ackerman & Rosenblum, 1977). The top executives of an organization determine the strategic direction of the firm by dealing with strategic issues on a continual basis. Over time, how these strategic issues are resolved plays a part in determining the strategy of the organization.

In the field of strategic management, a great deal of attention has been devoted to prescribing the ways in which organizations should address strategic issues in the formulation of strategy (Rowe, Mason, & Dickel, 1982; Schendel & Hofer, 1979). Some of the most widely recognized of these techniques and processes are portfolio theory, policy delphi, dialectical policy analysis, and the growth-share matrix (Grant & King, 1982). However, these techniques and processes are more applicable to the organizational level than

the individual level. The literature in strategic management which pertains to the individual top executive decision maker is, for the most part, normative and prescriptive. The descriptive work that exists in this area is generally of the case study nature with no additional studies to provide empirical backing.

The empirical work on individual decision making has originated in the disciplines which deal directly with cognitive decision processes. These studies typically are concerned with individual decision making as a generally applicable phenomenon. In other words, the studies do not focus on any single type or classification of individual decision maker such as the top executive. Failure to do this ignores the situational dynamics facing the individual which may play an important role in the decision process.

By integrating these two bodies of literature in an empirical study, a basis may be provided for understanding the decision processes used by top executives to address strategic issues. Since top management is responsible for carrying out the strategic management of the organization, a better understanding of how these decisions are made under varying conditions in the external environment should lead to a more complete understanding of the strategic management process.

Background

Many years of research have been devoted to developing models to help us understand decision making behavior (Payne, 1982). Perhaps the descriptive cornerstone was written by March and Simon

(1958). They developed the concept of bounded rationality, the basic premise of which states that there are limits on the amount of knowledge available concerning alternative courses of action. This "limited knowledge" results in the decision maker selecting a satisfactory solution. Thus, decision making behavior was viewed as being "satisficing" as opposed to "optimizing" in many instances. Prior to this work, decision making had been viewed as a rational process in which an individual searched for an optimal solution to a given problem.

Subsequent research on decision making has attempted to represent decision making behavior under various conditions. Several models of decision making behavior have grown out of this research. The most notable ones to be examined in this study are: (a) cost/benefit; (b) additive; (c) additive differences; (d) attribute dominance; (e) conjunctive; and (f) lexicographic models (Olshavsky, 1979; Payne, 1976, 1982). These models may be subsumed under one of two categories: alternative-based or attribute-based. In alternative-based decision behavior, the total alternatives are used as the basis for making the choice. These models are similar to the optimizing behavior discussed by March and Simon since an attempt is made to examine and evaluate all aspects of the alternatives in finding the best solution. Conversely, the attribute-based decision models focus on specific attributes or some standard criterion measures as the basis for making the decision. These models are reflective of satisficing decision behavior because only selected

attributes of the alternatives are evaluated. The focus is on finding a satisfactory solution rather than the best one.

Empirical studies on decision making behavior have shown that as the problem becomes more complex, individuals tend to utilize a less cognitively demanding decision process (attribute-based) as a means of resolution. Alternatively, with a less complex decision task, individuals have been more likely to use an alternative-based decision process. In summary, the decision process which is used is contingent upon the nature of the decision task at hand.

In the strategic management literature, the topic of decision making as a contingent phenomenon has been addressed at the organizational level. Anderson and Paine (1975), Fredrickson (1983), Fredrickson and Mitchell (1984), Mintzberg (1973), and Nutt (1976) reached similar conclusions on corporate decision processes in relation to the external environment surrounding the company. Specifically, they have pointed out that decision processes based on a rational model (i.e. complex, comprehensive) are appropriate for organizations in stable environments, but are not appropriate for organizations in unstable environments. On the one hand, in a stable environment, the information needed to make comprehensive decisions is readily available and it is relatively easy to integrate the individual decisions into a total strategy or plan. On the other hand, unstable environments do not lend themselves to comprehensive decision making and integration because of their uncertain and complex nature (Mintzberg, 1973). Fredrickson (1983)

found that a firm's performance will be affected if the comprehensiveness of its strategic decision process is not consistent with the nature of its environment. The high performing firms in stable environments tended to have a comprehensive strategic decision process and the high performing firms in unstable environments tended to have a noncomprehensive strategic decision process.

Based upon this background information and upon the concept that strategic management of the organization is the responsibility of top management, the dynamics of the environment surrounding the corporation will probably have an impact on how chief executive officers and presidents of companies address the strategic issues which they face.

Purpose of the Study

The purposes of this study are: (a) to integrate cognitive decision making literature with the strategic management literature; (b) to conduct an empirical study of the complexity of decision making behavior of executives responsible for making strategic decisions; and (c) to discover what relationships, if any, exist between the interaction of chief executive decision making and the stability and/or complexity of the industry and organizational performance. Specific questions to be investigated by this study are:

- (a) Are there differences in decision making behavior of top executives of manufacturing firms when dealing with strategic issues?

- (b) If so, can a relationship be drawn between these differences and the stability and/or complexity of the industry in which the top executive operates?
- (c) Finally, is there a relationship between economic performance and decision making behavior, and is this relationship contingent upon the stability and/or complexity of the industry?

Significance of the Project

Since "... top management is considered to be the organizational level at which strategic management is exercised," studies of the strategic management process should focus on this level and these individuals (Hodgetts & Wortman, 1980, p. 47). In trying to understand how executives make decisions, many authors have subjectively discussed their ideas of what successful executives do (Barnard, 1938; Harvey, 1982; Lindblom, 1959; Wrapp, 1967). However, rather than resulting in a consistent theory or description of the decision making process of executives, what has emerged are various conceptualizations of executive decision making. No empirical studies have been done to test hypotheses based upon these conceptualizations.

At this point, these questions emerge: Why study executive strategic decision making? Why not confine research on strategic decision processes to organizations? Essentially, there are two reasons.

First, it is individuals who actually make the strategic decisions, not organizations. Even if the decision is made by a group or committee, or a number of groups (i.e. organizational), typically the individuals in the group or committee have studied the situation and will be predisposed to a given solution. Although the dynamics of the group situation may result in more than an aggregation of individual choices, the starting point is still the individual. Moreover, since the top executives are charged with the responsibility for the strategic management of the organization, they are the ones who make the final decision.

Second, Lang, Dittrich, and White (1978) have shown that there is considerable similarity in the conceptual models representing individual, group, and organizational (i.e. involving more than a single group) problem solving models. Subsequent studies on organizational decision making have shown, depending on the situation, one type of strategic decision process is more appropriate than another (Fredrickson, 1983, 1984; Fredrickson & Mitchell, 1984). By examining individual decision making, this study may provide an indication as to whether or not the conceptual similarities are accurate.

The remainder of this section is devoted to explaining why this study is relevant to the field of strategic management, practitioners of management, teachers and students of strategic management, and the field of cognitive decision making.

For the field of strategic management, this study will attempt to lay the groundwork for future empirical studies of executive

strategic decision making. It will try to determine whether or not certain decision making behavior of the chief executive is more appropriate for one type of industry or environment versus another type. In other words, this research looks at chief executive decision making as a contingent phenomenon.

For practitioners of management, it will provide some understanding of how chief executives deal with strategic issues, and perhaps provide a basis for evaluating the decision making of the executive in light of the nature of the environment (i.e. stable versus unstable and complex versus simple) in which the decision is made. This could have significant implications for the evaluation, training, and selection of top-level executives. That is, if decision making were a contingent phenomenon, then perhaps executives could be trained to make decisions in a manner that is consistent with the nature of the industry. This study also may provide one criterion measure to be used in evaluating managers for promotion (i.e. those managers who exhibit the type of decision making behavior related to successful firms in their particular industry could be considered for promotion).

The significance to teachers and students of strategic management rests in the additional empirical insights that this study will add to the literature on how chief executives actually make decisions. Since organizational strategies have sometimes been characterized as "... a pattern in a stream of decisions" (Minzberg, 1982), a better understanding of how choices are made could lead to

a better understanding of how strategies are developed in an organization.

For the field of cognitive decision making, this study will evaluate whether or not the importance of the issue at hand has an impact on decision making behavior. Although a considerable amount of empirical work has been done on how individuals make decisions, the importance of the issue has not been addressed.

In summary, a quote from Fredrickson demonstrates the need for research of this type:

... strategy formulation is above all else a decision-making process, and that a more productive research approach may be to study how organizations make and integrate individual strategic decisions. Therefore, it seems appropriate for investigators to move from a 'plan' to a 'decision-based' view of strategy because individual decisions can more likely be studied using a variety of methods, and the population of research sites is almost limitless (1983, p. 17).

Project Outline

Chapter II reviews the literature in the field of strategic management which deals with decision making as well as the descriptive literature on individual decision making strategies. As a subtopic of each major area, the contingent nature of decision making is discussed. Finally, there is a conceptual model of the integration of these two bodies of literature and an explanation of how the model relates to, and is representative of, the study.

Chapter III provides the definitions, research hypotheses, measures, pilot test, sample, procedure, and data analyses to be used in the investigation.

Chapter IV provides the descriptive statistics of the measures used in the study, reports the statistical analyses used in testing the research hypotheses, and presents any post hoc analyses of the data concerning findings not specifically addressed by the research hypotheses.

Chapter V presents an overall review of the study. There is also a discussion of the study's implications, limitations, and suggestions for future research.

Summary

This chapter emphasizes that the strategic management of an organization is the responsibility of the top executives of that organization. By dealing with the strategic issues which face the firm on a continual basis, the strategy of the organization is developed. However, because there is little empirical work which exists on how top executives make decisions, there is little knowledge in the area.

Recent studies on the organizational level of strategy have concluded that environmental factors do have a significant impact on the strategic decision processes of organizations, and that the contingent nature of this relationship has implications for the economic performance of organizations operating under various industry conditions. In addition, studies on individual decision making originating in the cognitive field of decision making have shown that external factors (i.e. characteristics of the decision

task) affect the type of decision making behavior utilized by the individual.

The purposes of this study are: (a) to integrate the literature in cognitive decision making with the strategic management literature; (b) to conduct an empirical study of the complexity of decision making behavior of executives responsible for making strategic decisions; and (c) to discover what relationships, if any, exist between the interaction of chief executive decision making and the stability and/or complexity of the industry and organizational performance.

This project is significant to the field of strategic management in that it provides insight into how strategic issues are actually addressed by top executives in organizations.

CHAPTER II

LITERATURE REVIEW

This review of the literature is divided into three parts. First, descriptive literature on individual decision making strategies is discussed. Second, literature on decision making from the strategic management field is presented. In addition, as a subset of these two sections, the environmental effects upon decision making are reviewed. Finally, a conceptual model representing the integration of these two bodies of literature is provided and discussed. This model provides the basis for the development of the hypothetical statements to be tested in this study.

Individual Decision Making

As Huber (1980) noted, research on decision making has come from many different disciplines. However, for the purposes of this study, an applicable differentiation in the literature is the "prescriptive-descriptive" dichotomy (Huber, 1980; Kozielski, 1981). Prescriptive studies focus on developing normative techniques for making decisions which will aid in improving the quality of the decision, whereas descriptive studies emphasize understanding how decisions are made. Since this research is an

empirical investigation of the decision making behavior of top executives, the literature review deals with the descriptive studies. It is not the purpose of this literature review to examine the entire realm of descriptive decision making literature, but rather to deal specifically with the development of decision making models, or strategies, that have grown out of the descriptive literature.

Optimizing and Satisficing

In the nineteen-fifties, psychologists began to examine the decision process as well as its determinants. This work was inspired by investigations done in the fields of statistics and economics (Kozielecki, 1981). Before this time, the emphasis had been on expected utility (EU) and how this utility could be maximized (Huber, 1980; Janis & Mann, 1977; MacCrimmon & Taylor, 1976). This was a prescriptive concept in the sense that the focus was on describing how decisions could be made so that the choice would lead to the highest payoff; which assumed a totally rational "economic man" position and described the ideal rather than the existing state. The maximizing mode involved a clear set of alternative courses of action and a thorough understanding of the desired level of attainment. The alternative which comes the closest to the desired level is the one that is selected after all attributes, or factors, have been considered (MacCrimmon & Taylor, 1976). The process of maximizing utility, therefore, yields the

best possible solution and hence is the decision process which theoretically should be used.

Unfortunately, as Simon (1957) observed, people do not have the "wits to maximize" (cited in Janis & Mann, 1977, p. 22). In a realistic sense, there are always limitations of knowledge concerning alternative courses of action, time available to go through the decision making process, and cognitive abilities of the individual. This was best summed up by a quote from Miller and Starr (1967, pp. 24-25):

Contemporary developments in economics have emphasized the lack of realism of the assumption that individuals act so as to maximize their utility. There has not been an attack on the proposition that individuals should act so as to achieve a maximization of their utility. Rather, there has been sufficient evidence and supporting reasons to show that they do not act in this way. Among the reasons suggested have been the following: the inability of the individual to duplicate the rather recondite mathematics which economists have used to solve the problem of maximization of utility; the existence of other values (the higher values originally excluded by [Adam] Smith) which though not readily quantifiable, do cause divergences from the maximization of utility in the marketplace; the effect of habit; the influence of social emulation; the effect of social institutions.

... The work of psychologists would certainly tend to confirm the assertion that human beings have a variety of diverse motivations which do not lend themselves to maximization of utility--at least so long as utility is defined in terms of the 'satisfactions' resulting from marketplace phenomena.... Similarly, sociologists have accumulated considerable evidence to demonstrate the enormous influence of social institutions, habit, and tradition on the choices and decisions made by individuals. The effect of these psychological and sociological factors leads individuals to make decisions and to take actions without recourse to maximization of utility in the classical economic sense. Alternatively phrased, it can be said that these factors cause people to act irrationally--but it should be noted that this is simply a matter of definition, rationality having been defined as maximization of economic utility.

In elaborating upon the concept of satisficing, March and Simon (1958) addressed the nature of uncertainty in the decision problem (the degree of which indicates whether an individual decision maker is likely to satisfy or optimize). The cause of this uncertainty came from several sources. As Simon (1976) pointed out, these can be categorized as either personal limitations or external constraints. The personal constraints will be dealt with here while external considerations will appear in a subsequent section.

The major personal constraint is the inability of the decision maker to process the vast amount of information necessary to determine all the potentially favorable and unfavorable consequences of all the feasible courses of action. An attempt to do so would result in "information inundation" (Janis & Mann, 1977). Miller (1956) noted that the number of pieces of information that an individual can process is seven, plus or minus two. Obviously, seeking out and evaluating all the information necessary to make a decision would exceed this limit in most cases.

Other personal limitations are psychological aspects of the thought process and personality determinants. Some of the psychological aspects are: global thinking, tendency to dichotomize, cognitive nearsightedness, and oversimplified attribution of causation. Any of these thought process factors can cause the individual to make decisions on a less than optimal basis (March & Simon, 1958).

Personality determinants also play a role in decision making. For example, if an executive were power-driven (as opposed to having

an ideological orientation), his or her decision could be governed by self-interest. Obviously, this may have detrimental effects on the quality of the decision. Another determinant involves emotion rather than objectivity. In addition, some individuals are more creative than others. Depending on the nature of the situation, a more creative or a more common sense approach may be appropriate. In summary, the preceding factors may have a direct impact on how the problem is analyzed and how choices are made.

In other words, when an individual confronts many of the problems which he or she must deal with, attempts are made to reduce or simplify the dimensions of the problem and the alternative courses of action. In reviewing the work of March and Simon, Katz and Kahn (1978) noted:

The simplifications have a number of characteristic features: (1) Optimizing is replaced by satisficing--the requirement that satisfactory levels of the criterion variables be attained. (2) Alternatives of action and consequences of action are discovered sequentially through search processes. (3) Reportories of action programs are developed by organizations and individuals, and these serve as the alternatives of choice in recurrent situations. (4) Each specific action program deals with a restricted range of consequences. (5) Each action program is capable of being executed in semi-independence of the others--they are only loosely coupled together (p. 494).

On the basis of March and Simon's conclusions, many attempts have been made to understand and model individual decision making strategies by decision scientists. The following is a review of some of the more widely accepted models or processes.

Models of Individual Decision Making Behavior

These models can be arranged in ascending order from the least cognitively complex to the most cognitively complex (see Figure 2.1). For example, the lexicographic model requires only that a standard be set and each alternative is compared against the standard and accepted or rejected. At the other end of the continuum, the cost/benefit model requires that a value be determined for each dimension or attribute of each alternative, including positive and negative factors. This is a much more cognitively demanding task than comparing attributes of the alternatives against some standard criteria. In addition, these six models can also be classified into two groups, which are the attribute-based and alternative-based decision models.

Attribute-Based Decision Models. One grouping of models is classified as attribute-based decision models because selected attributes of the various alternatives are used as the basis for making the choice, that is, certain characteristics of each alternative are compared against one another. These cognitively simple models are representative of satisficing behavior since an attempt is made to examine and evaluate only selected aspects of the alternative solutions in finding a satisfactory solution. There are three attribute-based models.

Lexicographic or Elimination-by-Aspects Model. As Tversky (1972) noted, each alternative is viewed as a set of aspects or attributes. At each stage in the decision making process, a particular attribute is selected (with probability proportional to

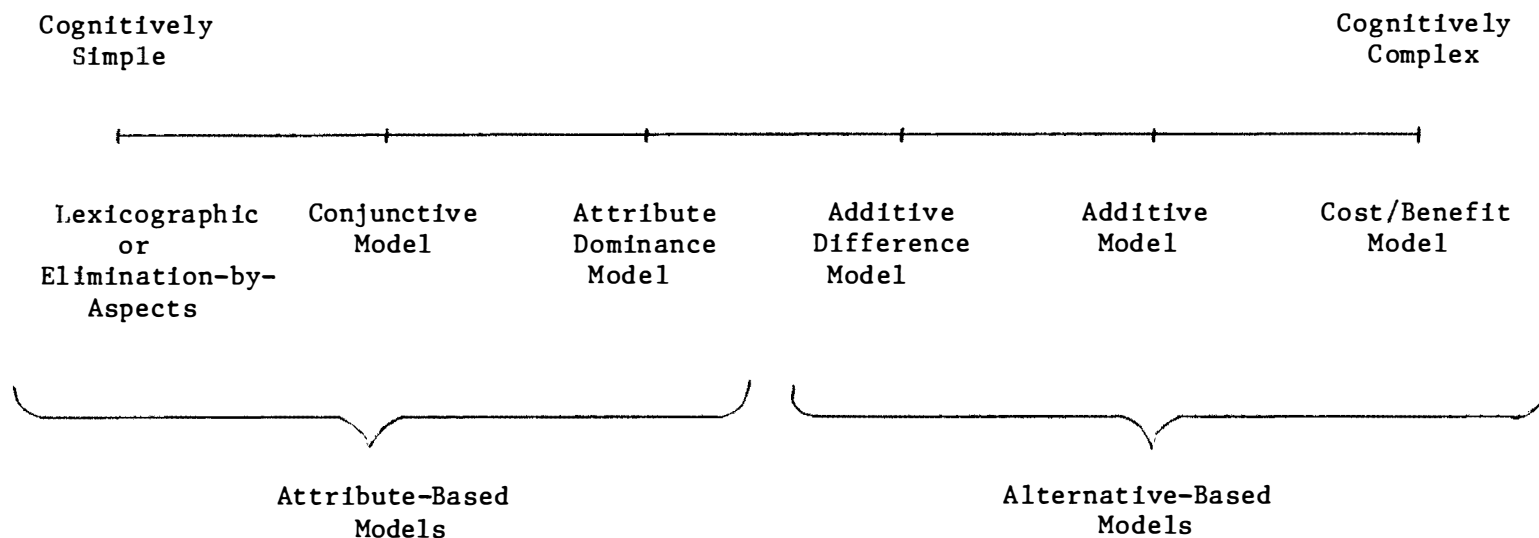


Figure 2.1. Ordering of Decision Making Models

NOTE: The determination of the cognitively simple-complex ranking was made possible by the definitional distinctions of each process as developed by the cognitive decision making scholars.

Sources: Amos Tversky. "Elimination by Aspects: A Theory of Choice," Psychological Review, 1972, 79, pp. 31-48; John W. Payne. "Task Complexity and Contingent Processing in Decision Making: An Information Search and Protocol Analysis," Organizational Behavior and Human Performance, 1976, 16, pp. 366-387; Richard W. Olshavsky. "Task Complexity and Contingent Processing in Decision Making: A Replication and Extension," Organizational Behavior and Human Performance, 1979, 24, pp. 300-316.

its weight) and all alternatives that do not possess the particular attribute are eliminated. The process continues until only one alternative remains (Tversky, 1972, p. 281).

The major problem with this decision strategy is that it does not ensure that the chosen alternative is superior to those which were eliminated. Its major benefit is that it is a good procedure for simplification.

Conjunctive Model. The selection of a particular alternative depends upon all the relevant attributes of the alternative surpassing some established standards or set of criteria (Coombs, 1964; Olshavsky, 1979; Payne, 1976). That is, an alternative must have a certain minimum value of all the relevant attributes to be selected.

This model is similar to the lexicographic model in that the basis for evaluation and choice is the attributes rather than the total alternatives. Unlike the lexicographic model, it requires the establishment of standards on all relevant dimensions at the beginning rather than evaluating attributes of the alternatives sequentially; therefore, it makes this process somewhat more cognitively demanding.

Attribute Dominance Model. Pairwise comparisons are made between alternatives, but only on several attributes. Preference for one alternative over another is based on the fact that the alternative with the greatest number of dominant attributes is selected (Payne, 1976; Olshavsky, 1979).

Once again, the basis for comparison is the attributes of the alternatives. However, this process necessitates the comparison of alternatives against each other on these dimensions, making this process more cognitively demanding than the two previous models.

Alternative-Based Decision Models. Another grouping of models may be classified as alternative-based decision processes, in which total alternatives are used as the basis for making the choice, that is, total alternatives are compared against one another. These cognitively complex models are representative of optimizing behavior since an attempt is made to examine and evaluate all aspects of the problem in finding the best solution. There are three alternative-based models.

Additive Difference Model. The choice involves pairwise comparisons of alternatives followed by a summation across the differences (Rappoport & Wallstein, 1972; Tversky, 1969). The alternatives are compared directly on each dimension, making this an alternative-based process (Payne, 1976). Since the basis for comparison is the total alternative, by definition, this decision making strategy is more cognitively complex than the attribute-based processes.

Additive Model. Each alternative in a set of alternatives is evaluated separately. A value for each dimension or attribute is determined and then all are summed to arrive at an overall value for each alternative. The alternative with the greatest overall

value is the one chosen (Coombs, 1964; Olshavsky, 1979; Rappoport & Wallstein, 1974).

This model is more cognitively complex than the additive difference model because it requires the evaluation and comparison of all alternatives essentially at the same time rather than making a series of pairwise comparisons. Rather than being based on a difference, the selection is based on an index value or score which is separately determined for each alternative.

Cost/Benefit Model. The costs and benefits (positive and negative aspects) alternative are evaluated against each other. Final values are determined and the alternative with the highest positive value is selected. As noted by Christensen-Szalanski (1978), the combination of benefits and costs follows an additive rule.

This model most closely approximates the ideal normative process of maximizing expected utility (Huber, 1980). It may be viewed as a special case of the additive model in that it specifically addresses the concept of positive and negative attributes associated with each alternative.

In summary, the six models or processes can be classified into two groups and may also be placed on a continuum for cognitively simple to cognitively complex in terms of the difficulty of evaluating and selecting an alternative from a group of alternatives. This leads to a discussion of determining under which conditions the different models are likely to be used. The

following section examines the effect of environmental factors on individual decision making.

Environmental Impact on Individual Decision Making

Reitman (1964) conceptualized a decision problem as consisting of three components: (a) an initial state of affairs; (b) a desired terminal state; and (c) various "transformers" or alternative strategies for moving from the initial to terminal state. MacCrimmon and Taylor (1976) noted that Reitman's conceptualization presented necessary, but not sufficient conditions for a decision problem to exist. A decision problem only exists if the decision maker perceives that the initial state is different from some desired terminal state and is motivated to reduce this difference. Otherwise, there is no decision to be made.

MacCrimmon and Taylor (1976) also discussed two types of problems or decision environments: well-structured and ill-structured. Well-structured situations are denoted by fairly complete information concerning the initial state, the end state, and the alternative capable of reaching the desired state. Under these conditions, individuals can usually make optimal decisions.

In ill-structured situations, decision environments are characterized by a high degree of uncertainty and complexity. In these cases, a decision maker is likely to have incomplete information about all three elements of the problem. Under these circumstances, people frequently make less than optimal decisions (Katz & Kahn, 1978).

In the literature on environmental effects upon decision making, the three major factors which have been addressed are uncertainty, complexity, and conflict (MacCrimmon & Taylor, 1976). This study addresses two of these: uncertainty (i.e. stability) and complexity. Since this study deals only with the decision making of the top executive in the organization, the impact of conflict upon decision making is not considered.

As MacCrimmon and Taylor (1976, p. 1402) noted, uncertainty, by definition, exists to some extent in decision situations involving only partial knowledge of the variables. Many business situations fall under this category, since many of them are characterized by uncertainty. Complexity is also an element which faces individual decision makers. This is certainly true in business environments. The impact of these two factors on individual decision making behavior is reflected in the strategy which is used for the development of alternative solutions and the actual selection from among those alternatives.

Uncertainty. The effect of uncertainty on decision making behavior can take several forms. Some of the ways in which individuals deal with uncertainty have been studied and reviewed by MacCrimmon and Taylor (1976, p. 1403). Specifically, the decision maker may: (a) reduce the uncertainty to certainty; (b) delay; (c) ignore or avoid the uncertainty; or (d) absorb the uncertainty.

In reducing the uncertainty to certainty, what the decision maker does is to behave as if uncertain events are more certain than they actually are. In addition, after choosing a course of action in which uncertainty is a factor, a decision maker may tend to convince himself or herself that "the event leading to more favorable outcomes for his (or her) chosen action will occur" (MacCrimmon & Taylor, 1965, p. 1403).

Delaying actions in response to uncertainty sometimes occurs. However, while this may be wise for individual cases (since more information may come to light with more time), it is very rare in important business decisions by the time they have reached the chief executive.

Avoiding or ignoring uncertainty may also take place. Studies which examine this phenomenon have typically focused on ignoring or avoiding uncertainty after an alternative course of action has been determined. In a study of kidney donors, Fellner and Marshall (1970) gave evidence for the way in which information was avoided or distorted before commitment in order to bolster the intention of volunteering their organ to save the life of a relative (Janis & Mann, 1977, p. 83). In other words, predisposition towards a given course of action may lead the individual selectively to perceive information; but more importantly, simply to ignore the uncertainties which are involved.

Absorbing uncertainty pertains specifically to information being passed along through decision making units in the organization. As information is passed from person to person, there

is a tendency for the information to be perceived as becoming less uncertain and more precise (MacCrimmon & Taylor, 1976; Woods, 1966). This phenomenon has implications for this study since the chief executives of organizations make decisions based on information presented to them by people or units at lower levels in the organization. Therefore, the chief executive may perceive the external environment as being more certain (i.e. stable) than it actually is.

Simon's satisficing approach best fits the limited information-processing of individuals.

Man's limited ability to foresee future consequences and to obtain information about the variety of available alternatives inclines him to settle for a barely 'acceptable' course of action that is 'better than the way things are now' (Janis & Mann, 1977, p. 26).

In following this line of reasoning, Slovic (1971) concluded, on the basis of his experiments, that business decision making suggests that executives avoid uncertainty and the necessity of going through complex decision making processes whenever possible. In conclusion, as a situation becomes more uncertain, the individual decision maker uses a less cognitively complex decision making process.

Complexity. The effect of complexity on decision making behavior has been well documented. Research in organizations has demonstrated the tendency of decision makers to resort to simplistic strategies (MacCrimmon & Taylor, 1976). Early studies on this topic

discussed the notion of "conservatism" (Peterson, Schneider, & Miller, 1965; Phillips & Edwards, 1966). Conservatism is the reluctance of individuals to extract as much information from added data as is theoretically implied by an optimal decision process (i.e. making the decision problem more complex). In essence, these empirical studies found that, as subjects were presented with more information, it was not used effectively when compared to an optimal decision process--which in this case was the Bayesian theory of probability (Edwards & Phillips, 1964). This implies that the additional information was not used to evaluate alternatives or to develop new alternatives. The remainder of this section is devoted to two recent works whose conclusions bear directly upon this study.

Payne (1976) chose four of the most widely accepted models of the decision making process (additive, additive difference, conjunctive, and elimination-by-aspects) as the basis for his study. In his literature review, Payne observed that studies of multialternative choice had been "entirely lacking." Most of the prior research had focused on how people choose between two alternatives. In addition, he cited studies which investigated the effects of additional information (Einhorn, 1971; Hayes, 1964; Hendrick, Mills, & Kiesler, 1968; Jacoby, Speller, & Kahn, 1974). These studies demonstrated that adding information causes the decision maker to: (a) increase the variability of responses; (b) increase the confidence of the decision maker in his/her judgment; and (c) decrease the quality of the choices (Slovic & Lichtenstein, 1971).

Payne's two experiments dealt with the information search and actual decision making. In the first experiment, six subjects were paid a fixed hourly rate to examine "information boards," (Wilkins, 1967) which represented one-bedroom furnished apartments (these were the alternatives). Each decision situation involved a number of alternatives (2, 6, or 12) and a number of dimensions (attributes) per alternative (4, 8, or 12). Each subject received three of the nine possible combinations and the order of presentation was counterbalanced across subjects.

In choosing between two alternatives, the subjects' decision processes were more cognitively complex (using an additive process or an additive difference process) than in multialternative situations. In the latter, the subjects tended to use an elimination-by-aspects or a conjunctive process (Payne, 1976, p. 374).

The second experiment was essentially the same except for three differences: (a) greater variety of decision situations; (b) more subjects; and (c) a complete within-subjects design. The results from this experiment supported the conclusions drawn from the first experiment. In this study, the single most important determinant of the cognitive complexity of the decision process used was the number of available alternatives.

A subsequent study by Olshavsky (1979) replicated the work of Payne. An additional factor which he addressed was the differentiation of the attributes within each alternative as simple or complex. Condominium apartments and stereo receivers were selected

as groups of alternatives which represented these two levels. The condominiums represented a product with simple, dichotomous attributes (e.g. kitchen--available, not available) and stereo receivers represented a product with complex, interval valued attributes (e.g. capture ratio--poor, fair, good, very good, excellent) (p. 303). The decision processes, or strategies, used by Olshavsky were additive, additive difference, attribute dominance, conjunctive, and lexicographic (or elimination-by-aspects) models. In general, Olshavsky's study supported earlier work by Lussier and Olshavsky (1974) and Payne (1976). The hypothesis concerning attribute complexity, that is, differences in the character of the attributes will result in different choice strategies, received only partial support.

In conclusion, Payne and Olshavsky's works on contingent processing in decision making found that, as the complexity of the task increased, there was a tendency to move from a one-stage to a multi-stage decision process. For example, when faced with a two-alternative choice problem, the subjects in Payne's (1976) study tended to use alternative-based decision strategies. When faced with a larger number of alternatives, subjects used the less cognitively demanding attribute-based decision models as a way of simplifying the decision task, and then returned to an alternative-based model to deal with the few remaining alternatives. Olshavsky's (1979) findings were consistent with these conclusions.

The second portion of this chapter addresses the literature on decision making in the field of strategic management along with the environmental impact on strategic decision making.

Strategic Decision Making

This section is devoted to a discussion of strategic decision making. The first part briefly reviews some of the conclusions regarding strategic processes in organizations. Next, executive decision making research is discussed. This review addresses research on: (a) roles of executives; (b) decision making styles; and (c) prescriptive/descriptive work. Finally, the environmental impact on strategic decision making is considered.

Strategic Decision Making of Organizations

In the strategic management literature, much attention has been devoted to prescribing the manner in which organizations should address strategic issues in the formulation of strategy (Rowe, Mason, & Dickel, 1982; Schendel & Hofer, 1979). Many different techniques and processes for the formulation of corporate strategy have been enumerated. Some of the most widely recognized methods are portfolio theory, policy delphi, and the business planning matrix, dialectical policy analysis, and the growth-share matrix (Grant & King, 1982). These models are characteristic of the dominant school of thought regarding strategic decision making.

Fredrickson (1983) referred to the above mentioned group as comprehensive models, which emphasize a rational process in dealing with strategic issues (see Table 2.1). Apparently, an organization's performance will be increased if the process of strategy formulation is carried out in this manner (Paine & Anderson, 1983; Schendel & Hofer, 1978). A second group of strategic decision making models is the incremental process group. Lindblom (1959) referred to the process as "muddling through."

Implicit in both classes is some concept of decision making (Fahey, 1981; Leontiades, 1982). The synoptic decision process centers on the development, evaluation, and selection of a strategic alternative(s) after the goals have been established, the internal resources have been assessed, and the external environment has been evaluated (Glueck, 1980; Grant & King, 1982; Hofer & Schendel, 1978). Ansoff (1980) referred to this as the process of strategic issue management in which an organization attempts to identify and quickly resolve important trends and events inside or outside the firm. The synoptic process is exhaustive in its attempt to be comprehensive in the generation and evaluation of alternatives. Consequently an attempt to optimize (March & Simon, 1958) is indicated. In contrast, the incremental decision process focuses only on a few alternatives to the status quo and does not attempt to be exhaustive in the evaluation of consequences; thereby suggesting a satisficing approach (March & Simon, 1958).

While the synoptic and incremental decision processes typify the current beliefs about how organizations make strategy decisions,

Table 2.1. Differences Between Synoptic and Incremental Strategic Decision Processes^a

Characteristics	Synoptic Processes	Incremental Processes
Motive for initiative	The process is initiated to problems or opportunities that appear during constant surveillance.	The process is initiated in response to a problem or dissatisfaction with the current state.
Concept of goals	The process is directed at achieving a specified goal or future intended state.	The process is directed at achieving a modification of the current state. The process is "remedial."
Relationship between means (alternatives) and ends (goals)	The goal is identified before and independent of the analysis of alternatives. Decision making is an "ends-means" process.	The remedial change outcome is considered at the same time the means for achieving it is analyzed. The processes are intertwined and simultaneous.
Concept of choice	The final choice of an alternative is dependent on how it contributes to the achievement of the goal. Decision quality is known only when it is shown that this decision provides the best means to the specified goal.	The final choice of an alternative is made by combining the alternatives (means) and their possible consequences (ends) and simultaneously selecting the one that yields the most desired outcome. Decision quality is judged by the agreement achieved in choosing an alternative (the means to the end).
Analytic comprehensiveness	When making individual decisions the process attempts to be exhaustive in the identification and selection of goals and the generation and evaluation of alternatives. All factors are considered.	When making individual decisions the strategy considers only a few alternatives to the status quo as alternative actions and only a restricted range of consequences in their evaluation. All possible factors are not considered.
Integrative comprehensiveness	Consciousness attempts are made to integrate the decisions that compose the overall strategy to insure that they reinforce one another. The strategy is viewed as a consciously developed, integrated whole.	Little attempts is made to integrate, consciously, the individual decisions that could possibly affect one another. The strategy is viewed as a loosely linked group of decisions that are handled individually.

^aDeveloped by the author from similar summaries presented by numerous authors, particularly Lindblom (1959) and Mintzberg (1973).

Source: James W. Fredrickson, "Strategic Process Research: Questions and Recommendations," Academy of Management Review, 1983, 8, p. 566.

they offer little in terms of understanding how organizations actually evaluate the different alternatives and select from among those alternatives. According to Fahey (1981), the literature on strategic decision making in organizations has been dominated by a highly normative stance. Fredrickson (1984) provided support for this point by stating that empirical research has essentially been limited to the comparison of firms classified as "formal" and "informal" planners. Again, this provides little information about what actually occurs during the strategic process.

Up to this point, this section has reviewed the general conclusions about strategic decision making in organizations. However, the thrust of this study is to examine the strategic decision making of executives within organizations. Therefore, the remainder of this section is devoted to research on executive decision making. According to Hodgetts and Wortman (1980, p. 12), the term "executive" refers to the top three levels of management in large organizations, the top two levels in medium-size organizations, and perhaps only the president in small organizations.

Executive Decision Making

It is the responsibility of executives to carry out the purpose or mission of the organization. They are the ones who attempt to provide the solutions to problems emanating from the internal and external environments (Hodgetts & Wortman, 1980, p. 44). In short, the executives of an organization are the ultimate decision makers for that organization and are charged with the responsibility for

its eventual success or failure. Therefore, it is unfortunate that there is so little research available on how executives make decisions. What is available is a great deal of information on the roles of executives (Barnard, 1938; Carlson, 1951; Hemphill, 1959; Mintzberg, 1973, 1975), decision making styles of executives (Guth & Taguiri, 1965; Maccoby, 1976; Miller, 1975), and prescriptive/descriptive work on how decisions are or should be made (Lindblom, 1959; Wrapp, 1967; Harvey, 1982). A brief review of the major contributions to the literature on strategic decision making follows.

First, four studies which address the roles of executives are reviewed. Barnard (1938) identified three essential executive functions: (a) providing a system of communication; (b) securing essential services from individuals within the organization; and (c) formulating the purpose and objectives of the organization.

While Barnard did not explicitly address decision making as an essential executive function, it is implicit in the processes mentioned. On executive decision making, he noted that individual decisions may involve non-logical processes, but the acts of organizations are governed by organizational, not personal, goals. Consequently, after the goals of an organization have been determined and adopted, the "...coordination of acts as means to these ends is itself an essentially logical process" (p. 186).

Carlson (1951) studied the work of nine Swedish managing directors (comparable to the CEO in the United States) and drew conclusions about working time, communication patterns, and work

content of their position which included fields of activity, questions of development and current operations, and questions of policy and application. The conclusions from work content have been questioned on methodological grounds (Castaldi, 1982).

Similarly, Hemphill (1959) compiled a list of 1,500 statements describing managerial work. From this list, he selected 575 which were evaluated by 93 executives in five large manufacturing firms. Three levels of management (upper, middle, and beginning) were included as well as five functional areas (research and development, sales, manufacturing, general administration, and industrial relations). He then performed a factor analysis which identified ten work roles of managers (Castaldi, 1982).

Lindblom (1959) discussed decision making as an explicit function of the executive, but it differed from the conventionally held belief that executive decision making was purposeful and rational. He concluded that the rational-comprehensive procedures were better used for small-scale problem solving where the number of variables is small and value problems restricted. As an alternative method which is more representative of the way policy formulation is actually done, Lindblom proposed "successive limited comparisons" (see Table 2.2).

Mintzberg (1973, 1975) also studied managerial work and determined that the manager's job could be described in terms often

Table 2.2. Comparison of Rational-Comprehensive and Successive Limited Comparisons Processes

Rational-Comprehensive (Root)	Successive Limited Comparisons (Branch)
1a. Clarification of values or objectives distinct from and usually pre-requisite to empirical analysis of alternative policies.	1b. Selection of value goals and empirical analysis of the needed action are not distinct from one another but are closely intertwined.
2a. Policy-formulation is therefore approached through means-end analysis: First the ends are isolated, then the means to achieve them are sought.	2b. Since means and ends are not distinct, means-end analysis is often inappropriate or limited.
3a. The test of a "good" policy is that it can be shown to be the most appropriate means to desired ends.	3b. The test of a "good" policy is typically that various analysts find themselves directly agreeing on a policy (without their agreeing that it is the most appropriate means to an agreed objective).
4a. Analysis is comprehensive; every important relevant factor is taken into account.	4b. Analysis is drastically limited: <ul style="list-style-type: none"> i) Important possible outcomes are neglected. ii) Important alternative potential policies are neglected. iii) Important affected values are neglected.
5a. Theory is often heavily relied upon.	5b. A succession of comparisons greatly reduces or eliminates reliance on theory.

Source: Charles E. Lindblom. "The Science of 'Muddling Through'," Public Administration Review, 1959, 19, p. 80.

"roles" or organized sets of behaviors identified with a position. These ten roles were grouped into three major categories: interpersonal, informational, and decisional. In discussing decisional roles, he made several observations which are relevant to this study. First, the manager typically authorizes the important decisions in his or her unit before they are implemented in order to insure a consistent and unidirectional strategy. Second, many important authorization decisions were made on an ad hoc basis with little time devoted to quantitative decision methods. Third, the decisional roles have been implicitly acknowledged in many instances, but have not been explicitly studied.

In an early review of studies which deal with decision making styles, Guth and Taguiri (1965) did some groundbreaking work in this area by studying six primary value orientations (theoretical, economic, aesthetic, social, political, and religious). The business managers in their sample were strongest on the economic, theoretical, and political scales; and weakest in aesthetic and social areas. The results on the religious dimension were inconclusive. Unfortunately, what Guth and Taguiri do not address is how these values are reflected in their decisions (Higgins, 1983).

In 1976, Maccoby categorized managers into four groups; the craftsman, the jungle fighter, the company man, and the gamesman (see Table 2.3). In his discussion, he implied that various types of manager respond differently to the same situations. Deal and Kennedy (1982) addressed types of organizational cultures (the

Table 2.3. Categorization of Managers

Roots of Competition		Categories of Manager		
Character Type	Craftsman	Jungle Fighter	Company Man	Gamesman
Typical meanings of Competition	Drive to build Competition vs. self and the materials	Kill or be killed Dominate or be dominated	Climb or fall Competition as price for secure position	Win or lose Triumph or humiliation
Source of Psychic Energy for Competitive Drive	Interest in work, goal of perfection, pleasure in building something better	Lust for power and pleasure in crushing opponent, fear of annihilation Wish to be the only one at the top	Fear of failure, desire for approval by authority	The contest, new plays, pleasure in controlling the play

Source: Michael Maccoby. The Gamesman (New York: Simon & Schuster, 1976), p. 106.

tough-guy culture, the bet-your-company culture, the process culture, and the work hard/play hard culture). According to them, decision making behavior of executives is essentially a function of the culture.

Analyzing personality traits, Miller (1975) suggested that top management traits such as arbitrary risk taking and conservatism were significant in determining the success of the firm. According to Higgins (1983), this study implies "... that the human variable may be an important predictor of strategic success and that therefore strategic success may be contingent upon this variable" (p. 170).

Finally, there are the prescriptive and descriptive studies on decision making. In 1967, Wrapp addressed the descriptive area:

Many of the articles about successful executives picture them as great thinkers who sit at their desks drafting master blueprints for their companies. The successful top executives I have seen at work do not operate this way. Rather than produce a full-grown decision tree, they start with a twig, help it grow, and ease themselves out on the limbs only after they have tested to see how much weight the limbs can stand (p. 97).

In his study, the general manager tested each proposal against at least three major criteria:

- (a) Will the proposal move the organization closer to the objectives they have in mind?
- (b) How will the proposal be received by various groups and subgroups in the organization?
- (c) How does the proposal relate to programs already in process or currently proposed?

He implied that the decision making process of an executive is less than rational, but that he or she does have an ulterior set of objectives against which to evaluate various issues.

In contrast, Harvey (1982) discussed the work of several authors and concluded that "... decision making is essentially a rational process, but as we have noted, there are limits to how orderly the strategic process is" (p. 228).

The prescriptive techniques such as portfolio theory, policy delphi, the business planning matrix, dialectical policy analysis, and the growth share matrix have been offered as bases for executive decision making, but these methods have had little testing at the individual executive level, other than some classification studies.

In conclusion, there is a paucity of empirical research which addresses exactly how executives make decisions on strategic issues and alternatives. What does exist are conceptual and descriptive pieces on the nature of work which executives perform and their role in the organization. The remainder of this section is devoted to looking at the environmental impact on strategic decision making.

Environmental Impact on Strategic Decision Making

The effect of the external environment on strategy formulation is a subject that has been well covered in the field of strategic management. This work was preceded by the impact of the environment on the organization and its structure. This section will first examine some of the major conclusions from this literature (mostly based on the work by organizational theorists) and then move on to

those dealing with the relationship between environment and strategic decision making.

The impact of the external environment has been a subject dealt with in the management literature since the middle nineteen sixties. The emphasis has been on viewing organizations as open systems which were impacted by, and had an impact on, the external environment. Emery and Trist (1965) were among the first to examine this relationship. They suggested that the change in the environment, particularly the increasing complexity of the environment, was a necessary area of study if organizational theorists were to continue to advance their understanding of organizational change. They discussed four ideal types of environment: (a) placid; (b) randomized; (c) disturbed-reactive; and (d) turbulent. One major conclusion was that a better understanding of the external environment will lead to a better understanding of the exchanges that take place between an organization and its environment, since the causal texture of the external environment is often a governing factor in these exchanges.

Continuing the open systems research stream, Lawrence and Lorsch (1969) conducted an empirical study of ten firms in three different kinds of environment. Their major focus was on the concepts of differentiation and integration. They examined the degree of differentiation and integration in three industries (plastics, container, and food packaging). High-performing and low-performing firms within these industries were evaluated to discover how organizations address the demands of their respective

environments. They concluded that in the effective (high-performing) firms, the degree of differentiation and integration was contingent on the nature of the external environment. Lorsch and Allen (1973) provided additional support for this point in a subsequent empirical study. They concluded that management of the total firm is "most effectively facilitated when top management chooses a set of organizational devices which are congruent with the particular constellation of environmental factors faced by the firm" (p. 167).

A later study by Tung (1972) looked at the relationship of environmental complexity, environmental change rate, and environmental routineness correlated with the organizational variables of perceived environmental uncertainty, structure, time perspective taken in planning, and frequency of changes in plans. Using a sample of twenty-one firms in Vancouver, Canada, Tung found that her results were consistent with other researchers of organization-environment interaction (Lawrence & Lorsch, 1967; Duncan, 1972).

The environmental characteristics under study "were shown to be significant predictors of variations in perceived environmental uncertainty, departmental structure, time perspective taken in planning, and frequency of changes to plans" (p. 691). More specifically, if the degree of perceived environmental uncertainty is low, a more rigid or mechanistic structure is appropriate. In

contrast, organizational units operating in a highly unstable and uncertain environment were forced to resort to shorter range strategies with more frequent modifications. Even though the study did not explicitly examine the impact of the fit between environmental characteristics and organizational variables in light of the effectiveness of the organization, this concept was implicitly addressed since all firms selected for the study were high performers in terms of return on investment (Tung, 1979, p. 691).

A more recent empirical study by Lenz (1980) of savings and loan associations did explicitly address the notion of organizational performance. He hypothesized that the performance of an organization varied according to a firm's combination of environment, strategy, and organizational structure. The factors which represented these variables were socio-economic development of the area, financial services mix, and configuration of the administrative hierarchy, respectively. The single performance measure used in the study was return on average assets.

Using a stepwise discriminant function analysis, Lenz found that the high performing firms differed from the low performing firms in their environment-strategy-organization structure combinations, although none of the variables individually was sufficient to explain differences in performance.

In a study dealing directly with strategic decision processes, Fredrickson and Mitchell (1984) examined an unstable industry--the forest products industry (Dess, 1980)--in looking at the

relationship between comprehensiveness of the strategic decision process and performance of the firm. Based on the conclusions of previous authors (Aldrich, 1979; Bourgeois, 1980; Nutt, 1976; Thompson, 1967), several points were made: (a) the environment often appears as a hypothesized contingency in the strategy process literature; (b) it is easier to identify critical variables in a stable environment thereby making it possible to develop rational, comprehensive theory regarding the relationship between those variables and the organization at a level of certainty that cannot be obtained in unstable environments; and (c) a firm that uses a noncomprehensive strategic decision process is better equipped to deal with an unstable environment than a firm which uses a comprehensive strategic decision process. Based on the preceding points, it was hypothesized that:

There will be a negative relationship between the comprehensiveness of strategic decision processes and performance in an unstable environment. A positive relationship would be expected in a stable environment (p. 405).

Comprehensiveness, as defined here, is the degree of integration of individual decisions into an overall strategy. Two financial measures of firm performance were used to reflect effectiveness and efficiency. Respectively, they were percent change in gross sales and average after tax return on assets.

Controlling for organizational size, the hypothesis was tested using partial correlations. Both change in gross sales and average after tax return on assets were significantly correlated with the composite measure of comprehensiveness, indicating that

comprehensive strategic decision processes (those based on rational models) may not be appropriate for organizations operating in an unstable environment.

In conclusion, research in the fields of organization theory and business strategy has demonstrated that the nature of the external environment affects the strategy and operation of the organization. In addition, preliminary research indicates that the fit between organizational strategy and environment can be correlated with performance of the firm.

In the following section of this chapter, these two areas of literature are integrated into a conceptual model which serves as the basis for the hypothetical questions to be addressed by this study.

The Model

This section discusses the relationship between the pertinent literature and this study. The Hodgetts and Wortman model of strategic management is used as a point of departure here for two reasons: (a) it deals with the functions of the top-level executive, which is the focus of this study; and (b) it is a process rather than a content model--which is also appropriate because this is a study of executive process (i.e. decision making).

This study focuses on the analysis and formulation aspects of the strategic management process (see Figure 2.2). In this case, chief executives will be asked to recount specific strategic issues that have had an impact on their organization, identify a number of

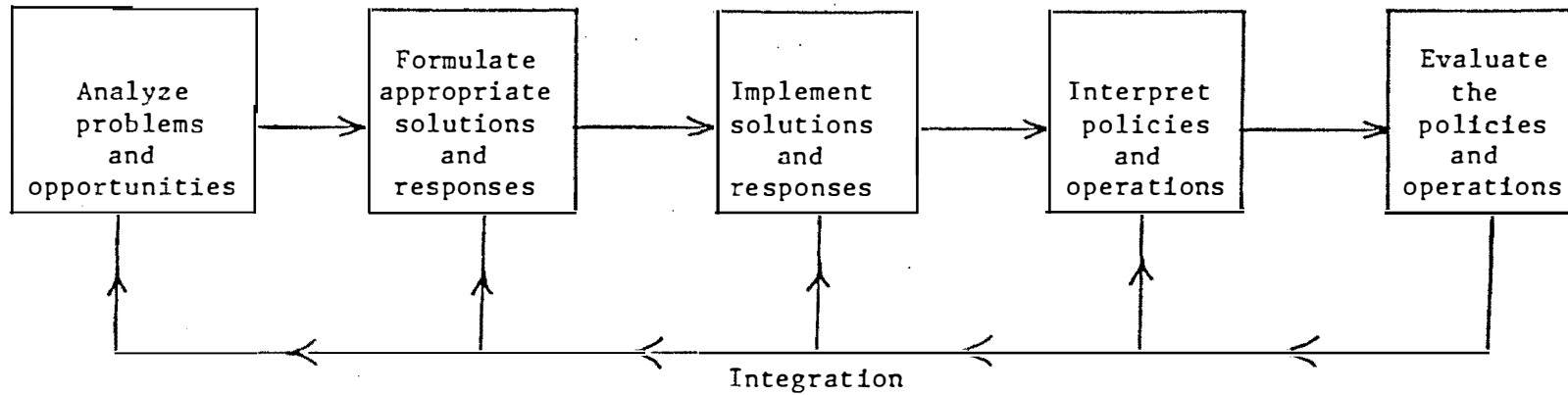


Figure 2.2. Hodgetts & Wortman Model of the Strategic Management Process

Source: Richard M. Hodgetts & Max S. Wortman, Jr., Administrative Policy (2nd. ed., New York: John Wiley & Sons, 1980), p. 52.

alternatives, and then explain how they analyzed the problem and formulated solutions. The factors involved in the identification of alternatives and analysis of those alternatives are the internal and external environments (Hodgetts & Wortman, 1980). This study focuses specifically on the nature of the external environment (i.e. degree of stability and degree of complexity), because "... to understand fully why a particular strategic alternative is chosen also requires knowledge of the environmental and organizational context in which the decision is made" (Hambrick & Snow, 1977, p. 109). Additionally, all strategic decisions are made within the context of the external environment (see Figure 2.3). Since strategic decisions are those which enable the organization to meet the opportunities and threats in the external environment, it is logical to study decision making by the chief executive officer in light of the nature of the external environment (Hambrick & Snow, 1977).

Looking at the formulation of solutions by chief executives requires the consideration of certain aspects previously covered in the literature review.

First, the cognitive literature on individual decision making makes two contributions to this study. Authors in this area have provided models of decision making which have laid the foundation for studying decision making by chief executives (Tversky, 1972; Payne, 1976; Olshavsky, 1979). These same authors have drawn conclusions about decision making under various conditions of complexity. Specifically, when faced with a greater number of

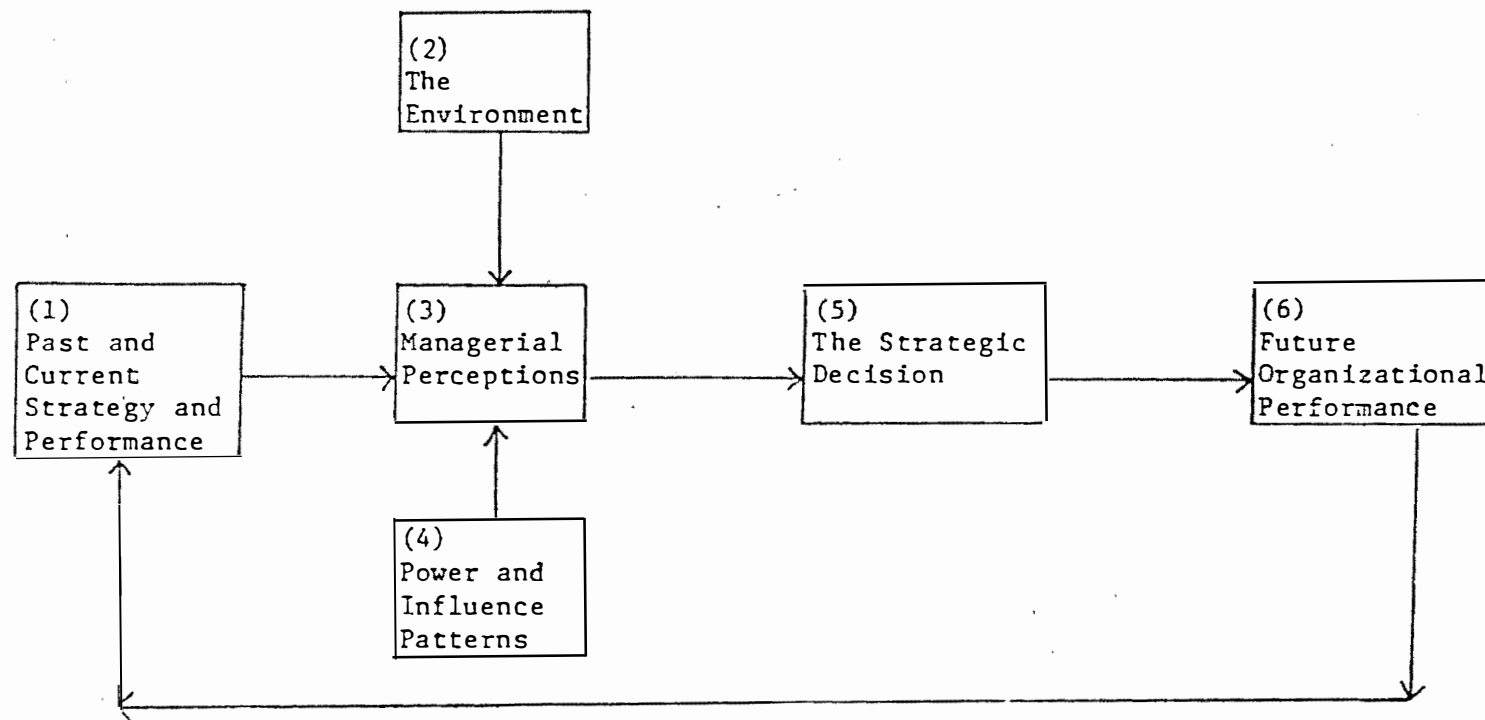


Figure 2.3. Model of Strategic Decision Making

Source: Donald C. Hambrick & Charles C. Snow. "A Conceptual Model of Strategic Decision Making in Organizations," Proceedings of Academy of Management, 1977, p. 110.

dimensions, subjects tended to use less complex decision strategies as a means of simplifying the task. In addition, as the dimensions of the problem increased, there was a decrease in the proportion of information used by the subjects. The cognitive literature makes a serious omission with respect to this study, and that is the question of importance of the problem. Since strategic decisions "... are those which are 'important' to the organization--either through the scope of their impact and/or through their long term implications" (Hambrick & Snow, 1977, p. 109), this is a major consideration.

Second, the literature on organizational strategic processes, particularly the work by Fredrickson (1983, 1984), indicates that there is a significant relationship between the nature of the environment and the strategic process of the organization. This study presumes that top-level executives within these organizations, due to the nature of the environment, will exhibit different types of decision making behavior. Hambrick and Snow (1977) provided the means for making this inferential leap by discussing their contextual model of strategic decision making. In their model, the strategic decision is based upon managerial perceptions (see Figure 2.4). Therefore, it is reasonable to assume that the nature of the environment will result in differing perceptions, which may, in turn, result in differences in the generation of alternatives and decision making behavior.

Third, the empirical and conceptual literature on executive decision making is included in the model. The primary issue here is

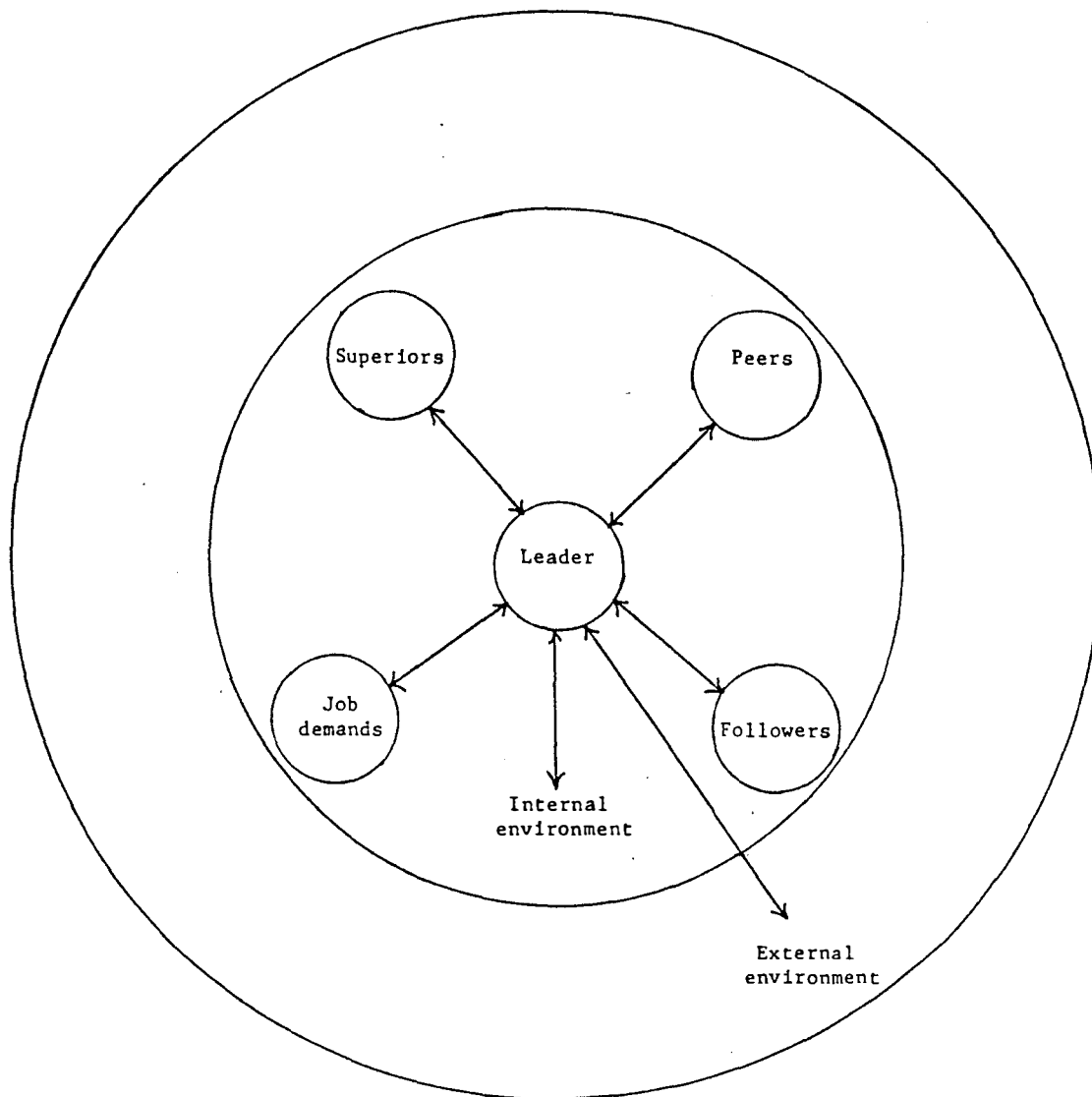


Figure 2.4. Relationship of a Leader to the Environment

Source: Richard M. Hodgetts & Max S. Wortman, Jr. Administrative Policy (New York: John Wiley & Sons, 1980), p. 60.

whether or not executive decision behavior is purposeful and rational. A review of the literature in this area reveals a divergence of viewpoints on this issue (Lindblom, 1959; Wrapp, 1967; Barnard, 1938; Schendel & Hofer, 1979).

The remainder of this section is devoted to reviewing briefly the relationships between the areas of literature covered in the previous section and the strategic management process.

In the analysis dimension of the strategic management process, there are many factors which could have an impact on how a strategic issue is analyzed; originating in the external and/or internal environment. This study focuses specifically on two areas in the external environment: degree of stability (measured perceptually and objectively) and degree of complexity (also measured perceptually and objectively). It is clear from the literature review that these two factors may have implications for the generation of alternatives, the complexity of decision making behavior of the chief executive, and the resulting performance of the firm (denoted in Figure 2.5 by broken lines). Based on the review of the literature, it is conceivable that the impact of the environmental factors of stability and complexity could occur at several places in the process (i.e. generation of alternatives, decision making, or moderating the relationship between decision making and economic performance). For this reason, these three possible relationships with the external environment are examined.

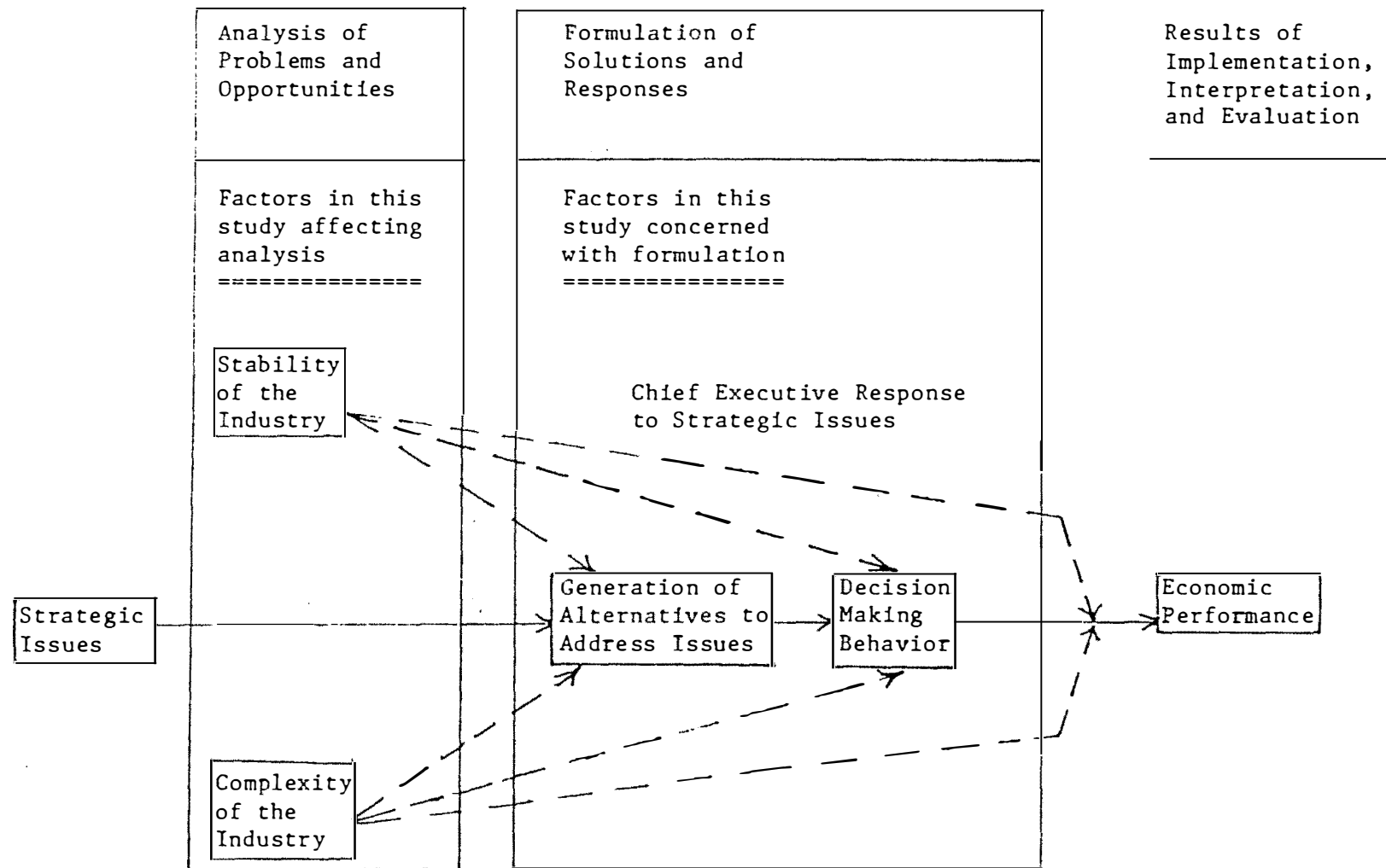


Figure 2.5. Relationship of the Study to the Field of Strategic Management

In this study, the formulation dimension focuses on the chief executive's response to a given strategic issue in terms of the number of alternatives that are generated to address the issue and then the decision making process used to select from among those alternatives (see Figure 2.5).

In the following chapter, the specific hypotheses relating to this model will be presented and discussed.

Summary

This chapter began with a discussion of the literature on individual decision making. The review of this literature centered around the descriptive studies which were developed on the basis of the concepts of optimizing and satisficing. From this beginning, the more widely accepted models of individual decision making behavior were presented and arranged along a continuum from cognitively simple to cognitively complex as follows: (a) lexicographic or elimination-by-aspects; (b) conjunctive; (c) attribute dominance; (d) additive difference; (e) additive; and (f) cost/benefit. In addition to placement on the continuum, the models were also classified as being either attribute-based or alternative-based. The rationale for placement and classification was also given.

As a subset of this review, the environmental impact on individual decision making was noted. The dimensions of uncertainty and complexity were specifically addressed. The major conclusion was that as the situation became more uncertain or more complex,

there was a tendency on the part of the decision maker to use a less cognitively demanding decision process.

The next major section dealt with a review of the literature on strategic decision making. The strategic decision making of organizations was discussed showing that there are two general schools of thought regarding strategic decision processes in organizations. One says that strategies are developed in a rational, purposeful manner and the other contends that strategy formulation is an incremental, less-purposeful process. In addition to the organizational concepts, the literature on executive decision making was also considered. Attention was focused on: (a) roles of executives; (b) decision making styles; and (c) some prescriptive/descriptive work on how executives make decisions.

In a subsequent section, the environmental impacts on strategic decision making were given. This section reviewed the contributions of organization theorists and business strategists to the examination of the fit between the external environment and the organization as a determinant of organizational success.

Merging the two major areas of literature resulted in the third and final division in this chapter--that is, the development of the conceptual model. The model was discussed in light of the literature and the interrelationships of the two areas were given. The specific hypothetical relationship derived from this model will be presented in the following chapter.

CHAPTER III

SOURCES AND METHODS

This chapter describes the definitions, hypotheses, measures, pilot test, sample, procedure and data analysis used in this study.

Definitions

The following is a list of definitions which provide the foundation for understanding the development of this study. This includes the dependent variables, the independent variables, and other terms used throughout the study.

Dependent Variables

The dependent variables are economic performance and complexity of decision making.

Economic performance is the measure of firm performance relative to the industry on the dimensions of change in total sales, return on total assets, and asset turnover for the five year period, 1979-1983. These measures are indicative of growth, profitability, and efficiency, respectively.

Complexity of decision making behavior is the measure of how an individual evaluates and selects from a set of alternative solutions. The degree of complexity is represented by six models of

decision making ranging from cognitively simple to cognitively complex. The six models are grouped into one of two headings. The three models on the cognitively simple side of the continuum are classified as attribute-based decision making processes, whereas the three models on the cognitively complex side are classified as alternative-based decision making processes. In a decision problem, there are two or more alternative solutions with each separate alternative having a number of characteristics or attributes. When using an attribute-based decision process, the individual focuses only on certain characteristics, or attributes, of each alternative as a way of eliminating alternative choices. Therefore, since only a limited number of characteristics from the alternatives are considered the process is cognitively simple. Alternatively, an alternative-based decision process is a method of evaluating and choosing an alternative in which the alternatives are considered in total. That is, all characteristics of the alternatives are evaluated. Hence, this is a more cognitively complex decision making process than the attribute-based decision process (Payne, 1976, pp. 366-387).

Independent Variables

The independent variables used in this study are: number of alternatives generated; stability of the industry; complexity of the industry; and complexity of decision making.

Number of alternatives generated is the measure of the sheer quantity of possible solutions for addressing a given strategic

issue facing an organization. The alternatives may have been developed at lower levels in the organization or by the chief executive. In either case, the aggregation of alternatives is then evaluated by the chief executive in attempting to resolve the strategic issue.

Stability of the industry is defined as the predictability of change in an industry. The easier it is to predict change in an industry, the more stable the industry (Dess & Beard, 1984, p. 56).

Complexity of the industry is the term which represents "...the heterogeneity and range of an organization's activities" (Child, 1972, p. 3). This construct is measured as the number of "inputs" or factors which an organization must deal with. The greater the number of factors, the greater the degree of complexity (Dess & Beard, 1984, p. 57).

Complexity of decision making is defined as above. In some of the hypotheses, it is a dependent variable and in others it is an independent variable, depending on temporal placement. In other words, it is hypothesized that environmental factors influence the degree of complexity of decision making which, in turn, influences the economic performance of the firm.

Other Terms

Other terms used in this study which require definition are given below.

Strategic management is "...concerned with the long range goals of an organization and with the appropriate course or courses of

action to achieve them, considering environmental conditions, available resources, and degrees of risk" (Hodgetts & Wortman, 1980, p. 7).

Strategic issues are developments either inside or outside the organization which are likely to have an important impact on the ability of the enterprise to meet its objectives (Ansoff, 1980, p. 133).

Decision making is the evaluation and choice from a set of alternatives. It is the process of thought and action that culminates in making a choice (MacCrimmon & Taylor, 1981, p. 1398).

Strategic decision making as a specific case of decision making, is the process of making decisions relating to strategic issues (Fahey, 1981, p. 43; Hambrick & Snow, 1977, p. 109).

Strategy is the "...total organizational effort to achieve the purpose or mission of the organization" (Hodgetts & Wortman, 1980, p. 90).

Chief executive is the executive at the highest level of the organization who is ultimately responsible for the survival and success of the organization. He or she significantly influences the strategic direction of the firm (Harvey, 1982, p. 39).

Dynamism is the change in an industry that is hard to predict and increases uncertainty for top management (Dess & Beard, 1984, p. 56).

Remote external environment is the "set of forces which originate beyond and usually irrespective of any single firm's

operating situation." It encompasses the political, economic, social, and technological factors (Pearce & Robinson, 1982, p. 104).

Immediate external environment is that set of forces with which a firm interacts directly. These include competitors, creditors, suppliers, customers, and the labor market (Pearce & Robinson, 1982, p. 111).

Value added by manufacturer is a measure of manufacturing activity derived by subtracting the cost of various materials from the value of shipments. This figure is then adjusted by the net change in finished goods and work-in-process inventories between the beginning and the end of the year. It is a measure used for comparing the relative economic importance of manufacturing among industries (U.S. Census of Manufactures, 1982, p. 6).

Specialization ratio is the ratio of primary product shipments to total shipments (U.S. Census of Manufactures, 1982, p. 6).

Concentration ratio is a measure of geographic concentration of a firm's activities on any given dimension. The closer the ratio is to one, the greater the concentration of the activity. As several authors have contended, the more heterogeneous an organization's activities, the greater the complexity (Dess & Beard, 1984, p. 57).

Research Hypotheses

The purpose of this research is to investigate the complexity of decision making behavior of the chief executive of a manufacturing firm in light of the complexity and stability which exists in the industry in which the firm operates. Before

proceeding to the specific hypotheses, a general overview is presented.

The dependent variable in hypotheses H1, H1A-H2D, and H3A-H3D is the complexity of decision making. Hypothesis H1 examines the effect of number of alternatives upon decision making. In hypotheses H1A-H2D and H3A-H3D, the direct and indirect effects upon decision making of stability of the industry and complexity of the industry are examined, respectively. The purpose is to determine the relationships of the independent variables (number of alternatives, stability of the industry, and complexity of the industry) to the dependent variable, complexity of decision making (as indicated by Lines, A, B, C, E, F in Figure 3.1).

In the groups of hypotheses H2A-H2D and H3A-H3D, the terms "direct" and "indirect" effects are used to state theoretical relationships between variables in the study. This terminology is consistent with Cohen and Cohen's (1983) discussion. The direct effect of a given independent variable is the effect of that variable when all other known measured causes are included in the equation (i.e. estimated by the partial regression coefficient). The indirect effect of a given independent variable on the dependent variable is the effect which takes place via another independent variable (Cohen & Cohen, 1983, p. 94). In other words, direct and indirect will refer to the model that will be developed in Hypotheses H2A-H2D and H3A-H3D and by so doing will account for the partial redundancy that may occur when there is a relationship that can be specified among variables.

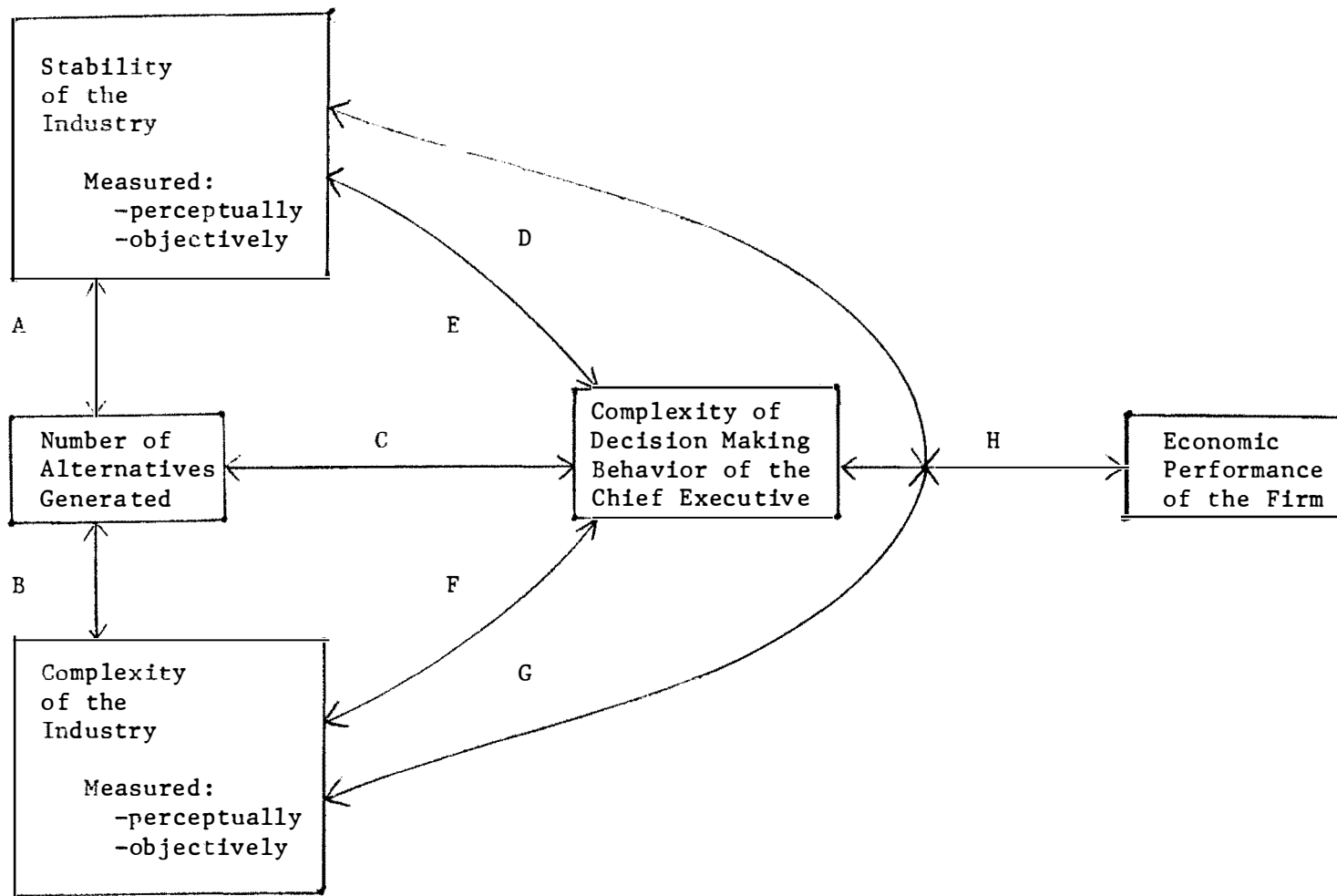


Figure 3.1. Hypothesized Relationships of Variables in the Study

The dependent variable in hypotheses H4, H5A, H5B, H6A, and H6B is economic performance. In hypothesis H4, the direct relationship between complexity of decision making and economic performance is tested. In hypotheses H5A and H5B the relationship between complexity of decision making and economic performance is further hypothesized as being contingent upon the stability of the industry. The relationship is tested a third time in hypotheses H6A and H6B, but in this case it is hypothesized as being contingent upon the complexity of the industry (these hypotheses are indicated by the Lines H, D, G in Figure 3.1).

The testing of hypotheses H5A through H6B is based upon the premise that there is no statistically significant relationship between industry stability and/or industry complexity and complexity of decision making behavior. If there is a strong correlation of stability and/or complexity with complexity of decision making behavior (e.g. $r = 1.0$), then the independent variables would be completely redundant and the regression would exhibit a curvilinear effect (Cohen & Cohen, 1983, p. 93). In addition, this redundancy would suppress evidence of any actual moderating effects of stability and/or complexity upon the relationship between economic performance and complexity of decision making behavior.

The remainder of this section is devoted to the discussion of the theoretical hypotheses, including an explanation of exactly what is being tested by each hypothesis and how it relates to the literature previously discussed.

Theoretical Hypothesis: H1. There is a direct negative linear relationship between the number of alternatives generated and the degree of complexity of the decision making behavior of the chief executive.

The test of this hypothesis is indicated by Arrow C (see Figure 3.1). As a decision problem becomes more complex, the individual decision maker uses a less cognitively complex decision making process in addressing the problem. This is because as the problem becomes more complicated (i.e. as the number of alternative solutions increases) it becomes necessary for the individual to simplify the process by reducing the number of alternatives which are possible solutions to the problem (Olshavsky, 1979; Payne, 1976).

Theoretical Hypothesis: H2A. There is a direct positive linear relationship between the degree of perceived stability of the industry in which the firm operates and the degree of complexity of the decision making behavior of the chief executive.

Theoretical Hypothesis: H2B. There is a direct positive linear relationship between the degree of objective stability of the industry in which the firm operates and the degree of complexity of the decision making behavior of the chief executive.

The test of the two hypotheses above is indicated by Line E (see Figure 3.1).

The emphasis here is on testing the direct relationship between the characteristics of the industry and the complexity of decision making. Because, as a situation becomes more ambiguous, the

individual decision maker is likely to use a more simplified decision process; whereas in a simpler decision situation, an individual decision maker is likely to use a more cognitively complex decision process (Olshavsky, 1979; Payne, 1976; Tversky, 1972).

Theoretical Hypothesis: H2C. There is an indirect positive relationship between the degree of perceived stability in which the firm operates and the degree of complexity of the decision making behavior of the chief executive mediated by the effect of number of alternatives generated.

Theoretical Hypothesis: H2D. There is an indirect positive relationship between the degree of objective stability in which the firm operates and the degree of complexity of the decision making behavior of the chief executive mediated by the effect of number of alternatives generated.

The above two hypotheses are indicated by Lines A-C (see Figure 3.1). They test the conclusion that the effect of the degree of stability of the industry on decision making may be mediated by the number of alternatives generated. If the stability of the industry is related to the number of alternatives, and this relationship is significant beyond the relationship between stability and decision making, then it can be argued on the basis of temporal placement (i.e. alternatives are generated in response to conditions in the external environment) that the number of alternatives generated "depends on" the stability of the industry. Subsequently, a decision, or choice, is made from among those alternatives using a particular decision making process. This is consistent with the

notion that the more uncertain (i.e. less stable) the industry is, the greater the opportunity for coming up with different ways to address a strategic issue (Fredrickson & Mitchell, 1984; Janis & Mann, 1977).

Theoretical Hypothesis: H3A. There is a direct negative linear relationship between the degree of perceived complexity of the industry in which the firm operates and the degree of complexity of the decision making behavior of the chief executive.

Theoretical Hypothesis: H3B. There is a direct negative linear relationship between the degree of objective complexity of the industry in which the firm operates and the degree of complexity of the decision making behavior of the chief executive.

Indicated by Line F (see Figure 3.1), this hypothesis is also a test of the literature on the cognitive aspects of individual decision making. It has been demonstrated empirically that as a situation becomes more complex, the individual decision maker is likely to use a more simplified decision process; whereas in a simpler decision situation, an individual decision maker is likely to use a more cognitively complex decision process (Olshavsky, 1979; Payne, 1976).

Theoretical Hypothesis: H3C. There is an indirect negative relationship between the degree of perceived complexity in which the firm operates and the degree of complexity of the decision making behavior of the chief executive mediated by the effect of number of alternatives generated.

Theoretical Hypothesis: H3D. There is an indirect negative relationship between the degree of objective complexity in which the firm operates and the degree of complexity of the decision making behavior of the chief executive mediated by the effect of number of alternatives generated.

These two hypotheses, shown by Lines B-C (see Figure 3.1), test the contention that the effect of the degree of complexity of the industry on the decision making behavior of the chief executive is mediated by the number of alternatives generated.

In other words, in a more complex industry, it is possible that more alternatives are generated. This, in turn, results in a more simplified decision making process being used.

Clearly, hypotheses H3A through H3D are mirror images of hypotheses H2A through H2D. The only difference is that complexity is examined instead of stability. The rationale for this set of hypotheses is the same (Janis & Mann, 1977).

Theoretical Hypothesis: H4. There is a direct positive linear relationship between the degree of complexity of the decision making behavior of the chief executive and economic performance of the firm.

This hypothesis is a test of the conclusions of the strategic management literature, that is, as the problem becomes more important in its impact on the organization (i.e. strategic), more sophisticated decision processes are required to consider all the significant aspects and reach a rational conclusion (Harvey, 1982). Consequently, those firms in which the chief executive closely

followed the "ideal" would be likely to perform better than those firms in which the chief executive did not. This direct relationship is shown by Line H (see Figure 3.1).

Theoretical Hypothesis: H5A. There is a relationship between the degree of complexity of the decision making behavior of the chief executive and economic performance of the firm which is contingent upon the degree of perceived stability of the industry.

Theoretical Hypothesis: H5B. There is a relationship between the degree of complexity of the decision making behavior of the chief executive and economic performance of the firm which is contingent upon the degree of objective stability of the industry.

The rationale for these hypotheses is based primarily on the work of Fredrickson (1983, 1984). He has shown that there is a negative relationship between the comprehensiveness of strategic decision processes and economic performance in an unstable environment. Conversely, there is a positive relationship between the comprehensiveness of strategic decision processes and economic performance in a stable environment. In other words, in terms of the economic performance of the firm, an unstable environment is better suited to a less comprehensive strategic decision process, whereas a stable environment is better suited to a more comprehensive strategic decision process. The above hypotheses makes a similar test at the individual level as indicated by Line D (see Figure 3.1, p. 60).

Theoretical Hypothesis: H6A. There is a relationship between the degree of complexity of the decision making behavior of the

chief executive and economic performance of the firm which is contingent upon the degree of perceived complexity of the industry.

Theoretical Hypothesis: H6B. There is a relationship between the degree of complexity of the decision making behavior of the chief executive and economic performance of the firm which is contingent upon the degree of objective complexity of the industry.

As the decision scientists have noted, the more complex the decision environment, the less complex the decision making behavior of the individual. Therefore, based on this finding and the conclusions of Fredrickson (1983, 1984), it is logical to assume that the better the "fit" between the complexity of decision making behavior and the complexity of the industry, the better the economic performance of the firm. This relationship is indicated by Line G (see Figure 3.1, p. 60).

Measures

This section discusses the measures to be used in testing the hypotheses previously mentioned. Whenever possible, measures with established reliability and validity were used. Where this was not possible, measures were developed and are described in this section (see Table 3.1).

Economic performance. There are an infinite number of measures which could serve as indicators of economic performance. It may be difficult to capture the various aspects of performance in a single measure (Weiner & Mahoney, 1981; Kirchoff, 1977). Therefore, rather than use a single measure of economic performance as the dependent

Table 3.1. Variables Used in a Study of Decision Making of Chief Executives in Southeastern U.S., 1979-1983

Variables in the Study	Explanation of Measurement
Economic Performance	Standardized five year average: (growth, profitability, efficiency) -change in total sales -return on assets -asset turnover (see Appendix A)
Complexity of Decision Making Behavior of the Chief Executive	Chief executive's indication concerning how he or she addressed a strategic issue -decision making behavior (see Appendix B, Section IV)
Alternatives Generated	Number identified by chief executive (see Appendix B, Section IV)
Stability: perceptual	Chief executive's response (see Appendix B, Section I)
Stability: objective	Calculation from industry data (see Appendix C)
Complexity: perceptual	Chief executive's response (see Appendix B, Section II)
Complexity: objective	Calculation from industry data (see Appendix D)
Strategic Issue	Chief executives response used as manipulation check (see Appendix B, Section III)

variable, this study has used three. These are: change in total sales; return on total assets; and asset turnover. These three measures represent growth, profitability, and efficiency, respectively (Bernstein, 1978). These measures were calculated using figures taken from the annual reports and 10-K reports of the thirty-two firms in the study for the five year period of 1979 through 1983, inclusive. However, in cases where the chief executive's tenure was less than this five year period, only those years' data applicable to his or her tenure were used. Specifically, in four cases, four years of data were used; in three cases, three years' data; and in two cases, two years' data.

This same information for each firm's industry, as determined by the four digit SIC code, was taken from Dun and Bradstreet's Key Business Ratios on the years 1979 through 1983. The industry data were then subtracted from the firm data as a means of arriving at a measure of economic performance on each of the three dimensions for each firm (see Appendix A).

In summary, by standardizing each firm's performance relative to its industry, it was possible to make comparisons across industries and draw conclusions which have practical significance.

Complexity of decision making of the Chief Executive. Complexity of decision making behavior is measured as the chief executive's response to a strategic issue which he or she has faced in the recent past (five years ago or less). This measure was

derived directly from the interview questionnaire (see Appendix B, Section IV, Item 2, Part C).

The questionnaire first asked the respondents which statement most accurately describes their initial evaluation. Based on that response, they were directed to other statements. These statements were representative of the six decision making models discussed in the previous chapter. The chief executives were then asked to indicate which of the statements best described how they addressed the issue. After each statement, the question was asked, "Did this process yield a final answer?" If not, then the chief executive was directed to continue through the questionnaire until a final answer resulted.

The items were then ranked according to cognitive complexity of decision making from one to six, with one being cognitively simple and six being cognitively complex. In cases where the chief executive went through more than one step in reaching a final decision, the values for all steps were averaged to yield a single measure for complexity of decision making. This was done in two of the cases.

Alternatives generated. This was measured as the number of potential alternative solutions to the problem generated by the chief executive. The number of alternatives generated was also derived directly from the interview questionnaire (see Appendix B, Section IV, Item 2, Part B).

Before the chief executive reported how many alternative solutions were generated, he or she responded to four items (see Appendix B, Section IV, Item 2, Part A) which determined if alternatives were readily identifiable; and if not, how much effort was put forth in attempting to identify other alternatives. Hopefully, this insured that all the alternatives generated in addressing the problem would be given.

Stability of the industry. This dimension is a measure of the degree of overall change in the industry, which indicates the predictability or certainty involved in operating in that industry. In this study, stability of the industry was measured in two ways: (a) perceptually and (b) objectively. Each of these is discussed below.

Perceptual Measure of Stability. In order to measure the top executive's perception of the degree of stability in his or her industry, each was first given the definition of the construct of industry stability and also given an example of what a stable industry is and what an unstable industry is. Then, each chief executive responded to the nine questionnaire items (see Appendix B, Section I) that were related to the impact of unpredicted changes originating in the immediate and remote external environments (Pearce & Robinson, 1982).

These responses were recorded on a seven point Likert-type scale ranging from no impact (stable) to a great impact (unstable)

for each of the nine items, then summed and divided by the number of items to arrive at an average measure of perceptual stability. Since this score is an average, it assumed an equal weight for each dimension (Cohen & Cohen, 1983).

Objective Measure of Stability. Three measures were used to operationalize the objective dimension of industry stability. These measures assessed industry stability in three areas: (a) total sales; (b) total employment; and (c) value added by manufacture. These measures were selected based on the work of Dess and Beard (1984), in which these variables loaded highly on a single dimension which Dess and Beard termed "instability." Also, the use of at least three variables is recommended by Thurstone (1974) in factor loadings. As noted in Appendix C, the method of calculation involved the determination of the extent of dispersion about a trend line over time while controlling for absolute size of the industry (Dess & Beard, 1984, p. 58). Specifically, the calculation used is the standard error of the regression slope coefficient divided by the mean value. Also, the calculated coefficients for the factors indicated that equal weighting of the factors was appropriate in deriving a single measure of stability (Dess & Beard, 1984).

Information for the years 1978 through 1982 was used because this was the most recent five year period for which data were available from the U.S. Census of Manufactures. The notion of

measuring stability over time is consistent with several researchers' conceptualization of this construct (Dess & Beard, 1984, p. 58). The completed calculations involved obtaining a single composite measure of objective stability. Because of the manner in which the construct was determined, the larger the value, the more unstable the industry. Therefore, since the hypotheses are stated in terms of stability, rather than instability, the measures have been reversed by assigning a negative value; which in no way affects the magnitude of the value, but does allow the results to be interpreted in terms of stability.

Complexity of the industry. This dimension is a measure of the heterogeneity and range of an organization's activities in terms of the number of inputs and outputs involved in a firm's "organization set" (Child, 1972). Industry complexity was also determined in two ways: (a) perceptually and (b) objectively. These methods are discussed below.

Perceptual Measure of Complexity. Industry complexity is measured as the extent to which an organization or executive must deal with a large and diverse number of inputs from the external environment. To determine the chief executive's perception of the degree of complexity in his or her industry, each was given the definition of the construct as well as what a complex environment entails. As with perceptual stability, each executive then responded to nine questionnaire items (see Appendix B, Section II)

which asked them to assess the impact of the increases in the number of factors originating in the immediate and remote external environments (Pearce & Robinson, 1982).

The response to these items was also recorded on a seven point Likert-type scale ranging from no impact (simple) to a great impact (complex) for each of the nine dimensions, then summed and divided by the number of dimensions to yield a single perceptual measure of complexity.

Objective Measure of Complexity. Four measures were used to operationalize the objective measure of industry complexity including: (a) specialization ratio; (b) concentration ratio of industry sales; (c) concentration ratio of industry employment; and (d) concentration ratio of industry establishments. Again, these measures were selected based on the work of Dess and Beard (1984) in which these variables loaded highly on the complexity dimension. In addition, the factor loading indicated equal weights were appropriate in developing a composite measure (see Appendix D).

The concentration ratios were calculated on the basis of regional data given by the U.S. Census of Manufactures using the Gibbs-Martin formula (Gibbs & Martin, 1962). For the specific formula, see Appendix D. The use of this formula provided a measure of concentration which made relative comparisons across industries possible.

Information from the year 1982 was used in the calculations since this is the most recent year for which data were available from the U.S. Census of Manufactures. Since the closer the composite measure (i.e. the ratio) is to one indicates that the industry is more concentrated and consequently simpler, negative signs were used to reverse the values so that hypotheses could be interpreted in terms of complexity.

Strategic issues. Seven questions were used to determine whether or not the issue was strategic in nature (see Appendix B, Section III, Items 4 and 5). The response to each item was recorded on a five point Likert-type scale ranging from very strong/very significant (one) to very weak/very insignificant (five). The individual item scores were averaged for an overall score. If the average was less than three, the issue was determined to be important to the chief executive, and therefore strategic. If the average was three or greater, then the issue could not be considered strategic. At this point, the subject was asked to discuss other issues until one was found which would qualify as strategic.

This measure was necessary as a manipulation check to qualify the subject and the interview as being valid for use in a study dealing with strategic decision making behavior.

Pilot Test

The following discusses the procedure, purpose, and results of the pilot test. The discussion of the results deals with the modifications made to the questionnaire used in the interview.

Procedure

In attempting to schedule five interviews with chief executives of manufacturing firms, a total of twenty-five organizations was initially selected. The listing came from the geographic section of the Tennessee Directory of Manufacturers. This initial list was randomly selected from firms which were headquartered in Knoxville, Tennessee.

Telephone calls were then made on July 26 and 27, 1984 in an attempt to schedule on-site interviews with the chief executive of the organization. In the telephone conversation, the chief executives were informed that the study was investigating strategic decision making behavior of chief executives of manufacturing firms. He or she was also informed that the interview was to be conducted on-site and should not take any longer than thirty to forty-five minutes. Finally, the results would be reported in a doctoral dissertation, and any information reported in the dissertation was confidential and would not be identified specifically with any firm or individual.

Of the list of twenty-five manufacturing firms, it was necessary to contact twenty-one in order to schedule five

interviews. It was not possible to schedule interviews with sixteen of the firms' chief executives for several reasons. In seven cases, the researcher was unable to speak directly to the chief executive. In four cases, the chief executive was on vacation. In another four instances, it was not possible for the chief executive to commit to an interview in the near future. In only one case did the chief executive refuse to participate in the study.

The actual interviews with the chief executives were conducted from August 1 to August 6, 1984. Four of the firms were privately owned manufacturing firms and the fifth manufacturer was publicly owned. The smallest firm in the pilot study had an employment total of twenty-eight and the largest had an employment of approximately 150. The firms were engaged in the production of pneumatic equipment, roofing felt, cold asphalt mix, carbonated beverages, and remote control panels. The tenure of the five chief executives in that position ranged from three to thirty four years with the average being 12.2 years.

Purpose

In general, the purpose of the pilot study was to test the structured questionnaire for practicality and ease of administration. More specifically, each of the four sections of the questionnaire was evaluated for modifications. Within each section, several questions were considered. Also, any comments made by the chief executives about the questionnaire were considered. The questions within each section are given below.

Perceptual measure of industry stability.

1. Was the definition of industry stability clear and understandable?
2. Were the instructions for scoring the responses clear?
3. Is the labeling of the scale itself clear?

Perceptual measure of industry complexity.

The same three questions applied to this section as were used for the measure of industry stability.

Strategic issue qualification/General information.

1. Was there a smooth transition from the items requiring verbal response to those requiring written response?
2. Did the chief executives have trouble with the individual items and the way they were to be scored?
3. Were there any items which seemed "irrelevant" by the chief executives in determining whether an issue was strategic or not?
4. Could the chief executive think of any items which should have been included in this section?
5. Was it easy for the researcher to determine if the issue was strategic (based on the chief executives' responses) during the course of the interview?

Measure of complexity of decision making behavior.

1. Was there a smooth transition from the items requiring verbal response to those requiring written response?

2. Were the questions on the generation of alternatives clear and easy to follow?
3. Were the individual statements on decision making behavior understandable?
4. Was it relatively easy for the chief executive to proceed through the questionnaire without assistance from the researcher?
5. Were there other statements or items which the chief executive felt should be included?

Results

The results of the pilot test were generally favorable. In all five instances, the chief executives were responsive to the study and expressed an interest in receiving a summarized copy of the final results. Since only the interview questionnaire was evaluated there was no need to gather any secondary data or any information relating to the economic performance of the firms in the pilot test. The descriptive statistics from the pilot study are given in Table 3.2. Modifications relating to the four sections of the questionnaire are discussed below.

Perceptual measure of industry stability. There was no need to make any modifications in this part of the interview questionnaire. All five chief executives stated that there was no problem understanding the definition of stability or how the responses were

Table 3.2. Descriptive Statistics of Measures Used in a Pilot Test of a Study of Decision Making of Chief Executives in the Southeastern U.S., 1979-1983

Variable	Mean	Range	Standard Deviation
Cognitive Complexity of Decision Making Behavior	2.83	1.00-5.00	1.79
Alternatives Generated	3.60	2.00-5.00	1.14
Perceptual Measure of Stability	3.47	2.78-4.11	0.52
Perceptual Measure of Complexity	4.87	3.67-6.22	1.18
Strategic Issue Manipulation Check	1.49	1.29-1.86	0.24

to be marked. One chief executive asked for clarification of the social dimension, which was answered during the interview.

Perceptual measure of industry complexity. No modifications were made in this section. In all instances, the definition and instructions were clear and understandable.

Strategic issue qualification/General information. There were two problems in this section of the questionnaire. In the pilot study, the questionnaire called for the chief executive to describe a major threat or opportunity which presented itself to his or her organization. After this, several lines were provided so the chief executive could briefly write a summary of the issue. This proved to be cumbersome and it was easier to simply have the chief executive respond verbally and for the researcher to make a few notes concerning the issue.

Another question asked the chief executive to state what impact this event or issue had on the organization. In the discussion of the issue, the impact on the organization had usually been covered. Therefore, to avoid redundancy, the initial question was re-phrased as follows: "Could you please verbally describe such a situation as well as when it occurred and what impact it had on your company?" (see Appendix B, Section III, Item 2).

Other than the above mentioned, there were no problems with this section of the interview questionnaire. None of the chief executives found any of the items to be irrelevant and could think of no other items which should be included. Finally the pilot test

demonstrated that it was easy for the researcher to determine if the issue was strategic simply by a quick visual inspection of the chief executive's responses as he or she was filling in the questionnaire.

Measure of complexity of decision making behavior. There were two problems in this part of the interview questionnaire. In the pilot study, the first question asked the chief executives to explain how they went about arriving at a solution to the issue. This was followed by a blank page on which to make notes. This procedure was determined to be unnecessary since these data were not used directly in the study and that, whenever permitted, this response was tape recorded. This was amended by removing the blank space between this question and the next. In addition, a question was placed at the end of the questionnaire which asked, "Is there anything else you would like to add about your decision making process?"

The other problem which emerged was in regard to the question: "Did this process yield a final answer?" Three of the chief executives did not understand whether this question applied to all of the statements or only the last statement (see Exhibit 3.1). Therefore, this was amended and each statement was followed by this question (see Exhibit 3.2). There were no other problems with this section of the questionnaire.

Specifically, which of these three statements best describes the manner in which you evaluated the alternatives?

- (6) ☐ I evaluated each alternative solution and came up with an overall weight or score for each one, considering all the characteristics of all the alternatives before making my choice.
- (5) ☐ I evaluated alternative solutions by comparing two at a time and coming up with a difference between the two; ranking one higher than the other. This process continued until all alternatives had been compared.
- (4) ☐ I evaluated each alternative solution separately with respect to its advantages and disadvantages. Based on this, I developed an overall score or weight for each solution before making my choice.

Did this process yield a final answer?

☐ Yes ☐ No

If the answer is no, then go on to the next page.

Exhibit 3.1. Questionnaire Items on Complexity of Decision Making
Used in the Pilot Test

Specifically, which of these three statements best describes the manner in which you evaluated the alternatives?

- (6) ☐ I evaluated each alternative solution and came up with an overall value or score for each one, considering all the characteristics of all the alternatives before making my choice.

Did this process yield a final answer?

☐ Yes ☐ No

If the answer is no, then go on to the next page.

- (5) ☐ I evaluated alternative solutions by comparing two at a time at a time and coming up with a difference between the two; ranking one higher than the other. This process continued until all alternatives had been compared.

Did this process yield a final answer?

☐ Yes ☐ No

If the answer is no, then go on to the next page.

- (4) ☐ I evaluated each alternative solution separately with respect to its advantages and disadvantages. Based on this, I developed an overall score or weight for each solution before making my choice.

Did this process yield a final answer?

☐ Yes ☐ No

If the answer is no, then go on to the next page.

☐ None of these are appropriate (please explain)

Sample

The sample size was based on five parameters. They are: (a) the largest number of independent variables in the regression equations; (b) the estimated effect size; (c) power; (d) the alpha level; and (e) the correction for a finite population (Cochran, 1977, p. 24; Cohen, 1977). The largest number of independent variables in any regression equation is three, therefore this value was used as a determinate of appropriate sample size. The effect size ($r=.5$) was based on the work of Fredrickson and Mitchell (1984). In this study, they found significant results on partial correlations between four summary measures of comprehensiveness and average return on total assets using a sample size of twenty three. The desired power level was set at the conventional level of 0.80 (Cohen, 1977). The significance level for this exploratory study was set at $p \leq .10$. Finally, the correction factor for a finite population was used since the firms sampled from were limited to publicly held manufacturing concerns which were headquartered in the southeastern United States. Using these parameters in the calculation, a sample size of thirty-two yielded a 0.24 possibility of a beta error (see Appendix E).

To ensure that the sample was large enough to be used in a hierarchical regression analysis (Cohen & Cohen, 1983), the calculations were made. Using the .76 level of power, a sample size of thirty-two was found to yield sufficient power (see Appendix F).

As publicly held manufacturing organizations, the firms were selected by executing a computer search of the Disclosure II 100 data base using the following criteria: (a) they are medium to large in terms of organizational size (\$500,000 or more in net worth and 100 or more employees); and (b) they are headquartered in the southeastern United States (Tennessee, Kentucky, Mississippi, Alabama, Georgia, Florida, North Carolina, and South Carolina). They also could be subsidiary operations of manufacturing firms as long as they were operated independently of the parent company and met the above criteria. The firms in Miami, Florida were excluded from the study because of travel considerations.

Using these criteria, the computer search produced a population of 148 organizations. Then, the Million Dollar Directory was used to acquire addresses and telephone numbers of all 148 organizations. From this list, a random sample of sixty firms was selected to be contacted for interviews with the chief executive. This assumed an acceptance rate of fifty percent.

Procedure

The sixty firms were clustered geographically. Then attempts were made to contact the chief executive of firms in a specific geographic area by telephone (see Appendix G). The telephone calls were made from one to two weeks in advance to schedule interviews in a certain region. When the interview was scheduled, a letter

confirming the appointment was sent to the particular chief executive (see Appendix H), except for instances when appointments were made on short notice. When it was not possible to schedule appointments with firms from the random sample of sixty, alternate firms from the population listing were used to supplement the sample.

The process of scheduling appointments and conducting interviews began on August 7, 1984 and was concluded with the last interview on December 17, 1984. During this time, 104 firms were contacted in an attempt to schedule interviews. Due to the nature of selection for replacement firms in the study (i.e. they were selected according to geographic area), the sample is not truly random, but is assumed to be for the purpose of this study. It is fairly representative of the firms in the population according to the distribution of sample firms compared to the distribution of firms in the population (see Table 3.3). All states are well represented on a percentage basis with the exception of Tennessee which had the largest percentage of firm used in the sample. There are two reasons for this. First, Tennessee firms were more willing to participate in a study being conducted out of the University of Tennessee. Second, in the latter stages of data collection, it was easier to follow up on previous attempts to schedule interviews in the middle and east Tennessee area.

Table 3.3. Publicly Held Manufacturing Firms Headquartered in the Southeastern U.S., 1984: Breakdown of Firms Used in a Study of Decision Making by Chief Executives

State	Firms in Population		Firms in Sample	
	Number	Percentage	Number	Percentage
Tennessee	17	11%	10	31%
Mississippi	5	3%	1	3%
Alabama	10	8%	1	3%
Georgia	28	19%	6	19%
North Carolina	36	24%	5	16%
South Carolina	8	5%	2	6%
Kentucky	6	4%	2	6%
Florida	<u>38</u>	<u>26%</u>	<u>5</u>	<u>16%</u>
TOTAL	148	100%	32	100%

Data Analysis

This section provides an explanation of the selected levels of significance and the descriptive and inferential statistical tests used in this study.

Level of Significance

The level of significance was set at .10 for the following reasons. First, this was an exploratory study. Second, there was no reason to assume that a Type I error would be more pernicious than a Type II error. Hays and Winkler (1979, p. 255) have noted:

... the conventional practice of setting alpha at some very small level is based on the notion that one kind of error is extremely important and must be avoided if possible. This is quite reasonable in some contexts, such as the study of the safety of a new medicine or the guilt of an accused man. On the other hand, in many situations, there is no basis for assuming that one error is much more serious than another.

Statistical Tests

The statistics used in the study take two forms. They are: (a) descriptive statistics of variables used in the study; and (b) inferential statistical tests of the hypotheses.

Descriptive Statistics

Before any inferential statistical tests are performed on the data, three sets of descriptive statistics were calculated. The means, ranges, and standards deviations of all variables were calculated in order to characterize the entire data set. These

measures were calculated to assess the variance associated with each variable used in the study--which could have implications for the testing of the actual hypotheses.

Inferential Tests of the Hypotheses

The inferential statistics used in this study were: (a) Pearson product-moment correlation; (b) multiple regression; and (c) hierarchical analysis.

For the sake of simplicity, the separate hypotheses which deal with perceived and objective measures of the external environment (stability and complexity) are discussed under the same heading. The reason is that, although they are run in separate hypotheses, they are analyzed in the same fashion.

Hypothesis: H1.

This hypothesis was tested by a simple Pearson product-moment correlation which examined the relationship between the number of alternatives generated and the degree of cognitive complexity of decision making behavior. As stated earlier, the significance of this correlation will be compared to the established level of .10. This is the case for all simple correlations and semipartial correlations discussed in the following chapter.

Hypotheses: H2A and H2B.

These two hypotheses also used a simple linear correlation to look at the direct relationship between: (a) perceived stability

and complexity of decision making--H2A and (b) objective stability and complexity of decision making--H2B.

Hypotheses: H2C and H2D.

These hypotheses were intended to test the indirect relationships between stability and complexity of decision making behavior via the number of alternatives generated. The full equation is given as the basis for demonstrating how variables were entered into the hierarchical analysis:

$$Y = A + B_1X_1 + B_2X_2 + e$$

where: Y = complexity of decision making behavior

A = regression constant

X₁ = perceptual or objective measure of stability

X₂ = number of alternatives generated

e = error term

First, the perceptual or objective measure of stability is entered into the equation. This is the total effect for that variable upon Y. Next, the alternatives generated variable is entered into the regression equation. Thus, with both variables entered, the regression coefficient is its direct effect. The difference between the total effect and the direct effect is the indirect effect (Cohen, 1983, p. 360).

Hypotheses: H3A and H3B.

These were tested using a Pearson product-moment correlation to evaluate the relationship between the degree of complexity of

industry measured perceptually (H3A) and objectively (H3B) and the complexity of decision making behavior.

Hypotheses: H3C and H3D.

These hypotheses were tested in the same manner as H2C and H2D with the only difference being the independent variables (X_1). The full equation is:

$$Y = A + B_1X_1 + B_2X_2 + e$$

where: Y = complexity of decision making behavior

A = regression constant

X_1 = perceptual or objective measure of complexity

X_2 = number of alternatives generated

e = error term

Hypothesis: H4.

This was tested as a Pearson product-moment correlation between the independent variable (degree of complexity of decision making behavior) and the dependent variable (economic performance).

Hypotheses: H5A and H5B.

The differentiation between H5A and H5B here is the same as before; that is, perceptual and objective measures of stability. A multiple regression was used to test this equation and the complete representation is:

$$Y = A + B_1X_1 + B_2X_2 + B_3X_{12} + e$$

where: Y = economic performance
 A = regression constant
 X_1 = complexity of decision making behavior
 X_2 = perceptual or objective measure of stability
 X_{12} = interaction between decision making and stability
 e = error term

This equation tested for the "fit" between decision making and stability, represented as the interaction term-- X_{12} . The contention is that there is a relationship between complexity of decision making and economic performance but that relationship is contingent on the degree of perceived or objective stability.

Hypotheses: H6A and H6B.

These were tested in the same fashion as H5A and H5B, using multiple regression. Again, the idea is to test for interaction, only in this case complexity is examined rather than stability. The full equation is:

$$Y = A + B_1X_1 + B_2X_2 + B_3X_{12} + e$$

where: Y = economic performance
 A = regression constant
 X_1 = complexity of decision making behavior
 X_2 = perceptual or objective measure of complexity
 X_{12} = interaction between decision making and complexity
 e = error term

As discussed previously in this chapter, there were three separate measures of economic performance used in the study; each

measuring a separate dimension of the "performance" construct. If the three measures of economic performance are orthogonal, then in the hypotheses where economic performance was used as the dependent variable (H4 through H6B), three repetitions of each hypothesis will be performed.

Summary

This chapter presented the definitions of terms used in this study. Understanding the terms and concepts used in the study facilitates the comprehension of the hypotheses and the interpretation of results in subsequent chapters. Next, the theoretical hypotheses were given. In addition to the hypotheses, the relationship of each hypothesis to the literature was briefly presented. Also the hypothetical statements were related to the model which described all hypothesized relationships.

The measures of the variables were covered in conjunction with an explanation of how they would be determined. This discussion dealt with the method of collection of the objective measures from secondary data sources as well as the collection of perceptual data from primary sources.

The pilot test was also discussed. This included the procedure, purpose, and results of the pilot test. The discussion of the results dealt primarily with the modifications made to the interview questionnaire. Moreover, the sample which was used in the study was discussed. The rationale for the determination of sample

size was given along with the criteria for the selection of the organizations.

A discussion of the procedure used in conducting the study was also provided. This covered the process used for firm selection, the time frame for scheduling appointments, and the distribution of firms in the study.

Finally, the data analysis section overviewed the statistics used in the study. This review included a discussion of the descriptive statistics calculated on variables used in the study and a discussion of the inferential statistical methods used to test the hypotheses.

CHAPTER IV

RESULTS OF THE STUDY

This chapter presents the results of this study. In this chapter, four areas are covered: (a) the presentation of the descriptive statistics which describe this data set; (b) the analysis and discussion of the inferential tests of the hypotheses; (c) post hoc analysis which was determined based on the inferential tests of the stated hypotheses; and (d) a summary of the chapter.

The Descriptive Statistics

The descriptive statistics which were calculated for the variables used in this study are given in Table 4.1. These are the statistics for all thirty-two manufacturing firms in the sample. The calculated values are the mean, standard deviation, range, and minimum and maximum scores on each variable.

The change in sales figure is reported in percentages. On the average, the change in total sales for the five year period shows that relative to the industry, the firms in the study had more than doubled their total sales. The return on total asset and asset turnover variables both report negative values. Again, this is in relation to industry return on total assets and industry asset turnover.

Table 4.1. Descriptive Statistics of Variables Used in a Study of Decision Making by Thirty-two Chief Executives of Manufacturing Firms in the Southeastern U.S., 1979-1983^a

Variable	Descriptive Statistics				
	Mean	Standard Deviation	Range	Minimum Value	Maximum Value
Change in Total Sales	240.54	1220.12	7010	-96	6914
Return on Total Assets	-13.38	94.47	555	-528	27
Asset Turnover	-0.30	1.53	9	-2	7
Complexity of Decision Making Behavior	3.93	1.78	5	1	6
Number of Alternatives Generated	3.97	4.17	23	2	25
Industry Stability: Perceptual	4.36	1.02	4	3	7
Industry Stability: Objective	-0.29	0.13	1	-1	0
Industry Complexity: Perceptual	3.83	1.02	4	1	5
Industry Complexity: Objective	0.41	0.12	1	-1	0

^aChange in Total Sales and Return on Total Assets are reported in percentages. Asset Turnover is reported as a ratio (i.e. "times" turned over). Complexity of Decision Making Behavior and the Perceptual measures of Industry factors are reported from Likert-type scales. Objectives measures of Industry factors are reported as negative proportions.

The complexity of decision making variable was recorded on a six point scale, therefore the range is restricted to maximum of five. The number of alternatives generated to address a given strategic issue ranged from two to twenty-five with a mean of 3.97, which indicates that in most cases, the number of alternatives was relatively small.

In the case of the perceptual measures, the ranges were restricted by the fact that a Likert-type scale was used. In addition, the objective measures for industry stability and industry complexity were reported in terms of negative ratios and are thereby restricted to a minimum value of negative one and a maximum value of zero.

The Pearson product-moment correlations are given in Table 4.2. The correlation matrix of the variables provides the basis for the inferential tests of the hypotheses as well as the post hoc analysis of additional research questions raised as a consequence of the matrix and the testing of the stated hypotheses.

Inferential Tests of the Hypotheses

The primary purpose of this dissertation was to examine the decision making behavior of chief executives of manufacturing firms in response to strategic issues facing their organizations. To achieve this, six major hypotheses were developed and tested. The first three hypotheses (H1-H3D) examined the effects upon complexity of decision making, the dependent variable, of: (a) number of alternative generated; (b) stability of the industry; and (c)

Table 4.2. Pearson Product-Moment Correlations of Variables Used in a Study of Decision Making by Thirty-two Chief Executives of Manufacturing Firms in the Southeastern U.S., 1979-1983

Variable	1	2	3	4	5	6	7	8	9
1. Change in Total Sales	1.00	.06	-.05	.10	-.09	-.17	.27*	.19	.16
2. Return on Total Assets		1.00	-.02	.18	.06	.18	.29*	-.16	-.01
3. Asset Turnover			1.00	-.17	.04	-.40**	.06	.19	.09
4. Complexity of Decision Making Behavior				1.00	-.41***	.04	.18	-.11	.05
5. Number of Alternatives Generated					1.00	.10	.12	-.13	.02
6. Industry Stability: Perceptual						1.00	-.09	-.82***	-.05
7. Industry Stability: Objective							1.00	.17	.24*
8. Industry Complexity: Perceptual								1.00	.17
9. Industry Complexity: Objective									1.00

*Significant at $p \leq .10$

**Significant at $p \leq .05$

***Significant at $p \leq .01$

complexity of the industry, respectively. The next three hypotheses (H4-H6B) focused upon the relationship between the dependent variable, economic performance of the firm, and the independent variable, complexity of decision making behavior. In the fifth and sixth hypotheses (H5A-H6B), the relationship between economic performance and decision making was viewed as being contingent upon the stability and complexity of the industry, respectively.

Three statistical techniques were used to evaluate these relationships: (a) Pearson product-moment correlation; (b) hierarchical analysis; and (c) multiple regression. In the hypotheses utilizing product-moment correlations (H1, H2A, H2B, H3A, H3B, and H4), the correlation coefficients will be reported from the correlation matrix in Table 4.2. The coefficients were tested for significance at $p \leq .10$. In the remainder of the hypotheses (H2C, H2D, H3C, H3D, H5A, H5B, H6A, and H6B), either hierarchical analysis or multiple regression was used. In either case, the full regression model is first tested for significance. If the multiple R^2 value is statistically significant at $p \leq .10$, the variables within the model were evaluated based on a significance test ($p \leq .10$) of the semipartial correlations of the variables. This provided a test of the unique contribution of a given independent variable to the variance in the dependent variable (Nie, et al., 1975, p. 333).

The remainder of this section reports the results of the statistical tests of the hypotheses and provides a discussion of these results.

The Alternatives Generated Hypothesis, H1

This theoretical hypothesis was designed to test directly the conclusion in the cognitive decision making literature that as the number of alternatives generated as potential solutions increases, the complexity of the decision making behavior of the chief executive decreases.

Discussion. A Pearson product-moment correlation was computed for complexity of decision making and alternatives generated. Decision making behavior was significantly related ($p \leq .01$) to the number of alternatives generated. The correlation coefficient ($r = -.41$) indicated support for the hypothesized negative relationship (see Table 4.2).

Simply stated, the more alternatives that were generated, the more a chief executive tended to use a simplified decision making process to achieve a final answer. As an additional observation, the major division point seemed to be between three and four. If four or more alternatives were generated, the chief executive mostly used one of the attribute-based models (lexicographic, conjunctive, or attribute dominance). With two or three alternatives, the alternative-based methods were primarily used (additive difference, additive, or cost/benefit). For specific totals, see Table 4.3.

In terms of practical significance, the test of this hypothesis indicates that in some cases, decisions may be made which are less than optimal. More specifically, when a chief executive uses an attribute-based decision making process (i.e. one which focuses on

Table 4.3. Frequency Count for Relationship Between Decision Making Behavior and Alternatives Generated in a Study of Decision Making by Thirty-two Chief Executives of Manufacturing Firms in the Southeastern U.S., 1979-1983

Number of Alternatives Generated	Decision Making Behavior	
	Attribute-Based	Alternative-Based
Two or Three	6	15
Four or More	9	2

certain characteristics of the alternative), it is possible that some of the alternatives which were eliminated could have provided a better answer to the strategic issue if they had been evaluated completely.

The results of this test perhaps indicated tentative support for March and Simon's (1958) concept of "satisficing" behavior. When attribute-based decision processes were used, it may be argued that the chief executive was searching for an acceptable solution rather than the best solution. This is of particular interest considering that these decisions were made in response to strategic issues - not minor problems. These findings were also consistent with Lindblom's (1959) notion that for complex problems, it is not possible to investigate fully all the alternatives.

In conclusion, the strategic management literature may espouse the use of analytical tools such as portfolio theory and dialectical policy analysis, but when the final decision is made by the chief executive, it may be that the resolution of the strategic issue is handled in the same fashion as any decision, be it major or minor.

The Industry Stability Hypotheses, H2A and H2B

These theoretical hypotheses tested the extent to which the stability of the industry directly affects the complexity of decision making behavior of the chief executive. In both hypotheses, a Pearson product-moment correlation was used to test the relationships.

Discussion. In Hypothesis 2A, the correlation between complexity of decision making behavior and the chief executive's perception of industry stability was computed. Decision making behavior was not correlated with perceptual stability ($r=.04$; see Table 4.2, p. 99). Similarly, in Hypothesis 2B, complexity of decision making behavior was not correlated with the objective measure of stability ($r=.17$; see Table 4.2, p. 99).

Conceptually, there may be a reason for this. One possible explanation was indicated by Janis and Mann (1977). If an individual is predisposed to addressing a problem in a certain manner, then he or she may ignore the uncertainties which are involved. In this study, it may have been that chief executives in unstable (i.e. uncertain) industries chose to ignore the environment and focus on the problem at hand. This explanation receives tentative support from the lack of correlation between the perceptual measure of industry stability and the objective measure of industry stability ($r=-.09$; see Table 4.2, p. 99). The perceptual measure of industry stability (see Appendix B, Section I) asked the chief executive to assess the impact of industry stability on his or her organization. Therefore, if these are accurate measures of the constructs they represent and the chief executives were ignoring the true impact of the stability of the industry, then a strong correlation between these two variables would not be expected.

This explanation may indicate why the objective measure of industry stability was not significantly correlated with complexity of decision making, but gives no indication as to why the perceptual measure of industry stability was not significantly correlated with decision making behavior. For this, a possible explanation is that the size of the organization may have been a factor. Specifically, in larger organizations it may have been that the chief executives of larger organizations did not perceive the impact to be as important to their decision making as did chief executives of smaller organizations, or they simply ignored it. This question is examined in the post hoc analysis (Dalton & Kesner, 1985).

A final plausible explanation may be that the industry stability affects the number of alternatives generated rather than the complexity of decision. This explanation is examined in the following two hypotheses.

The Indirect Effect of Perceptual Stability Hypothesis, H2C

The intent of this hypothesis was to test for the indirect effect of perceptual stability upon decision making behavior. Since there is a rationale for the ordering of the variables (explained in the preceding chapter), the relationships were examined and tested for significance.

Hypotheses 1 and 2A have provided the tests of the direct effects upon complexity of decision making of the number of alternatives generated and perceptual stability, respectively. Here the relationship between all three variables was examined.

Discussion. To test for the indirect effect of perceptual industry stability upon complexity of decision making via alternatives generated, a hierarchical analysis was performed. This was done using multiple regression in which perceptual stability was entered as the first independent variable and the variable "alternatives generated" was entered in the second step. Both of these variables were regressed against the dependent variable, complexity of decision making behavior. A test of significance of the full regression equation was statistically significant at the 0.10 level with a multiple R^2 of .18 ($p \leq .06$; see Table 4.4). A further analysis of the indirect effect of perceived industry stability involved comparing the regression coefficients entered in both steps ($.08 - .15 = -.07$), as prescribed by Cohen and Cohen (1983).

Examination of the semipartial correlation coefficients revealed that the majority of the variance was explained by the number of alternatives generated ($sr = -.42$). This semipartial correlation coefficient was significant at the 0.10 level ($p \leq .02$; see Table 4.5). The semipartial correlation coefficient for the perceptual measure of industry stability was not significant at the 0.10 level ($p \leq .62$). Therefore, the inclusion of perceptual stability does not add significance to the relationship between alternatives generated and complexity of decision making behavior.

In conclusion, the significance tests for the product-moment correlations (reported in H1 and H2A) and the semipartial correlations (reported in H2C) indicated that there was not sufficient

Table 4.4. Full Regression Results for Complexity of Decision Making Behavior with Perceptual Industry Stability and Alternatives Generated in a Study of Decision Making by Thirty-two Chief Executives of Manufacturing Firms Headquartered in the Southeastern U.S., 1979-1983^a

Source	DF	SS	MS	F	p	Multiple R ²
Model	2	17.49	8.75	3.13	.06	.18
Error	29	81.06	2.79			
Total	31	98.55				

^aFull Regression Equation: $Y = A + B_1 X_1 + B_2 X_2 + e$

where: Y = complexity of decision making behavior

A = regression constant

X_1 = perceptual measure of industry stability

X_2 = number of alternatives generated

e = error term

Table 4.5. Hierarchical Analysis of Complexity of Decision Making with Perceptual Industry Stability and Alternatives Generated in a Study of Decision Making by Thirty-two Chief Executives of Manufacturing Firms Headquartered in the Southeastern U.S., 1979-1983

Step	Variable	B	t	r	sr	p
1	Industry Stability: Perceptual	.08	.24	.04	.04	.82
2	Industry Stability: Perceptual	.15	.51	.04	.09	.62
	Number of Alternatives Generated	-.18	-2.49	-.41	-.42*	.02

*Significant at $p \leq .05$.

support for the indirect relationship of perceptual stability to decision making behavior mediated by alternatives generated. Consequently, the only relationship which could be shown as significant was the relationship between the number of alternatives generated and complexity of decision making behavior.

A potential explanation for lack of significance in this hypothesis is the possibility that the size of the organization may have had an impact. In this case, it may have been that in larger firms the chief executives did not expend a great deal of effort trying to generate alternatives (Dalton & Kesner, 1985), since a larger firm may not perceive the impact of the stability, or instability, of the industry to have as great an impact on their firms. This question is addressed in the post hoc analysis later in this chapter. Another explanation, and perhaps a more plausible one, involves a measurement issue. The perceptual measure of industry stability asks the chief executive to indicate his or her perception of the impact of industry stability over a five year period (see Appendix B, Section I). Since the strategic issue was addressed at some point during this five year period, it is possible that his or her perception of the impact of industry stability was different at that point in time from what it was for the five year period.

The Indirect Effect of Objective Stability Hypothesis, H2D

This hypothesis provides the test for the indirect effect of objective stability upon complexity of decision making behavior via

the number of alternatives generated. The paths between the three variables (objective stability, alternatives generated, and decision behavior) were examined and tested for significance.

Hypotheses 1 and 2B have already demonstrated the direct effects upon decision making of alternatives generated and the objective measure of industry stability, respectively. This hypothesis examines the indirect effect of objective stability.

Discussion. In order to assess the indirect effect of the objective measure of industry stability upon complexity of decision making via the number of alternatives generated, hierarchical analysis was used. The hierarchical analysis incorporated a multiple regression equation. The variable entered in the first step was the objective measure of industry stability. In the second step, the number of alternatives generated was entered into the regression equation. The test of statistical significance of the full model yielded significance at the 0.10 level. The multiple R^2 value was .22 ($p \leq .03$; see Table 4.6).

To calculate the indirect effect of objective industry stability, the correlation coefficient for objective stability given in the second step was subtracted from the correlation coefficient for the same measure as given by the first regression equation ($2.44 - 3.20 = -0.76$; Cohen & Cohen, 1983, p. 360).

Upon examining the semipartial correlation coefficients, it was again shown that the majority of the variance was accounted for by

Table 4.6. Full Regression Results for Complexity of Decision Making Behavior with Objective Industry Stability and Alternatives Generated in a Study of Decision Making by Thirty-two Chief Executives of Manufacturing Firms Headquartered in the Southeastern U.S., 1979-1983^a

Source	DF	SS	MS	F	p	Multiple R ²
Model	2	21.87	10.94	4.14	.03	.22
Error	29	76.68	2.64			
Total	31	98.55				

^aFull Regression Equation: $Y = A + B_1X_1 + B_2X_2 + e$

where: Y = complexity of decision making behavior

A = regression constant

X_1 = objective measure of industry stability

X_2 = number of alternatives generated

e = error term

the alternatives generated variables ($sr = -.44$). This semipartial coefficient was shown to be significant at the 0.10 level ($p \leq .02$). The semipartial coefficient for the objective measure of stability was not significant ($p \leq .18$). Again the significance of the total regression equation is primarily accounted for by the alternatives generated variable (see Table 4.7).

The significance test of this hypothesis (H2D) demonstrates that there was not sufficient support for the indirect relationship between objective stability and complexity of decision making behavior. Again, the only relationship that was shown to exist was the relationship between number of alternatives generated and complexity of decision making behavior of the chief executive.

As for reasons for lack of significant findings in the statistical test of this hypothesis, there are two considerations which might be noted. The first consideration relates to the size of the organization, but in a different fashion from the manner in which it was discussed previously. As Woods (1966) and MacCrimmon and Taylor (1976) have noted, when information is passed through decision making units in an organization, there is a tendency for the information to be perceived as less uncertain (i.e. unstable) and more precise. Again this notion may receive nominal support from the lack of correlation between the perceptual and objective measures of stability. However, the specific implication for this study is that since chief executives of organizations were the subjects (i.e. decision makers), it is likely that he or she was

Table 4.7. Hierarchical Analysis of Complexity of Decision Making with Objective Industry Stability and Alternatives Generated in a Study of Decision Making by Thirty-two Chief Executives of Manufacturing Firms Headquartered in the Southeastern U.S., 1979-1983

Step	Variable	B	t	r	sr	p
1	Industry Stability: Objective	2.44	.98	.18	.18	.34
2	Industry Stability: Objective	3.20	1.39	.18	.23	.18
	Number of Alternatives Generated	-.19	-2.67	-.41	-.44*	.01

*Significant at $p \leq .01$.

making decisions on issues and information which had passed through several units at lower levels of the organization. The larger the organization, conceivably, the more units the information has passed through.

The second consideration relates to the variance of the measure of objective industry stability. Perhaps using only manufacturing firms in the study reduced variance in this measure (see Table 4.1, p. 97). Had other types of businesses been used, it is possible that greater variance in this measure would have been obtained, since manufacturing firms may be subject to similarities in the way they are impacted by the external environment.

The Industry Complexity Hypotheses, H3A and H3B

These hypotheses were evaluated in the same fashion as Hypotheses 2A and 2B. In this instance, they test the extent to which the measures of industry complexity, rather than stability, impact upon the complexity of decision making behavior of the chief executive.

Discussion. The Pearson product-moment correlation between perceptual industry complexity and decision making behavior was computed in Hypothesis 3A. Based on the significance test of the correlation coefficient, complexity of decision making behavior could not be considered to be related significantly to the perceptual measure of industry complexity ($r = -.11$; see Table 4.2, p. 99). In Hypothesis 3B, the correlation coefficient ($r = .05$) was

computed for the relationship between decision making behavior and the objective measure of industry complexity. The significance test of this coefficient revealed that this correlation also could not be considered statistically significant at the 0.10 level (see Table 4.2, p. 99).

In attempting to explain the lack of significant findings in these correlations, a few points should be mentioned. In regard to the inability to demonstrate a relationship between the objective measure of industry complexity and decision making, there is not a significant correlation between the perceptual and objective measures of complexity ($r=.17$; see Table 4.2, p. 99).

This point is similar to the point made in the discussion of the objective measure of industry stability. Specifically, if the measures accurately assess the constructs they were intended to represent and if the chief executives were ignoring the complexity of the industry, then a strong correlation would not be expected.

A potential explanation for the lack of correlation between perceptual complexity and decision making behavior, once again may be a function of organization size. Given two firms operating in the same industry, it is possible that larger organization would not be as greatly impacted by the complexity of the industry as would be the smaller firm. This explanation is consistent with Dalton and Kesner's (1985) notion that larger organizations enjoy environmental advantages over smaller firms because of a greater degree of organizational slack.

The final explanation will be investigated in the two hypotheses which follow. That is, the complexity of the environment may be related to the generation of alternatives rather than the complexity of decision making behavior.

The Indirect Effect of Perceptual Complexity Hypothesis, H3C

This hypothesis tests the indirect effect of perceptual complexity upon complexity of decision making behavior in the same manner as Hypothesis H2C tested the effect of perceptual stability. The rationale for the causal ordering is explained in Chapter 3.

Hypotheses 1 and H3A have provided the tests of the direct effects of number of alternatives and perceptual complexity upon decision making. This hypothesis examines the conceptualized relationships between all three variables.

Discussion. Hierarchical analysis was used to examine the indirect effect of the perceptual measure of industry complexity via the number of alternatives generated. Using a multiple regression, perceptual complexity was entered in the first step and number of alternatives generated was entered in the second. The indirect effect of perceptual industry complexity upon complexity of decision making was computed based on the difference between the regression coefficients of perceptual complexity in each step.

A significance test of the full model regression was shown to be significant at the 0.10 level ($p \leq .04$; see Table 4.8). The

Table 4.8. Full Regression Results for Complexity of Decision Making Behavior with Perceptual Industry Complexity and Alternatives Generated in a Study of Decision Making by Thirty-two Chief Executives of Manufacturing Firms Headquartered in the Southeastern U.S., 1979-1983^a

Source	DF	SS	MS	F	p	Multiple R ²
Model	2	19.29	9.65	3.53	.04	.20
Error	29	79.26	2.73			
Total	31	98.55				

^aFull Regression Equation: $Y = A + B_1 X_1 + B_2 X_2 + e$

where: Y = complexity of decision making behavior

A = regression constant

X_1 = perceptual measure of industry complexity

X_2 = number of alternatives generated

e = error term

indirect effect of the perceptual measure of industry complexity was .09 (-.19 - (-.28); see Table 4.9).

Further analysis of the semipartial correlation coefficients revealed that the majority of the relationship was accounted for, once again, by the alternatives generated variable ($sr = -.43$). This semipartial correlation coefficient was significant at the 0.10 level ($p \leq .02$). The semipartial correlation coefficient for perceptual industry complexity ($sr = -.16$) was not significant at the 0.10 level ($p \leq .34$). The addition of perceptual complexity to the regression equation does not add significantly to the relationship (see Table 4.9).

The significance tests for the correlations (reported in H1 and H3A) and the semipartial correlations (reported in H3C) show that there is not sufficient support for the indirect relationship between perceptual complexity and decision making behavior. The only statistically significant relationship is between the number of alternatives generated and complexity of decision making behavior.

In considering explanations of lack of significant findings, the arguments of organizational size and the measurement issue presented in the discussion of Hypothesis 2C also apply here. In addition, one other potential explanation is mentioned. This explanation is related to the work of the cognitive decision scientists who have empirically examined the models of decision making behavior. In both the initial study by Payne (1976) and the

Table 4.9. Hierarchical Analysis of Complexity of Decision Making with Perceptual Industry Complexity and Alternatives Generated in a Study of Decision Making by Thirty-two Chief Executives of Manufacturing Firms Headquartered in the Southeastern U.S., 1979-1983

Step	Variable	B	t	r	sr	p
1	Industry Complexity: Perceptual	-.19	-.59	-.11	-.11	.56
2	Industry Complexity: Perceptual	-.28	-.96	-.11	-.16	.34
	Number of Alternatives Generated	-.18	-2.58	-.41	-.43*	.02

*Significant at $p \leq .05$.

replication of Olshavsky (1979), the discussion of task complexity focused on the number of alternatives and the number of dimensions of information within each alternative. The results demonstrated that "... the most important determinant of complexity [of decision making] examined was clearly the number of alternatives available" (Payne, 1976, p. 384). In addition, Payne found that as the amount of information presented to the subjects increased, there was a subsequent increase in the variability of the responses and a decrease in the proportion of information used. There was also a decrease in the quality of the decision and an increase in the confidence of the decision maker in his or her choice. This increase in variability indicates a misuse of additional information and perhaps a misperception of the situation (i.e. the decision maker was confident about the choice despite the fact that choices were worse with added information). This is perhaps consistent with the findings in this hypothesis in that only information relating to the alternatives may have been used in making the choice.

The Indirect Effect of Objective Complexity Hypothesis, H3D

This hypothesis is intended to test the indirect effect of the objective measure of complexity upon decision making via the number of alternatives generated. The correlation between the three variables: alternatives generated; objective complexity, and decision making were generated and tested for significance.

Hypotheses 1 and 3B have tested the direct effects upon decision making behavior of alternatives generated and the objective measure of industry complexity, respectively.

Discussion. Once again, the hierarchical analysis incorporated a multiple regression. In this case, the objective measure of industry complexity was entered into the equation as the first independent variable. In the second step, the number of alternatives generated was entered into the equation. The significance test of the full model regression revealed that the regression equation was significant at the 0.10 level of acceptance. The multiple R^2 for the equation was .17 ($p \leq .06$; see Table 4.10).

The difference between the regression coefficients for the objective measure of industry complexity yielded the indirect effect of objective complexity upon complexity of decision making behavior via the number of alternatives generated. This value was $-.14$ ($.72 - .84$; see Table 4.11).

After computing overall significance, the semipartial correlation coefficients were reviewed. The semipartial coefficient for the objective complexity measure was .06, and a t-test of significance for this value was .75. Once again, the majority of the explained variance is accounted for by the number of alternatives generated which had a semipartial correlation coefficient of $-.41$ and a significance value of .02 (see Table 4.11).

The significance test of the Hypothesis 3D failed to demonstrate sufficient support for the indirect relationship between

Table 4.10. Full Regression Results for Complexity of Decision Making Behavior with Objective Industry Complexity and Alternatives Generated in a Study of Decision Making by Thirty-two Chief Executives of Manufacturing Firms Headquartered in the Southeastern U.S., 1979-1983^a

Source	DF	SS	MS	F	p	Multiple R ²
Model	2	17.07	8.54	3.04	.06	.17
Error	29	81.48	2.81			
Total	31	98.55				

^aFull Regression Equation: $Y = A + B_1X_1 + B_2X_2 + e$

where: Y = complexity of decision making behavior

A = regression constant

X_1 = objective measure of industry complexity

X_2 = number of alternatives generated

e = error term

Table 4.11. Hierarchical Analysis of Complexity of Decision Making with Objective Industry Complexity and Alternatives Generated in a Study of Decision Making by Thirty-two Chief Executives of Manufacturing Firms Headquartered in the Southeastern U.S., 1979-1983

Step	Variable	B	t	r	sr	p
1	Industry Complexity: Objective	.72	.25	.05	.05	.80
2	Industry Complexity: Objective	.86	.33	.05	.06	.75
	Number of Alternatives Generated	-.17	4.34	-.41	-.41*	.02

*Significant at $p \leq .05$.

objective industry complexity and complexity of decision making behavior via alternatives generated. Only the correlation between alternatives generated and decision behavior was statistically significant.

One explanation for lack of significant findings relating to the indirect effect of the objective measure of complexity is the same as discussed in Hypothesis 2D. That is, it is conceivable that by the time the strategic issue was addressed by the chief executive, he or she was focusing only on the issue at hand without regard for the complexity of the external environment. In effect, the nature of the issue had been "simplified" by decision units at lower levels of the organization (Woods, 1966), thereby resulting in a non-significant correlation between complexity of the external environment and number of alternatives generated.

An equally plausible explanation is one that relates to the concept of "conservatism" (Peterson, Schneider, & Miller, 1965). Conservatism implies that individuals do not extract as much information from additional data as possible assuming an optimal decision making process. Therefore, it is possible that even if the chief executive were aware of the complexity of the external environment, he or she might not use this information in searching for additional alternatives to address the issue. This question is examined later in this chapter in the post hoc analysis.

Observations Based on Results of Hypotheses 1 Through 3D

The hypotheses covered up to this point were intended to examine the complexity of decision making behavior of the chief executive in relation to a recent strategic issue facing his or her organization. In so doing, the number of alternatives generated, the complexity of the industry, and the stability of the industry were considered. The only hypothesis which was shown to have statistical significance was between number of alternatives and complexity of decision making behavior (Hypothesis 1). In the discussions of Hypotheses 2 and 3, various explanations based on measurement issues and previous literature were reviewed in an attempt to offer possible reasons for lack of statistically significant findings. Two of these explanations (i.e. organizational size and search for additional alternatives) are examined in the post hoc analyses. Unfortunately, other potential explanations could not be examined given the existing data set.

In conclusion, a quote from Simon (1976, p. 309) may be representative of the findings (or lack of findings) presented here:

An important proposition in organization theory asserts that each executive will perceive those aspects of the situation that relate specifically to the activities and goals of his department. The proposition is frequently supported by anecdotes of executives and observers in organizations, but little evidence of a systematic kind is available to test it. It is the purpose of this chapter to supply some such evidence.

The proposition we are considering is not peculiarly organizational. It is simply an application to organizational phenomena of a generalization that is central to any explanation of selective perception: Presented with a complex stimulus, the subject perceives in it what he is 'ready' to perceive; the more complex or

ambiguous the stimulus, the more the perception is determined by what is already 'in' the subject and the less what is 'in' the stimulus.

It is therefore offered, with strong warnings to the reader - due to lack of statistical significance in the tests of hypotheses, that the generation of alternatives and subsequent evaluation of these alternatives may have been divorced from environmental conditions and considerations. In other words, the chief executives in this study may have addressed the strategic issues based on the factors unique to the issue and based on his or her perceptions of the issue at that point in time.

The Economic Performance Hypothesis, H4

As developed in Chapter 2 and hypothesized in Chapter 3, it is possible that the manner in which decisions are made by the chief executive may have an impact on the economic performance of the firm. Hypothesis 4 examines this relationship.

Discussion. As discussed in Chapter 3, the economic performance of the firm was evaluated using three separate measures. These measures were: (a) percentage change in total sales; (b) return on assets; and (c) asset turnover. These measures were representative of growth, profitability, and efficiency, respectively, as indicators of economic performance relative to the firm's industries. In this hypothesis, as in the two subsequent hypotheses, the measures of economic performance serve as the dependent variable and complexity of decision making behavior is the independent variable.

Since there are three dependent measures, the first step was to test for correlations between them. The Pearson correlations showed that the three measures were not strongly correlated with one another; and the test of significance confirmed that none could be considered significant at the 0.10 level (see Table 4.2, p. 99). Therefore, it was acceptable to assume that the three measures of economic performance were indeed measuring separate aspects of firm performance and it was possible to run three separate univariate tests rather than use a multivariate statistical technique.

Three Pearson product-moment correlations were computed for the relationship between complexity of decision making behavior and all three measures of economic performance. In the first instance, decision making behavior was correlated with the change in total sales. The correlation coefficient was .10 which was not statistically significant. Correlating decision behavior with return on assets gave a .18 correlation. Finally, a correlation coefficient of -.17 between asset turnover and complexity of decision making behavior (see Table 4.2, p. 99) was computed. The significance tests in Hypothesis 4 did not provide support for the conclusion that the complexity of decision making behavior of the chief executive has a statistically significant impact on the economic performance of the firm.

There are at least three factors which may have contributed to the lack of statistically significant findings in the correlations examined in this hypothesis. The first factor is a measurement

problem and the second is related to the conceptual basis for this hypothesis. The third factor relates to Hypotheses 5B and 6B.

The first measurement problem relates to the manner in which the measures of economic performance were calculated. In all three measures (change in total sales, return on total assets, and asset turnover), the value for the individual firms was determined by comparing the firm performance on each with its industry measure for the same time period (see Appendix A for calculations). In other words, the values for the economic performance variables are difference scores between firm and industry. While this is a generally accepted way of evaluating the performance of a firm (Pearce & Robinson, 1982), it may be that the method of calculation yielded a measure similar to change scores (Campbell & Stanley, 1966), which may be unreliable because of measurement error. This issue will be addressed in the post hoc analysis.

The second explanation is based on the conceptual underpinnings of the hypothesis. This hypothesis was intended to test the conventional notion that the analysis of strategic issues is comprehensive and every relevant factor is taken into account in evaluating the issue and arriving at a solution. If this were true, it was inferred that firms in which chief executives exhibited complex decision making behavior would out-perform firms in which the chief executives employed more simplistic decision making behaviors. As Lindblom (1959) noted, executive decision making may be less purposeful and rational than it was traditionally believed to be. He also concluded that complex decision making was better suited to

small scale problem solving. Given Lindblom's conclusion, a statistically significant relationship between complexity of decision making behavior and economic performance might not be expected.

The final explanation is that the relationship between complexity of decision making behavior and economic performance is contingent upon environmental characteristics. At the organizational level, this has been addressed by several scholars (Anderson & Paine, 1975; Mintzberg, 1973; Fredrickson & Mitchell, 1984). Hypotheses 5 and 6 examine this question at the individual level of decision making, since there was no statistically significant direct relationship between the environmental characteristics and complexity of decision making behavior as tested previously (Hypotheses H2A through H3D).

The Contingency Effect of Perceptual Stability Hypothesis, H5A

This hypothesis was built from the foundation of Hypothesis 4. It states that the relationship between complexity of decision making behavior and economic performance is contingent upon the stability of the industry as perceived by the chief executive. This hypothesis was tested using a regression equation in which economic performance is the dependent variable and the independent variables are complexity of decision making behavior, perceptual stability, and an interaction term between decision making behavior and perceptual stability.

Discussion. In each case, the independent variables were entered into the regression equation sequentially. This was done by

entering the two main effects, complexity of decision making behavior and perceptual stability, and then the interaction term.

The first measure of economic performance to be tested was the change in total sales. With all independent variables entered into the equation, the multiple R^2 value was .07. This gives a significance measure of .54, which is not sufficient for the 0.10 level criterion (see Table 4.12). Therefore, the semipartial correlation coefficients were not evaluated, but were reported in Table 4.13.

The second measure of economic performance that was evaluated was return on total assets. Entering the two main effects first and then the interaction term, the multiple R^2 was .15. The significance calculation was .21 which is not sufficient for the 0.10 level. Again, the semipartial correlation coefficients were not analyzed since the overall regression equation was rejected (see Table 4.12).

The third and last measure of economic performance that was evaluated was asset turnover. With all three independent variables in the model, the multiple R^2 was .18. The significance value associated with this was .13 (see Table 4.12) and the hypothesis was rejected at the 0.10 significance level.

In none of the three cases did the significance test of multiple R^2 provide support for the hypothesized relationship in H5A. A possible explanation for the lack of significant findings may be that the manner in which perceptual stability was measured

Table 4.12. Full Regression Results for Change in Total Sales, Return on Total Assets, and Asset Turnover with Complexity of Decision Making Behavior and Perceptual Industry Stability in a Study of Decision Making by Thirty-two Chief Executives of Manufacturing Firms Headquartered in the Southeastern U.S., 1979-1983^a

Dependent Variable	Source	DF	SS	MS	F	P	Multiple R ²
Change in Total Sales	Model	3	3354749	1118250	.73	.54	.07
	Error	28	42794508	1528375			
	Total	31	46149257				
Return on Total Assets	Model	3	40151	13417	1.59	.21	.51
	Error	28	236409	8443			
	Total	31	276560				
Asset Turnover	Model	3	13.21	4.40	2.07	.13	.18
	Error	28	59.43	2.12			
	Total	31	72.64				

^aFull Regression Equation: $Y = A + B_1 X_1 + B_2 X_2 + B_3 X_{12} + e$

where: Y = change in total sales, return on total assets, or asset turnover

A = regression constant

X_1 = complexity of decision making behavior

X_2 = perceptual measure of industry stability

X_{12} = interaction between X_1 and X_2

e = error term

Table 4.13. Independent Variable Analysis of Complexity of Decision Making Behavior and Perceptual Industry Stability in a Study of Decision Making by Thirty-two Chief Executives of Manufacturing Firms Headquartered in the Southeastern U.S., 1979-1983

Dependent Variable	Independent Variable	B	t	r	sr	p
Change in Total Sales	Complexity of Decision Making	723.46	1.08	.10	.20	.29
	Industry Stability: Perceptual	357.22	.58	-.17	.11	.57
	Interaction	-139.20	-.98	-.10	-.18	.34
Return on Total Assets	Complexity of Decision Making	89.38	1.78	.18	.31*	.08
	Industry Stability: Perceptual	86.25	1.88	.18	.33*	.07
	Interaction	-17.25	-1.63	.19	-.29	.11
Asset Turnover	Complexity of Decision Making	-.34	-.43	-.17	-.07	.67
	Industry Stability: Perceptual	-.77	-1.06	-.40	-.18	.30
	Interaction	.05	.27	-.31	.05	.70

*Significant at $p \leq .10$

(i.e. asking for organizational impact over a five year period) was not consistent with the impact of the external environment on a particular strategic issue. As proposed in the discussion of Hypothesis 1 through 3D, it may be that each issue may be dealt with on its individual merits and the predispositions of the decision maker.

The Contingent Effect of Objective Stability Hypothesis, H5B

The contention here was that the relationship between complexity of decision making behavior and economic performance of the firm is contingent upon the interaction of decision making behavior and the objective measure of stability. The hypothesis was tested using multiple regression with economic performance as the dependent variable and decision making behavior, objective stability, and the interaction between the two as the independent variables.

Discussion. There were three repetitions performed using multiple regression. The dependent variables are, in order, change in total sales, return on assets, and asset turnover. The independent variables were entered into the regression equation as before, with the main effects of decision making behavior and objective stability entered first and second, respectively. Then, the interaction between decision making behavior and objective stability was entered.

In the case of the change in total sales, the full multiple regression equation had a multiple R^2 of .09. This gave a

significance value of .42, which is not consistent with the established level of significance (see Table 4.14).

With return on assets as the dependent variable, the regression equation with all three independent variables entered yielded a multiple R^2 value of .18 (see Table 4.14). A significance test of this value provided a value of .14. Again, this value did not meet the criterion level of significance and therefore the semipartial correlation coefficients of the individual independent variables were not examined (see Table 4.14).

Finally, asset turnover was used as the dependent variable and the regression equation was computed. The calculated multiple R^2 was .04. The significance value associated with this was .78, which does not meet the predetermined level, making further computation or evaluation unnecessary (see Tables 4.14 and 4.15).

In all three cases of the dependent variables, the tests of significance based on the multiple R^2 did not provide support for this hypothesis.

There are two considerations which pertain to the results of this hypothesis. First, the formulation of this hypothesis was based, in large part, on the work of Fredrickson and Mitchell (1984). Their overall conclusion was "...that strategic decision processes that are based on rational models are not appropriate for some environments" (p. 419). However, their study was done on the organizational level. In this study, the unit of analysis was the individual decision maker. Lang, Dittrich, and White (1978) pointed

Table 4.14. Full Regression Results for Change in Total Sales, Return on Total Assets, and Asset Turnover with Complexity of Decision Making Behavior and Objective Industry Stability in a Study of Decision Making by Thirty-two Chief Executives of Manufacturing Firms Headquartered in the Southeastern U.S., 1979-1983^a

Dependent Variable	Source	DF	SS	MS	F	P	Multiple R ²
Change in Total Sales	Model	3	4363356	1454452	.97	.42	.09
	Error	28	41785900	1492354			
	Total	31	46149256				
Return on Total Assets	Model	3	48447	16149	1.98	.14	.18
	Error	28	228212	8150			
	Total	31	276659				
Asset Turnover	Model	3	2.77	.92	.37	.78	.04
	Error	28	69.87	2.50			
	Total	31	72.64				

^aFull Regression Equation: $Y = A + B_1 X_1 + B_2 X_2 + B_3 X_{12} + e$

where: Y = change in total sales, return on total assets, or asset turnover

A = regression constant

X_1 = complexity of decision making behavior

X_2 = objective measure of industry stability

X_{12} = interaction between X_1 and X_2

e = error term

Table 4.15. Independent Variable Analysis of Complexity of Decision Making Behavior and Objective Industry Stability in a Study of Decision Making by Thirty-two Chief Executives of Manufacturing Firms Headquartered in the Southeastern U.S., 1979-1983

Dependent Variable	Independent Variable	B	t	r	sr	p
Change in Total Sales	Complexity of Decision Making	300.26	.84	.10	.15	.41
	Industry Stability: Objective	-893.06	-.19	.27	-.03	.85
	Interaction	824.13	.78	.15	.14	.44
Return on Total Assets	Complexity of Decision Making	-32.58	-1.23	.18	-.21	.23
	Industry Stability: Objective	706.08	2.05	.29	.35*	.05
	Interaction	-126.02	-1.60	-.01	-.28	.12
Asset Turnover	Complexity of Decision Making	-.24	-.52	-.17	-.10	.61
	Industry Stability: Objective	2.19	.36	.06	-.07	.72
	Interaction	-.25	-.19	.17	-.03	.85

*Significant at $p \leq .05$

out that considerable similarity exists between individual, group, and organizational decision making theories. The results of this hypothesis did not provide support for this notion.

The second consideration was indicated from an inspection of the correlation matrix (see Table 4.2, p. 99). The matrix shows that two of the measures of economic performance (change in total sales and return on total assets) were significantly correlated with the objective measure of industry stability at the $p \leq .10$ level. This indicates that those firms operating in stable environments "out-performed" those in unstable environments, relative to their respective industries. This is somewhat consistent with the theory that environment may be a primary determinant of performance (Lenz, 1980). One implication for this study is that the stability of the industry may have a greater impact on the performance of a firm than the decision making behavior of the chief executive. However, it is possible that the way in which economic performance of the firm was measured could have been a factor. Calculating economic performance for the firm as the difference between firm performance and industry performance (see Appendix A) may have "clouded" the relationship. This issue is addressed in the post hoc analysis.

The Contingent Effect of Perceptual Complexity Hypothesis, H6A

The intent of this hypothesis is to examine the relationship between complexity of decision making behavior and economic

performance in much the same manner as the two preceding hypotheses. In this case, the focus in the external environment has shifted from stability to complexity. Using multiple regression, the contention that the relationship between complexity of decision making behavior of the chief executive and the economic performance of the firm is contingent upon the perception of the complexity of the industry was evaluated.

Discussion. In all three instances, the independent variables were entered into the regression equation in a predetermined fashion. The decision making behavior variable was entered first, and then the perceptual measure of complexity. After the two main effects had been entered, the interaction term between the two was then entered.

The first dependent variable to be evaluated was total sales. In the full regression with both main effects and the interaction effect, the multiple R^2 was .07 which yielded a significance calculation of .55. Support was not provided for the full regression equation and it was unnecessary to further examine the individual variables (see Table 4.16).

Next, return on total assets was evaluated. The full regression in this instance had a multiple R^2 of .06. This value was not statistically significant at the 0.10 level of acceptance for significance, having a value of .60 (see Table 4.16).

Finally, the regression equation using asset turnover as the dependent variable was run. The multiple R^2 was .06 which gave a

Table 4.16. Full Regression Results for Change in Total Sales, Return on Total Assets, and Asset Turnover with Complexity of Decision Making Behavior and Perceptual Industry Complexity in a Study of Decision Making by Thirty-two Chief Executives of Manufacturing Firms Headquartered in the Southeastern U.S., 1979-1983^a

Dependent Variable	Source	DF	SS	MS	F	P	Multiple R ²
Change in Total Sales	Model	3	3298738	1099579	.72	.55	.07
	Error	28	42850518	1530375			
	Total	31	46149256				
Return on Total Assets	Model	3	17393	5798	.63	.60	.06
	Error	28	259266	9260			
	Total	31	276659				
Asset Turnover	Model	3	4.22	1.41	.58	.64	.06
	Error	28	68.42	2.44			
	Total	31	72.64				

^aFull Regression Equation: $Y = A + B_1 X_1 + B_2 X_2 + B_3 X_{12} + e$

where: Y = change in total sales, return on total assets, or asset turnover

A = regression constant

X_1 = complexity of decision making behavior

X_2 = perceptual measure of industry complexity

X_{12} = interaction between X_1 and X_2

e = error term

significance value of .64 (see Table 4.16). As with the two previous regression runs, it was not necessary to proceed further in the evaluation of this regression for the purposes of testing the stated hypothesis, but the values for individual variables are reported in Table 4.17.

In each instance, the significance tests failed to provide support for the hypothesis that there is a relationship between a firm's economic performance and complexity of decision making behavior of the chief executive and that this relationship is contingent upon the perceptual measure of industry complexity.

As with Hypothesis 5A, the way in which perceptual complexity was measured may have possibly accounted for the lack of significance, if indeed, a true relationship existed.

The Contingent Effect of Objective Complexity Hypothesis, H6B

This hypothesis was designed to test the effect of the impact of the objective measure of complexity on the relationship between complexity of decision making behavior and the economic performance of the firm. This hypothesis also utilized multiple regression as its statistical technique. There are three repetitions performed to test this hypothesis. The three dependent variables are, in order of presentation, change in total sales, return on total assets, and asset turnover.

Discussion. In each test of this hypothesis, the independent variables were entered into the equation in the following

Table 4.17. Independent Variable Analysis of Complexity of Decision Making Behavior and Perceptual Industry Complexity in a Study of Decision Making by Thirty-two Chief Executives of Manufacturing Firms Headquartered in the Southeastern U.S., 1979-1983

Dependent Variable	Independent Variable	B	t	r	sr	p
Change in Total Sales	Complexity of Decision Making	-256.20	-.54	.10	-.10	.59
	Industry Complexity: Perceptual	-159.12	-.27	.19	-.05	.79
	Interaction	94.58	.75	.23	.14	.46
Return on Total Assets	Complexity of Decision Making	-18.68	-.51	.18	-.09	.62
	Industry Complexity: Perceptual	-42.03	-.92	-.12	-.17	.36
	Interaction	7.67	.78	.12	.14	.44
Asset Turnover	Complexity of Decision Making	-.26	-.43	-.17	-.08	.67
	Industry Complexity: Perceptual	.10	.14	.18	.03	.89
	Interaction	.04	.22	-.03	.04	.83

order: complexity of decision making behavior; objective measure of complexity; and the interaction term.

For the equation with total sales as the dependent variable, with all three independent variables entered into the regression equation, the multiple R^2 was .04 and the significance value associated was .75. Therefore, the regression equation was not supported at the 0.10 level for total sales (see Table 4.18).

With return on assets as the dependent variable and all three independent variables entered, the multiple R^2 was .03 and the significance value was .80 (see Table 4.18).

In the final case with asset turnover as the dependent variable, there was also no support provided for the hypothesis. The multiple R^2 was .08 and the significance test of this value was .51 (see Table 4.18). There was no need for further analysis of the independent variables since the overall regression equations were not supported (see Table 4.19).

As with the objective measure of stability, the significance tests of the hypothesis which tested for the impact of objective complexity upon the relationship of decision making behavior with economic performance did not provide support for the hypothesis.

Observations Based on Results of Hypothesis 4 Through 6B

These hypotheses examined the relationship between economic performance of the firm and complexity of decision making behavior of the chief executive. In looking at this relationship the impacts of environmental stability and complexity upon this relationship

Table 4.18. Full Regression Results for Change in Total Sales, Return on Total Assets, and Asset Turnover with Complexity of Decision Making Behavior and Objective Industry Complexity in a Study of Decision Making by Thirty-two Chief Executives of Manufacturing Firms Headquartered in the Southeastern U.S., 1979-1983^a

Dependent Variable	Source	DF	SS	MS	F	P	Multiple R ²
Change in Total Sales	Model	3	1898827	632942	.40	.75	.04
	Error	28	44250429	1580372			
	Total	31	46149256				
Return on Total Assets	Model	3	9589	3196	.34	.80	.03
	Error	28	267070	9538			
	Total	31	276659				
Asset Turnover	Model	3	5.67	1.89	.79	.51	.08
	Error	28	66.97	2.39			
	Total	31	72.64				

^aFull Regression Equation: $Y = A + B_1 X_1 + B_2 X_2 + B_3 X_{12} + e$

where: Y = change in total sales, return on total assets, or asset turnover

A = regression constant

X_1 = complexity of decision making behavior

X_2 = objective measure of industry complexity

X_{12} = interaction between X_1 and X_2

e = error term

Table 4.19. Independent Variable Analysis of Complexity of Decision Making Behavior and Objective Industry Complexity in a Study of Decision Making by Thirty-two Chief Executives of Manufacturing Firms Headquartered in the Southeastern U.S., 1979-1983

Dependent Variable	Independent Variable	B	t	r	sr	p
Change in Total Sales	Complexity of Decision Making	272.72	.58	.10	.11	.56
	Industry Complexity: Objective	-373.49	-.08	.16	-.01	.94
	Interaction	-208.84	.46	.01	.08	.65
Return on Total Assets	Complexity of Decision Making	16.14	.44	.18	.08	.66
	Industry Complexity: Objective	-79.16	-.21	-.01	-.04	.83
	Interaction	15.27	.18	-.15	.03	.86
Asset Turnover	Complexity of Decision Making	-.77	-1.33	-.17	-.24	.19
	Industry Complexity: Objective	7.24	1.23	.09	.23	.23
	Interaction	-1.47	-1.12	.14	-.20	.27

were also considered. None of the hypotheses were shown to be statistically significant. In attempting to account for lack of statistical significance in the results, several issues were mentioned. Among these were: measurement problems in the dependent variables; measurement problems in the perceptual measures; lack of theoretical consistency between organizational and individual decision behavior; and overriding impact of environmental factors on economic performance. The first and fourth explanations are examined further in the post hoc analysis.

The development of these hypotheses was based upon the premise that chief executives who exhibited decision making behavior which was consistent with their external environment would be rewarded with superior economic performance. In other words, certain types of decision making behavior are appropriate for certain environmental conditions. However, the results of the hypotheses failed to provide support for this. This may have been because: (a) organizational performance is a multiply determined phenomenon (Lenz, 1980); (b) there was a change in the external factors which overwhelmed the relationship between economic performance and complexity of decision making behavior; and (c) as indicated in the discussion of Hypotheses 1 through 3D, decision making behavior was related to the particular strategic issue, which may be unique, rather than reflective of environmental conditions.

Post Hoc Analysis

The post hoc analysis addresses four factors which were not specifically identified in the formulation of the theoretical

hypotheses. These factors arose as potential explanations based on the results of the correlation matrix (see Table 4.2, p. 99) and the discussion of the findings from testing the stated hypotheses. The four factors are: (a) organizational size; (b) search for additional alternatives; (c) measurement of economic performance; and (d) impact of environmental factors on economic performance. The initial two factors are related to Hypothesis 1 through Hypothesis 3D and the latter two factors are related to Hypothesis 4 through Hypothesis 6B.

The remainder of this section discussed the findings of the post hoc analysis on each of these four factors as well as how they relate to the theoretical hypotheses previously tested in this chapter.

Organizational Size

It was mentioned in the discussions of the hypotheses dealing with the impact of the environmental factors upon complexity of decision making behavior (H2A through H3D) that organizational size may have been a factor which contributed to the lack of significant findings in the testing of these hypotheses. To examine this contention, the number of employees for each of the firms in the study was taken from Moody's Industrial Manual for 1983, which was the last year used in this study.

In the discussion of Hypotheses 2A through 2D, it was mentioned that perhaps chief executives of larger organizations did not

perceive the impact of industry stability to be as great as the impact on smaller organizations. This was shown to be the case, based on the results of the correlation matrix. The perceptual measure of industry stability was negatively correlated with organizational size ($r = -.27$, $p \leq .10$; see Table 4.20). However, further analysis of coefficients produced using multiple regression did not support the notion that once the effect of organizational size had been removed, there would be a correlation between the perceptual measure of industry stability and complexity of decision making behavior (see Table 4.21).

In the other hypotheses in which size was mentioned as a possible confounding factor (H3A through H3D), there was no evidence of this in the correlation matrix (see Table 4.20) or in the calculation of partial correlations between variables controlling for size (see Table 4.22).

In conclusion, it was shown that organizational size was significantly correlated with the perceptual measure of industry stability, which indicates that the impact of environmental stability is perceived as being greater by the chief executives of smaller organizations. However, controlling for organizational size did not lead to statistically significant partial correlations between the variables examined in testing Hypotheses 2A through 3D and therefore, does not add to the predictive capability of these hypotheses.

Table 4.20. Post Hoc Correlation Matrix of Variables in a Study of Decision Making by Thirty-two Chief Executives of Manufacturing Firms Headquartered in the Southeastern U.S., 1979-1983

Variable	1	2	3	4	5	6	7	8
1. Complexity of Decision Making Behavior	1.00	-.41**	.04	.18	-.11	.05	-.06	-.08
2. Number of Alternatives Generated		1.00	.10	.12	-.13	.02	-.16	-.12
3. Industry Stability: Perceptual			1.00	-.09	-.82**	-.05	-.27*	-.17
4. Industry Stability: Objective				1.00	.17	.25*	.10	-.26*
5. Industry Complexity: Perceptual					1.00	.17	.10	.18
6. Industry Complexity: Objective						1.00	-.03	-.38**
7. Organizational Size							1.00	-.01
8. Search for Additional Alternatives								1.00

*Significant at $p < .10$

**Significant at $p < .01$

Table 4.21. Multiple Regression Results for Complexity of Decision Making Behavior with Organizational Size and Perceptual Industry Stability in a Study of Decision Making by Thirty-two Chief Executives of Manufacturing Firms Headquartered in the Southeastern U.S., 1979-1983

Variable	B	t	r	sr	p
Organizational Size	-.0004	-.29	-.06	-.05	.77
Industry Stability: Perceptual	.0490	.15	.04	.03	.88

Table 4.22. Partial Correlation Matrix of Variables Controlling for Organizational Size in a Study of Decision Making by Thirty-two Chief Executives of Manufacturing Firms Headquartered in the Southeastern U.S., 1979-1983

Variable	1	2	3	4	5	6
1. Complexity of Decision Making Behavior	1.00	-.43**	.03	.18	-.10	.05
2. Number of Alternatives Generated		1.00	.06	.13	-.11	.02
3. Industry Stability: Perceptual			1.00	-.07	-.83**	-.06
4. Industry Stability: Objective				1.00	.16	.25*
5. Industry Complexity: Perceptual					1.00	.18
6. Industry Complexity: Objective						1.00

*Significant at $p \leq .10$

**Significant at $p \leq .01$

Search for Additional Alternatives

In the discussions of Hypotheses 2C and 3D, the search for additional alternatives was presented as a potential confounding factor for the tests of these hypotheses. Since this information was obtainable from the interview questionnaire, it is examined here. Each chief executive's response was recorded on a six-point Likert-type scale ranging from no additional search, one, to a very large amount of search, six (see Appendix B, Section IV, Item 2, Part A).

In the case of Hypothesis 2C, it was suggested that in larger organizations, the alternative solutions to a strategic issue were likely generated at lower levels of the firm and passed up through the organizational levels to the chief executive. Consequently, the chief executive of a large firm would not expend a great amount of effort searching for additional alternatives, but instead would make the decision from the alternatives he or she was presented. Unfortunately, a statistically significant correlation did not exist between organizational size and search by chief executives for additional alternatives (see Table 4.20). Therefore, it cannot be concluded that chief executives of larger organizations are less likely to search for additional alternatives than chief executives of smaller firms.

In the discussion of Hypothesis 3D, the concept of "conservatism" was presented as a factor which may have had a role in the lack of statistically significant findings. Specifically,

conservatism implies that chief executives of manufacturing firms operating in complex environments would be no more likely to search for additional alternatives than chief executives of manufacturing firms operating in simpler environments. Along this line, the correlation matrix in Table 4.20 produced some interesting results. There was a negative correlation between search for additional alternatives and the objective measure of industry complexity that was significant at the .05 level ($r = -.38$). This indicates that the more complex the industry, the less likely the chief executive was to search for additional alternatives. Since complexity relates to the amount of information available, this finding perhaps demonstrates that in more complex industries, chief executives avoided searching for additional alternatives in response to strategic issues. Hence, it could be said that conservative search behavior was present.

The search for additional alternatives was also negatively correlated with the objective measure of industry stability ($r = -.26$, $p \leq .10$; see Table 4.20). Since stability is indicative of predictability of industry events, it may have been that chief executives of manufacturing firms in less stable (i.e. less predictable) industries engaged in a greater search in an attempt to reduce the unpredictability of the situation.

A final observation on the search factor is the relationship between search for additional alternatives and the number of alternatives generated. There was no statistically significant

relationship between these two variables ($r = -.12$; see Table 4.20). Intuitively, it would be expected that the more a chief executive searched for additional alternatives, the greater the number of alternatives which would be generated. While the interpretation of non-significance is severely limited, it appears that, for whatever reason, additional search may have been a fruitless activity. This finding lends itself to the notion of "conservatism" in that the chief executives may not have used the information generated from the search for additional alternatives effectively. Subsequent analyses of the value produced using a multiple regression to examine the relationship between search and alternatives generated while controlling for complexity and stability did not demonstrate statistical significance (see Table 4.23 and 4.24).

In summary, although the search for additional alternatives was significantly related to the objective measures of industry complexity and industry stability, it was not shown that the search for additional alternatives was "hiding" a relationship between the external environment and the generation of alternatives.

Measurement of Economic Performance

In the discussion of Hypothesis 4, it was mentioned that the way in which economic performance was measured yielded a measure similar to change scores. Since change scores may increase the likelihood of measurement error (Campbell & Stanley, 1966), these results were recalculated using hierarchical analysis to minimize

Table 4.23. Multiple Regression for Number of Alternatives Generated with Search for Additional Alternatives and Objective Industry Complexity in a Study of Decision Making by Thirty-two Chief Executives of Manufacturing Firms Headquartered in the Southeastern U.S., 1979-1983

Variable	B	t	r	sr	p
Search for Additional Alternatives	-.30	-.66	-.12	-.12	.52
Industry Complexity: Objective	-1.30	-.14	-.03	-.03	.89

Table 4.24. Multiple Regression for Number of Alternatives Generated with Search for Additional Alternatives and Objective Industry Stability in a Study of Decision Making by Thirty-two Chief Executives of Manufacturing Firms Headquartered in the Southeastern U.S., 1979-1983

Variable	B	t	r	sr	p
Search for Additional Alternatives	-.21	-.50	-.12	-.09	.62
Industry Stability: Objective	3.19	.51	.12	.09	.61

this error. Specifically, rather than reporting economic performance as the difference between the firm and its industry, these measures were separated. Then, using hierarchical analysis, economic performance of the firm was the dependent variable, and economic performance of the industry was entered as the first independent variable. The remaining variables were then entered as prescribed by the hypotheses (Campbell & Stanley, 1966; Cohen & Cohen, 1983).

To determine whether or not measurement error was hiding any true relationships, Hypothesis 4 was re-examined using hierarchical analysis for all three measures of economic performance (change in total sales, return on total assets, and asset turnover).

In addition, for the four remaining hypotheses (H5A, H5B, H6A, and H6B), the measures of economic performance which resulted in the highest R^2 values in the initial tests of the hypotheses were used to re-evaluate these relationships. In the cases of significant R^2 values for the post hoc analyses, specific relationships between variables were examined.

In the case of Hypothesis 4, the only R^2 value which was shown to be statistically significant was asset turnover (see Table 4.25). However, closer analysis of the variables reveals that the correlation between asset turnover for the firm and asset turnover for the industry accounts for the significance of the relationship (see Table 4.26). There was no significant relationship between

Table 4.25. Post Hoc Analysis of Economic Performance of the Firm in a Study of Decision Making by Thirty-two Chief Executives of Manufacturing Firms Headquartered in the Southeastern U.S., 1979-1983^a

Dependent Variable	Source	DF	SS	MS	F	P	Multiple R ²
Change in Total Sales for the Firm	Model	2	632060	316030	.20	.82	.12
	Error	29	45636762	1583681			
	Total	31	46268822				
Return on Total Assets for the Firm	Model	2	22348	11174	1.26	.30	.28
	Error	29	257162	8868			
	Total	31	279510				
Asset Turnover for the Firm	Model	2	18.98	9.49	4.08	.03	.47*
	Error	29	67.49	2.33			
	Total	31	86.47				

*Significant at $p \leq .05$

^aFull Regression Equation: $Y = A + B_1 X_1 + B_2 X_2 + e$

where: Y = change in total sales for the firm, return on total assets for the firm, or asset turnover for the firm

A = regression constant

X_1 = change in total sales for the industry, return on total assets for the industry, or asset turnover for the industry

X_2 = complexity of decision making behavior

Table 4.26. Independent Variable Analysis of Asset Turnover for the Firm in a Study of Decision Making by Thirty-two Chief Executives of Manufacturing Firms Headquartered in the Southeastern U.S., 1979-1983

Variable	B	t	r	sr	p
Asset Turnover for the Industry	.68	2.43	.43	.40*	.02
Complexity of Decision Making Behavior	-.17	-1.10	-.25	-.18	.28

* Significant at $p \leq .05$

asset turnover for the firm and complexity of decision making behavior of the chief executive.

The post hoc analysis of the remaining hypotheses also failed to demonstrate that measurement error may have been responsible for covering up any statistically significant relationships (see Table 4.27). Again, the only R^2 value which was shown to be statistically significant was asset turnover as tested in Hypothesis 6B. Evaluation of the variables revealed that the only significant relationship was between the asset turnover of the firm and the asset turnover of the industry (see Table 4.28).

In summary, there is no evidence that the way in which economic performance was originally measured and tested in the initial calculations contained measurement error which was "hiding" relationships between the criterion and predictor variables.

Impact of Environmental Factors

Finally, the correlation matrix presented in Table 4.2 (p. 99) demonstrates correlations between the measures of industry stability and economic performance. Specifically, both change in total sales and return on total assets were correlated with the objective measure of industry stability ($r = .27$; $r = .29$, respectively). Also, asset turnover was negatively correlated with the perceptual measure of industry stability ($r = -.40$, $p \leq .05$; see Table 4.2, p. 99).

The correlation of change in total sales and return on total assets with the objective measure of industry stability is not

Table 4.27. Post Hoc Hierarchical Analysis for Economic Performance of the Firm in a Study of Decision Making by Thirty-two Chief Executives of Manufacturing Firms Headquartered in the Southeastern U.S., 1979-1983

Variable (Hypothesis)	Source	DF	SS	MS	F	P	Multiple R ²
Return on Total Assets (5A)	Model	4	55496	13824	1.67	.19	.45
	Error	27	224014	8297			
	Total	31	279510				
Return on Total Assets (5B)	Model	4	52475	13119	1.56	.21	.43
	Error	27	227034	8409			
	Total	31	279509				
Change in Gross Sales (6A)	Model	4	3567021	891755	.56	.69	.28
	Error	27	42701800	1581548			
	Total	31	46268821				
Asset Turnover (6B)	Model	4	22.99	5.75	2.44	.07	.52*
	Error	27	63.48	2.35			
	Total	31	86.47				

* Significant at $p \leq .10$

Table 4.28. Independent Variable Analysis of Asset Turnover for the Firm in a Study of Decision Making by Thirty-two Chief Executives of Manufacturing Firms Headquartered in the Southeastern U.S., 1979-1983

Variable	B	t	r	sr	p
Asset Turnover for the Industry	.66	2.34	.43	.39*	.08
Complexity of Decision Making Behavior	-.84	-1.47	-.25	-.24	.15
Industry Complexity: Objective	7.61	1.31	.06	.22	.20
Interaction	-1.57	-1.21	.19	-.20	.24

* Significant at $p \leq .05$.

easily explained. The only feasible explanation relates to measurement of the constructs. Since the measures of economic performance (i.e. change in total sales and return on total assets) are calculated as the difference between the firm and the industry, it is possible that in stable (unchanging) industries, the five year average for economic performance is also relatively stable. Therefore, firms operating in stable industries may be more likely to compare favorably, particularly in regard to change in total sales. In conjunction with this, if some degree of self-selection in the sample is operating, such that only the chief executives who believe their organizations to be successful were willing to be interviewed, then this explanation becomes even more credible.

The negative correlation between asset turnover and the perceptual measure of industry stability is more readily understandable. It is possible that chief executives of manufacturing firms who perceived the environment as unstable might focus on organizational efficiency (as measured by asset turnover). This is consistent with the literature in strategic management (Thompson & Strickland, 1984).

Unfortunately, controlling for the measures of perceptual and objective industry stability did not reveal subsequent relationships between complexity of decision making behavior and economic performance (see Tables 4.29 and 4.30).

Table 4.29. Partial Correlation Matrix of Variables Controlling for Organizational Size in a Study of Decision Making by Thirty-two Chief Executives of Manufacturing Firms Headquartered in the Southeastern U.S., 1979-1983

Variable	1	2	3	4
1. Complexity of Decision Making Behavior	1.00	.11	.18	-.16
2. Change in Total Sales		1.00	.10	-.13
3. Return on Total Assets			1.00	.06
4. Asset Turnover				1.00

Table 4.30. Partial Correlation Matrix of Variables Controlling for Objective Measure of Industry Stability in a Study of Decision Making by Thirty-two Chief Executives of Manufacturing Firms Headquartered in the Southeastern U.S., 1979-1983

Variable	1	2	3	4
1. Complexity of Decision Making Behavior	1.00	.06	.14	-.18
2. Change in Total Sales		1.00	-.01	-.07
3. Return on Total Assets			1.00	-.04
4. Asset Turnover				1.00

Summary

This chapter began with the presentation and a brief discussion of the descriptive statistics of the variables used in the study. Statistics which were calculated included the mean, standard deviation, minimum value, and maximum value. In addition, the restrictions of the perceptual measures were discussed as well as the objective measures.

In the second section of this chapter, the inferential tests of the hypotheses were performed and reported. It was also explained that the six main hypotheses could be divided into two sets. The first set of hypotheses evaluated complexity of decision making behavior of the chief executive as the dependent measure. The direct and indirect effects of number of alternatives, industry stability, and industry complexity upon decision making were tested. In this first set of hypotheses, the only one shown to be statistically significant was Hypothesis 1. A strong correlation between number of alternatives generated and complexity of decision making existed. In the discussions of the hypotheses, various explanations for the findings were offered.

The remaining set of hypotheses examined the relationship between the dependent variable, economic performance, and the independent variable, which is now complexity of decision making. The contingent effects of industry stability and industry complexity were also tested. None of these hypotheses received support based on tests of statistical significance.

The final section of this chapter involved the post hoc analysis of four factors mentioned in the discussions of the hypotheses tests which may have contributed to the lack of statistically significant findings. Specifically, the four factors were: (a) organizational size; (b) search for additional alternatives; (c) measurement of economic performance; and (d) impact of environmental factors on economic performance. The evaluation of these variables provided tentative support for the explanation of conservatism in decision making, but did not add to the statistical significance of the stated hypotheses. The implications of the results of the study are discussed in the following chapter.

CHAPTER V

SUMMARY AND CONCLUSION

Specifically, the purposes of this chapter are: (a) to summarize briefly the purpose of the study, the literature review, the theoretical hypotheses, the methodology used, and the major results; (b) to discuss the implications of the study; (c) to describe the limitations of the study; and (d) to suggest areas of future research.

Purpose of the Study

There were essentially three purposes of this dissertation: (a) to integrate cognitive decision making literature with the strategic management literature; (b) to conduct an empirical study of the complexity of decision making behavior of executives responsible for making strategic decisions; and (c) to discover what relationships, if any, exist between the interaction of chief executive decision making and the stability and/or complexity of the industry and organizational performance.

Literature Review

For many years, academic researchers have studied the decision making behavior of individuals. A significant amount of this effort has been devoted to the development of models which explain this behavior (Payne, 1982). One of the more notable contributions was provided by March and Simon (1958) in their bounded rationality concept. Essentially, the premise was that there is a limited amount of knowledge available to the decision maker concerning alternative courses of action. This led to the distinction between "satisficing" and "optimizing" behaviors. In other words, that there are instances where the decision maker will settle for a course of action that is satisfactory, rather than optimal.

Research growing from this basis has focused on decision making behavior under various circumstances. In simpler terms, researchers have tried to model decision making behavior, as well as examine when an individual is likely to use one model of decision behavior rather than another. The more general models that have been researched and used in this study are: (1) cost/benefit; (2) additive; (3) additive difference; (4) attribute dominance; (5) conjunctive; and (6) lexicographic (Olshavsky, 1979; Payne, 1976, 1982). These models can be considered as alternative-based decision making models or attribute-based decision making models. In the alternative-based models (cost/benefit, additive, and additive difference), the total alternative is used as the basis for making

the decision. Conversely, the attribute-based models (attribute dominance, conjunctive, and lexicographic) use specific attributes of the alternatives as the basis for making a decision.

Studies related to these models have shown that as a problem becomes more complex, there is a tendency for an individual to use a less complex decision making process. Therefore, the type of decision making behavior used by the individual is dependent upon the nature of the decision task or problem being examined.

In the literature of strategic management, there have also been studies which looked at decision making as a contingent phenomenon, but these have been done on the organizational level of analysis. The conclusions for organizational decision making is similar to those of the cognitive decision scientists. Specifically, the more complex decision processes are appropriate for firms operating in a stable environment, but not for firms in unstable environments (Anderson & Paine, 1975; Fredrickson, 1983; Fredrickson & Mitchell, 1984; Mintzberg, 1973; Nutt, 1976).

Using the conclusions from these two bodies of literature and given the concept that the strategic management of the organization is the responsibility of top management (Hodgetts & Wortman, 1980), it is logical to hypothesize that the differences in the tasks an individual chief executive faces as well as the particular environment in which the firm must operate will have an impact on how a chief executive addresses a strategic issue.

Theoretical Hypotheses

There were six major hypotheses which evolved from the study of these two bodies of literature. These hypotheses were divided into two sets of hypotheses. In the first set, complexity of decision making behavior was the dependent variable and in the second set economic performance was the dependent variable.

Hypothesis 1 stated that there was a direct negative linear relationship between the number of alternatives generated and the complexity of decision making behavior of the chief executive. The second hypothesis contained four parts. The first two parts, H2A and H2B, stated the direct relationships of: (a) the perceived stability of the industry and (b) the objective stability of the industry with the complexity of decision making behavior, respectively. The remaining two parts of this hypothesis, H2C and H2D, indicated an indirect relationship of perceptual and objective stability with complexity of decision making behavior, mediated by the number of alternatives generated. All four parts of the third hypothesis, H3A through H3D, were phrased in the same manner as the four parts of Hypothesis 2. The difference was that industry complexity was examined rather than industry stability.

The fourth hypothesis, H4, declared a direct relationship between complexity of decision making behavior of the chief executive and economic performance of the firm.

Economic performance of the firm was measured on three dimensions. These were: (a) change in total sales; (b) return on

total assets; and (c) asset turnover. Therefore, three tests of Hypothesis 4 were required. This was also true for the remaining hypotheses, which were tested when Hypotheses 2 and 3 were not supported. The fifth main hypothesis stated that the relationship between complexity of decision making behavior and economic performance was contingent upon industry stability. This hypothesis was broken down into two parts in which Hypothesis 5A focused on the perceptual measure of industry stability and Hypothesis 5B looked at the objective measure of industry stability. The sixth hypothesis, including H6A and H6B, provided a test of the relationship between complexity of decision making behavior and economic performance as being contingent upon industry complexity. The breakdown between the A and B parts denoted the separate effects of the perceptual measure of industry complexity and the objective measure of industry complexity, respectively.

Methodology

To test the hypothetical statements statistically, nine different variables were required, including: change in total sales; return on total assets; asset turnover; complexity of decision making behavior of the chief executive; number of alternatives generated; objective measure of stability; perceptual measure of stability; objective measure of complexity; and perceptual measure of complexity. The complexity of decision making behavior, number of alternatives generated and perceptual measures provided primary data which were obtained from a structured

interview questionnaire. The other information was gathered from secondary sources. The measures of economic performance for the firms were determined by taking firm performance figures from company financial statements and gathering data on the financial condition for the industry in which the firm exists and then comparing the two. By standardizing firm performance in this manner, comparisons could be made across industries. The objective measures of industry stability and complexity were calculated using industry figures given in the Census of Manufactures.

The sample firms used in the study were selected by executing a computer search of the Disclosure II 100 data base. The firms had to be traded publicly, medium to large in terms of organizational size (\$500,000 or more in net worth and 100 or more employees), and headquartered in the southeastern United States.

The statistical tests which were used to test the hypotheses were Pearson product-moment correlation, multiple regression, and hierarchical regression. In addition, descriptive statistics were calculated on the measures used in the study. These descriptive statistics included the calculation of mean, ranges, standard deviations, minimum values and maximum values of the measures.

Major Results

The six basic hypotheses were divided into two sets. The first set of hypotheses (H1 through H3D) examines the effect upon decision making behavior of: (1) number of alternatives generated;

(2) stability of the industry; and (3) complexity of the industry. In this set of hypotheses, decision making behavior is the dependent variable. The second set of hypotheses (H4 through H6B) examines the relationship between decision making behavior and economic performance. In this set, economic performance is the dependent variable.

Finally, the post hoc analysis looked at four factors covered in the discussion of the hypotheses as potential explanations for the lack of statistically significant findings.

Decision Making Behavior as the Dependent Variable

In the case of the first hypothesis, a Pearson product-moment correlation was calculated to test the relationship between complexity of decision making behavior of the chief executive and the number of alternatives generated to address a strategic issue. A test for the statistical significance of this relationship indicated that the hypothesis was supported at the alpha level of .01 (alpha level = .10 required for acceptance).

In the remainder of the hypotheses in this set (H2A through H3D), the tests of statistical significance performed on the zero-order correlations and hierarchical regressions failed to yield support for these hypotheses. Therefore, none of the hypothesized direct or indirect paths could be supported based on the results of this study.

Economic Performance as the Dependent Variable

A Pearson product-moment correlation was calculated for the relationship between economic performance and decision making behavior of the chief executive. Three repetitions were performed using three separate measures of economic performance. These three measures were change in total sales, return on total assets, and asset turnover. In all three cases, the tests of statistical significance of these correlations failed to provide support for the hypothesized relationships.

In the fifth hypothesis, the contingent effects of stability upon this relationship was tested using multiple regression. Both perceptual and objective measures of stability were used for each iteration, making a total of six separate statistical tests. The evaluation of statistical significance failed to provide support for any of the six hypotheses.

The sixth hypothesis, which focused on the contingent effects of complexity, was also tested using multiple regression. Three iterations were performed using both perceptual and objective measures of complexity for a total of six regression runs. In all instances, statistical tests of significance failed to provide support for any of them.

Post Hoc Analysis of Factors

The post hoc analysis dealt with four factors related to conceptual discussions of the study findings. These factors were

organizational size, search for additional alternatives, measurement of economic performance, and impact of environmental factors on economic performance. While none of these variables was truly a confounding factor in relation to the stated hypotheses, examination of them possibly provided further understanding of the decision making behavior of the chief executive in relation to a strategic issue. Specifically, the evaluation of organizational size suggests that this may affect the chief executive's perception of the stability of the environment. Also the evaluation of the search for additional alternatives indicates that the concept of "conservatism" may have been affecting the chief executive's decision making behavior.

Implications of the Study

This study suggests that there is definitely a relationship between the complexity of decision making behavior of chief executives and the number of alternatives generated to address a given strategic issue. This is important for the following three reasons.

First, it has been assumed by many management scholars that the decision making behavior that chief executives exhibit when addressing strategic issues is rational. In other words, the final choice of an alternative is based on a thorough, exhaustive evaluation of all alternatives and the solution that provides the best response is selected. March and Simon (1958) would have

referred to this as "optimizing" behavior. Based upon this study's empirical evidence, that as the strategic issue increases in complexity (i.e. more alternatives), there is a tendency for the chief executive to use some type of simplifying process which discounts the need for each alternative to be fully evaluated before a choice is made. The implication is that regardless of the importance of the issue (i.e. the fact that it is strategic), the decision making behavior of the chief executive differs in relation to the number of alternatives generated in addressing a strategic issue.

Second, although many management scholars have viewed executive decision making as a rational process, there are other scholars who believe the process is not rational, but rather incremental in nature (Lindblom, 1959; Wrapp, 1967). Neither of these contentions is based upon empirical research. This study provides the empiricism and also implies that neither of the two perspectives is entirely accurate, nor entirely inaccurate. Rather, as the cognitive decision scientists (Payne, 1976; Olshavsky, 1979) attest, it is related to the complexity of the strategic issue in question.

Third, there is the implication that the chief executive may not be acting in the best interests of his or her organization. Since the complexity of decision making behavior of the chief executive is related to the number of alternatives generated, then it is possible that in situations involving a large number of alternatives, the chief executive may not be selecting the best

solution for the organization. This indicates the need for chief executives to possibly re-evaluate their decision making behavior and realize that when dealing with complex issues of major importance to the organization, it may be better to resist the tendency to resort to simplifying decision behavior, because this may lead to the elimination of alternatives which, on further evaluation, may provide a better solution to the problem than the alternatives which remain.

Regarding the impact of the external environment on chief executive decision making behavior, this study did not provide sufficient support for the contention that the complexity of decision making behavior is related to the stability or complexity of the environment, either directly or indirectly. Coupled with the fact that a relationship exists between decision making behavior and number of alternatives generated, the implication may be that the nature of the strategic issue may not be based on industry factors, but is inherent to the problem itself, and this may be what affects the complexity of decision making behavior of the chief executive. More specifically, given the findings are true, the situation is as Simon (1976) suggested. That is, the generation of alternative solutions and evaluation of those alternatives by the chief executive is a process which is not related to environmental considerations, but rather, which is centered on the specific strategic issue and the characteristics and/or dispositions of the decision maker. While this may be a possible implication, it cannot be determined based on this study.

The contingent relationship between complexity of decision making behavior and economic performance was also considered. There was no indication that economic performance of the firm was related to the complexity of decision making behavior on the part of the chief executive, nor that this relationship was contingent upon environmental stability or complexity. However, assuming that all measures are accurate indicators of what they measure and that the sample is representative of the population of manufacturing firms, then the results imply that there is no relationship between decision making of the chief executive and the economic performance of the firm. This is conceivable given that there are many factors in the implementation of a given decision (both internal and external) which could have an impact on the outcomes. In other words, an excellent decision can yield poor results if the implementation is thwarted.

Finally, it is also implied that organizational size may be affecting the chief executive's perception of industry stability and to a certain extent conservatism may be operating--which would perhaps indicate that the chief executives were not using all available information advantageously.

In summary, this study suggests that there is a relationship between the nature of the strategic issue and the complexity of decision making behavior of the chief executive which has implications for our understanding of the strategic decision process as well as the manner in which executives make decisions on strategic issues.

Limitations of the Study

The major limitation of this study is the small sample size ($n=32$) of the chief executives and organizations used. This caused problems in terms of generalizability of the findings as well as performance of the statistical tests.

Another limitation relating to the generalizability of the study was the fact that the sample was drawn only from publicly held manufacturing firms in the southeast United States. Therefore, it is not practical to generalize the findings of this study to other types of organizations in other regions.

A third limitation of the study is that a structured, closed-end questionnaire was used to measure complexity of decision making behavior. Prior research in this area allowed the subjects to explain how they were making the decision as they were addressing the issue (Payne, 1976; Olshavsky, 1979). This information gathering process allowed the subjects more latitude than having them select from among several representative statements of decision making behavior.

The fourth limitation is that self-report data were used for four measures in this study. This problem becomes important when correlating one self-report measure with another. Specifically, two problems which may have a bearing on this study are: (a) using an idiosyncratic response style (e.g. use or avoid extreme response alternatives, a tendency to answer affirmatively or negatively); and

(b) a tendency to respond in a manner that is felt to be consistent or logical (Organ, 1985; Blalock, 1971).

The fifth limitation is that some of the chief executives who were interviewed held that position for less than five years. This caused problems in comparing the performance of that firm with the decision making behavior of that chief executive, since it is possible that a chief executive could have "inherited" problems over which he or she had little control. Even though longitudinal factors were condensed into a single measure, comparison of firms over differing numbers of years was a limitation.

A sixth limitation of this research is the selection of firms used in the study. Although they were initially selected randomly from concentrated geographic areas, when firms declined to participate, they were replaced with other firms. This may have created a bias in the results, since the sample is not truly random.

The seventh limitation deals with the problem of attempting to measure the performance of organizations (Hall, 1972; Pennings, 1975; Steers, 1975). In an attempt to minimize this problem, this research used widely accepted measures of economic performance to represent growth, profitability, and efficiency.

Finally, the most critical limitation of the study may have been the inability to focus on perceptual and objective measures of environmental stability and complexity at the time the strategic issue was addressed. It has been suggested in this study that there may not be a relationship between the complexity of decision making behavior and the external environment. However, if it were possible

to measure environmental factors (both perceptually and objectively) at the time the decision was being made, more significant relationships may be discovered.

Suggestions for Future Research

This exploratory research has raised several issues which could be examined in future strategic management research. The first suggestion for future research is that this study be replicated in other geographic areas using other types of organizations besides manufacturing. It is also suggested that the replication focus primarily on the relationship between decision making behavior and alternative generation. A second suggestion for this replication is that different measures be used to collect information on these two variables. One recommended method of collection would be actual observation of chief executives similar to Mintzberg's (1975) study. This would eliminate the dependence on self-report data. A third suggestion is the continued examination of the concept of a causal model. In this study, none of the causal linkages were supported although grounded in theory. Along this line, it is also suggested that new measures of performance be used. The reason being that performance of the organization is likely determined by a multitude of factors and a measure of performance for the chief executive such as subordinate and peer (i.e. board of directors) evaluations would provide a more focused measure of chief executive performance.

A fourth suggestion for future research would be to examine the impact on organizational performance of decisions made on specific

strategic issues. The implication was made earlier that it is possible that in some cases, the decisions may be less than optimal. A study along this line would provide support for this contention, if proven.

A fifth suggestion for future research would be to examine some of the correlations that were significant in this study but were not hypothesized. Specifically, the correlation between the perceptual environmental stability and the asset turnover should be more thoroughly evaluated. The fact that these measures are related raises the issue of whether or not the chief executive is forming his or her perceptions of the external environment based on performance of the organization. If so, then what implications does this have for his or her decision making behavior? Also, the relationship between organizational size and the perception of the impact of environmental stability should be explored further. This could lead to a greater understanding of factors which may be associated with decision making behavior.

Another suggestion would be to further examine the concept of conservatism in decision making behavior. There was tentative evidence that conservative behavior may have implications for the relationship between industry factors (stability and complexity) and the search process in looking for additional alternative solutions. This would perhaps provide a better understanding of the initial stages of decision making by chief executives.

A final suggestion would be to use a methodology similar to the one used by Fredrickson and Mitchell (1984). That is, select a

specific industry and develop a "representative" strategic issue which is common to that industry. Then ask chief executives of firms in that industry to make a decision on that strategic issue. This methodology would increase the internal validity of the study through a certain degree of standardization, similar to the methodology used by cognitive decision scientists.

In closing, it is hoped that this study has contributed to a better understanding of how chief executives make decisions. It is also hoped that this research will provide at least a partial basis for future studies in this area.

REFERENCES

REFERENCES

- Aldrich, H. E. Organizations and environments (New York: McGraw-Hill, 1976).
- Anderson, C. R. & Paine, F. T. Managerial perceptions and strategic behavior. Academy of Management Journal, 1975, 18, 811-823.
- Ansoff, H. I. Strategic issue management. Strategic Management Journal, 1980, 1, 131-148.
- Barnard, C. I. Functions of the executive (Cambridge, Mass.: Harvard University Press, 1938).
- Bernstein, L. A. The analysis of financial statements (Homewood, Ill.: Dow Jones-Irwin, 1978).
- Blalock, H. M., ed. Causal models in the social sciences (New York: Aldine-Atherton, 1971).
- Bourgeois, L. J. Strategy and environment: A conceptual integration. Academy of Management Review, 1980, 5, 25-39.
- Campbell, D. T. & Stanley, J. C. Experimental and quasi-experimental designs for research (Chicago, Ill.: Rand McNally, 1963).
- Carlson, S. Executive behavior: A study of the workload and working methods of managing directors (Stockholm, Sweden: Strombergs, 1951).
- Castaldi, R. M. An analysis of the work roles of chief executive officers in small furniture manufacturing firms (Blacksburg, Virginia: Virginia Polytechnic Institute and State University, 1982. Unpublished Doctoral Dissertation).
- Child, J. Organization structures, environment, and performance: The role of strategic choice. Sociology, 1972, 6, 1-22.
- Christensen-Szalanski, J. J. J. Problem-solving strategies: A selection mechanism, some implications, and some data. Organizational Behavior and Human Performance, 1978, 22, 307-323.
- Cochran, W. G. Sampling techniques (3rd ed., New York: John Wiley & Sons, 1977).
- Cohen, J. Power analysis for the behavioral sciences (Revised ed., New York: Academic Press, 1977).

- Cohen, J. & Cohen, P. Applied multiple regression/correlation analysis for the behavioral sciences (2nd ed., Hillsdale, N.J.: Lawrence Erlbaum Associates, 1983).
- Coombs, C. H. A theory of data (New York: John Wiley & Sons, 1964).
- Dalton, D. R. & Kesner, I. F. Organizational growth: Big is beautiful. Journal of Business Strategy, 1985, 6, 38-48.
- Deal, T. E. & Kennedy, A. A. Corporate Cultures (Reading, Mass.: Addison-Wesley Publishing Co., 1982).
- Dess, G. G. & Beard, D. W. Dimensions of organizational task environments. Administrative Sciences Quarterly, 1984, 29, 52-73.
- Edwards, W. & Phillips, L. D. Man as transducer for probabilities in Bayesian command and control systems. In G. L. Bryan & M. M. Shelly (Eds.), Human judgments and optimality (New York: John Wiley & Sons, 1964).
- Einhorn, H. J. Use of nonlinear, noncompensatory models as a function of task and amount of information. Organizational Behavior and Human Performance, 1971, 6, 1-27.
- Emery, F. E. & Trist, E. L. The causal texture of organizational environments. Human Relations, 1965, 15, 21-32.
- Fahey, L. On strategic management decision processes. Strategic Management Journal, 1981, 2, 43-60.
- Fellner, C. H. & Marshall, J. R. Kidney donors. In J. Macauley & L. Berkowitz (Eds.), Altruism and helping behavior (New York: Academic Press, 1970).
- Frederickson, J. W. Rationality in strategic decision processes. Proceedings of Academy of Management, (Loveland, Colorado: Lithographic Press: 1983, 17-21.
- Frederickson, J. W. Strategic process research: Questions and recommendations. Academy of Management Review, 1983, 8, 565-575.
- Frederickson, J. W. The comprehensiveness of strategic decision processes: Extension, observations, future directions. Academy of Management Journal, 1984, 27, 445-466.

- Fredrickson, J. W. & Mitchell, T. R. Strategic decision processes: Comprehensiveness and performance in an industry with an unstable environment. Academy of Management Journal, 1984, 27, 399-423.
- Galbraith, J. & Nathanson, Strategy implementation (St. Paul, Minn.: West Publishing, 1978).
- Gibbs, J. R. & Martin, W. T. Urbanization technology and the division of labor: International patterns. American Sociological Review, 1962, 27, 667-677.
- Glueck, W. F. Strategic management and business policy (New York: McGraw-Hill, 1980).
- Grant, J. H. & King, W. R. The logic of strategic planning (Boston, Mass.: Little, Brown & Co., 1982).
- Guth, W. D. & Taguiri, R. Personal values and corporate strategies. Harvard Business Review, 1965, 43, 125-136.
- Hall, R. H. Organizations: Structure and process (Englewood Cliffs, N.J.: Prentice-Hall, 1972).
- Hambrick, D. C. & Snow, C. C. A conceptual model of strategic decision making in organizations. Proceedings of Academy of Management (Colorado Springs, Colorado: University Press, 1977, 109-112)
- Harvey, D. F. Business policy and strategic management (Columbus, Ohio: Charles E. Merrill Publishing Co., 1982).
- Hayes, H. R. Human data processing limits in decision making. In E. Bennett (Ed.), Information system science and engineering. Proceedings of the First Congress on the Information System Sciences (New York: McGraw-Hill, 1964).
- Hayes, W. L. & Winkler, R. L. Statistics, Volume 1 (New York: Holt, Rinehart and Winston, 1970).
- Hemphill, J. K. Dimensions of executive positions (Columbus, Ohio: Bureau of Business Research, Ohio State University, 1960).
- Hendrick, C., Mills, J., & Kiesler, C. A. Decision time as a function of the number and complexity of equally attractive alternatives. Journal of Personality and Social Psychology, 1968, 8, 313-318.
- Higgins, J. M. Organizational policy and strategic management (New York: Dryden Press, 1983).

- Hodgetts, R. M. & Wortman, M. S. Administrative policy (2nd ed., New York: John Wiley & Sons, 1980).
- Hofer, C. W. & Schendel, D. A. Strategy formulation: Analytical concepts (St. Paul, Minn.: West Publishing, 1978).
- Huber, G. P. Managerial decision making (Glenview, Ill: Scott, Foresman and Co., 1980).
- Jacoby, J., Speller, D. E., & Kahn, C. A. Brand choice behavior as a function of information load. Journal of Marketing Research, 1974, 11, 63-69.
- Janis, I. L. & Mann, L. Decision making: A psychological analysis of conflict, choice, and commitment (New York: The Free Press, 1977).
- Katz, D. & Kahn, R. L. The social psychology of organizations (2nd ed., New York: John Wiley & Sons, 1978).
- Kirchhoff, B. Organizational effectiveness measurement and policy research. Academy of Management Review, 1977, 2, 347-355.
- Kozielecki, J. Psychological decision theory (Boston, Mass.: D. Reidel Publishing Co., 1975).
- Lang, J. R., Dittrich, J. E., & White, S. E. Managerial problem solving models: A review and a proposal. Academy of Management Review, 1978, 3, 851-866.
- Lawrence, P. R. & Lorsch, J. W. Organization and environment: Managing differentiation and integration (Homewood, Ill.: Richard D. Irwin, 1969).
- Lenz, R. T. Environment, strategy, organization structure and performance: Patterns in one industry. Strategic Management Journal, 1980, 1, 209-226.
- Leontiades, M. Management policy, strategy, and plans (Boston, Mass.: Little, Brown, & Co., 1982).
- Lindblom, C. E. The science of "muddling through". Public Administration Review, 1959, 19, 79-88.
- Lorsch, J. W. & Allen, S. A. Managing diversity and interdependence: An organizational study of multidivisional firms (Boston, Mass.: Harvard Press, 1973).

- Lussier, D. A. & Olshavsky, R. W. An information processing approach to individual brand choice behavior. Annual Conference of the Operations Research Society of America / The Institute of Management Sciences, San Juan, De Puerto Rico, 1974.
- Maccoby, M. The gamesman (New York: Simon & Schuster, 1976).
- MacCrimmon, K. & Taylor, R. Decision making and problem solving. In M. D. Dunnette (Ed.), Handbook of industrial and organizational psychology (Chicago: Rand McNally, 1976, 1397-1453).
- March, J. G. & Simon, H. A. Organizations (New York: John Wiley & Sons, 1958).
- Miller, D. Towards a contingency theory of strategy formulation. Proceedings of Academy of Management, 1975, 64-66.
- Miller, G. A. The magical number seven, plus or minus two. Psychology Review, 1956, 63, 81-97.
- Miller, D. W. & Starr, M. K. The structure of human decisions (Englewood Cliffs, N. J.: Prentice-Hall, 1967).
- Mintzberg, H. New York, New York. Interview, August 14, 1982.
- Mintzberg, H. The manager's job: Folklore and fact. Harvard Business Review, 1975, 53, 49-61.
- Mintzberg, H. The nature of managerial work (New York: Harper & Row, 1973).
- Mintzberg, H. Patterns of strategy formation. Management Science, 1978, 24, 934-938.
- Mintzberg, H. Strategy-making in three modes. California Management Review, 1973, 15, 44-53.
- Nie, N., Hull, C., Jenkins, J., Steinbrenner, K., & Bent, D. Statistical package for the social sciences (2nd ed., New York: McGraw-Hill, 1975).
- Nutt, P. C. Models for decision-making in organizations and some contextual variables which stipulate optimal use. Academy of Management Review, 1976, 1, 147-158.
- Olshavsky, R. W. Task complexity and contingent processing in decision making: A replication and extension. Organizational Behavior and Human Performance, 1979, 24, 300-316.

- Organ, D. W. Self-reports in organizational research: Problems and prospects. Paper presented at the Academy of Management, San Diego, 13 August 1985, pp. 1-15.
- Paine, F. T. & Anderson, C. R. Strategic management (Chicago, Ill.: Dryden Press, 1983).
- Payne, J. W. Task complexity and contingent processing in decision making: An information search and protocol analysis. Organizational Behavior and Human Performance, 1976, 16, 366-387.
- Payne, J. W. Contingent decision behavior. Psychological Bulletin, 1982, 92, 382-402.
- Pearce, J. A. & Robinson, R. B. Strategic management (Homewood, Ill.: Richard D. Irwin, 1982).
- Pennings, J. M. The relevance of the structural contingency model for organizational effectiveness. Administrative Science Quarterly, 1975, 20, 393-410.
- Peterson, C. R., Schneider, R. J., & Miller, A. J. Sample size and the revision of subjective probabilities. Journal of Experimental Psychology, 1965, 69, 522-527.
- Phillips, L. D. & Edwards, W. Conservatism in a simple probability inference task. Journal of Experimental Psychology, 1966, 72, 346-354.
- Rappoport, A. & Wallstein, T. S. Individual decision behavior. Annual Review of Psychology, 1972, 23, 131-179.
- Reitman, W. Heuristic decision procedures, open constraints, and the structure of ill-defined problems. In M. Shelley and G. Bryan (Eds.), Human judgments and optimality (New York: John Wiley & Sons, 1964).
- Rowe, A. J., Mason, R. O., & Dickel, K. Strategic management and business policy (Reading, Mass.: Addison-Wesley, 1982).
- Schendel, D. A. & Hofer, C. W., eds. Strategic management (Boston, Mass.: Little, Brown & Co., 1979).
- Simon, H. A. Administrative behavior: A study of the decision-making processes in administrative organizations (3rd ed., New York: Free Press, 1976).
- Simon, H. A. Models of man: Social and rational (New York: John Wiley & Sons, 1957).

- Slovic, P. Limitations of the mind of man: Implications for decision making in the nuclear age. Oregon Research Institute Bulletin, 1971, 11, 41-49.
- Slovic, P. & Lichtenstein, S. Comparison of Bayesian and regression approaches to the study of information processing in judgment. Organizational Behavior and Human Performance, 1971, 6, 649-744.
- Steers, R. M. Problems in the measurement of organizational effectiveness. Administrative Science Quarterly, 1975, 20, 546-558.
- Thompson, A. A. & Strickland, A. J. Strategic management: Concepts and cases (3rd ed., Plano, Texas: Business Publications, Inc., 1984).
- Thompson, J. D. Organizations in action (New York: McGraw-Hill, 1967).
- Tung, R. L. Dimensions of organizational environments: An exploratory study of their impact on organization structure. Academy of Management Journal, 1979, 22, 672-693.
- Tversky, A. Elimination by aspects: A theory of choice. Psychological Review, 1972, 79, 281-299.
- Tversky, A. Intransitivity of preferences. Psychological Review, 1969, 76, 31-48.
- U.S., Department of Commerce. Bureau of the Census. 1982 Census of Manufactures (Washington, D.C.: U.S. Government Printing Office).
- Uyterhoeven, H. E. R., Ackerman, R. W., & Rosenblum, J. W. Strategy and organization (Revised ed., Homewood, Ill: Richard D. Irwin, 1977).
- Weiner, N. & Mahoney, T. A. A model of corporate performance as a function of environmental, organizational, and leadership influences. Academy of Management Journal, 1981, 24, 453-470.
- Wilkins, L. Social deviance (Englewood Cliffs, N. J.: Prentice-Hall, 1967).
- Woods, D. H. Improving estimates that involve uncertainty. Harvard Business Review, 1966, 44, 91-98.
- Wrapp, H. E. Good managers don't make policy decisions. Harvard Business Review, 1967, 45, 91-99.

APPENDIXES

APPENDIX A
MEASURES OF ECONOMIC PERFORMANCE

Measures of Economic Performance

The following are the quantitative measures used to calculate standardized measures of firm performance relative to its industry:

- (1) Change in Total Sales = Five year average change in total sales for the firm minus the five year average change in total sales for the industry.*
- (2) Return on Total Assets = Five year average return on total assets minus five year average return on total assets for the industry.*
- (3) Asset Turnover = Five year average asset turnover for the firm minus five year average asset turnover for the industry.*

*Five year averages are for the years 1979-1983, inclusive, except in cases where the chief executive took that position later than 1979. In these cases, the appropriate years' data were used.

Data Sources: 10-K reports on firms in the study and Dun and Bradstreet's Key Business Ratios for industry figures.

APPENDIX B

STRUCTURED INTERVIEW QUESTIONNAIRE

The first two sections of this interview deal with information about the stability and complexity of your industry. Please read the explanation of each term and then mark the appropriate response.

I. Perceptual Measures of the Stability of the Industry

The construct of industry stability is concerned with the difficulty of predicting change and uncertainty in a given industry. In a stable industry, key organizational members are able to predict change relatively easily and there is not a great deal of uncertainty in the industry (Dess & Beard, 1984). In an unstable industry, change is difficult to anticipate and there is a considerable amount of uncertainty.

In the past five years, what has been the impact on your business of drastic and unpredicted changes originating in the following areas:

	No Impact							A Great Impact
Customers		_____	_____	_____	_____	_____	_____	
Creditors		_____	_____	_____	_____	_____	_____	
Competitors		_____	_____	_____	_____	_____	_____	
Suppliers		_____	_____	_____	_____	_____	_____	
Labor Market		_____	_____	_____	_____	_____	_____	

	No Impact						A Great Impact
Economic	_____	_____	_____	_____	_____	_____	
Political	_____	_____	_____	_____	_____	_____	
Social	_____	_____	_____	_____	_____	_____	
Technological	_____	_____	_____	_____	_____	_____	

Overall, for the past five years, how would you characterize the environment surrounding your company?

_____ Very Stable
 _____ Stable
 _____ Unstable
 _____ Very Unstable

II. Perceptual Measures of the Complexity of the Industry

Industry complexity has been defined as the extent to which an organization must deal with a diverse and large number of inputs from the external environment. Managers facing a complex environment have greater information processing requirements than managers facing a simple environment (Dess & Beard, 1984, p. 9).

In the past five years, what has been the impact of the increases in the number of factors which must be dealt with in your organization originating in the following areas:

	No Impact							A Great Impact
Customers	_____	_____	_____	_____	_____	_____	_____	
Creditors	_____	_____	_____	_____	_____	_____	_____	
Competitors	_____	_____	_____	_____	_____	_____	_____	
Suppliers	_____	_____	_____	_____	_____	_____	_____	
Labor Market	_____	_____	_____	_____	_____	_____	_____	
Economic	_____	_____	_____	_____	_____	_____	_____	
Political	_____	_____	_____	_____	_____	_____	_____	
Social	_____	_____	_____	_____	_____	_____	_____	
Technological	_____	_____	_____	_____	_____	_____	_____	

Overall, for the past five years, how would you characterize the environment surrounding your company?

___ Very Simple

___ Simple

___ Complex

___ Very Complex

Measures of Decision Making Behavior
of the Chief Executive Officer

The two remaining sections deal with your decision making process. It is important to remember that there are no right or wrong answers.

III. The third part of this interview determines whether or not the issue being discussed is strategic in nature. Although this section is not directly related to the decision making process, it is still significant because this study deals with how a CEO makes decisions on strategic issues. Therefore, it is necessary to insure that the issue in question is indeed strategic. Also, it is necessary to know the particular CEO's tenure in that position, since the implications being drawn on this research cover a five year period.

1. How long have you been in your present position? _____
Are you the founder of this firm? _____
2. If you would, think of a major threat or opportunity which presented itself to your organization and required your attention. Could you please verbally describe such a situation as well as when it occurred and what impact it had on your company?

3. Where in the external environment did this problem or opportunity originate?

<input type="checkbox"/> customers	<input type="checkbox"/> general economic trends
<input type="checkbox"/> suppliers	<input type="checkbox"/> social trends
<input type="checkbox"/> competitors	<input type="checkbox"/> legislative action
<input type="checkbox"/> labor market	<input type="checkbox"/> technological changes
<input type="checkbox"/> creditors	<input type="checkbox"/> other (specify)

4. The following questions are aimed at developing a more tangible measure of the exact impact of this particular event or issue. Please mark the appropriate response.

- A. How likely is it that responsibility for dealing with this issue could have been delegated to other members of the organizations at lower levels?

- (1) ☐ highly unlikely
- (2) ☐ unlikely
- (3) ☐ indeterminable
- (4) ☐ likely
- (5) ☐ highly likely

B. What level of resource commitment (e.g. people, money, physical assets, time) did addressing this problem require?

- (1) ___ a great deal
- (2) ___ a considerable amount
- (3) ___ an average amount
- (4) ___ an small amount
- (5) ___ a negligible amount

C. How strong was the effect on the organization internally?

- (1) ___ very strong
- (2) ___ strong
- (3) ___ average
- (4) ___ weak
- (5) ___ very weak

D. How strong was the effect on the segment of your immediate external environment that was the most strongly affected (i.e. customers, suppliers, competitors, creditors, or labor market)?

- (1) ___ very strong
- (2) ___ strong
- (3) ___ average
- (4) ___ weak
- (5) ___ very weak

5. In sum, as an overall measure of organizational impact,
how significant was this issue in terms of:

Growth

- (1) ___ very significant
- (2) ___ significant
- (3) ___ no effect
- (4) ___ insignificant
- (5) ___ very insignificant

Profitability

- (1) ___ very significant
- (2) ___ significant
- (3) ___ no effect
- (4) ___ insignificant
- (5) ___ very insignificant

Efficiency

- (1) ___ very significant
- (2) ___ significant
- (3) ___ no effect
- (4) ___ insignificant
- (5) ___ very insignificant

IV. This part of the interview is devoted to understanding the decision making process you use to address the strategic issue mentioned in Section III. Again, it is important to emphasize that there are no right or wrong answers. The point here is to develop an understanding of how you make decisions in regard to important issues.

1. Could you please explain how you went about arriving at a solution to this issue?

2. As a recap of what you have just said please consider the following items and mark the appropriate responses.

A. Were alternative solutions to the problem readily identifiable?

☐ yes ☐ no

If yes, do you feel that the alternative solutions exhaustively represented the ways in which the problem could have been addressed without changing the basic mission and/or strategy of your business?

☐ yes ☐ no

Was it necessary to change the basic mission and/or strategy of your business?

☐ yes ☐ no

Go to part B. on the next page.

If no, then did you identify other alternative solutions?

☐ yes ☐ no

How much effort was expended on your part to identify other alternatives?

☐ a very large amount

☐ a large amount

☐ a moderate amount

☐ a small amount

☐ a very small amount

B. In sum, how many different alternative solutions to the problem were identified?

☐

C. In initially evaluating the alternatives, which of the following statements most accurately describes what you did.

(1) ☐ I evaluated each alternative solution separately and completely before making a decision.

(2) ☐ I evaluated certain aspects of each alternative solution against each other or against some standard criteria.

☐ Neither (please explain further).

If (1) most accurately describes the action that you took, then go to page 11 and continue.

If (2) most accurately describes the action that you took, then go to page 13 and continue.

Specifically, which of these three statements best describes the manner in which you evaluated the alternatives?

- (6) ☐ I evaluated each alternative solution and came up with an overall value or score for each one, considering all the characteristics of all the alternatives before making my choice.

Did this process yield a final answer?

☐ yes ☐ no

If the answer is no, then go on to the next page.

- (5) ☐ I evaluated alternative solutions by comparing two at a time and coming up with a difference between the two; ranking one higher than the other. This process continued until all alternatives had been compared.

Did this process yield a final answer?

☐ yes ☐ no

If the answer is no, then go on to the next page.

- (4) ☐ I evaluated each alternative solution separately with respect to its advantages and disadvantages. Based on this, I developed an overall score or weight for each solution before making my choice.

Did this process yield a final answer:

☐ yes ☐ no

If the answer is no, then go on to the next page.

☐ None of these are appropriate (please explain)

In continuing the decision making process:

___ I focused my attention on evaluating the remaining alternatives individually. (Go to page 11)

___ I focused my attention on evaluating certain aspects of each alternative against one another or against some standard. (Go to page 13)

Specifically, which of the three statements on these two pages best describes the manner in which you evaluated the alternatives?

- (3) ☐ I selected several characteristics of each alternative and compared them one against the other based on these characteristics. Once all the alternatives have been compared on these characteristics, I selected a different group of characteristics and continued the process.

Did this process yield a final answer?

☐ yes ☐ no

If the answer is no, then go back to page 12 and continue.

- (2) ☐ I established a cutoff level for all the characteristics, and those that did not meet the cutoff level were eliminated. If more than one alternative remained, the cutoff levels were raised.

Did this process yield a final answer?

☐ yes ☐ no

If the answer is no, then go back to page 12 and continue.

- (1) ☐ I determined how the characteristics were ranked from most important to least important. Then I evaluated all the alternatives on the most important characteristics. All the alternative which did not meet a minimum cutoff level were eliminated. Then I repeated this process with the second most important characteristic; and so on.

Did this process yield a final answer?

☐ yes ☐ no

If the answer is no, then go back to page 12 and continue.

Is there anything else you would like to add about your decision making process?

Would you like a summarized copy of the finalized report sent to you?

☐ yes ☐ no

APPENDIX C

QUANTITATIVE MEASURES OF THE STABILITY OF THE INDUSTRY

Quantitative Measures of the Stability of the Industry

The following are the quantitative measures used to calculate the stability of the industry in which the firm operates (Dess & Beard, 1984, p. 46):

- (1) Instability in total sales - measures as the value of shipments; standard error of the regression slope coefficient divided by the mean value (most recent five years).
- (2) Instability in total employment - measures the instability in total employment; same measurement procedure as above.
- (3) Instability in value added by manufacture - measures the value added by manufacture; same measurement procedure as above.

All three factors are weighted equally (averaged) in arriving at a single quantitative measure of stability. The final figure is then assigned a negative value to remain consistent with the stated hypotheses.

Data Source: United States Bureau of Census, Census of Manufactures

APPENDIX D

QUANTITATIVE MEASURES OF THE COMPLEXITY OF THE INDUSTRY

Quantitative Measures of the Complexity of the Industry

The following are the quantitative measures used to calculate the complexity of the industry in which the firm operates (Dess & Beard, 1984, p. 45, pp. 47-48.

- (1) Specialization ratio - the ratio of primary product shipments to total primary and secondary, excluding miscellaneous) product shipments for the establishments classified in the industry (most recent five years).
- (2) Geographical concentration of total sales. Measured as:

$$C_i = \frac{\sum_j^m S_{ij}^2}{(\sum_j^m S_{ij})^2}$$

where:

C = concentration of industry sales index

S = dollar volume of industry sales

i = 1,2,...,n

j = 1,2,...,m

n = number of industries in the sample

m = number of census divisions

- (3) Geographical concentration of total employment. Measured as:

$$C_i = \frac{\sum_j^m TE_{ij}^2}{(\sum_j^m TE_{ij})^2}$$

where:

C = concentration of industry total employment index

TE= total industry employment

Same measurement procedure as above

(4) Geographical concentration of industry establishments.

Measured as:

$$C_i = \frac{\sum_j^m IE_i^2}{(\sum_j^m IE_i)^2}$$

where:

C = concentration of industry establishments index

IE= number of industry establishments

Same measurement procedure as above

All four factors are weighted equally (averaged) in arriving at a single quantitative measure of complexity. The final figure is then assigned a negative value to remain consistent with the stated hypotheses.

Data Source: United States Bureau of Census, Census of Manufactures

APPENDIX E

CALCULATION OF POWER ANALYSIS

The following is the calculation of power in the statistical tests used in this study assuming an effect size of .25, an alpha of .10, and three predictors. The first part (I.) is a calculation of power without the finite population correction factor and the second part (II.) includes the finite population correction factor (Cochran, 1977, p. 24).

I.

$$L = \frac{R^2_{Y \cdot B}}{1 - R^2_{Y \cdot B}} (N - u - 1)$$

where: Y = dependent variable

B = set of independent variables

$R^2_{Y \cdot B}$ = explained variance proportion

$1 - R^2_{Y \cdot B}$ = error variance proportion

$\frac{R^2_{Y \cdot B}}{1 - R^2_{Y \cdot B}} = f^2 = \text{the effect size } (.25)$

N = the sample size (32)

u = number of independent variables (3)

therefore: L = 7.00

Power as a function of L = 7.00 and u = 3 at alpha = .10 is:

.70 (Cohen, 1977, p. 418).

When correcting for a finite population, lambda (L) is multiplied by 1/fpc (the finite population correction factors).

II. The formula is:

$$fpc = \frac{N-n}{n}$$

where: N = population size (148)

 n = sample size (32)

therefore: $fpc = .88 \quad \frac{148-32}{148}$

$$L \cdot fpc = 7.00 \times 1/.88 = 7.95$$

Power as a function of L = 7.95 and u = 3 at alpha = .10 is:

.76 (Cochran, 1977, p. 24).

APPENDIX F

CALCULATION OF POWER ANALYSIS FOR HIERARCHICAL MODEL

The formula for the calculation of sample size for hierarchical analysis is presented below:

$$n^* = \frac{L}{f^2} + k_A + k_B + k_C + 1$$

- 1) The alpha level is set at .10
- 2) The level of power is set at .76 (same as previous level)
- 3) Degrees of freedom is 1
- 4) L value from the table, based on the above is approximately 8
- 5) f^2 value for the population is estimated at .25
- 6) Substituting in the formula:

$$n^* = \frac{8}{.25} + 1 + 1 + 1 + 1$$

sample = 36

(Cohen & Cohen, 1983, pp. 154-7)

APPENDIX G
TELEPHONE INTERVIEW

Telephone Interview

Good (morning) (afternoon). This is Steve Arendall from the University of Tennessee at Knoxville. I am calling in regard to some dissertation research that I am doing on the decision making of chief executive officers of manufacturing firms in the southeastern United States.

I will be in your area around (date) and I wonder if we could set up an appointment time? If possible, I would like to question you about your industry and your decision making process. It should also be mentioned that it is the policy of the University of Tennessee to handle all such information in a strictly confidential manner.

Thank you for your time.

APPENDIX H

INTERVIEW LETTER



DEPARTMENT OF MANAGEMENT
College of Business Administration
The University of Tennessee
Knoxville, 37996-0545
Telephone: (615) 974-3161

(date)

(Executive's name)
(Company's name)
(Mailing address)
(City, State, Zip code)

Dear (Executive's name):

This letter is to confirm our meeting on (date and time). I would like to thank you for the opportunity to meet with you, as this interview is instrumental in gathering information to be used in this doctoral research.

I would like to stress that you will not be asked to reveal any sensitive material. All information will be held in the strictest of confidence. No individual respondent will be identified in any publication resulting from this research effort.

If you have any questions about the study, feel free to contact me or my major professor, Dr. Max S. Wortman, Jr. at the above address or telephone number.

Thank you again for this interview, and I look forward to seeing you soon.

Sincerely yours,

Steve Arendall

VITA

Charles Steven Arendall was born in Warrington, England on August 3, 1955, the first and only son of Charles Lewis and Pamela Read Arendall. The family moved to Memphis, Tennessee the following year and he attended elementary school in Memphis. He graduated from Messick High School in May 1973. The following August, he entered Memphis State University and graduated magna cum laude in May 1977 with a Bachelor of Business Administration. From 1977 until 1979 he worked for Burroughs Corporation as a Territory Manager. During this time, he attended night classes in the Master of Business Administration program at Memphis State University and graduated summa cum laude with a major in Management in May 1980.

In the fall of 1980, he accepted a teaching assistantship at the University of Tennessee, Knoxville and began study toward a doctorate. In January of 1985, he accepted a faculty position with Louisiana State University in Baton Rouge, Louisiana. He received the Doctor of Philosophy degree with a major in Management in June 1986.

The author is a member of Beta Gamma Sigma, the Southern Management Association, and the Academy of Management. Mr. Arendall will continue to be employed by Louisiana State University after graduation.