

AN INVESTIGATION OF THE EFFECTS OF ORGANIZATIONAL
FACTORS AND PERSONAL CHARACTERISTICS ON TOP EXECUTIVES/
PERCEIVING A STRATEGIC ISSUE AS AN OPPORTUNITY OR A THREAT

by

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(ABSTRACT)

The strategic management literature makes frequent references to the need for directing the firm's responses to perceived opportunities or threats in the environment. The purpose of this study is to determine if the top executives from different firms view an important environmental development differently, in terms of it being an opportunity or threat, and, if so, do these perceptions relate to organizational factors and to personal characteristics of the top executive? A model is proposed and includes organizational strategy, organizational structure, executive locus of control and behavioral response repertoire. Fourteen operational hypotheses are formulated.

Thirty-six top executives of firms in the metalworking machinery and equipment industry are polled for their opinions of flexible manufacturing systems (FMS) developments. FMS refers to technology that is only now becoming available and consists of the integration of

computer facilities and robotics mechanisms. Predecessors of FMS include numerically controlled machinery (NCM), computer aided design (CAD) and computer aided manufacturing (CAM).

The effect of locus of control on FMS perceptions is not analyzed because of measurement problems. Correlation analyses reveal that organizational strategy, some aspects of organizational structure, and certain characteristics of the top executive are related to FMS perceptions at close-to-significant levels.

Cluster analysis is applied to the data on strategy and structure to identify groups of firms on the basis of the similarity in their strategy-structure features. Executives' perceptions of FMS are compared across groups, and certain combinations of strategy type and structural characteristics relate to more opportunistic perceptions, although not at significant levels.

The results of the statistical findings are discussed and an interpretation offered. Suggestions for future research on strategic issue perceptions are proposed.

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CHAPTER ONE

TOP EXECUTIVE PERCEPTIONS OF A STRATEGIC ISSUE - OPPORTUNITY OR THREAT?

INTRODUCTION

When discussing the managing of organizations, operations management is usually delineated from strategic management. In Drucker's (1964) pragmatic parlance, operations management addresses doing things right, strategic management doing the right things.

Paine and Naumes (1982, p. 4) provided greater detail on the essence of strategic management:

Strategic Management involves the decision making and the activities in an organization which (1) have wide ramifications, (2) have a long-time perspective, and (3) use critical resources toward perceived opportunities or threats in a changing environment. Strategic management is a dynamic social process within which an intellectual process is embedded (Emphasis on 'perceived' added by the author).

Their definition suggested that the strategic management of the firm includes the guiding of the firm's response to important opportunities or threats emanating from the dynamic environment of the firm.

These opportunities or threats fit into a category of problems Ansoff discussed in terms of strategic issues. He defined a strategic issue as: "A forthcoming

development, either inside or outside the organization which is likely to have an important impact on the ability of the enterprise to meet its objectives" (1980, p.133).

On the one hand, limiting consideration to "developments" originating in the external environment of the firm, a strategic issue may be viewed positively by top managers because they see it in terms of potential opportunities for the firm. The issue may permit a company strength to be further exploited, or the change in the environment may signal that what was once a weakness in the firm's character may now be a strength. When environmental conditions change to allow the exploitation of a company's strengths, and this set of circumstances is perceived in a timely manner by a firm's management, Abell (1978) claimed that a "strategic window" is present.

On the other hand, a strategic issue may be viewed negatively because a weakness in the firm's capabilities becomes pressing, or what was once a source of a company's strength becomes a hindrance to performance. Moreover, an issue, which is perceived by the management of one firm as an opportunity and by the management of another firm as a threat, may be perceived as neither by the managements of other firms.

This potential for perceptual differences of strategic issues raised two questions. These questions concerned the way in which executives view issues which

have the potential to require firm-transforming activities on the part of many firms operating in an industry. First, how are such issues perceived in terms of potential opportunities or threats to these firms? In other words, do executives from competing firms view the same issue differently? Second, if executives view a strategic issue differently, are the characteristics of the executives and of the firms they run related to these perceptions in a systematic manner?

No researchers have in their discussions of (perceived) opportunities and threats, i.e., strategic issues, addressed the question of what factors relate to perceptual differences of strategic issues among top executives from different firms. The purpose of this chapter is to introduce a research study that analyzed top executive perceptions of a significant environmental development. It was assumed that the existence of differences in perceptions of a strategic issue among executives would not necessarily imply differences in the response of the firms to the issue.

The following section provides an overview of the theoretical and empirical underpinnings of the study. Chapter 2 summarizes the literature which most closely related to the present study.

ORGANIZATIONAL GESTALTS

A number of strategic management models included as an important component the identification of strategic issues (Steiner, Miner and Gray, 1982; Hofer and Schendel, 1978; Schendel and Hofer, 1979). But none of these models explicitly dealt with the variables which influence executives in their identifying and evaluating important environmental developments as opportunities or threats.

Porter (1979) provided direction for the analysis of executive strategic issue perceptions. As a student of industrial organization, he maintained that within an industry, with industry defined as groups of firms producing similar or substitutable products or services, certain firms are better "positioned" than others to adapt to or take advantage of change. This positioning is the result of past decisions and activities undertaken by the firm with respect to the firm's environment.

At least four "types" of decisions appear to be crucial for understanding organizational adaptation and development. According to Miles, Snow and Pfeffer (1974):

In our view, the study of organizational adaptation to environmental demands should be focused on a series of intertwined "decision points":

1. The decisions by which the organization selects a portion of the total environment as its particular arena of activity (i.e., its domain) and chooses a basic strategy for managing the domain;

2. The decisions by which the organization establishes an appropriate technology for implementing its basic operating strategy;

3. The decisions by which the organization creates a structure of roles and relationships to control and coordinate technology and strategy; and

4. The decisions made to assure organizational continuity-the capacity to survive, adjust and grow (pp. 246-247).

A vast array of conceptual and empirical work addresses the relationships between the results, or outcomes of decisions made by management with respect to these variables. The result of this work is a rich, if not parsimonious, description of organizations in contingent terminology (Burns and Stalker, 1961; Lawrence and Lorsch, 1967; Thompson, 1967; Duncan, 1972; Chandler, 1962; Woodward, 1965; Perrow, 1970; Pugh, et al., 1969).

Problems encountered in the validation of conceptual pieces and the replication of empirical works (for example, see Tosi, et al., 1973; Pugh, et al., 1969) led one author to suggest that researchers consider the strategic choices made by management for reconciling these inconsistencies (Child, 1972). These choices are not necessarily rational (Cyert and March, 1963), are shaped by managements' perceptions of the situation and the value system of the dominant coalition, and are constrained by previous strategic choices (Child, 1972; Miles and Snow, 1978).

An additional thorny issue stemming from the contingency approach is that when organizational performance has been examined, different choices of strategy, technology, structure, etc., have led to equivalent levels of success (Anderson and Paine, 1975). Apparently, equifinality, i.e., different means producing similar outcomes, is a characteristic of organizations as systems (Katz and Kahn, 1966).

Miller (1981) reviewed contingency theoretical perspectives and came to the conclusion that:

The implicit assumption (of the contingency approach) is that given a particular environment or technology, there is only one way to succeed. In other words, contingency statements are highly simplistic. They concern few conditions. While this sort of orientation may be useful as a first step, researchers are not open to finding a number of successful or unsuccessful models of adaptation in a given environment. They do not examine the substitutability of various adaptive strategies (p. 6).

The analyses of the bivariate relationships among variables may not be sufficient for achieving a comprehensive understanding of organizations. Considering organizations as wholes, or "gestalts," of many variables may be necessary (Mintzberg, 1979; Miller, 1981; Miller and Friesen, 1980). It may be the complex interaction of numerous variables which determines the quality of alignment an organization achieves with respect to its environment (Miles, et al., 1974).

Since organizations appear to resist revolutionary change (Mintzberg, 1978, Cyert and March, 1963; Miller, 1981; Miller and Friesen, 1980), executives are likely to judge strategic issues in light of present organizational characteristics and the interaction of these characteristics (e.g., strategy, technology, structure) (Anderson and Paine, 1977; Paine and Anderson, 1975). The more threatening the strategic issue is to present organizational characteristics, the less likely it is that an executive will see the strategic issue as an opportunity. The more accommodating that present organizational characteristics are, the more likely it is that an executive will see the issue as an opportunity for the firm. In essence, the executive will view the issue in terms of the "organizational tools" presently available. This was the basic assumption underlying the study.

At the least, the greater the incongruence perceived between organizational conditions and environmental demands, the greater will be the uncertainty felt by management. Furthermore, the more uncertainty which is experienced, the more likely it is that significant changes will be initiated in the internal features of the organization (Anderson and Paine, 1977; Paine and Anderson, 1975). If organizations are reluctant to change, and if some organizations are better positioned to

adapt to or take advantage of change, then top executives should be influenced in their evaluations of environmental change by an organization's present strategic orientation.

PURPOSE OF THE RESEARCH PROJECT

The purpose of this research project is to analyze top executive perceptions of a strategic issue by: (1) formulating a model of strategic issue perceptions that includes conceptually relevant variables; (2) deriving operational hypotheses based upon the model; and (3) testing the hypotheses and, thus, the model.

SIGNIFICANCE OF THE RESEARCH STUDY

Numerous groups of students of organizational phenomena may find this research valuable. For the student of strategy and the strategy formulation process, the "question of differences" has far too long been ignored. That is, too little is known about what accounts for the differences in different managements' actions.

The environmental contingencies that present themselves in a situation probably shape the way that managers respond. But perceptions, not "reality," may be more important in explaining both the similarities and differences in managerial actions than are any objective circumstances (Miles, et al., 1974).

According to Anderson and Paine:

The fact that similar types of environments have been noted to elicit similar organization responses (such as the Woodward studies) from organizations in these environments can be attributed to the fact that members of these organizations have similar perceptual processes. However, a growing body of evidence exists which documents different response patterns in similar environments. An interesting situation occurs when different response patterns in the same environment are equally successful (1975, p. 813).

Studies which investigate perception formation should contribute much to researchers' and managers' understanding of subsequent behaviors.

Researchers interested in the processes underlying organizational adaptation should also find this study significant. In discussing strategic issue management, Ansoff made the following point:

Frequently, external threats, because they signal significant discontinuities in the environment, can be converted into opportunities by aggressive and entrepreneurial management. In fact, such ability to convert threats into opportunities has been one of the most prized characteristics in the history of American management (1980, p.133).

Perceptions appear to be crucial to such conversion activities. If, as Ansoff (1980) suggested, turning threats into opportunities is one cornerstone of America's strengths, then identifying those factors which relate to an executive's viewing an issue as an opportunity or a threat is important for understanding organizational

behavior.

Another significant aspect of this study stems from the fact that since Chandler's (1962) seminal work, there has been debate in the management literature about the cause-effect relationship of strategy and structure. Chandler believed that changes in structure followed changes in strategy, and that these changes occurred only after a significant decline in performance was noted by management. According to Galbraith and Nathanson:

Chandler proposed a sequence consisting of new strategy creation, emergence of new administrative problems, decline in economic performance, invention of a new appropriate structure, and subsequent recovery to profitable levels (1979, p. 249).

But within the confines of a given metastrategy (Mintzberg, 1978), or myth (Hedberg and Jonsson, 1977), Child (1972) suggested that structure influences strategic choice. If strategy is viewed as a stream of decisions that defines the firm's purpose over time (Mintzber, 1978), structure is one of the consequences of this decision stream (Miles, Snow and Pfeffer, 1974).

Dominant individuals or coalitions are constrained to some extent by the system of beliefs and values which formed the basis for past decision making (strategic) choices. He/she or they are also constrained by the consequences of those choices, one of those being the firm's structural characteristics. It is the pattern

formed by choices of environment, strategy, technology, structure, etc., which appears to be the major concern in understanding organizational adaptation and development (Miller, 1982; Miller and Friesen, 1980; Miles and Snow, 1978; Child and Kieser, 1981).

The student of managerial work may also find this study of interest. Although there is increasing empirical evidence that there are more similarities than differences in the content of managerial work, i.e., the managerial role set (Mintzberg, 1973), different individuals will exhibit different approaches when enacting their role. A finding that perceptual differences on a single issue are the result of differences in people and their environments may add to the body of knowledge on the nature of managerial work, especially at the chief executive level of decision making.

For the organizational consultant, the findings of this study could prove invaluable. As Lyles and Mitroff (1980) demonstrated, the assumptions underlying managers' positions within an organization on an issue are often in conflict. Through a technique termed "dialectical debate," they found that exploring these assumptions leads to better problem definition, and subsequently more successful joint efforts aimed at problem resolution. By knowing in advance what factors could influence executive perceptions of an issue (e.g., opportunity or threat), the

consultant would be better prepared to deal with the objective versus subjective reality dilemma so often encountered in an organization.

Finally, practitioners should find this research important. Much has been written on the structuring of organizations and progress has been made on assisting managers in formulating strategies for their firms. But little has been done to enlighten management on how past structural and strategic decisions relate to the way an executive perceives his or her world. If managers can be made aware of how their personal characteristics and organizational environment impact their decision-making premises, they will be better able to identify where important sources of bias may originate. If open-mindedness is essential for optimizing the generation of alternatives available in a changing world, then being aware of the limiting factors surrounding the intellectual processes embedded in the strategic management process of the firm would prove invaluable (Paine and Naumes, 1982, p. 4).

SUMMARY

This chapter demonstrated the need to investigate the nature of executive strategic issue perceptions. Strategic issues, and the management of these issues, will

undoubtedly consume more and more time and effort on the part of executive decision makers. How executives perceive and respond to these issues may have long lasting effects on the organizations executives manage, and, in a broader sense, on the society which relies on organizations for the providing of the goods and services it demands.

Little is known about the factors which shape executive perceptions. The purpose of this study is to analyze executive perceptions. A number of segments involved in studying and managing organizations should benefit from a more comprehensive understanding of the topic.

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CHAPTER TWO

LITERATURE SEARCH

INTRODUCTION

Research on strategic management has not yet addressed why top executives perceive a strategic issue (Ansoff, 1980) as an opportunity or a threat. The identification of the variables which could explain or relate to these perceptions must, therefore, be based on the theoretical and empirical literature which may be only indirectly related.

RESEARCH MODEL DEVELOPMENT

Ansoff defined a strategic issue as: "A forthcoming development, either inside or outside the organization which is likely to have an important impact on the ability of the enterprise to meet its objectives" (1980, p. 133). Timely perception of, and appropriate response to, strategic issues originating in a firm's environment(s) are crucial for organizational survival and effectiveness.

The responsibility for guiding an organization's response to a strategic issue resides with the top executives of the enterprise. The chief executive of an

organization is likely to be the most important individual of the top management team and will normally be a prime sponsor, if not the initiator, of significant change in an organization (Chandler, 1962; Child and Kieser, 1981). Furthermore, his or her perceptions of the strategic issue will play a significant role in determining the organization's response (Paine and Anderson, 1977; Anderson and Paine, 1975).

An individual's perceptions of change in the environment of the organization, in terms of a potential opportunity or threat, should be influenced by the interaction of at least two factors. First, variables which have been suggested to relate to managerial perceptions should be analyzed. Second, features of organizations and characteristics of individuals associated with adaptive capabilities and/or innovative tendencies on the part of organizations should be examined.

The issue of managerial perceptions is addressed first, followed by a discussion of organizational adaptation/innovation. The objective was to build a logical, internally consistent model that would: (1) incorporate theoretically sound variables for this analysis of executive strategic issue perceptions; and (2) provide a basis for formulating testable hypotheses.

MANAGERIAL PERCEPTIONS

Perception has evolved as an important conceptual and empirical variable in the analysis of organizations. Environmental uncertainty, as a perceptual process outcome (Downey and Slocum, 1975), has been the common denominator of many discussions (Burns and Stalker, 1961; Lawrence and Lorsch, 1967; Duncan, 1972). Thompson (1967) went so far as to suggest that coping with uncertainty is the essence of administration.

Duncan (1972) emphasized that properties of environments and organizations are not constant features, but "...they are dependent on the perceptions of organization members and thus can vary...to the extent that individuals differ in their perceptions" (p. 325). Miles, Snow and Pfeffer concurred and concluded that actions taken by organizations were consistent with perceptions rather than with the objective characteristics of the environment.

They proposed that organizations could perceive the same environment differently because environmental elements may be ignored, or the perceptions of these elements may be distorted. This ignorance or distortion of environments may result in organizations accepting as given "a wide range of 'perceived environments' (which) may be tolerated for lengthy periods in real circumstances" (1974, p. 249). Miles, Snow and Pfeffer

did not specify why environments are ignored or distorted, but they did emphasize the need for research in this area.

Clearly, organizations do not perceive, individuals do. What is not clear is the impact that the organization has on individual perceptions (Downey and Slocum, 1975).

Research on individual perceptions has demonstrated that numerous individual differences can influence the way that an individual views his or her world. In reviewing this research, with an emphasis on interpersonal perceptions, Zalkind and Costello (1962) concluded that such factors as an individual's needs, values, and cultural background are important. Moreover, an individual's "perceptual set," based on expectations and experiences, is referenced in any attempt to categorize "new" experiences.

Litterer (1973) presented a model of perception formation (see Figure 2.1) that indicated that variables in addition to personal differences can have an impact on the perception formation process. These included stress, group pressure, interaction, role, reference groups, organizational position and job, and the reward system.

Downey and Slocum (1975) proposed an integrated framework for understanding perceptions of environmental uncertainty. They went to great lengths to establish that environments "...do exist and have real attributes" (p. 570). The responses to these environments, including

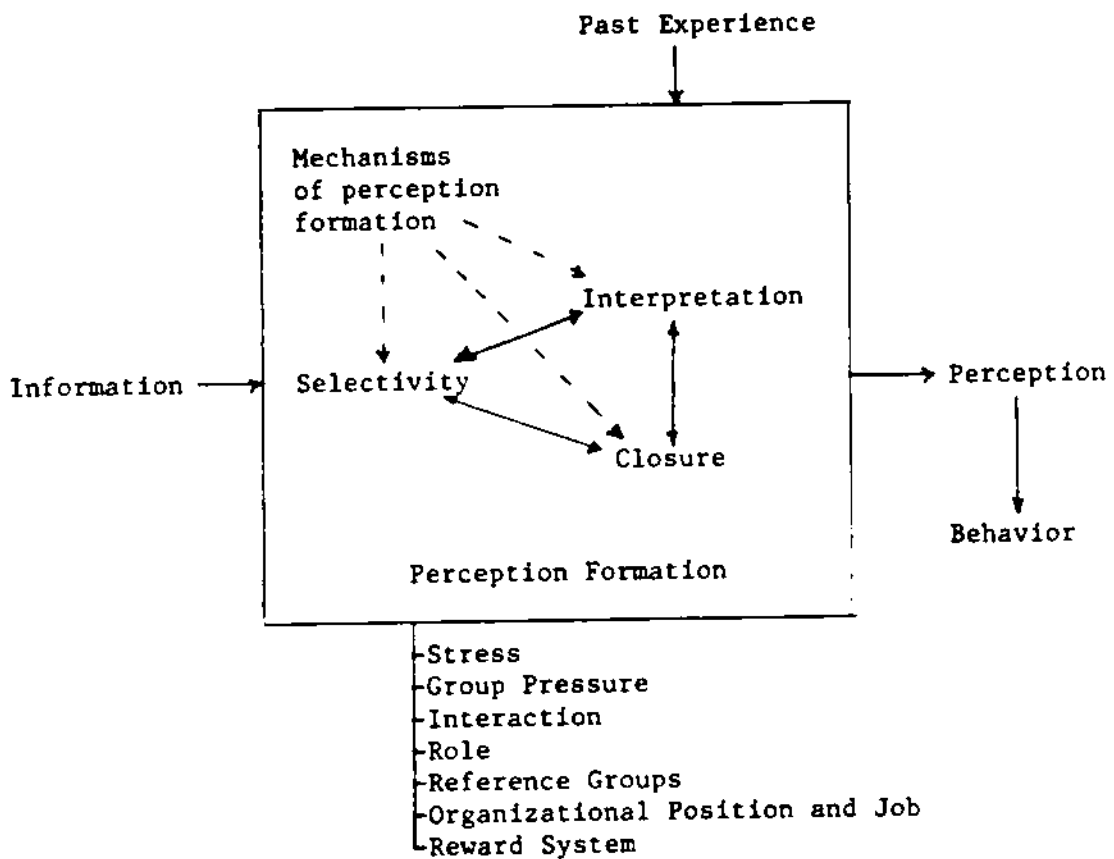


Figure 2.1

Perception Formation and Its Effect on Behavior

(Adapted from Joseph A. Litterer,
The Analysis of Organizations, 2nd Ed.
 New York: John Wiley and Sons, 1973, p. 103)

uncertainty, are perceptual qualities.

To explain why differences in perceptions could be manifested, they suggested that: (1) behavior is goal directed; and (2) uncertainty is the result of a sense of a loss of control. Perceptions derive from the process of "mapping" environmental stimuli. Mapping the environment is undertaken to achieve control over the environment in order to more fully satisfy personal goal attainment. However, this mapping process is never complete and provides a potential source of perceived uncertainty. Variability in perceptions of uncertainty can be analyzed in terms of the factors affecting this mapping process.

For participants in organizations, characteristics of environments resulting from domain choices and organizational design decisions would be a potential source of perceived uncertainty. That is, environments are "chosen" and "created" by the decision makers and the designers of the organization for its members.

Environmental characteristics do not necessarily cause perceptions of uncertainty. Characteristics of the individual's cognitive processes, an individual's behavioral response repertoire, and social expectations are important intervening variables. Cognitive processes include an individual's tolerance for ambiguity (Duncan, 1972) and ability to comprehend complexity (Downey and Slocum, 1975).

An individual's behavioral response repertoire refers to the capability to generate appropriate responses under varying conditions. Finally, social expectations derive from the socialization process experienced in an organization. Conditioning appears to influence uncertainty perceptions. For example, an individual's "functional upbringing" could influence the way in which an individual views problems, opportunities, and so on (Dearborn and Simon, 1963). Role expectations attached to a particular position in an organization could also contribute to uncertainty perceptions (Downey and Slocum, 1975).

Domain choices are influenced by the perceptions of environments on the part of the dominant individual or coalition (Downey and Slocum, 1975), and the value system of this individual or group (Child, 1972). Some organizations stake out domains that are more dynamic, complex, hostile, and so on (Mintzberg, 1978; Miller, Kets de Vries and Toulouse, 1982).

To accommodate domain choices, decision makers devise organizational strategies and effect organizational structures. Choices of strategy and structure may then influence decision makers' perceptions of environments (Child, 1972; Anderson and Paine, 1975; Hedberg and Jonsson, 1977; Miles, Snow and Pfeffer, 1974).

Organizational Strategy and Perceptions

Just as individuals map their environments (Downey and Slocum, 1975), organizations map theirs. Based on these mappings, organizations develop theories of cause and effect relationships, or theories of action (i.e., strategies) which are tested against "reality." Positive reinforcement results in organizational learning. Organizational learning, and reinforcement of the theories underlying the learning process results in increasing elaboration and even institutionalization of these theories (Starbuck, 1965; Hedberg and Jonsson, 1977; Mitroff and Kilmann, 1976; Hedberg, 1981).

Mintzberg alluded to this tendency when he referred to strategy as being "a pattern in a stream of decisions" (1978, p.935). It is an integrated set of ideas and constructs through which problems are identified and evaluated, and corrective actions undertaken which forms the basis for the pattern. Khandwalla's conceptualization of strategy "as a loose or tight coupling together of decisions, guidelines, heuristics, etc." (1976, p. 64) conveyed similar meaning.

Strategies can be thought of as tests of reality stemming from something akin to an individual's perceptual set. This "organizational set" was labelled "metasystem" by Beer (1975), the "myth" from which an organization devises its strategies during a certain time interval by

Hedberg and Jonsson (1977). Viewed in these ways, strategies act on individuals in the organization to shape perceptions and behaviors in accordance with the accepted myth. Additionally, structure and processes develop which institutionalize the myth and even come to replace the guidance provided previously by the myth (March and Simon, 1958; Burns and Stalker, 1961; Cyert and March, 1963).

Such developments in strategy elaboration serve a number of useful functions, especially in static, benevolent environments.

By bridging the gap between myths and realities, strategies serve the dual purpose of ordering feedback information into categories provided by the myths and filtering off signals that are inconsistent with the world views that the myths represent. In both ways they reduce uncertainty and economize on limited information-processing capacity in organizations. The ordering function serves efficiency within the frame of reference myths define. The filtering function prevents organizations from overreacting to change (Hedberg and Jonsson, 1977, p. 92).

The existence of a myth, metastrategy or an organizational mind-set probably explains the uncovering of patterns in the way that organizations align themselves with their environments (Anderson and Paine, 1975; Miles and Snow, 1978; Child and Kieser, 1981; Hedberg, 1981; Starbuck, 1982).

With respect to strategy formulation and perceptions, Paine and Anderson noted that:

Recent advances in understanding the strategy formulation problem have centered around the role of the decision maker as a mediator between the internal characteristics of the organization and the important elements of the external environment. In general, managers (or policy-makers) perceiving a highly uncertain environment are likely to use different decision patterns in strategy formulation than those managers perceiving a high degree of certainty in the environment (1977, pp. 147-148).

For them, the interaction of managerial perceptions of the environment and the need for change in the internal features of the organization has theoretically predictable effects on certain variables. Paine and Anderson failed to specify whether managerial perceptions of the need for change in the internal features of the organization were in response to conditions viewed as opportunities or threats, but these variables were: (1) mission or domain, (2) objectives, (3) strategies and policies, (4) organizational form, and (5) the role performance of policy makers (Anderson and Paine, 1975, p. 816). They concluded that lower degrees of perceived uncertainty resulted in managers' actions being aimed more at maintaining the status quo. Higher levels of uncertainty apparently lead to bolder, more risky entrepreneurial strategy making (1977, pp. 148-149).

Except for the exclusion of technology, these variables are almost identical to the "decision points"

approach suggested by Miles, Snow and Pfeffer (1974) for understanding organizational adaptation and development (i.e., domain, strategy, technology, structure, and provisions for the continuity of the organization). It is the interaction of choices made with respect to Anderson and Paines' first four variables, plus the choice of technology, that determines "...the extent of competence, capabilities, or internal resources (available to the organization) to carry out desired actions" (1977, p. 150).

In the event of environmental change, the top executive would face a situation which would be perceived to: (1) favor past strategic choices of domain, strategy, technology and structure; or (2) not support past strategic choices. A mismatch among these variables, i.e., incongruence, would result in perceived need for change in one, and probably many of these variables (Miller, 1980; Miller and Friesen, 1980). The greater the perceived incongruence between these variables, the more likely it would be that management would engage in significant alteration of controllable variables (Anderson and Paine, 1975; Paine and Anderson, 1977; Miller and Friesen, 1980).

The myth (Hedberg and Jonsson, 1977) or metastrategy (Mintzberg, 1978) or metasystem (Beer, 1975) which guides organizational actions (i.e., strategies) is shaped

significantly by the CEO's theories of cause and effect relationships. Structure and process characteristics will follow from these strategies (Hedberg and Jonsson, 1977; Hedberg, 1981; Child and Kieser, 1981; Mintzberg, 1978).

Perceptions of a change in the organization's environment could either favor or threaten the executive's goals and sense of controlling the situation because the choices that have been made with respect to strategy are primarily the results of the theories of cause and effect that the top executive (or executives) has (have) developed. An organization's present strategic pattern would reflect these theories.

A strategic issue would be a "test" of the myth or myths which led to present organizational conditions (Hedberg and Jonsson, 1977; Hedberg, 1981). Comparing the demands of the strategic issue with present organizational features would result in "passing" or "failing" the test. Passing the test would imply an opportunity, failing would suggest a threat.

Organizational Structure and Perceptions

The previous section alluded to the tendency of organizations to institutionalize organizational strategy, and, thus, the myth underlying strategy, through organizational structural characteristics (March and

Simon, 1958; Burns and Stalker, 1961; Mintzberg, 1978; Hedberg and Jonsson, 1977; Child and Kieser, 1981). Although the evidence is not conclusive, some of it suggested that organizational structure is important for understanding managerial perceptions. According to Miles, Snow and Pfeffer (1974):

How organizations attend to various aspects of their environments and how this information is collected and processed are issues that are both unexplored and critical to our understanding of organizational adaptation. It is entirely conceivable that organization structure itself conditions the enactment process...Therefore, structure may not only be a consequence of the environment but may also influence the environment through its effect on managerial attention processes (p. 250).

At the executive level of decision makers, Child (1972) offered some explanation for differences in perceptions when he discussed the "imperatives" that had been forwarded to explain the role of technology, environment and organization size with respect to organizational structure. Strategic choices were central to his argument, and these choices are a function of managerial perceptions, the constraints imposed by prior strategic choices and organizational goals.

In reference to the impact that structural choices might have on perceptions, Child maintained that:

(T)he type of structure utilized may affect the quality of other strategic decisions because of the way it influences the communication of necessary information and so on...Information reaching the dominant coalition is open to reinterpretation at the hands of the people who have to pass it on, such as those in boundary roles with respect to information coming in from the environment and those in roles lower down in the hierarchy with respect to information passing up from operating levels (1972, pp. 12, 13).

Top-level executives are to some extent dependent upon the organizations they create in terms of information availability and reliability.

Empirical studies which have examined the relationship between structure and perceptions support the proposition that structure influences perceptions. For instance, Carter (1971) reported findings that supported the notion that organizational structure could influence top management's perceptions of, and choices among organizational projects.

Based on laboratory experiences, Huber, O'Connell and Cummings (1975) provided support for a structure/perception relationship. They suspected that information specificity and information load, coupled with group structure could influence experienced uncertainty. In general, their hypotheses were supported. For example, they found support for a negative relationship between

information load and uncertainty, a positive relationship between tightness of group structure and uncertainty, and an interactive relationship between information specificity, group structure and perceived uncertainty. They concluded that "...perceptions of the environment are influenced by factors both external and internal to an organization" (p. 737).

Using 62 longitudinal case studies taken from graduate level business policy texts, Paine and Anderson (1977) found that for organizations reporting certain and uncertain environments and low perceived need for internal change, structure was not, apparently, a differentiating variable. For organizations reporting high perceived need for internal change under certain and uncertain environmental conditions, mechanistic organizations dominated in environments perceived to be uncertain and organic organizations dominated in environments perceived to be more certain. The major conclusion the authors drew from their findings was that the degree of incongruence among their research variables would be a predictor of the extent and likelihood of managerial change initiatives.

More importantly for the analysis of strategic issue perceptions, Paine and Anderson's work suggested that management references organizational structure vis a' vis environmental conditions. Organizational structures which were not accommodative of environmental conditions related

to managerial perceptions of the need for change in the organization's structural characteristics. A strategic issue presents a "test" of the appropriateness of an organization's structural characteristics.

Having presented the rationale for analyzing organizational strategy and organizational structure with respect to CEO perceptions of environments, in general, attention is now given to an organization's predilection to respond to changed or changing environmental conditions. The essential thrust of the discussion is that some organizations and individuals are more accommodative of change, and that the degree of responsiveness built into organizations and inherent to individuals will influence or be related to CEOs' perceptions of changing environmental conditions. Again, strategy and structure are important to the discussion.

ORGANIZATIONAL ADAPTATION AND INNOVATION

Ansoff claimed that a strategic issue "...is likely to have an important impact on the ability of the enterprise to meet its objectives" (1980, p. 133). When the environmental conditions facing an organization change significantly, the organization must respond; the organization must change also. But, some organizations appear to "resist change even when their environments

threaten them with extinction" (Miller and Friesen, 1980, p. 591). Other organizations exhibit very different behaviors; not only do they accommodate change, they initiate it often (Miles and Snow, 1978; Mintzberg, 1973; Hedberg, 1981).

Burns and Stalker (1961) were instrumental in pointing out that under different environmental conditions, different management systems could be appropriate. In terms of a continuum they labelled from "organic" to "mechanistic," they discussed how organizations could align themselves in environments requiring primarily programmed decision making as opposed to non-programmed decision making (e.g., domain and strategy choices) (Simon, 1957). Concomitant differences in the degree to which organizations are centralized, specialized, and formalized could have significant implications for organizational adaptive capabilities.

In discussing firms which have developed the kind of system appropriate for non-programmed decision making, Burns and Stalker (1961) claimed that these firms rely on a "common culture" or system of shared beliefs which is expressed in a code of conduct on the way to deal with people. It is this code of conduct and its expression which is the "...first sign...of a management system appropriate to changing conditions" (p. 250). Miles and Snow (1978) reiterated this point at great length (pp.

121-129). It is more than structure which encourages or facilitates organizational adaptive capabilities.

Burns and Stalker appeared to favor an organic approach to management system design, but they recognized that both types (i.e., mechanistic and organic) "...represent a 'rational' form of organization...to exploit the human resources of concern in the most efficient manner feasible in the circumstances of concern" (1961, p. 250). In other words, the appropriateness of structure is contingent upon circumstances. The nature of these circumstances is to a large degree a function of the strategic choices made by top managers and "...only partially preordained by environmental conditions..." (Miles, Snow, Meyer and Coleman, 1978). The contingency assertion has been echoed consistently since the work of Burns and Stalker (Lawrence and Lorsch, 1967; Perrow, 1970; Woodward, 1965; Pugh, et al., 1969; Child, 1972; Rumelt, 1974).

Once choices have been made with respect to domain, strategy and structure, what combination(s) of these variables allows an organization to be more capable of adapting to its environment, if not capable of manipulating it? In the face of changing conditions, where a response or a set of responses are not part of an organization's programmed repertoire, innovation is needed. This does not mean that organizations will

innovate. In fact, the evidence suggested that the capacity to formulate innovative responses to change are part of some organizations' behavioral repertoires, but not others' (Miles and Snow, 1978; Miller, et al., 1982; Mintzberg, 1973; Paine and Anderson, 1977).

Factors Affecting the Adaptive/Innovative Capabilities of Organizations

Mohr (1969) defined innovation as "...the successful introduction into an applied situation of means or ends that are new to that situation" (p. 230). He maintained that innovation in an organization can be predicted on the basis of the interaction of the motivation to innovate, the strength of obstacles against innovation and the availability of resources for overcoming such obstacles (p. 228). His observations were based on the analysis of 93 public health organizations.

Mohr considered motivation to innovate from the standpoint of "ideology" and "activism" of the top health officer in a department. Ideology was defined in terms of "a health officer's opinion regarding the scope of services that should properly be offered by the local health agency...in non-traditional public health program areas" (p. 236). In the context of the strategic management of the firm, "ideology" rings of domain and strategy choices. In fact, "scope of services" appears

frequently in discussions of organizational strategy (Schendel and Hofer, 1977).

Activism was defined as the top officer's perceptions "of the extent to which...(his role)...requires interaction with others...to obtain ideas, support, approval, and resources for departmental programs" (p. 235). Additional adjectives used to describe activism were: "go-getter, aggressive, ambitious, interested in accomplishment and willing to stick his neck out" (p. 235).

Obstacles to innovation were broken down into community obstacles and organizational obstacles. The first addressed education levels of the population served by the health agency and the occupational breakdown of the population. Organizational obstacles were operationalized according to the training levels of organizational participants.

Finally, organizational resources and size were ascertained. Level of expenditures was equated with resources and number of people in the community served by the agency represented size.

Product moment correlation coefficients calculated for measures of innovation and these variables were all positive. That is, greater activism and a progressive ideology of the manager, an educated and professional population (i.e., market served), an educated workforce

and size were positively related to innovation. Combining these variables in an additive model, it was possible to explain 53 per cent of the variation in the adoption of innovative programs (p. 252). A multiplicative model accounted for a slightly higher percentage of the variance and indicated that interaction of the variables was present. Mohr concluded that "...innovation (should be) viewed as a multiplicative function of the motivation to innovate and the balance between the obstacles and resources bearing upon innovation" (p. 259). Mohr did not specify whether innovation was in response to perceived opportunities or threats.

Three points made by Mohr are particularly relevant for the investigation of executive strategic issue perceptions. First, "(a)n organization may be more likely to innovate when its environment is rapidly changing than when it is steady" (Mohr, 1969, p. 231). If management choices of domain are as crucial as suggested for understanding the nature of the environment a firm faces (Child, 1972; Miles, Snow and Pfeffer, 1974; Downey and Slocum, 1975; Duncan, 1972), then managements' attitudes toward change and innovation would be reflected in choices of domain and the strategies undertaken for positioning the firm in these domains (Miles and Snow, 1978; Miller, et al., 1982; Child, 1972).

With respect to the relationship between strategy and

managements' attitudes toward change, Miles and Snow (1978) found that when firms were studied for their tendencies to seek out new opportunities and to "...experiment with potential responses to emerging environmental trends" (p. 29), important differences between firms emerged. The firms that they labelled "Prospectors" were the most likely to engage in experimentation. The firms that they labelled "Defenders" were the least likely to engage in these activities. The domain and strategy choices of some firms predisposed these firms to more aggressive, innovative strategic postures (Miles and Snow, 1978).

Second, "...innovation should also be more likely when the social environment to which an organization (or an individual) belongs has norms that favor change than when its norms do not favor change" (Mohr, 1969, p. 231). An organization which values adaptive capabilities versus efficiency, and which institutionalizes these values through its structural and process characteristics will be better able to respond to changing conditions (Burns and Stalker, 1961; Hage and Aiken, 1967; Miles and Snow, 1978).

Finally, with respect to individuals confronted with the need to innovate, or the opportunity for innovation, the "...self confidence to overcome obstacles presented in terms of human forces..." (Mohr, 1969, p. 234) is

important.

Support for Mohr's ideas was presented by Pierce and Delbecq (1977). After breaking innovation down into three phases, namely, initiation, adoption and implementation, they proposed three models to explain innovation in organizations. The variables that they identified could influence each phase differently, and they were labelled contextual variables, structural characteristics and attitudinal variables.

Contextual variables related to innovation were: (1) environmental uncertainty (complexity and dynamism); (2) organizational size (employees and resources); (3) organizational age (length of tenure of dominant coalition); and (4) interorganizational interdependencies.

Structural variables were: (1) differentiation (heterogeneity of occupational types); (2) professionalism (degree of professional training and outside professional activities); (3) decentralization (participativeness in decision making); (4) formalization (degree to which a codified body of rules, procedures, or behavior prescriptions are used to handle decisions and work processing); and (5) stratification (the degree of status congruence and ease of intraorganizational mobility).

Finally, individual attitudes (e.g., job satisfaction, job involvement, performance dissatisfaction and intrinsic motivation) and the values of strategic

decision makers toward change were discussed (pp. 29-33).

The authors proposed three additive models for exploratory purposes, with each model suggesting the potential for different relationships among the variables when considering the initiation, adoption and implementation of innovation. They concluded that "...organizations which are more organic in structure apparently will have a momentum to initiate innovation...But these very structural characteristics that are conducive to initiation appear to inhibit the decision to adopt and the necessary mechanisms for implementation" (p. 35).

The theoretical and empirical work that has been reviewed to this point has suggested that with respect to perceptions, the adaptive/innovative capacity of organizations is important. The characteristics of the individual whose perceptions are being studied are also important. The literature that was reviewed was interpreted to suggest that an organization's strategy and its structural characteristics merit inclusion in an analysis of CEO perceptions of a strategic issue. Attention is now directed to the interactive effect that strategy and structure may have with respect to strategic issue perceptions. Following the discussion of strategy/structure interaction, an important characteristic of the individual, with respect to

perceptions and innovative tendencies, is addressed.

ORGANIZATIONAL GESTALTS

The processes by which organizations come to align themselves in an environment are not fully understood. But it does appear that all organizations face a set of similar problems. According to Miles and Snow:

Although we realize that adaptation is a complex and ongoing process, we believe it can be broken apart, for purposes of analysis, into three major problems requiring top-management attention and decisions: the entrepreneurial problem, the engineering problem and the administrative problem (1978, p. 14).

For Miles and Snow, the entrepreneurial problem for the ongoing concern relates to discrete events that arise in the firm's environment that require adjustments in the firm's strategy, specifically, strategic issues. The engineering problem relates to the technological requirements and structural alignments needed to accommodate the strategy adjustment. The administrative problem is concerned with appropriate process changes needed to accommodate the adjustments in the strategy and structure of the firm.

Additionally, "because the (ongoing) organization has already obtained a set of 'solutions' to its engineering and administrative problems, its next attempt at an entrepreneurial 'thrust' may be difficult" (Miles,

et al., 1978). With respect to this "set of 'solutions,'" organizations appear to exhibit "gestalts" with respect to their dominant features. That is, choices of domain, for example, place limits on subsequent choices of strategy, technology, and structure (Miller, 1981). Examples of gestalts include structure and domain/strategy (Chandler, 1962; Burns and Stalker, 1961; Lawrence and Lorsch, 1967; Rumelt, 1974; Galbraith and Nathanson, 1978; Miller and Friesen, 1980; Mintzberg, 1978), and, to a lesser extent, technology and structure (Woodward, 1965; Perrow, 1970), and size and structure (Pugh, et al., 1969; Child, 1973).

Anderson and Paine (1975) and Paine and Anderson (1977) proposed organizational gestalts on the basis of: (1) organizational objectives; (2) strategies and policies; (3) organization form; and (4) role performance of (the) policy maker. Their four gestalts were labelled the adaptive planning mode, the planning mode, the adaptive entrepreneurial mode and the entrepreneurial or stress mode. Firms were assigned to the quadrants of their model (gestalts) subjectively. "The scoring of cases was done by two naive judges who were provided with descriptions of the variables to be scored and examples of anchor points for the rating scales..." (Paine and Anderson, 1977, p. 149).

To analyze organizations according to their adaptive responses to the entrepreneurial, engineering and

administrative problems they encounter, Miles and Snow (1978) developed an organizational typology consisting of three stable types of organizations. They discussed a fourth type of organization, but instability was its primary distinguishing characteristic.

The differences between organizations according to these "pure" types stemmed from their decisions and activities with respect to domain choices (e.g., simple-complex, static-dynamic), strategic thrusts (e.g., aggressive-defensive), technological emphasis (e.g., flexible-efficient), and structure (organic-mechanistic). In fact, it was the patterned differences along these variables which led Miles and Snow to formulate their typologies which they labelled: Prospectors, Analyzers, Defenders and Reactors.

With respect to organizational strategy type and structural characteristics, Miles and Snow reported that Defenders tended to exhibit extensive division of labor. Defenders also relied on formalized procedures and centralized decision making to a greater extent than did organizations that were categorized differently in terms of strategy. For example, Prospectors showed low division of labor, low formalization and were decentralized. Analyzers fell in the middle on these structural characteristics.

Subsequent analyses confirmed the analytical validity

of their typologies (1978, pp. 94-115). A major strength of this project was its reliance on field research and/or survey data of actual firms.

The works of Miller and Friesen (1977, 1978) and Miller (1979, 1981, 1982) represented statistically rigorous attempts to establish organizational gestalts. Using 31 measures of environmental, organizational and strategy making characteristics, these authors identified a number of distinct organizational types. "Q-techniques" (e.g., converse factor analysis) application to their data was a significant improvement over the methods used by Paine and Anderson (1977) to establish their typologies. But like Paine and Anderson (but unlike Miles and Snow, 1978), data were derived from case studies.

Miles and Snow's (1978) work relied heavily on field research and/or survey data, and their categorization of firms as Prospectors, Analyzers or Defenders exhibited evident analytical potential. This suggested that their organization typology deserved further attention. Combining the measures and data collection methods of Miles and Snow (1978) with Q-techniques statistical analyses offered a vehicle for investigating strategic issue perceptions in a more comprehensive manner than would be true for bivariate analyses only.

THE ROLE OF THE INDIVIDUAL

Characteristics of individuals responsible for the strategic aspects of managing a firm are important for understanding organizational responses to environments. In particular, an individual's confidence in his or her ability to control events is important (Mohr, 1969; Downey and Slocum, 1975; Collins and Moore, 1970; Hage and Dewar, 1973). The ability to engage in entrepreneurial activities is also important for organizational adaptation (Miles and Snow, 1978; Collings and Moore, 1970). Locus of control (Rotter, 1966) has been found to be related to an individual's sense of controlling a situation and entrepreneurial inclinations (Brockhaus, 1980; Miller, et al., 1982). Since perceived loss of control of a situation is related to perceptions of uncertainty (Downey and Slocum, 1975), locus of control could relate to perceptions of uncertainty in the environment.

Briefly, an individual's reported locus of control reflects the degree to which an individual feels that actions taken by him or her determine the course of events around them. Conversely, it is a measure of the degree to which an individual feels that destiny and the actions of others or external events determine his or her future. Internals are said to feel they control their own destiny to a greater extent than do externals (Rotter, 1966).

Miller and his associates (1982) investigated top

executive locus of control as it related to strategy making, structure and organizational environments. They hypothesized that aggressive, confident, proactive individuals would tend to undertake more innovative, risky strategies to the extent that chief executives have the power to manipulate the firm. Strategy choices would then have implications for the structure of organizations along a rough organic/mechanistic continuum. Similarly, the environments enacted by these organizations would correspond to the strategic and structural choices made. They considered locus of control to be a "personality" characteristic that strongly influences other organization and extra-organization variables. Statistical congruence among measures of these variables was expected by the researchers.

Consistent, significant relationships between four measures of organizational strategy (i.e., innovation, risk taking, proactiveness and futurity), environment (i.e., dynamism and heterogeneity) and three measures of structure (i.e., scanning, technocratization and differentiation) and locus of control of top executives confirmed Miller and his associates' (1982) expectations. They concluded that strategy was the controlling factor in environment perceptions, given locus of control of the chief executive. Proactive, aggressive strategies led to dynamic, heterogeneous environments being enacted by

organizations headed by internal CEOs. In essence, a CEO with a stronger belief that he/she controls events and outcomes ran a more innovative, organic organization. CEOs with external locus of control tendencies ran more defensive, mechanistic organizations.

With respect to the individual, cognitive processes have been suggested to be important for understanding uncertainty perceptions (Downey and Slocum 1975; Duncan, 1972). Uncertainty results from a sense of a loss of control of the situation and a generalized expectancy construct, locus of control, has been suggested to explain individuals' tendencies to perceive themselves as more or less able to control situations surrounding them (Rotter, 1966; Brockhaus, 1980; Miller, et al., 1982). To the extent that locus of control is a predictor of proactive, aggressive behavior, it is likely that such tendencies relate to innovative inclinations (Mohr, 1969; Miller, et al., 1982).

PROPOSED MODEL FOR INVESTIGATING EXECUTIVE STRATEGIC ISSUE PERCEPTIONS

A review of the literature on perceptions of uncertainty suggested that perceptions would be influenced by characteristics of the individual doing the perceiving and by his or her surroundings. An individual's beliefs about the extent to which events could be controlled and

the implications these belief tendencies have for behavioral inclinations (Brockhaus, 1980; Mohr, 1969; Miller, et al., 1982; Collins and Moore, 1970) provided support for the inclusion of locus of control in the research. An individual's behavioral response repertoire (e.g., age, educational background and scope, tenure, professional affiliation) also appeared to be important (Hage and Aiken, 1967; Mohr, 1969; Downey and Slocum, 1975; Pierce and Delbecq, 1977). Therefore, locus of control and behavioral response repertoire were included in the research model (see Figure 2.2).

An individual's environment constituted the second major aspect of the model. In essence, an organization's choice of strategy---whether the firm is essentially a Prospector, Analyzer or Defender (Miles and Snow, 1978)---was thought to represent not only the firm's choice of domain characteristics (Miles, Snow and Pfeffer, 1974; Child, 1972), but also the general nature of the myth guiding organizational activities (Hedberg and Jonsson, 1977; Child and Kieser, 1981; Hedberg, 1981). Thus, including organizational strategy would provide an idea of the type of environment the firm enacts, the basic nature of the theories of cause and effect relationships held by management and the social expectations with respect to uncertainty (avoidance versus seeking it out) present in a given organization (Miles and Snow, 1978;

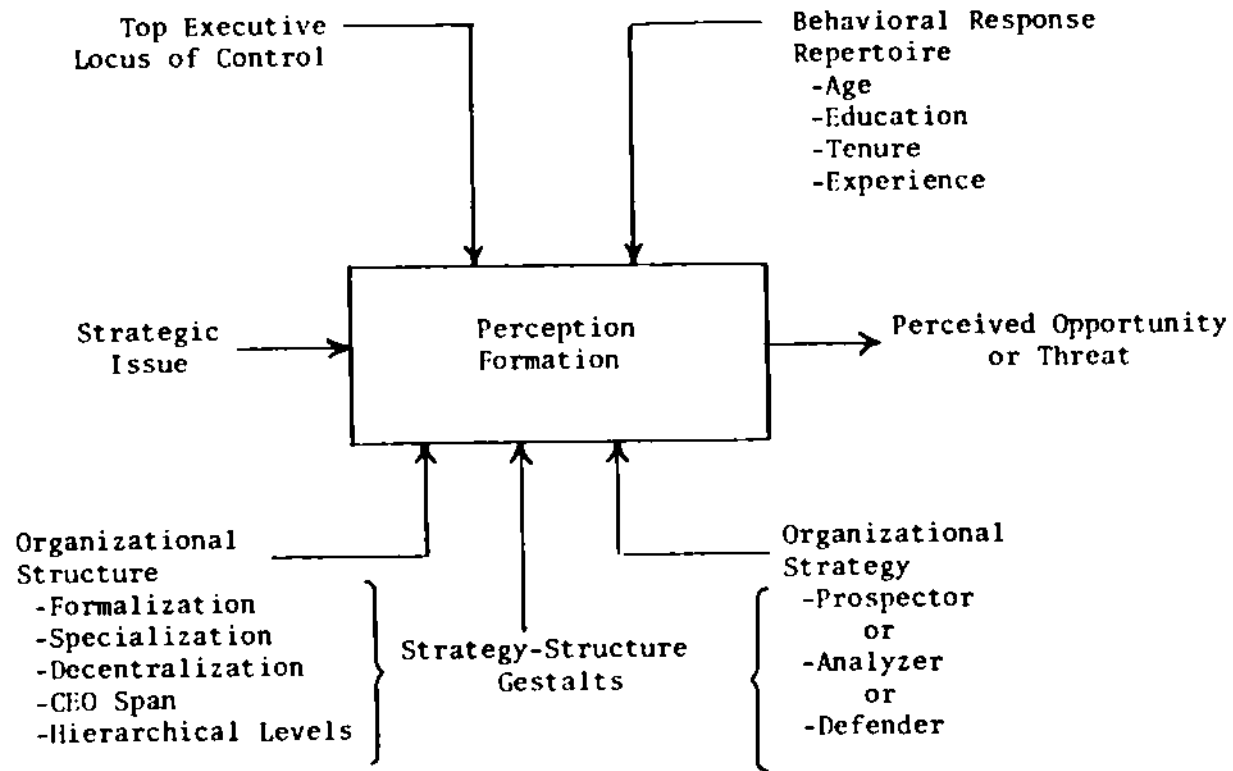


Figure 2.2

Proposed Model for Analyzing Top Executive Strategic Issue Perceptions

Child, 1972; Hedberg and Jonsson, 1977; Hedberg, 1981; Downey and Slocum, 1975).

Organizational structural characteristics had been suggested to be potential sources of influence on perceptions (Child, 1972; Miles, Snow and Pfeffer, 1974; Downey and Slocum, 1975; Huber, O'Connell and Cummings, 1975; Duncan, 1972) and organizational innovation capabilities (Mohr, 1969; Pierce and Delbecq, 1977; Miles and Snow, 1978; Burns and Stalker, 1961). Organization structure, in terms of formalization, specialization, decentralization, CEO span of control and levels of managerial personnel, was included in the model.

The model follows the format for understanding perception formation presented by Litterer (1973) (see Figure 2.1). Environmental stimuli, in this case flexible manufacturing systems developments, provide information to the perceiver. This information is attended to selectively, and interpreted in light of experience and expectations, in this case an individual's behavioral response repertoire and locus of control. "Other factors" affecting perceptions are now conceptualized in terms of organizational strategy (i.e., Prospector, Analyzer or Defender) and organizational structural characteristics.

SUMMARY

Because no research on strategic management had been done on top executive perceptions of a strategic issue (Ansoff, 1980), the theoretical basis for this study was derived from the literature which was the most relevant given the purpose of the study. The conceptual and empirical works addressing managerial perceptions and organizational adaptive/innovative capabilities were emphasized.

The literature on managerial perceptions suggested that perceptions stem from an individual's attempts to map his or her environment to more fully satisfy personal goals. Perceived uncertainty results from a sense of losing control of circumstances (Downey and Slocum, 1975).

Organizational strategy was proposed as a research variable for analyzing executive perceptions of strategic issues. Strategies are "theories of action" grounded in organizational myths (Hedberg and Jonsson, 1977; Hedberg, 1981). Organizational myths, and resulting strategies, both influence and are influenced by the top executives of firms. Strategies which are reinforced by the environment are elaborated and even institutionalized (March and Simon, 1958; Cyert and March, 1963; Hedberg and Jonsson, 1977; Hedberg, 1981). It was proposed that strategic issues would pose "tests" for the organization's present strategic posture, and, consequently, the top executive's

theory of the world.

Organizational structure was also selected as a research variable. Structure appears to have the potential to influence managerial perceptions (Downey and Slocum, 1975; Child, 1972; Miles, Snow and Pfeffer, 1974; Carter, 1971; Paine and Anderson, 1977). Structure derives from organizational strategy. Therefore, a strategic issue would test organizational structure, also. Less abstractly, structure can facilitate or impede the transference of necessary information (Child, 1972) and has been found to relate to perceptions of uncertainty (Huber, et al., 1975; Duncan, 1972).

With respect to an organization's capacity for responding to changed or changing environmental conditions, at least three factors are important. First, an organization may choose domains requiring primarily programmed or non-programmed decision making (Simon, 1957). Organizational strategy will reflect this choice and managerial attitudes toward change (Miles and Snow, 1978; Miller, et al., 1982; Child, 1972).

Second, the social structure of an organization is important for understanding the capacity for responding to changing conditions (Burns and Stalker, 1961; Hage and Aiken, 1967; Pierce and Delbecq, 1977). Third, the interaction of strategy and structure is relevant for understanding organizational adaptation and development

(Chandler, 1962; Paine and Anderson, 1977; Miles, et al., 1974; Miller, 1981). The empirical identification of organizational gestalts, based on the interaction of strategy and structure, can be achieved more rigorously than has been done previously through the use of Q-techniques (Miller, 1978).

Uncertainty appears to stem from threats to the goals of a person and the feeling that one is not in control of a situation (Downey and Slocum, 1975). The locus of control construct was suggested to be important for predicting the extent to which one would feel that a situation was not under control. For this reason, locus of control was included in the research model.

Comprehensiveness of the behavioral responses that a person has at his or her command was also suggested to be important for predicting uncertainty perceptions and the ability to generate innovative solutions to novel problems (Mohr, 1969; Hage and Aiken, 1967; Pierce and Delbecq, 1977; Downey and Slocum, 1975). For this reason, indices of this construct were included in the model, e.g., age, experience, tenure, education, professional affiliation.

Organizational strategy was included in the model in terms of an organizational typology of strategies developed by Miles and Snow (1978) that labels organizations according to whether they are primarily Prospectors, Analyzers or Defenders. Organizational

structure was also included in the model in terms of formalization, specialization, decentralization, CEO span of control and levels of managerial personnel.

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CHAPTER THREE

RESEARCH METHODOLOGY

INTRODUCTION

This chapter discusses the methodology used to investigate strategic issue perceptions including definitions, hypotheses tested, measurement methods and data collection procedures.

DEFINITIONS OF TERMS

Top executive perceptions of flexible manufacturing systems (FMS) developments were analyzed. Top executives were defined as those individuals with responsibility for a firm or a subsidiary of a firm. All data collection efforts were aimed at the chief executive officer of a firm, or the top executive of an affiliate or subsidiary of a firm in a single industry.

The industry chosen for the study was labeled Metalworking Machinery & Equipment (S.I.C. 354, 50,000 Leading U.S. Corporations, 1980). The rationale for choosing a single industry for analysis was based on Hatten's (1979) contention that the issue of sample homogeneity is essential in quantitative strategic

management research. The particular sample or sub-sample examined has an impact on the relationships uncovered among variables of concern (Hrebiniak and Snow, 1980).

To overcome this problem, Hatten (1977) suggested that researchers identify "strategic groups." Some evidence of such attempts include studies of the brewery industry (Schendel and Patton, 1976), major appliances (Hunt, 1972), the chemical process industry (Newman, 1973), and the consumer goods industry (Porter, 1973). As the strategic group in this study, chief executives of firms, or top managers of subsidiaries of firms competing in the metalworking machinery and equipment industry in Ohio, were employed.

The dependent variable was the perceptions of chief executives with respect to a strategic issue. Ansoff (1980, p.133) defined a strategic issue as:

A forthcoming development, either inside or outside of the organization which is likely to have an important impact on the ability of the enterprise to meet its objectives.

Strategic issue perceptions were conceptualized in terms of the attainment of organizational objectives while keeping in mind that organizational objectives could vary (Child, 1972; Perrow, 1970). Strategic issue perceptions was defined as the degree to which a top executive views the issue as threatening the firm's ability to meet its objectives, or the degree to which the top executive views

the issue as an opportunity for attaining organizational objectives.

Approaching perceptions in this manner differed from traditional approaches (Lawrence and Lorsch, 1967; Duncan, 1972; Huber, O'Connell and Cummings, 1975). This was based on the proposition that uncertainty with respect to an issue or object stems from: (1) instrumentality of the issue or object with respect to goal attainment; and/or (2) perceived loss of control of circumstances (Downey and Slocum, 1975).

Factors external to the individual were suggested to be potential sources of variation in perceptions (Child, 1972; Miles, et al., 1974; Duncan, 1972; Huber, et al., 1975; Hedberg, 1981). Organizational strategy and organizational structure were two of these factors and were included in the study as research variables.

Organizational strategy was defined as the pattern in the stream of decisions that defines the firm's relationship with its environment over time (Mintzberg, 1978, p. 935), especially as that pattern relates to product and market interactions in a competitive environment (Hofer and Schendel, 1978).

Organizational structure was defined as the relatively fixed relationships that exist among jobs and organizational units with the following components:

- (1) Organizational formalization, or the extent to which rules, procedures, instructions, and communications are written and the extent to which jobs are explicitly defined, such as in a manual (Osborn, et al., 1980, p.302).
- (2) Organizational specialization, or the extent to which organizational activities are fractionated, assigned to and managed by individuals or groups of individuals who do no other job in the organization (Mintzberg, 1979, pp. 69-80).
- (3) Organizational decentralization, or locus of decision making in terms of where in the vertical hierarchy decisions are made (Osborn, et al., 1980, p. 301).
- (4) Organizational configuration, in terms of the span of control of the top executive and the number of levels of managerial personnel present in the organization (Pugh, et al., 1969).

On the basis of evidence which suggested that personal characteristics of the individual perceiver could influence perceptions (Mohr, 1969; Collins and Moore, 1970; Duncan, 1972; Downey and Slocum, 1975; Child, 1972; Pierce and Delbecq, 1977), an individual's locus of control and behavioral response repertoire were included as research variables. Locus of control was defined as the extent to which an individual perceives that events and outcomes are a function of the individual's behavior (internally controlled), or the degree to which an individual feels that events are beyond his or her control (Levenson and Miller, 1976, p. 199).

Behavioral response repertoire was defined as the set of variables which contribute to an individual's capacity to respond appropriately to the environmental conditions

he or she encounters (Downey and Slocum, 1975).

These definitions were utilized throughout the research endeavor. Each variable was operationalized to allow the examination of the hypotheses discussed in the following sections.

THE THEORETICAL HYPOTHESIS

This research was undertaken to gather data which could be utilized to establish empirically whether the following theoretical hypothesis could be supported.

HT: Chief executive perceptions of a strategic issue as an opportunity or a threat will relate to organizational factors and to characteristics of the executive.

Chapters 1 and 2 discussed the literature from which this hypothesis was derived. In the following section, operational hypotheses are stated and the literature and/or value judgments supporting the generation of these hypotheses is presented.

HYPOTHESES TESTED IN THE STUDY

Fourteen operational hypotheses were set up to test the theoretical hypothesis including those related to organizational strategy, organizational structure, an executive's locus of control and behavioral response repertoire.

Organizational Strategy

Organizational strategies are tests of organizational metasystems, or myths. Strategies which are perceived to be "successful" are elaborated and even institutionalized (Khandwalla, 1976; Mintzberg, 1978; Hedberg and Jonsson, 1977; Hedberg, 1981).

An important distinguishing characteristic of organizations pursuing different strategies was the extent to which they seek out new opportunities and "...experiment with potential responses to emerging environmental trends" (Miles and Snow, 1978, p. 29). Firms that were the most likely to engage in these activities Miles and Snow labelled "Prospectors," while firms that were the least likely to seek out opportunities and to engage in experimentation they labelled "Defenders." The following hypothesis was formulated:

H1: Chief executive perceptions of a strategic issue will relate to whether an organization is identified as a Prospector, Analyzer or Defender.

Organizational Structure

Based on a laboratory simulation, Huber, O'Connell and Cummings (1975) suggested that the amount of environmental information that organizational members are subjected to may have an impact on uncertainty perceptions. Structure was found to influence the

conveyance of information. Child (1972) noted that structure may influence managerial perceptions by limiting or distorting information reaching top management. Carter's (1971) findings supported Child's proposition. Duncan (1972) found that uncertainty perceptions were related to structure. Miles, Snow and Pfeffer (1974) argued that highly specialized organizations influence managerial perceptions of environments.

In 1977, Pierce and Delbecq proposed that different structural characteristics exhibited different effects when the initiation, adoption and implementation "phases" of innovation were considered. The impact that the degree of formalization and the extent to which an organization is centralized has on innovation depends on whether initiation, adoption or implementation is of concern. Regardless of which phase of innovation that is being considered, specialization would be positively associated with innovation (Pierce and Delbecq, 1977, pp. 34-35).

To allow the formulation of testable hypotheses with respect to organizational formalization and organizational centralization, an assumption was made. Ansoff (1980) defined a strategic issue in terms of a "forthcoming development." Executive perceptions were tapped for an issue only now appearing on the strategic horizon (the strategic issue designated for analysis is discussed later in this chapter). The relationships between structure and

the initiation phase of innovation suggested by Pierce and Delbecq (1977) were assumed to be the most appropriate model for the hypotheses. Specifically, they hypothesized that specialization and decentralization would be positively related to initiation, and formalization would be negatively related to initiation.

Huber, et al.'s (1977) findings on information specificity and load were also considered. They found direct evidence that information load was negatively related to uncertainty perceptions and conflicting evidence on information specificity, depending on group structure. CEO span of control and the number of levels of managerial personnel were hypothesized to be associated with information load and specificity, respectively.

With respect to perceptions of the strategic issue, the following hypotheses were formulated:

H2: Chief executive perceptions of a strategic issue will relate negatively to organizational formalization.

H3: Chief executive perceptions of a strategic issue will relate positively to organizational specialization.

H4: Chief executive perceptions of a strategic issue will relate positively to organizational decentralization.

H5: Chief executive perceptions of a strategic issue will relate positively to the CEO's span of control.

H6: Chief executive perceptions of a strategic issue will relate negatively to the number of levels of managerial personnel.

Organizational Gestalts

Discussion in the first two chapters alluded to the likelihood that organizations exhibit gestalts, or patterns among major variables (Mintzberg, 1978; Anderson and Paine, 1975; Miller, 1981; Miles and Snow, 1978). The data on organizational strategy and structure were analyzed to identify empirically groups of firms which exhibited similar patterns among organizational strategy and organizational structure measures. The results of this analysis were utilized to examine the effect of different strategy-structure patterns, or gestalts, on chief executive perceptions of a strategic issue.

Locus of Control

Locus of control was defined earlier in this chapter. The only notable research which included this variable when examining top level executives was discussed in Chapter 2. Briefly, Miller, et al. (1982) examined locus as it related to strategy, strategy formulation, structure and perceptions of organizational environments. They proposed and found congruence between locus and strategy (i.e., internal locus of control related to proactive,

innovative strategies). Internal tendencies also related to futurity and risk taking tendencies. Finally, more organicness in structure was positively related to CEO internal locus of control tendencies.

Mohr (1969) suggested that activism tendencies were a predictor of innovation. Pierce and Delbecq (1977) hypothesized that attitudes toward change (e.g., favorable) on the part of decision makers would predict innovative tendencies. Beliefs in one's ability to control events were positively related to innovative predilections (Collins and Moore, 1970; Brockhaus, 1980) and negatively related to tendencies to perceive uncertainty in a given situation (Downey and Slocum, 1975). The following hypothesis was formulated:

- H7: Chief executive perceptions of a strategic issue will relate positively to internal locus of control.

Behavioral Response Repertoire

The final variable in the analysis was labelled the individual's behavioral response repertoire. This refers to the set of variables that contributes to the capacity to respond appropriately to circumstances. Variety of experience conveys the meaning of the construct (Downey and Slocum, 1975). Education (Pierce and Delbecq, 1977; Mohr, 1969), professional affiliation (Hage and Dewar,

1973), tenure (Pierce and Delbecq, 1977), functional background (Dearborn and Simon, 1963), and age (Child and Kieser, 1981) are variables which have been associated with the construct. The following hypotheses were formulated with respect to the behavioral response repertoire:

- H8: Chief executive perceptions of a strategic issue will relate positively to education (years).
- H9: Chief executive perceptions of a strategic issue will relate negatively to years since completing education.
- H10: Chief executive perceptions of a strategic issue will relate positively to professional affiliation (continuing education).
- H11: Chief executive perceptions of a strategic issue will relate to experience in functions of the firm.
- H12: Chief executive perceptions of a strategic issue will relate positively to variety of functional experience.
- H13: Chief executive perceptions of a strategic issue will relate negatively to age.
- H14: Chief executive perceptions of a strategic issue will relate negatively to tenure.

MEASUREMENT METHODS USED IN THE STUDY

To analyze executive perceptions of a strategic issue, data were collected on the variables of interest using a mail questionnaire (see Appendix A). The questionnaire was divided into sections.

Strategic Issue Measurement

Section A of the questionnaire shows 14 external environmental issues that were presented for executive evaluation. These issues were discussed in terms of being strategic in nature (Hofer and Schendel, 1978, p. 92; Aguilar, 1967, p. 11; Steiner, Miner and Gray, 1982, p. 66).

This section of the questionnaire included the measure of the dependent variable, Item Number 9, namely, the extent to which computer/robotics technology poses a threat or offers an opportunity with respect to the firm's attainment of its objectives. The rationale for nesting the issue of concern among numerous environmental issues was twofold.

First, if an executive were asked to respond on only one issue, no reference point would have been suggested to provide the level of organizational analysis and thought desired by this research. By "camouflaging" the variable of concern to some extent, the executives would be coaxed

into a strategic frame of mind.

Second, the last two items in this section delved into executive perceptions of change, in general, in product and process technologies. Comparing responses on these items with the responses on the computer/robotics technology item would provide a means for estimating the reliability of the responses (Nunnally, 1978). One step in the analysis was the calculation of correlation coefficients for the responses on the items that addressed technological change, namely, perceptions of computer/robotics and perceptions of change in process and product technologies.

The instructions for Section A contain the scale for executive evaluation of the extent to which the environmental issues might pose threats or present opportunities with respect to organizational objectives. The scale offered eight choices. Six of the scale options addressed opportunity or threat potential in subjective, probabilistic terms (e.g., possible, probable and definite). One choice allowed executives to consider the substance of the issue without an opportunity or threat qualification. The last choice gave the executive the option to consider the issue not relevant with respect to the firm he heads.

Strategy and CEO Perceptions of FMS

Snow and Hambrick (1980) identified four major methods for identifying organizational strategies: Investigator inference, self typing, external assessment and objective indicators.

Part 1, Section B of the questionnaire presented the method used to measure organizational strategy in this study. 'Self typing by CEOs of their firms' strategies was utilized. A modified measurement method applied to a typology of strategies developed by Miles and Snow was employed (see Appendix A, Section B, Part 1). Miles and Snow (1978) and others have developed and refined their approach in over 200 businesses in ten industries.

In their scheme, firms can be classified as essentially Prospectors, Analyzers, Defenders and Reactors (1978). It is a business-level typology of strategies ("How should we compete in this business?") as compared with corporate-level strategies ("What businesses should we be in?") (Hofer and Schendel, 1978). The instrument shown in Appendix A was obtained from Raymond Miles at the Doctoral Consortium on Business Policy and Social Issues, Detroit, Michigan, August, 1980.

In the questionnaire presented in Appendix A, the "Type 1" organization is a Defender. The "Type 2" organization is a Prospector, and "Type 3" is an Analyzer (Miles and Snow, 1978). The description of the Reactor

was excluded from this self-typing because of its less than complimentary wording. Miles and Snow followed this procedure when executives identified their firms' strategic postures.

To Miles and Snow, these strategy types are "pure" forms. A given firm could exhibit characteristics of a number of types. To allow for this possibility, the directions in this section of the questionnaire asked that executives read the descriptions of the organizations and take notes on what they saw as the most distinguishing characteristics of each hypothetical firm. After reading the descriptions, another set of instructions directed the executives to allocate 25 points among these descriptions. Executives were told to build a composite picture of their firm by spreading these points across the types of organizations described in the three scenarios.

A forced choice of one description was not requested because Miles and Snow suggested that few firms would fit neatly into one category or another, even though it was expected that some executives in this study would choose to assign all points to one type of strategy.

To analyze whether strategy type related to opportunity/threat perceptions stemming from the strategic issue (Hypothesis 1), groups of executives reporting similar strategy types were compared for differences in perceptions of FMS. To compare groups, it was necessary

to identify the relevant groups.

A statistical method termed K-means cluster analysis (BMDP, 1981) was used to group respondents according to the strategy of the firm. This technique identifies similar groups of respondents according to Euclidean distances in the data space using the following formula:

$$\Delta_{jk} = [\sum_{i=1}^n (X_{ij} - X_{ik})^p]^{1/p}$$

All cases were initially assigned to one cluster. At each stage of the analysis, clusters were split to form new clusters. When the designated number of clusters was reached, cases were iteratively reallocated into the cluster whose center was the closest.

An analysis of variance provided information on the significance of the spatial difference of cases across the variables. F-ratio statistics indicated the extent to which variable mean scores were different for cases assigned to different clusters. This information allows the researcher to draw conclusions with respect to which variables provide the greatest degree of discrimination for cluster assignment of cases.

In this analysis (as in subsequent cluster analyses), all variables were standardized before cluster computations were performed. This is advisable for variables that are not scaled identically (Aaker, 1971; Miller, 1978).

In 1978, Miller noted that when utilizing cluster analysis, the number of clusters formed depends on the purpose of the research project. In other words, there are no mathematical heuristics for establishing the optimal number of clusters for analysis. Since the purpose of this part of the analysis was to explore the possibility that groups of firms with similar strategy patterns would exhibit similar within-group central tendencies with respect to FMS perceptions, the following decision rule was established. Clusters were formed according to the CEO's strategy self-typing to test for the discriminatory power of different cluster patterns while keeping in mind the need for adequate within-group sizes.

The mean responses on the opportunity/threat scale for computer/robotics technology for groups of executives reporting similar strategy types were compared. A one-way analysis of variance was performed to determine if any one group was different. By examining the mean responses on the opportunity/threat scales for the strategic issue, it is possible to determine if a difference exists in at least one group. Such an outcome would provide evidence for rejecting the null hypothesis that strategy type makes no difference with respect to strategic issue perceptions.

Analyzing perceptions of FMS central tendencies for groups established on the basis of the cluster analysis

described above does not take into consideration the weight given to a particular strategy description by a chief executive. Therefore, in addition to the test for central tendency differences between groups, product moment correlation coefficients were calculated for the FMS perceptions measure and the points allocated to each strategy description. These coefficients were examined for their sign and significance level.

Structure and CEO Perceptions of FMS

In this study, a limited set of structural characteristics was analyzed. Part 2 of Section B, Appendix A, presents the measures that were utilized.

Six items in this part of the questionnaire tapped organizational formalization (Questions 1-4) (Osborn, et al., 1982, pp. 308-309). Scoring these items was accomplished as follows: 'no' = 0, 'yes' = 1; 'a' = 1, 'b' = 2, etc. A higher average score indicated that an organization was more formalized.

Question 5 measured organizational functional specialization (Pugh, et al., 1969). Scoring Question 5 required the tallying of the number of functions that the chief executive indicated were managed by an individual who engaged in essentially no other task. This sum was then divided by the total number of categories (N=20) to

obtain a percentage of the organizational activities that were specialized.

Question 6 tapped the CEO's span of control and the number of levels of managerial personnel. This question asked that the CEO provide a copy of the organizational chart. If it were not available, the CEO was asked to sketch his organization on the questionnaire. Determining the CEO's span and the number of levels of managerial personnel was accomplished through a visual inspection of the chart.

Question 7 measured organizational decentralization (Osborn, et al., 1982. p. 311). Eight items were contained in this section. Executives were asked to specify the degree to which decisions were delegated with respect to: (1) budget establishment; (2) hiring and firing personnel; (3) promoting and demoting personnel; (4) new project establishment; (5) setting unit objectives; (6) establishing rules and procedures; (7) handling exceptions; and (8) purchasing equipment. The response categories were: none, little, some and great. Responses were coded one through four, summed and averaged to obtain an average degree of decentralization in an organization. A higher average score indicated greater overall decentralization.

To analyze Hypotheses 2 through 6, which dealt with the impact of organizational structural characteristics on

perceptions, product moment correlation coefficients were calculated for each structural feature and executive perceptions of FMS. A multiple regression model was then be generated using a stepwise procedure. The regression model was examined for:

1. Which variables entered the model.
2. The sign and the significance of the beta terms.
3. The amount of variation explained by the model.

Strategy and Structure Gestalts and CEO Perceptions of FMS

That strategy and structure are related is a recurrent theme in the strategic management literature (Chandler, 1962; Rumelt, 1974; Anderson and Paine, 1975; Miles and Snow, 1978). Substitutability of structural characteristics (Miller, 1981) and apparent equifinality (Paine and Naderson, 1977) confuse the specification of these interrelationships. Definitive conclusions on these interrelationships may remain elusive (Hatten, 1977).

Identification of combinations of strategy and structural characteristics was apparent in the works of Paine and Anderson (1977), Miles and Snow (1978), Miller (1981), and Miller and Friesen (1977). Taking this thrust a step further, measures collected on strategy and structural characteristics in this research were used to derive empirically groups of firms.

These groups were defined by within-group pattern similarity across the variables while maximizing between-group differences. Cluster analysis (K-means, BMDP, 1981) was applied to the data on strategy, formalization, centralization, specialization, CEO span of control and the number of level of managerial personnel. The decision rule on the formation of clusters that was established earlier was applied in these analyses.

The cluster analysis results were utilized for the additional analysis of executive perceptions of FMS. Specifically, the mean responses on executive perceptions of FMS for groups of firms with different gestalts were compared. Analysis of variance was utilized to test for differences in at least one mean score.

Locus of Control and CEO Perceptions of FMS

Section C, Part 2 tapped an individual's locus of control tendencies. The instrument used in this study to gauge locus of control was developed by Levenson and Miller (1976). They borrowed from and improved upon Rotter's (1966) original measurement of locus of control. They claimed that their measure of internal tendencies is far more construct specific than Rotter's twenty-nine item questionnaire. They accomplished this increased construct specificity by subjecting large samples taken on Rotter's

measure to factor analyses. The eight items used in this study were labelled the Internal Scale by Levenson and Miller (1976) and came from a multidimensional questionnaire (p. 202).

Scoring Levenson and Miller's (1976) items required an averaging of the responses on the Likert-type responses shown. A higher score indicated that an individual was more externally inclined, while a lower score indicated that an individual was more internally inclined.

To test the hypothesis that locus of control would relate to perceptions (Hypothesis 7), the correlation coefficient for locus of control and CEO perceptions of FMS was calculated. The correlation coefficient was analyzed for both its significance and its sign. It was expected that the relationship would be negative---that is, internal tendencies would relate to opportunistic perceptions.

Behavioral Response Repertoire and CEO Perceptions of FMS

Section D of the questionnaire was used to collect data on the chief executive. These data included: (1) age; (2) number of years of education; (3) educational emphasis; (4) years since completing education; (5) continuing education involvement; (6) industry, firm and position tenure; and (7) time spent in different

functional areas of the firm before becoming CEO. These factors were examined for their relationships to CEO perceptions of FMS by means of a correlation analysis. The correlation coefficients were analyzed for both their sign and significance.

An additional measure was computed to estimate variety of experience (Downey and Slocum, 1975). The number of different functional areas in which an executive had experience was calculated, and this score was correlated with perceptions of FMS scores.

ADDITIONAL METHODOLOGICAL COMMENTS

Two issues remain unaddressed. First, the indices of formalization, decentralization, specialization and locus of control are multi-item measures intended to estimate the constructs. Under these conditions, Nunnally (1979, 1978) suggested that the reliability of such indices be analyzed. Estimating internal consistency as a predictor of reliability is the most common procedure utilized (Nunnally, 1978). Therefore, Cronbach's alpha was calculated for the measures of formalization, decentralization and locus of control. Because the items measuring specialization are dichotomous, the Kuder-Richardson formula 20 (KR-20) is the result of calculating alpha for these items (Nunnally, 1970, p.

126).

Second, for the tests of the hypotheses discussed so far, a level of significance for rejection of the null was not specified. The alpha level required for the rejection of the null is presented---that is, the "p" value, or the "alpha level" required to reject the null hypothesis, is reported. In this way, maximum information is conveyed to the reader.

STUDY CONTEXT - THE STRATEGIC ISSUE

Recalling Ansoff's definition of a strategic issue and the purposes of this study, a strategic issue must be identified which would provide the context for the analysis of executive perceptions and the factors which are expected to influence or relate to these perceptions. Earlier in this chapter, flexible manufacturing systems (FMS) developments were identified as the strategic issue for analysis. The rationale for choosing this environmental issue is discussed in this section.

In reviewing the students of industrial organization (Porter, 1979) and the discussants of competitive advantage (South, 1982; Hofer and Schendel, 1978), two criteria appeared to be useful in selecting an objective strategic issue. These were:

1. The issue needed to be current and had to exhibit potential potency for the firms to be included in the study.
2. The issue had to contain inherently some degree of controllability for the executives in question.

The first criterion was needed for control purposes; specifically, if firms included in the study could evade the issue, much of the study's purpose could be invalidated. The second criterion was necessary because if the response to the strategic issue were dictated from some extraneous source, little individual variation in perceptions could be expected from executives.

The potential for changes in the production technologies of numerous industries as a strategic issue offered the promise of meeting both criteria. The integration of computers and industrial robotics into the manufacturing processes of the firm is the focus of these changes. There is evidence to suggest that the capabilities of industrial robotics, coupled with the data processing speed and accuracy of computers, have strategic ramifications for those industries susceptible to their application (Thompson and Paris, 1982).

The results of present applications of computer/robotics technology were reviewed at length by Ouellette, Thomas, Mangold and Cheremisinoff (1983). Eight categories of effects stemming from increasing

application of this technology (or technologies) were synthesized. These categories were: (1) energy savings; (2) material savings; (3) labor effects; (4) productivity; (5) economics; (6) environmental effects; (7) worker safety and health; and (8) product quality.

With respect to the conclusions from the study and future trends, the authors commented:

Highly automated production technologies cut across the traditional lines of management and organization of the factory. Traditional business organizations may have difficulty accepting the disruption of established patterns that accommodate a high level of automation...The completely automated factory is 10 years from receiving widespread acceptance in the United States...The integration of computer-aided design (CAD) and manufacturing (CAM) into the automatic factory is a difficult, complex problem. It involves several production technologies, complexities in factory organization; labor, engineering and management relations; the introduction of new equipment and procedures unfamiliar to existing personnel; and high capital investment in new, untried manufacturing methods. Since the economic advantages of the automated system are not obvious for many applications, management will be reluctant to accept it (pp. 159-160).

Grant and King (1982, p.93) recognized the importance of these changes when they claimed that the requirements for planning and controlling strategic technological investments will never be greater than in the next decade. Furthermore, the implications and pervasiveness of these changes for management thinking and practices are just

beginning to be recognized.

Thompson and Paris (1982, p.47) maintained that the increasing use of computer facilities coupled with industrial robotics mechanisms will require an entirely different approach to the decision making and the management of the corporation. They suggested that the traditional analytical approach that began with the works of Frederick W. Taylor must be replaced with an integrated, systems perspective in making decisions and planning strategies. Table 3.1 indicates the implications stemming from these changes in technology that Thompson and Paris (1982) proposed.

These technological changes hold the potential for causing severe uncertainty to be experienced by executives managing firms in industries vulnerable to the introduction of computer/robotic technology. These coming changes in technology provided the context for this study. How executives viewed these changes was expected, a priori, to be related to the variables discussed in the previous sections.

DATA COLLECTION METHODS

To collect the data for the study, a mail questionnaire was utilized. The sample consisted of top executives. These executives' names and the firms they

TABLE 3.1
COMPUTER-INTEGRATED MANUFACTURING: SOME STRATEGIC IMPLICATIONS*

Operating Implications	Vertical Integration	Resource Deployments	Manufacturing Systems	Human Resources	Organization
-Short change over time (EOQ = 1)	-Smaller lot size economical	-Physical size reduced in importance	-Movement to flow from batch control	-Need to upgrade skills	-Centralized planning
-Economy of scale of limited advantage	-Reduced volume advantage	-Multimission facilities practical	-Emphasis on quick turnaround as opposed to smoothing	-Potential social problems	-Decentralized operations
-High utilization required	-Lower penalty for variety	-Redundancy required	-Centralized planning	-Rewards will be based on responsibility, not efficiency	-Changing line and staff definitions
-Process knowledge in software	-Volume needed to increase utilization	-Process replication easy	-Need consistent, accurate data base	-Functions must work more closely together	
-Vulnerable to breakdown	-May not want all eggs in one basket				
	-Process transfer easy				
	-Higher levels tempered by capital availability	-Smaller, multimissioned plants closer to the market	-Discrete manufacturing will move to process control	-Need for a more high skilled worker	-Less functionalized, more integration

DIRECTIONS

*Adapted from H. Thompson and M. Paris, "The Changing Face of Manufacturing Technology," *The Journal of Business Strategy*, Vol. 3, No. 1 (Summer 1982), pp. 45-52.

head were drawn from 50,000 Leading U.S. Corporations, 1980.

To solicit executive participation, a letter was sent to a sub-sample of the larger sample to determine if an appeal by letter would result in executives agreeing to participate. A stamped, addressed postcard was enclosed with the letter to allow easy response for the executives regarding whether they would be willing to participate.

This initial mailing was sent to fifteen chief executives. The firms these executives headed were stratified by size in terms of annual sales. Chapter 4 discusses the outcome of this approach in detail.

SUMMARY

This chapter addressed methodology. Important terms were defined as a prelude to operationalization of the variables measured and analyzed.

The sample was defined to include as units of analysis individuals identified as the top managers of firms or subsidiaries in a single industry. The sample industry was defined as the Metalworking Machinery & Equipment firms operating in the state of Ohio.

Strategic issue perceptions were conceptualized in terms of organizational objectives and the potential of such issues to provide opportunities or to pose threats to

the firm's ability to meet its objectives.

Perceptions were expected to relate to factors external to the perceiver and to characteristics of the perceiver. External factors included organizational strategy and organizational structure. Locus of control and an individual's behavioral response repertoire comprised the perceiver's characteristics.

Strategy was conceptualized according to the belief that strategy is a reflection and extension of a broader, more encompassing metasystem (Beer, 1975) or myth (Hedberg and Jonsson, 1977) underlying the perceptual processes of members of the firm. Strategy was operationalized according to Miles and Snow's (1978) typology, which can be used to categorize firms as primarily Prospectors, Analyzers or Defenders.

Structure was considered to be a potential correlate of perceptions. Five aspects of structure were identified. These were: (1) formalization; (2) specialization; (3) decentralization; (4) CEO span of control; and (5) number of levels of managerial personnel.

Locus of control was operationalized utilizing an eight item measure developed by Levenson and Miller (1976). It was expected that internal locus of control tendencies would relate positively to CEO perceptions of flexible manufacturing systems (FMS) developments.

Behavioral response repertoire was operationalized

according to an individual's: (1) age; (2) education; (3) time since completing his/her education; (4) continuing education involvement; (5) involvement in different functions of the organization; and (5) variety of experience in different organizational functions.

The hypotheses tested, the statistical techniques utilized and data collection methods were discussed. The rationale for selecting flexible manufacturing systems developments as the strategic issue was presented.

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CHAPTER FOUR

DATA ANALYSIS AND RESULTS

INTRODUCTION

This chapter presents the outcome of the analyses and includes an overview of the study sample, characteristics of the sample and presentation of the findings. Due to the length of the chapter, an in-depth discussion of the results is reserved for the final chapter.

STUDY SAMPLE

Individuals responsible for the strategic management of metalworking machinery and equipment companies which are headquartered in Ohio comprised the sample. This sample was drawn from the population defined by those firms listed under Standard Industrial Classification (S.I.C.) 354, Metalworking Machinery & Equipment firms in 50,000 Leading U.S. Corporations (1980). A list of seventy individuals identified as the chief executive officer (CEO) in these firms was compiled (see Appendix B).

The firms that these CEOs headed ranged in size according to annual sales from \$3,000,000 to \$536,000,000

and in relative standing in their industry by sales from 2 to 439. The population consisted of 443 firms. The 70 firms in Ohio represented 15.8 per cent of all the firms listed under this S.I.C.

To determine whether these executives would be willing to participate in the study, a letter was sent to 15 of these CEOs seeking permission to send the questionnaire for their inspection. A facsimile of the letter, and of the post card which was enclosed for ease of response, are presented in Appendix C. The firms that these CEOs are in charge of are shown in Appendix D. These firms were stratified by size in terms of sales volume.

Of the 15 letters sent to the CEOs, only four (27%) post cards were returned, and they were negative. These executives responded that they were not willing to examine the questionnaire. Clearly, another data collection technique was needed.

The second approach to collect the needed data consisted of telephoning the executives to solicit their cooperation. Those executives who had been sent a letter, but who had not responded to it, were called first. The fact that a letter had been sent to these executives was mentioned on the first two calls. This was dropped on the remaining calls because the mention of the letter seemed to put these first two executives in an uncomfortable,

defensive position. Apparently they had received the letter, but ignored it. An example of the researcher's side of the telephone conversation is contained in Appendix E.

This approach was very positive. Of the eleven executives called who had not responded to the letter, most of them said that they would be willing to examine the questionnaire. Some explained that they would have to see it before deciding to fill it out. Others simply agreed to complete it.

This approach to gaining access to CEOs was then utilized to contact the remaining executives in the sample. The eleven CEOs who had not responded to the letter were contacted on July 12, 1983. The remaining executives were contacted over the period July 13-18, 1983. A total of 138 phone calls was made to contact 66 executives. Three firms could not be reached. Apparently, these firms had moved, gone out of business or been purchased by other firms. One firm had been listed twice in 50,000 Leading U.S. Corporations (1980).

Ten firms were contacted numerous times without gaining access to the chief executive. Four secretaries agreed to pass the questionnaire on to the CEO. How effective this approach actually was in gaining CEO responses to the questionnaire was unobtainable.

While telephoning the executives, the sometimes dated

nature of the list of names taken from 50,000 Leading U.S. Corporations (1980) became apparent. A few of the individuals listed as the chief executive were no longer in this position. Some had advanced to chairman or had retired. Some had taken jobs at other organizations. This did not present a problem. In the cases where the CEO was now the chairman or had left the firm, it was possible to speak to him or to his replacement. All of the executives that were contacted were men.

Of the 66 executives called, 52 (79%) agreed to examine the questionnaire. The names of the individuals who were sent the questionnaire and the firms they head are contained in Appendix F.

By July 31, 1983, 39 questionnaires were returned, representing a response rate of 75 per cent. Three could not be used for the following reasons. One incomplete questionnaire was returned with one comment: "Too vague." Another was returned with an apologetic note indicating that the individual who should fill it out was on extended sick leave. The last questionnaire was unusable. On questions requiring the choice of scale values, one value from a scale was placed in all the response categories. This CEO did request a summary of the research even though he did not complete the questionnaire in "good faith."

The remaining questionnaires were filled out with a high degree of completeness. The only questions left

blank often dealt with the firm's asset figures, the CEO's span of control and the number of levels of managerial personnel.

Due to the approach taken in gaining access to the CEOs, no follow-up was undertaken. Since executives were asked to examine the questionnaire and then decide whether they would be willing to complete it, calling again to encourage cooperation was deemed inappropriate. Moreover, no systematic method for identifying who responded and who did not was attempted because anonymity had been guaranteed. However, 64 per cent of the executives did identify themselves in requesting a summary of the research.

The following section discusses the characteristics of the sample. First, statistics on firm size and business form are presented. Second, descriptive statistics on the executives are discussed.

SAMPLE CHARACTERISTICS

On the basis of 36 usable questionnaires, a breakdown on some characteristics of the firms and the respondents is presented in Tables 4.1 through Table 4.4.

Firm Characteristics

As Table 4.1 indicates, there was substantial

TABLE 4.1

SIZE CHARACTERISTICS OF METALWORKING MACHINERY
AND EQUIPMENT FIRMS IN OHIO, 1983

Size Characteristics	Mean	Standard Deviation	Skewness	Kurtosis	N
Employees	273	225	1.26	1.52	36
Assets (\$)	12,000,000	15,974,000	2.36	5.88	31
Sales (\$)	20,000,000	21,481,000	2.88	9.51	34

variation among the firms with respect to size. The mean number of employees reported was 273. The firms ranged in size as measured by employees from the smallest firm having 40 employees to the largest having 1,000. Taken together, the firms employed 9,832 people.

The distribution of the firms in terms of size as measured by employees was not symmetrical. A measure of skewness (1.261) indicated that the sample clustered at the low end of the mean. The distribution also exhibited kurtosis (1.519), indicating that it was more narrow, or peaked than would be expected under normal distribution conditions.

Executives were asked to report the dollar value of the firm's assets (see Table 4.1). Five executives failed to do so. The following breakdown refers to the 31 firms for which executives did provide the data.

The mean asset value for the sample was \$12 million. The firms ranged in asset size from \$1 million to \$70 million. In total, the executives reported \$383 million in assets. With respect to assets, the sample was skewed (2.358) to the left of the mean and exhibited kurtosis (5.877).

A final measure of size obtained was annual sales (see Table 4.1). Two executives did not provide this figure. The mean sales figure for the remaining firms was \$20 million. The firms ranged in sales volume from \$4

million to \$110 million. Total sales for all firms was \$679 million. The distribution for sales followed the same pattern as did those for employees and assets---that is, the distribution was skewed left (2.878) and exhibited kurtosis (9.513).

Executives were also asked about the business form of the enterprise they head (see Table 4.2). Only one executive reported that the firm was a sole proprietorship. None of the executives indicated that the firm was a partnership. Twenty-three reported that they headed closely held corporations, four executives identified the firm as a publicly traded corporation and one executive specified that the firm was an affiliate of another firm. Seven executives reported that the firm was a wholly-owned subsidiary of another firm.

Executive Characteristics

In Tables 4.3 and 4.4, descriptive statistics on the respondents are shown. One question asked of executives was their official title (see Table 4.3). These titles were categorized according to whether the individual held the title of executive vice president (7 or 19.4%), president (14 or 38.9%), chief operating officer (4 or 11.1%), CEO (5 or 13.9%) or chairman (6 or 16.2%).

The average age of the respondents was 54. These

TABLE 4.2
BUSINESS FORM OF METALWORKING MACHINERY AND
EQUIPMENT FIRMS IN OHIO, 1983

Business Form	Number of Firms	Percent (%)
Sole Proprietorship	1	2.8
Partnership	...	...
Closely Held Corp.	23	63.9
Publicly Traded Corp.	4	11.1
Affiliate	1	2.8
Wholly Owned Subsidiary	<u>7</u>	<u>19.4</u>
TOTAL	36	100.0%

TABLE 4.3

TITULAR BREAKDOWN OF POSITIONS HELD BY
EXECUTIVES WHO COMPLETED QUESTIONNAIRE

Executive Title	Number of Executives	Percent (%)
Executive Vice President	7	19.4
President	14	38.9
Chief Operating Officer	4	11.1
Chief Executive Officer	5	13.9
Chairman	<u>6</u>	<u>16.2</u>
TOTAL	36	99.5%*

*Does not add to 100% due to rounding error.

TABLE 4.4

PERSONAL CHARACTERISTICS OF EXECUTIVES IN
METALWORKING MACHINERY AND EQUIPMENT
FIRMS IN OHIO, 1983

Personal Characteristics	Mean	Standard Deviation	Skewness	Kurtosis
Age	54.6	9.11	- .24	- .32
Education in years	14.7	4.70	-1.65	4.14
Years since completing education	28.8	12.58	- .49	- .46
Years worked in the industry	28.2	12.95	- .53	- .30
Years spent with firm	24.3	13.00	- .20	- .73
Years in present position	10.9	9.43	1.30	1.78

individuals ranged in age from 33 to 72 years old (see Table 4.4). Ages clustered to the right of the mean (skewness = $-.243$). Moreover, the distribution of age was flatter, or less peaked than would be expected under normal distribution conditions (kurtosis = $-.322$). These executives tended to be older than 54 with some very young exceptions.

The remaining data contained in Table 4.4 revealed the level of formal education reported by the sample. The mean number of years of formal education was 15, and in terms of how long it had been since the executives had completed their formal education, the mean was 29 years. Some executives reported that as long as 50 years had passed since completing their education.

Regarding the issue of tenure, the average executive had spent 28 years in the industry, 24 years with the firm he now heads, and eleven years in his present position. Apparently, most of these executives had spent almost their entire careers with the firms they had come to lead.

The next sections address the findings that emerged from the analyses. First, attention is given to the measures used to ascertain executive perceptions of the opportunities or threats stemming from the strategic issue of robotics/computer integration. Second, strategy and perceptions are discussed. Third, the reliability estimates of multi-item scales are presented. Fourth, the

analyses of structure and perceptions are put forth. Fifth, organizational gestalts and perceptions are addressed. Finally, characteristics of the individuals and perceptions are analyzed.

STRATEGIC ISSUE PERCEPTIONS: SCALE ANALYSIS

The dependent variable in this study was executive perceptions of the potential opportunity or threat to the firm stemming from the production capabilities of industrial robotics/computer integration. Executives were provided with an eight-point Likert scale structured in subjective, probabilistic terms to indicate their perceptions (see Appendix A, Section A).

The mean response (N=36) to the computer/robotics opportunity/threat item was 5.08 (see Table 4.5). Clearly, there were differences of opinion among executives as to what the implications of the issue were for the firms they head.

The majority of the executives considered the strategic issue to be more or less of an opportunity for the firm (77.8%). Only five (13.9%) executives considered the issue relevant, but posing no threat nor offering an opportunity with respect to the firm's objectives. Three (8.4%) considered the issue a threat.

In developing the item to measure executive

TABLE 4.5

RESPONSE DISTRIBUTION OF CHIEF EXECUTIVE OFFICER
 PERCEPTIONS OF THE OPPORTUNITY OR THREAT STEMMING
 FROM COMPUTER/ROBOTICS TECHNOLOGY POTENTIAL WITH RESPECT
 TO THE FIRM'S ABILITY TO ATTAIN ITS OBJECTIVES

Executive Perceptions	Number of Executives	Percent (%)
Definite Threat	1	2.8
Probable Threat	2	5.6
Possible Threat	...	...
Relevant, No Threat or Opportunity	5	13.9
Possible Opportunity	15	41.7
Probable Opportunity	8	22.2
Definite Opportunity	5	13.9
Not Relevant	...	...
Missing	...	...
TOTAL	36	100.1%*

*Does not add to 100% due to rounding error.

Mean = 5.08

S.D. = 1.38

Skewness = -1.05

Kurtosis = 1.75

perceptions of the strategic issue, there was some doubt as to whether the issue of concern to the researcher would be of concern to the executives polled. The results indicated that the issue identified for analysis was at least relevant for consideration for all the executives.

Two additional items were contained in this section of the questionnaire which addressed the issue of technological change (see Appendix A, Section A). Responses were compared on these content-similar items.

Correlation coefficients were calculated for the 14 environmental issues (see Table 4.6). Item 13 dealt with CEO perceptions of the opportunities or threats stemming from product technology changes. Item 14 addressed process technology changes. Both showed strong, positive relationships with the dependent variable, Item 9, which addressed computer/robotics technology potential. These coefficients were .47 (N=35, $p=.002$) and .36 (N=34, $p=.017$), respectively.

The correlation coefficients between executive perceptions of computer/robotics technology and product/process changes suggested that executives did not consider computer/robotic technology the only relevant concern with respect to changes in the firm's process and/or product technologies. The correlation coefficient for Items 13 and 14 was .72 (N=34, $p<.000$). The positive, high correlation coefficients between the three measures

TABLE 4.6
CORRELATION MATRIX FOR CHIEF EXECUTIVE OFFICER PERCEPTIONS OF OPPORTUNITY OR
THREAT STEMMING FROM FOURTEEN ENVIRONMENTAL ISSUES*

Environmental Issue	OT1	OT2	OT3	OT4	OT5	OT6	OT7	OT8	OT9	OT10	OT11	OT12	OT13	OT14
OT1 (GDP Growth Rate)	.32	.29	.31	.31	.32	.31	.31	.26	.32	.31	.30	.29	.31	.30
OT2 (Political Climate)	.46**	.31	.30	.30	.31	.30	.30	.26	.31	.31	.30	.28	.31	.30
OT3 (Defense Spending)	.28	.28	.34	.33	.34	.32	.33	.27	.34	.33	.32	.31	.33	.32
OT4 (Taxation/Spending)	.32*	.45**	.32*	.35	.35	.33	.35	.28	.35	.33	.33	.32	.34	.33
OT5 (Interest Rates)	.33*	.37*	.04	.16	.36	.34	.35	.28	.36	.34	.34	.33	.35	.34
OT6 (Workplace Safety)	.40*	.13	.22	.30*	-.05	.34	.33	.28	.34	.32	.32	.32	.33	.32
OT7 (Inflation)	.24	.40*	-.01	.30*	.23	.05	.35	.28	.35	.33	.33	.32	.34	.33
OT8 (Environmental Laws)	.57**	.38*	.17	.41*	.04	.47**	.14	.30	.36	.28	.28	.28	.27	.27
OT9 (Computer/Robotics)	.18	.19	.47**	.21	-.18	.17	.14	.30	.36	.34	.34	.33	.35	.34
OT10 (Foreign Compet.)	.01	.10	-.20	-.01	-.09	-.33*	.02	-.13	.09	.34	.33	.31	.33	.32
OT11 (Foreign Markets)	.46**	.16	.28	.02	.17	.27	.13	.19	-.05	.18	.34	.32	.33	.32
OT12 (Energy)	.29	.09	.20	.36*	.18	.29	-.01	.03	.10	-.24	.29	.31	.32	.31
OT13 (Product Tech.)	.41*	.27	.26	.22	.03	.19	.17	.48**	.47**	.10	.32*	.17	.35	.34
OT14 (Process Tech.)	.35*	.26	.15	.01	.11	.10	.10	.34*	.36*	.12	.34*	.29	.72**	.34

*Lower Triangle: Correlation Coefficient; Upper Triangle: N of Cases

**p<.05

***p<.01

of CEO perceptions of technological change indicated that the CEOs were responding consistently with respect to their views on technological change.

ORGANIZATIONAL STRATEGY AND EXECUTIVE PERCEPTIONS OF COMPUTER/ROBOTICS TECHNOLOGY

Measures of organizational strategy were collected using descriptive scenarios of hypothetical organizational strategy types devised by Miles and Snow (1978). "Types" 1, 2 and 3 described Defenders, Prospectors and Analyzers, respectively (see Appendix A, Section B, Part 1).

Executives were asked to read all the descriptions and to take notes on what they felt were the most important characteristics of each type. They were then directed to allocate 25 points among the descriptions to build composites of their firms' strategies.

The fact that most of the executives allocated points among the types versus skipping this section or assigning all the points to one description indicated that careful attention was given to this section of the questionnaire. Only two executives left this section blank.

Hypothesis 1 was:

H1: Chief executive perceptions of a strategic issue will relate to whether an organization is identified as a Prospector, Analyzer or Defender.

To test this hypothesis, the sample was divided into

groups according to the responses on Section B of the questionnaire (see Appendix A, Section B, Part 1). K-means clustering (BMDP Statistical Software, 1981) was applied to the data collected on organizational strategy. Clusters were formed according to the CEOs' strategy self-typing to test for the explanatory power of different cluster patterns while keeping in mind the need for adequate within-cluster group sizes.

From two to eight clusters were formed. Figure 4.1 demonstrates the clustering of firms into four clusters. Figure 4.1 is a plane depicting the CEOs' allocations of points to the three strategy types. Respondent scores on the Prospector scenario correspond with the closeness of a firm to the XY intercept. Point values assigned to the Defender scenario correspond to distances on the Y-axis, and point values assigned to the Analyzer scenario correspond to distances on the X-axis of the figure.

Clusters are identified by the geometric figures (see Figure legend). The numbers inside the geometric figures indicate the number of executives that chose a particular pattern of assigning points in this section of the questionnaire. Table 4.7 shows the mean number of points assigned to the three strategy typologies for the four clusters.

The mean responses on computer/robotics opportunity/threat perceptions were compared. Four

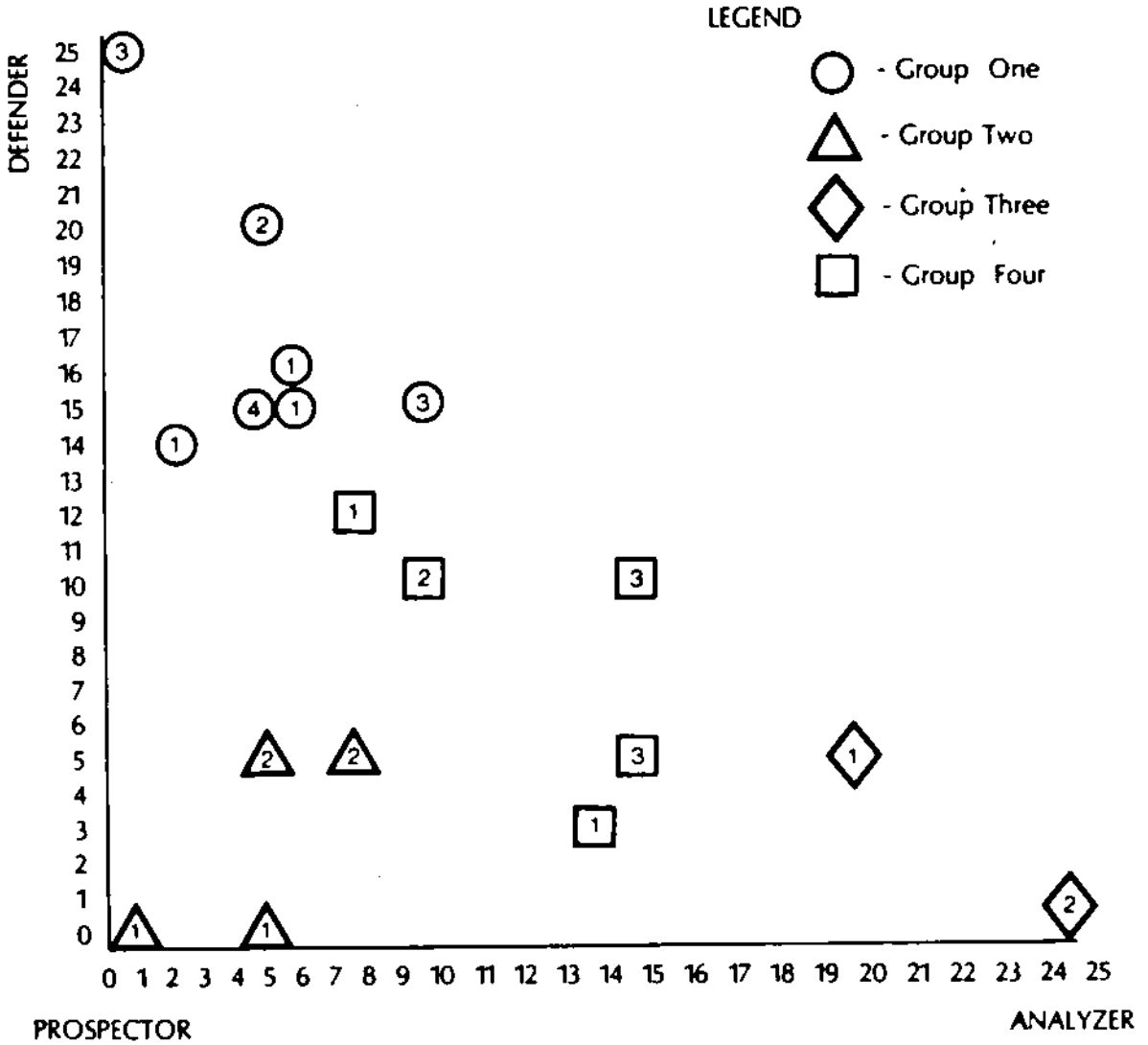


Figure 4.1

Graphic Display of
Strategic Posture Clusters

TABLE 4.7

AVERAGE POINTS ALLOCATED TO DEFENDER, PROSPECTOR AND ANALYZER STRATEGY SCENARIOS BY CHIEF EXECUTIVES WHICH RESULTED IN THE IDENTIFICATION OF FOUR CLUSTERS OF SIMILAR FIRMS*

Clusters	Strategy Types			N
	<u>Defender Scenario</u>	<u>Prospector Scenario</u>	<u>Analyzer Scenario</u>	
Cluster 1	17.7	2.4	4.9	15
Cluster 2	3.3	16.3	5.1	6
Cluster 3	1.7	0.0	23.3	3
Cluster 4	8.0	3.8	13.2	10

*25 points were designated for chief executive allocation among the scenarios to produce composite "pictures" of their firm's strategic postures.

clusters, subjected to an analysis of variance for determining whether differences existed in the central tendencies of CEO perceptions of FMS, provided the strongest evidence that differences in the data were present ($p=.155$). Table 4.8 presents the mean responses for the CEOs' perceptions of FMS across the four clusters. Table 4.9 presents the ANOVA statistics for the test for central tendency differences in at least one group with respect to FMS perceptions.

Strategy type did provide some explanation for differences in perceptions, but the significance of the test did not allow the rejection of the null hypothesis that strategy type makes no difference with respect to CEO perceptions of FMS. Referring to Table 4.8, the cluster with the highest mean score (the most opportunistic perceptions) on FMS perceptions consisted of CEOs who were inclined to view their firms as primarily Prospectors. The lowest mean score was reported by CEOs who identified their firms as primarily Analyzers.

As an additional check on the effect that strategy type might have on perceptions, covariation in CEO perceptions of FMS and strategy self-typing was analyzed by calculating correlation coefficients for executive perceptions of FMS and the points assigned to each strategy scenario. The relationship between points assigned to the Prospector scenario and the dependent

TABLE 4.8

MEANS, STANDARD DEVIATIONS, MAXIMUM AND MINIMUM
 SCORES FOR CHIEF EXECUTIVE PERCEPTIONS OF THE
 OPPORTUNITY OR THREAT STEMMING FROM COMPUTER/
 ROBOTICS TECHNOLOGY FOR GROUPS (4) DEFINED
 BY FIRMS' STRATEGIC POSTURES

Cluster	Mean	S.D.	Maximum	Minimum	N
1	5.20	1.37	7	2	15
2	5.50	1.05	7	4	6
3	3.33	2.02	5	1	3
4	5.10	1.29	7	2	10

TABLE 4.9

COMPARISON OF MEAN RESPONSES (ANOVA) FOR CHIEF EXECUTIVE PERCEPTIONS OF THE OPPORTUNITY OR THREAT STEMMING FROM COMPUTER/ROBOTICS TECHNOLOGY FOR GROUPS (4) DEFINED BY FIRMS' STRATEGIC POSTURES

Source	Sum of Squares	D.F.	Mean Square	F Value	Tail Probability (p)
Between Groups	10.42	3	3.472	1.88	.155
Within Groups	<u>55.47</u>	30	1.849		
TOTAL	65.89				

variable approached significance and was positive ($r=.20$, $N=34$, $p=.13$) (see Table 4.10). The relationship between points assigned to the Defender scenario and the dependent variable was also positive ($r=.15$, $N=34$, $p=.19$). When the relationship between points assigned to the Analyzer scenario and executive perceptions of FMS was calculated, it was negative and significant ($r=-.36$, $N=34$, $p=.02$). The more inclined an executive was to view the firm he heads as fitting into the Analyzer category, *ceteris paribus*, the less inclined was the individual to see the strategic issue as an opportunity.

With respect to the hypothesis, the ANOVA results, using four clusters of firms formed according to CEO strategy self-typing, provided only weak support for the hypothesis that strategy type would be related to FMS perceptions. The correlation analysis provided stronger support for rejecting the null hypothesis of no difference in that CEO tendencies to associate their firm's strategy with the Analyzer scenario were significantly related to FMS perceptions. Tendencies to associate the firm's strategy with the Defender and Prospector scenarios were not significantly related to FMS perceptions.

RELIABILITY OF MULTI-ITEM SCALES

Hypotheses were tested using data collected on

TABLE 4.10

CORRELATION MATRIX FOR POINTS ASSIGNED TO STRATEGY
SCENARIOS AND CHIEF EXECUTIVE PERCEPTIONS OF
OPPORTUNITY OR THREAT STEMMING FROM
COMPUTER/ROBOTICS TECHNOLOGY*

Variables	OT9	S1	S2	S3
OT9 (Computer/Robotics Tech)	36	34	34	34
S1 (Defender Scenario)	.154	34	34	34
S2 (Prospector Scenario)	.195	-.551	34	34
S3 (Analyzer Scenario)	-.360*	-.593	-.357	34

* $p < .02$ ("p" levels not reported for relationships not in column 1)

*Lower Triangle: Correlation Coefficients

Upper Triangle: N of Cases for Correlation

previously developed scales. Four of these multi-item scales were designed to measure a single construct including organizational formalization, decentralization, functional specialization and CEO locus of control. Since the items presented for CEO specification of these variables can only be considered samples of the universe of items that could tap these constructs, Cronbach's alpha was calculated to estimate whether sufficient internal consistency was present to suggest reliability.

Nunnally (1970) noted that reliability estimates for tests employed in applied psychology should exhibit higher scores than might be acceptable in basic or exploratory research. He suggested that tests with reliability coefficients of less than .80 would be questionable in applied psychology, but less than .80 could be acceptable in basic research. "Thus in basic research one typically does not lose a great deal because of moderate amounts of measurement error (1970, 127)." Later, he went on to suggest that "(i)n the early stages of research...one saves time and energy by working with instruments that have only modest reliability, for which purpose reliability of .70 or higher will suffice" (1978, p. 245).

The results of alpha for the formalization, decentralization, specialization and locus of control scales are presented in Table 4.11. The unstandardized alpha generated for the six items measuring organizational

TABLE 4.11

RELIABILITY ESTIMATE COEFFICIENTS (ALPHA) FOR UNSTANDARDIZED
AND STANDARDIZED RESPONSES FOR MULTI-ITEM SCALES
MEASURING ORGANIZATIONAL FORMALIZATION, DECENTRALIZATION,
AND SPECIALIZATION AND CHIEF EXECUTIVE LOCUS OF CONTROL

Scale	N of Items	Unstandardized Response Alpha	Standardized Response Alpha	N*
Formalization	6	.53	.75	34
Decentralization	8	.75	.76	34
Specialization	18	.85	.85	34
Locus of Control	8	.61	.60	34

*Listwise deletion of cases.

formalization was .53. Standardized alpha equalled .75. Since alpha improved from .53 to .75 when the responses were standardized, standardized responses were employed for the items tapping formalization. This was appropriate because these items were not scaled identically. Using these items to estimate formalization was acceptable based upon Nunnally's criteria.

With respect to the scale for functional specialization, two functions were identified by all the respondents as specialized. Specifically, purchasing and accounting were specialized in all of the firms. These functions were not considered in calculating alpha (KR-20) or for the testing of the hypothesis because these items exhibited no variance. Including (or excluding) these items would have no impact on the analyses.

The reliability estimate for specialization was .85 and did not improve when standardized. Gauged by Nunnally's (1978) criteria, this scale was more than adequately reliable.

Coefficient alpha was calculated for the measures of decentralization. The unstandardized alpha on the eight items (N=34) was .75. Standardized alpha equalled .76. These coefficients were deemed acceptable for using the average decentralization score for testing the hypothesis.

The last scale for which alpha was calculated addressed locus of control. There were eight items in

this scale and alpha for these items equalled a low .61. The coefficient did not improve when the responses were standardized. This finding was disappointing in light of Levenson and Miller's (1976) reporting a reliability estimate of .77 in their study. Because alpha for the measure of locus of control did not meet Nunnally's (1978) lenient criteria for using scales in exploratory research, (i.e., $\alpha \geq .70$), the hypothesis addressing locus of control and perceptions was not tested.

STRUCTURE AND ISSUE PERCEPTIONS

Organizational structural characteristics, as they related to CEO perceptions of computer/robotics technology, were examined. Structure was measured in terms of organizational formalization, specialization and decentralization.

Executives were also asked to provide a copy of the firm's organizational chart. If this were not available, executives were asked to sketch an organizational chart showing the CEO's span of control and the longest "chain of command" for management personnel. These last two measures were not provided by a majority of the respondents. In fact, only 17 executives reported CEO span of control, and 18 executives provided an estimate of the number of levels of management personnel. Two

respondents reported that the information was proprietary. This outcome limited the strength of any conclusions developed on the basis of the measures of CEO span of control and levels of managerial personnel.

The hypotheses tested were:

H2: Chief executive perceptions of a strategic issue will relate negatively to organizational formalization.

H3: Chief executive perceptions of a strategic issue will relate positively to organizational specialization.

H4: Chief executive perceptions of a strategic issue will relate positively to organizational decentralization.

H5: Chief executive perceptions of a strategic issue will relate positively to the CEO's span of control.

H6: Chief executive perceptions of a strategic issue will relate negatively to the number of levels of managerial personnel.

Formalization and Executive Perceptions

Six items were included in the questionnaire to collect data on the extent to which formalization was present in an organization (see Appendix A, Section B, Part 2, Questions 1 to 4). To analyze whether the extent of formalization in an organization related to CEO perceptions of FMS, CEO responses on the formalization

items were standardized, summed and averaged to obtain an indicator of organizational formalization. This score was then correlated with CEO perceptions of FMS (see Table 4.12).

The relationship between formalization and CEO perceptions of FMS is negative. However, the significance of the relationship can not be considered conclusive ($p=.149$).

Correlation coefficients were calculated for the individual items that made up the formalization scale and CEO perceptions of FMS (see Table 4.13). Five of the six items were related to perceptions negatively. The one item that was related to perceptions positively ($r=.161$, $p=.179$) addressed the presence of written instructions or job descriptions for nonsupervisory personnel.

The extent to which job descriptions and written instructions were distributed to unit heads and supervisory personnel was negatively related to CEO perceptions. For unit heads, this coefficient was $-.269$ ($p=.056$). For supervisory personnel, this coefficient was $-.295$ ($p=.043$). These levels of significance were not achieved by the remaining items (see Table 4.13).

With respect to the hypothesis, the null that organizational formalization would not relate to CEO perceptions can not be rejected. A negative relationship between formalization and perceptions had been

TABLE 4.12

CORRELATION COEFFICIENTS FOR FORMALIZATION, SPECIALIZATION,
 DECENTRALIZATION, CEO SPAN OF CONTROL AND LEVELS
 OF MANAGERIAL PERSONNEL WITH CEO PERCEPTIONS OF
 OPPORTUNITY OR THREAT STEMMING
 FROM COMPUTER/ROBOTICS TECHNOLOGY

Organization Variable	r	Tail Probability (p)	N
Formalization	-.181	.149	35
Specialization	.057	.372	35
Decentralization	-.091	.301	35
CEO Span of Control	.255	.161	17
Levels of Managerial Personnel	-.275	.135	18

TABLE 4.13

CORRELATION COEFFICIENTS FOR ITEMS CONTAINED IN ORGANIZATIONAL FORMALIZATION SCALE AND CHIEF EXECUTIVE PERCEPTION OF THE OPPORTUNITY OR THREAT STEMMING FROM COMPUTER/ROBOTICS TECHNOLOGY

Formalization Measures	r	Tail Probability (p)	N
Organizational Chart Distribution	-.1307	.224	36
Job Description Distribution to Unit Heads	-.2694	.056	36
Job Description Distribution to Supervisory Employees	-.2948	.043	35
Job Description Distribution to Operatives	.1605	.179	35
SOP Availability	-.0676	.350	35
Written Report Requirements	-.1266	.231	36

hypothesized, and this proved to be the case.

Specialization and Executive Perceptions

Organizational specialization was measured by asking executives to identify those activities in the organization that are managed by at least one person who concentrates almost exclusively on a particular function. Twenty functions were specified for executive selection (see Appendix A, Section B, Part 2, Question 5). The functions of purchasing and accounting were specialized in all of the firms. Responses on these items were not included in the analyses.

Specialization was gauged by adding the number of functions that executives indicated were specialized. This score was averaged. This resulted in one measure of organizational specialization in terms of the percentage of organizational functions that were specialized. This score was correlated with CEO perceptions of FMS (see Table 4.12).

It was hypothesized that specialization would be positively related to CEO perceptions of computer/robotics technology. The sign of the relationship supported the hypothesis ($r=.057$), but the relationship was very weak ($p=.372$).

The correlation coefficients between the individual

specialization items and CEO perceptions were examined. Four items related to perceptions at $p \leq .10$. Three of these were positive and one was negative (see Table 4.14).

Whether the organization had specialized the sales function related to perceptions positively ($r = .38$, $N = 35$, $p = .01$). Thirty firms stated this function was specialized and five reported that it was not.

Specialization of the employee training function related to perceptions negatively ($r = -.26$, $N = 35$, $p = .06$). Only five firms reported this function was specialized and 30 reported that it was not.

Item 8 dealt with the specialization of materials control and related to perceptions positively ($r = .22$, $N = 35$, $p = .10$). Firms were more evenly divided on this with 20 firms reporting that this function was specialized, while 15 said that it was not.

Item 18 assessed whether production control was specialized. Twenty-four firms reported that it was, eight reported that it was not. Specialization of this function related to perceptions positively ($r = .22$, $N = 35$, $p = .10$).

All of the executives reported that the functions of purchasing and accounting were specialized. Of the remaining categories, ten areas related to perceptions positively, and eight related to perceptions negatively. Specialization of the long-range planning, forecasting and

TABLE 4.14

CORRELATION COEFFICIENTS FOR SPECIALIZATION OF
ORGANIZATIONAL FUNCTIONS AND CHIEF EXECUTIVE PERCEPTIONS OF
THE OPPORTUNITY OR THREAT STEMMING FROM COMPUTER/ROBOTICS TECHNOLOGY

Organization Function	r	p	N
Public Relations	.124	.239	35
Advertising	-.177	.155	35
Sales	.380	.012	35
Customer Service	-.068	.350	35
Employee Recruiting	-.031	.430	35
Employee Training	-.262	.064	35
Purchasing*	...	...	35
Materials Control	.221	.101	35
Maintenance	.131	.226	35
Long Range Planning	.052	.383	35
Accounting*	...	...	35
Financial Control	.179	.152	35
Market Research	-.138	.215	35
Job/Product Pricing	.060	.365	35
Workflow Planning	.068	.350	35
Legal Affairs	-.088	.307	35
Insurance Planning	-.034	.424	35
Production Planning	.220	.102	35
Forecasting	.003	.494	35
Capital Budgeting	-.132	.225	35

*All firms reported that these functions were specialized.

capital budgeting functions did not relate to CEO perceptions significantly. In fact, only ten firms reported that they employed individuals with primary responsibility for long-range planning, eleven firms indicated that individuals were primarily responsible for forecasting and twelve firms reported specialization of the capital budgeting function.

Like the results from analyzing organizational formalization, it is not possible to reject the null hypothesis that organizational specialization makes no difference with respect to CEO perceptions of a strategic issue. The individual organizational functions whose specialization did relate to CEO perceptions significantly, namely, sales, training, materials control and production control, were related to perceptions inconsistently.

Decentralization and Executive Perceptions

Decentralization was tapped by an eight item questionnaire section which asked executives to estimate the amount of influence that unit heads have over decision making in different organizational activities (see Appendix A, Section B, Part 2, Question 7). A four point Likert scale was provided for CEO responses.

The relationship that the average degree of

decentralized decision making and CEO perceptions of computer/robotics technology shared is presented in Table 4.12. The relationship is negative, but it is not significant ($r=-.091$, $p=.301$). The sign of the relationship was not in line with the relationship that had been hypothesized. Taking into account the extremely weak coefficient, a more decentralized organization, overall, was not a positive aspect of CEO perceptions of the strategic issue.

Correlation coefficients between individual items in the scale and CEO perceptions of computer/robotics technology were calculated (see Table 4.15). Six items related to perceptions negatively, and two items related to perceptions positively. Item 5 came close to being significantly related to perceptions ($r=.19$, $N=36$, $p=.14$). This dealt with the setting of unit objectives. Greater freedom or autonomy on the part of unit heads in setting objectives for their units appeared to give CEOs greater confidence in the ability of the organization to take advantage of the issue addressed in the dependent variable.

Item 7 also related to perceptions ($p=.07$, $N=35$), but negatively ($r=-.25$). Greater freedom on the part of unit heads in handling work exceptions did not induce more opportunistic perceptual tendencies on the part of the CEOs. This relationship was significant. This suggested

TABLE 4.15

CORRELATION COEFFICIENTS FOR DECENTRALIZATION OF
ORGANIZATIONAL DECISION MAKING AND CHIEF EXECUTIVE
PERCEPTION OF OPPORTUNITY OR THREAT STEMMING
FROM COMPUTER/ROBOTICS TECHNOLOGY

Decentralization Variable	r	p	N
Budget Establishment	-.046	.396	36
Hiring/Firing Personnel	-.105	.272	36
Promoting/Demoting Personnel	-.085	.310	36
New Project Establishment	.036	.418	36
Setting Unit Objectives	.188	.137	36
Establishing Rules/Procedures	-.063	.360	35
Handling Work Exceptions	-.252	.072	35
Purchasing Equipment	-.069	.345	36

that CEOs who sensed that they have less control over the manner in which their subordinates address problems had less confidence in the organization's ability to take advantage of the strategic issue.

The null hypothesis that decentralization would not relate to CEO perceptions of a strategic issue can not be rejected. The hypothesized sign of the relationship was not supported.

CEO Span, Managerial Levels and FMS Perceptions

The last structural variables examined individually for their relationships to CEO perceptions of computer/robotics technology were CEO span of control and the number of levels of managerial personnel. Only 17 executives reported CEO span of control, and 18 responded on the number levels of managerial personnel. Table 4.12 presents the results of calculating correlation coefficients for these variables against CEO perceptions of computer/robotics technology potential.

The hypothesis was that CEO span of control would relate to perceptions positively. The hypothesized sign of the relationship was supported ($r=.255$), but the null of no difference in perceptions, given CEO span of control, could not be rejected ($p=.161$).

Levels of managerial personnel related to CEO

perceptions of FMS negatively ($r=-.275$), and this relationship approached significance ($p=.135$). This finding supported the hypothesized relationship between levels of managerial personnel and CEO perceptions of FMS. But, the null of no difference in perceptions, given levels of managerial personnel, could not be rejected.

MULTIPLE REGRESSION ANALYSIS OF STRUCTURAL CHARACTERISTICS AND CEO PERCEPTIONS OF COMPUTER/ROBOTICS TECHNOLOGY

To more fully analyze the relationship between organizational structure and CEO perceptions of computer/robotics technology, two multiple regression models were generated. The variables included in the first model were: CEO perceptions of the opportunity or threat stemming from the strategic issue (the dependent variable); the average of scores on the extent to which formalization was present in the organization; the extent to which organizational activities were specialized; and the average of the score on the extent to which decision making was decentralized.

The second multiple regression included these same variables plus CEO span of control and the number of levels of managerial personnel. This two-stage approach was utilized because of the significant number of firms which did not provide data on CEO span and number of levels of managerial personnel.

A stepwise function was employed to produce the regression models (SPSS, 1975). The results of these calculations are presented in Tables 4.16 and 4.17. Only those cases which contained no missing values were analyzed.

The initial variable to enter the first model was organizational formalization. This relationship was negative, but insignificant ($p=.290$). The sign of the relationship was in the hypothesized direction.

Specialization entered the model on the second step of the analysis. This relationship was positive. The significance of the model decreased to $p=.394$ and the standard error of the model did not improve.

Organizational decentralization was the last variable to enter the model. The relationship was negative, but the addition of the variable further decreased the significance of the model ($p=.580$), and the standard error of the model increased.

The combination of formalization, specialization and decentralization resulted in an R-squared of only .062. The signs of the relationships were in the hypothesized directions for organizational formalization and specialization, but not for decentralization. The results of the analysis provided no evidence for the rejection of the null that structure does not relate to CEO perceptions of computer/robotics technology. In the final step of the

TABLE 4.16

MULTIPLE REGRESSION MODELS (STEPWISE FUNCTION) FOR FORMALIZATION,
SPECIALIZATION AND DECENTRALIZATION (Xs) AND CEO PERCEPTIONS
OF COMPUTER/ROBOTICS TECHNOLOGY (Y)

Step	Variable(s)	Slope(s) (B)	S.E.B.	Beta	t-score Slope Coefficient	p	Standard Error Model	F-Value Model	p	N*	R ²
1	Formalization	-.396	.368	-.187	-1.076	.290	1.419	1.157	.290	34	.035
2	Formalization	-.553	.410	-.261	-1.347	.188	1.424	.960	.394	34	.058
	Specialization	.994	1.132	.170	.878	.387					
3	Formalization	-.513	.430	-.242	-1.192	.243	1.444	.665	.580	34	.062
	Specialization	1.096	1.183	.187	.926	.362					
	Decentralization	-.194	.543	-.070	-.358	.723					

*Listwise deletion of cases

analysis, the standard errors of the slope coefficients are larger than the coefficients for specialization and decentralization (see Table 4.16). The probabilities associated with the test for rejecting the null hypotheses that the Beta coefficients were not equal to zero were extremely high.

Table 4.17 presents the results of the second multiple regression analysis. In addition to formalization, specialization and decentralization, CEO span of control and levels of managerial personnel were included. Only 16 cases could be used in the analysis because of missing values.

For the cases included in this regression, over thirty-three per cent of the variation in CEO perceptions of FMS was explained. The statistics attached to the coefficients improved in many cases over those generated for the larger group of firms in the previous analysis (see Table 4.16). However, the standard error of the model was initially greater than the standard error in the previous regression, and with the addition of more variables, the error term improved only slightly, if at all.

Multiple regression analyses of CEO perceptions of computer/robotics technology and organization structure did not provide support for rejecting the null hypotheses.

TABLE 4.17

MULTIPLE REGRESSION MODEL(S) (STEPWISE FUNCTION) FOR FORMALIZATION,
SPECIALIZATION, DECENTRALIZATION, CEO SPAN OF CONTROL,
LEVELS OF MANAGERIAL PERSONNEL (Xs) AND CEO PERCEPTIONS
OF COMPUTER/ROBOTICS TECHNOLOGY (Y)

Step	Variable(s)	Slope(s) (B)	S.E.B.	Beta	t-score Slope Coefficient	p	Standard Error Model	F-Value Model	p	N*	R ²
1	Formalization	-1.025	.698	-.366	-1.470	.164	1.741	2.160	.164	16	.134
2	Formalization	-1.045	.692	-.373	-1.510	.155	1.727	1.719	.218	16	.209
	CEO Span of Control	.275	.247	.275	1.114	.286					
3	Formalization	-.905	.703	-.323	-1.289	.222	1.721	1.515	.261	16	.275
	CEO Span of Control	.269	.246	.269	1.095	.295					
	Decentralization	-.921	.885	-.261	-1.041	.318					
4	Formalization	-1.266	.816	-.451	-1.551	.149	1.736	1.315	.324	16	.323
	CEO Span of Control	.194	.262	.194	.739	.476					
	Decentralization	-1.320	.998	-.374	-1.322	.213					
	Specialization	1.828	2.054	.299	.890	.393					
5	Formalization	-1.254	.849	-.447	-1.476	.171	1.805	1.007	.462	16	.335
	CEO Span of Control	.178	.276	.178	.645	.534					
	Decentralization	-1.233	1.060	-.349	-1.165	.271					
	Specialization	1.934	2.151	.316	.899	.390					
	Managerial Levels	-.233	.561	-.114	-.416	.687					

*Listwise deletion of cases

STRATEGY AND STRUCTURE GESTALTS AND CEO
PERCEPTIONS OF COMPUTER/ROBOTICS TECHNOLOGY

Whether patterns in organizational strategy and organizational structural characteristics would be influential with respect to CEO perceptions of the strategic issue was analyzed. Measures on strategy, formalization, specialization, decentralization, CEO span of control and levels of managerial personnel were subjected to a K-means cluster analysis (BMDP, 1981). This technique identifies similarity of cases along the variables of concern.

Clusters were formed according to responses on the relevant variables to test for the explanatory power of different cluster patterns with respect to CEO perceptions of FMS while keeping in mind the need for adequate within-cluster group sizes. From three to eight clusters were formed. The result of each clustering was subjected to an analysis of variance to compare the mean responses for each group on perceptions of FMS. The tail probability associated with the F-statistic for the six analyses ranged from a low of .442 at three clusters to a high of .678 at eight clusters.

Only the results of the analysis of three clusters are presented. The mean scores for the groups along the variables used to form clusters are presented in Table 4.18. The probability that at least one cluster exhibited

a difference in terms of the mean score on a variable is shown. Subscripts indicate the rank of each cluster, by row, with respect to a variable. Smaller subscripts indicate that the group, on average, assigned a higher score to the variable.

The variables which provided for cluster discrimination at $p \leq .10$ were: (1) points assigned to the Defender strategy description; (2) points assigned to the Analyzer strategy description; (3) organizational formalization; (4) organizational specialization; and (5) organizational decentralization. Points assigned to the Prospector description, the CEO's span of control and number of levels of managerial personnel did not provide for cluster discrimination in the analysis.

The fact that point assignment to the Prospector description did not discriminate clusters stems from the tendency of the majority of the CEOs to identify their firms in terms of the Defender and Analyzer descriptions. Fourteen executives self-typed their firm strictly in terms of the Defender and Analyzer descriptions. One executive self-typed his firm in terms of the Analyzer and Prospector descriptions only, and no executives allocated all points between the Defender and Prospector scenarios.

Only about one half of the sample provided figures for the CEO' span of control and number of levels of managerial personnel. As a result, missing values for

TABLE 4.18

MEANS SCORES FOR STRATEGY AND STRUCTURE VARIABLES
UTILIZED TO FORM THREE CLUSTERS
(K-MEANS CLUSTERING) OF FIRMS*

Variables	Cluster 1	Cluster 2	Cluster 3	Tail probability (p) that Variable Mean Score is Different for at Least one Cluster
Defender Description	5.30 ³	13.50 ¹	12.92 ²	.005
Prospector Description	2.30 ³	5.42 ²	7.00 ¹	.202
Analyzer Description	17.40 ¹	6.00 ²	5.08 ³	.000
CEO Span of Control	5.00 ²	5.43 ¹	5.00 ²	.955
Levels of Managerial Personnel	4.40 ¹	3.86 ³	4.33 ²	.702
Formalization**	.189 ²	-.687 ³	.556 ¹	.000
Specialization	.467 ²	.261 ³	.528 ¹	.005
Decentralization	3.29 ²	2.88 ³	3.34 ¹	.024
Number of Firms in Cluster	10	13	12	

*Subscript numbers indicate the rank of the cluster on the variable by row.

**Standardized to mean = 0 prior to analysis.

these variables had a major impact on the cluster technique calculations. This probably explains the lack of discriminatory power for these variables.

The mean score on FMS perceptions is presented in Table 4.19 for each cluster, along with the minimum and maximum score for this variable within a cluster. An analysis of variance was utilized to determine if differences in these means were present in the data. The results of this analysis are shown in Table 4.20.

The highest (most opportunistic) perceptions of FMS were reported by the firms comprising Cluster #2 (see Table 4.19). This cluster was dominated by CEOs who tended to self-type their firms as Defender-oriented. These firms were the least formalized, the least specialized and the least decentralized, on average. These firms also reported the fewest managerial levels and the greatest span of control for the CEO.

The least opportunistic perceptions of FMS were reported by the firms comprising Cluster #1. These CEOs self-typed their firms' strategic orientation as being primarily Analyzer-oriented. In terms of formalization, specialization and decentralization, the firms comprising this cluster scored in the middle. That is, these firms were more formalized, specialized and decentralized than the cluster that viewed the strategic issue in the most opportunistic terms (Cluster # 2). But these firms were

TABLE 4.19

MEANS, STANDARD DEVIATIONS, MAXIMUM AND MINIMUM SCORES FOR
 CHIEF EXECUTIVE PERCEPTIONS OF THE OPPORTUNITY OR
 THREAT STEMMING FROM COMPUTER/ROBOTICS TECHNOLOGY FOR
 GROUPS (3) DEFINED BY STRATEGY AND STRUCTURE VARIABLES

Cluster	Mean	S.D.	Maximum	Minimum	N
1	4.60	1.84	7.0	1.0	10
2	5.31	1.44	7.0	2.0	13
3	5.25	.866	7.0	4.0	12

TABLE 4.20

COMPARISON OF MEAN RESPONSES (ANOVA) FOR CHIEF EXECUTIVE
 PERCEPTIONS OF THE OPPORTUNITY OR THREAT STEMMING
 FROM COMPUTER/ROBOTICS TECHNOLOGY FOR GROUPS (3)
 DEFINED BY STRATEGY AND STRUCTURE VARIABLES

Source	Sum of Squares	D.F.	Mean Square	F Value	Tail Probability (p)
Between Groups	3.324	2	1.662	.84	.442
Within Groups	<u>63.419</u>	32	1.982		
Total	66.743				

less formalized, specialized and decentralized than the firms comprising Cluster #3. Clusters #2 and #3 both fell primarily into the Defender category of strategy. But the clusters were at the extremes in terms of the structural variables which provided for discriminatory power in determining the clusters.

THE INDIVIDUAL AND FMS PERCEPTIONS

At this point in the analysis, the focus of attention shifted to the individual. Characteristics of the individual that were originally to be analyzed included his locus of control and what was termed the behavioral response repertoire. Due to the low internal consistency of the scale used to measure locus of control, no further analysis of this variable was attempted. In other words, H7 was not tested.

The following section discusses the outcome of analyzing the variables included as part of the behavioral response repertoire with respect to perceptions of FMS.

Behavioral Response Repertoire and CEO Perceptions of FMS

Section D of the questionnaire (see Appendix A) collected data on a number of variables. These included: (1) the CEO's age; (2) the number of years of formal

education the CEO had accumulated; (3) the CEO's educational emphasis (e.g., engineering, business, etc.); (4) the number of years since the CEO had completed his education; (5) continuing education involvement; (6) industry, firm and position tenure; and (7) the time the CEO had spent in different functional areas of the firm before becoming CEO. An additional index was calculated to estimate the variety of functional area experience. The greater the number of functional areas the CEO had experience in, the greater was the variety index.

The hypotheses tested were:

H8: Chief executive perceptions of a strategic issue will relate positively to education (years).

H9: Chief executive perceptions of a strategic issue will relate negatively to years since completing education.

H10: Chief executive perceptions of a strategic issue will relate positively to professional affiliation (continuing education).

H11: Chief executive perceptions of a strategic issue will relate to experience in functions of the firm.

H12: Chief executive perceptions of a strategic issue will relate positively to variety of functional experience.

H13: Chief executive perceptions of a strategic issue will relate negatively to age.

H14: Chief executive perceptions of a strategic issue will relate negatively to tenure.

The CEO's perceptions of FMS were correlated with the above variables. The results of this analysis are presented in Tables 4.21 and 4.22.

Referring to Table 4.21, none of the variables were related to FMS perceptions at $p \leq .10$. Two variables related to perceptions at approximately $p = .14$. Specifically, years since completing education was positively related to perceptions ($r = .257$, $N = 34$, $p = .143$). The sign of this relationship was the opposite of the relationship that had been hypothesized.

Variety of functional area experience was also positively related to perceptions ($r = .183$, $N = 36$, $p = .142$). The sign of this relationship supported the hypothesis.

Age, education, continuing education involvement and three measures of tenure did not relate to CEO perceptions of FMS significantly.

With respect to time spent in different organizational activities, only engineering experience related negatively to FMS perceptions ($r = -.203$, $N = 36$, $p = .235$) (see Table 4.22). Time spent in the production, data processing and quality control functions related to perceptions positively at $p \leq .10$. Time spent in the research and development function related positively to FMS perceptions at $p = .116$.

TABLE 4.21

CORRELATION COEFFICIENTS FOR CHARACTERISTICS OF THE CHIEF
EXECUTIVE AND PERCEPTIONS OF THE OPPORTUNITIES OR
THREATS STEMMING FROM COMPUTER/ROBOTICS TECHNOLOGY

Variable	r	Tail Probability (p)	N
Age	.080	.624	36
Education	-.084	.627	36
Years Since Completing Education	.257	.143	34
Continuing Education Involvement	-.089	.604	36
Industry Tenure	.106	.537	36
Firm Tenure	.185	.280	36
Position Tenure	.079	.645	36
Variety of Functional Area Experience	.183	.142	36

TABLE 4.22

CORRELATION COEFFICIENTS FOR YEARS SPENT IN FUNCTIONAL AREAS
AND CHIEF EXECUTIVE PERCEPTIONS OF THE OPPORTUNITY OR
THREAT STEMMING FROM COMPUTER/ROBOTICS TECHNOLOGY (N=36)

Functional Area	r	Tail Probability (p)
Finance	.108	.531
Marketing	.088	.610
Sales	.023	.894
Production	.293	.083
Engineering	-.203	.235
Purchasing	.067	.699
Personnel	.215	.208
R&D	.267	.116
Data Processing	.294	.081
Quality Control	.316	.060
Accounting	.044	.800

Of the executives who had attended college, all of them described their educational emphasis as engineering. Of the remainder of the measures included under the auspices of an individual's behavioral response repertoire, the only variables that exhibited reasonably strong association with the CEO's perceptions of FMS were all related to perceptions positively. These variables were: (1) years since completing one's formal education; (2) variety of functional area experience; and (3) years spent in the production, research and development, data processing and quality control operations of a firm. The evidence suggested that to some extent, some aspects of an individual's behavioral response repertoire could not be ruled out as important variables in explaining executive perceptions of a strategic issue. But none of the significance levels of the tests of the hypotheses allowed the categorical rejection of the null hypotheses that these variables would make no difference with respect to CEO strategic issue perceptions.

SUMMARY

The sample was limited to metalworking machinery and equipment firms in the state of Ohio. Thirty-six usable questionnaires were obtained for a response rate of 69 per cent. The respondents represented over 50 per cent of the

firms in Ohio in S.I.C. 354 (50,000 Leading U.S. Corporations, 1980).

The size of the firms in the sample was presented in terms of employees, sales and assets. The business form of the firms was shown, and characteristics of the respondents, in terms of their age, education, and tenure, were discussed.

The dependent variable, namely, CEO perceptions of the opportunity or threat with respect to the firm's ability to meet its objectives due to computer/robotics technological potential, was relevant for all the executives. Comparing this variable to executive perceptions of change in product and process technology indicated that the executives responded consistently on their views of technological change.

A methodology for ascertaining organizational strategic posture resulted in executives classifying their firms in terms of "pure" organizational strategy types. Executives built composite descriptions of their firms' strategic postures.

The null hypothesis that strategy type would not relate to executive perceptions of the strategic issue could not be rejected. However, correlation analysis of the relationship between executives' tendencies to identify their firms' strategic postures as Defenders, Analyzers or Prospectors did provide some evidence that

strategic posture makes a difference with respect to CEO perceptions of computer/robotics technology.

Whether organizational structural characteristics have an impact on perceptions was not evident in a clear cut manner. Some evidence that certain aspects of structure were related to perceptions did emerge, and a multiple regression model which included all of the structural variables was able to account for about one-third of the variation in 16 CEOs' perceptions of the opportunity or threat stemming from computer/robotics technology. However, the significance level and standard error of the model suggested that the model did not explain the relationships among the variables well.

A low estimate of reliability for the locus of control scale precluded the testing of the hypothesis that locus of control would relate to strategic issue perceptions. With respect to the individual's behavioral response repertoire, a few of the variables utilized to tap this construct approached significance with respect to their relationship to strategic issue perceptions. One of these was the time that had passed since a CEO completed his formal education. This was positively related to FMS perceptions. The sign of this relationship was the opposite of that which had been hypothesized.

Another was variety of functional background experience. It was positively related to FMS perceptions.

This relationship had been hypothesized.

Years spent in the production, research and development, data processing and quality control functions before becoming CEO were positively related to CEO perceptions of FMS. Age, continuing education involvement and tenure did not relate to perceptions.

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CHAPTER FIVE

SUMMARY AND CONCLUSIONS

INTRODUCTION

This chapter first presents a brief overview of the study. The outcomes of the analyses are discussed and the implications and limitations of the study are addressed. Finally, suggestions for future research are proposed.

SUMMARY

Perceptions of one's environment play a major role in determining the behavior an individual exhibits (Litterer, 1973). When considering the role of top executives in the strategic management of the firm, perceptions take on even greater importance. Not only do perceptions shape the behavior of these individuals, but they shape the development of organizations.

With respect to the intricacies of perception formation by individuals occupying management positions at the apex of modern organizations, little is known about what factors play a part. The purpose of this research was to analyze executive perceptions by examining both organizational features and personal characteristics. The

research question underlying this study was: Do organizational features and personal characteristics of top managers relate to these executives' perceptions of a strategic issue? Perceptions of the strategic issue were operationalized in terms of assistance or impediment to organizational goal attainment.

Three variables were analyzed for their relationship to top executive perceptions of flexible manufacturing systems (FMS) developments. FMS represents the integration of computers and robotics into the production processes of the firm. These technological developments have revolutionary implications for some industries (Thompson and Paris, 1982; Ouellette, et al., 1983).

Organizational strategy, organizational structure, and executive behavioral response repertoire were measured and analyzed with respect to CEO perceptions of FMS. Additionally, the interaction of strategy, structure and perceptions was analyzed. Data on these variables were collected from 36 top executives of firms in the metalworking machinery and equipment industry in Ohio.

With respect to organizational strategy, typologies developed by Miles and Snow (1978) were employed to ascertain the extent to which top managers considered their firms to be more or less similar to one or more of three hypothetical strategy types, namely, Prospectors, Defenders and Analyzers. Based on the assumption that

organizational strategy reflects a broader organizational mind set (Hedberg and Jonsson, 1977), it was hypothesized that strategy would show a statistical relationship to executive perceptions of computer/robotics implications for the firm.

Using K-Means cluster analyses, organizations were grouped according to similarity of responses on the strategy descriptions. On the basis of these analyses, average executive responses on the perceived opportunity or threat stemming from the strategic issue within a cluster were compared across groups using analysis of variance.

Dividing the sample into four clusters, the cluster most closely associated with the Analyzer strategy description had the least opportunistic mean score on FMS perceptions. Based on the ANOVA, the null hypothesis of no difference could not be rejected, but the level of significance achieved left room for doubt ($p=.155$).

The data were then subjected to a different statistical method. Correlating the tendency of executives to consider their firm more or less similar to the three strategy types, some support for suggesting that organizational strategic posture was related to CEO perceptions of computer/robotics technology emerged. CEO tendencies to self type their firm as even partially Analyzer-oriented related to less opportunistic

perceptions of the strategic issue. This relationship was significant at $p \leq .02$.

Organization structural characteristics were also investigated to establish whether differences on these characteristics might shed light on perceptual differences of PMS among executives of different firms. Three measures of structure were collected from a majority of the sample. Two additional structural characteristics were obtained from about one-half of the sample.

The degree of formalization present in an organization was correlated with executive perceptions of the strategic issue. It was hypothesized that degree of formalization would be negatively related to PMS perceptions. The sign of the relationship supported the hypothesis, but the significance level attained was not conclusive. Correlating the components of the formalization scale with CEO perceptions suggested that some aspects of formalization were significantly related to CEO perceptions.

When organizational specialization was analyzed for its relationship to perceptions, little support was uncovered to suggest with any degree of confidence that specialization is an important factor. The hypothesis was that specialization would be positively related to perceptions of the strategic issue. The correlation coefficient between specialization and perceptions was

positive, but insignificant. The specialization of different functions of the firm was related to CEO perceptions of FMS inconsistently.

The degree of decentralization present in eight organizational activities was also examined for its relationship to perceptions. Average decentralization did not relate to perceptions significantly. Individual aspects of decentralization were inconsistently related to perceptions.

The hypothesis was that decentralization would be positively related to perceptions. The results of the analysis suggested just the opposite. Greater decentralization was negatively related to perceptions, but insignificantly.

Data on two additional structural characteristics were obtained from about one-half of the organizations that responded. These were CEO span of control and the number of levels of managerial personnel in the organization. Span related to perceptions positively, levels negatively. The signs of these relationships were in the directions that had been hypothesized.

Two multiple regression models utilizing structural variables to explain CEO perceptions of computer/robotics technology's potential for the firm were generated. The models did not produce a good fit on the data.

Measures on strategy and structure were combined to

derive clusters of firms exhibiting similarities along the relevant variables. Three clusters proved to be the most powerful for explaining differences in CEO perceptions of FMS, but the significance level achieved for the test for differences was little better than flip-of-the-coin odds.

Behavioral response repertoire was operationalized in terms of the CEO's age, education, years since completing one's education, tenure, continuing education involvement, functional area experience and variety of functional area experience. The only variables that related to CEO perceptions of computer/robotics technology were years since completing education, variety of functional area experience and time spent in the areas of production, research and development, data processing and quality control. Measures on these variables were all positively related to perceptions. These relationships were not clearly significant.

Of the variables studied for their relationship to CEO perceptions of the opportunity or threat stemming from FMS technology, only strategy-type, organizational formalization and a few of the measures taken on the CEOs offered relatively clear-cut explanatory power. For 17 executives, span of control and levels of managerial personnel were also related to FMS perceptions at close-to-significant levels. Table 5.1 presents a summary of: the variables analyzed for their relationships to

executive perceptions of flexible manufacturing systems developments; the hypothesized relationships, where appropriate; the statistical techniques applied to the data; and the level of significance required to reject the null hypothesis that no relationship exists.

DISCUSSION OF THE STUDY

Nystrom and Starbuck (1981) noted that a preponderance of the empirical research undertaken to explain organization phenomena fails to treat organizations as flexible, adaptive and complex. Research is undertaken to explain events after the fact. They argued the need for a different research thrust.

One useful strategy is to look for natural experiments-spontaneous events that alter the inputs to organizations or organizational structure. Observers can study organizations' reactions to reorganizations, to disruptions of information or materials, to fluctuating inputs or demands, and to shocks such as natural disasters, new laws, or technological innovations...Observers have to predict where and when interesting events will happen in order to see such events consistently. Prediction also enables observers to start observing before natural experiments occur. Predicting the outcomes of natural experiments gives observers opportunities to be surprised and then to find out why their predictions failed (1981, pp. xviii-xix).

Following the advice of Nystrom and Starbuck (1981), this research was based on a prediction that a "natural

TABLE 5.1

SUMMARY TABLE OF VARIABLES STUDIED, HYPOTHESIZED RELATIONSHIPS,
STATISTICAL METHODS, AND ALPHA TO REJECT NULL OF NO DIFFERENCE

Hypothesis	Variable(s)	Hypothesized Relationship	Method(s)	α To Reject Null of No Difference
H ₁	Strategy	(NA)	Cluster, ANOVA, Correlation	.155* .020
	Structure			
H ₂	Formalization (F)	(-)	Correlation	.149
H ₃	Specialization (S)	(+)	Correlation	.372
H ₄	Decentralization (D)	(+)	Correlation	.301**
H ₅	CEO Span of Control (C)	(+)	Correlation	.161
H ₆	Levels Mgt. Personnel (L)	(-)	Correlation	.135
H ₂ -H ₆	Model I (F+S+D)	(NA)	Regression	.580
H ₂ -H ₆	Model II (F+S+D+C+L)	(NA)	Regression	.462
	Strategy + Structure	(NA)	Cluster, ANOVA	.442*
H ₇	Internal Locus of Control	(+)	Not Tested	
	Behavioral Response Repertoire			
H ₈	Education	(+)	Correlation	.627**
H ₉	Years Since Education Complete	(-)	Correlation	.143**
H ₁₀	Continuing Education	(+)	Correlation	.604
H ₁₁	Functional Experience	(NA)	Correlation	.060-.800
H ₁₂	Variety of Experience	(+)	Correlation	.142
H ₁₃	Age	(-)	Correlation	.624**
H ₁₄	Tenure	(-)	Correlation	.280-.645**

* Best Results Achieved
** Sign of Relationship Not Hypothesized

experiment" was in the making. The large scale introduction and adoption of flexible manufacturing systems in the United States is probably ten years away (Ouellette, et al., 1983).

To analyze differences in executive perceptions of the opportunity or threat stemming from this potential strategic issue, it was hoped that the issue would at least be relevant for the executives polled. Fortunately, this turned out to be the case. Even though large scale adoption of FMS is on the "strategic horizon," the prediction that a natural experiment is in the making for the firms in the industry appeared to be justified.

No prior research which was directly related to the research question addressed in this study was available for reference on this project. A research question that had been ignored by strategic management researchers was addressed. However, due to the nonexistence of previous research work, a number of theoretical "leaps" were made in the identification and justification of the variables which were included in this study as potential correlates of executive perceptions of the strategic issue.

With this in mind, the following sections attempt to reconcile the findings and non-findings that emerged in the analyses. Again, it is necessary to draw on literature which is only indirectly related to this project.

Organizational Strategy

Miles and Snow (1978) concluded that in terms of innovative tendencies, Prospectors were the most likely to exhibit these tendencies, Defenders were the least likely. The results of this study indicated that Analyzers were the least inclined to view the strategic issue of FMS opportunistically. Prospectors did view the strategic issue more opportunistically than did the Defenders, but the difference, on average, was minimal.

One possible explanation for the results that were obtained stems from the theoretical nature of firms described by the scenarios. The Defender description portrays firms whose executives feel that the firm enjoys a secure market position. Their emphasis is on servicing customers through quality, service and lower prices. By concentrating on "relatively stable product or service area(s)," these firms may not feel threatened by FMS because these firms believe that they enjoy a cost advantage over their competition. Adopting flexible manufacturing systems would be seen as a natural extension of their present emphasis on efficiency.

What these executives may fail to recognize is that efficiency could come to be less important as a competitive advantage. Flexible manufacturing systems developments may permit a firm, any firm, to achieve economies of scale regardless of scope of operations.

Similarly, quality products, in terms of workmanship, could come to be more a function of equipment purchases and software incorporation than of in-house expertise (Thompson and Paris, 1982). Evidence of this phenomenon is apparent in other industries already affected by the technology (Ouellette, et al., 1983). For Defenders, the strategic implications of FMS may not be apparent, and, thus, these firms see the change as just another tool for attaining organizational goals.

The firm described by the Prospector scenario is one which is accustomed not only to adapting to change, but to introducing change. Emphasis is placed on being "first in" and the firm is sometimes unable to maintain strength in areas it enters. Such a competitive stance, as fostered by the firm's executives, may encourage a feeling that trying is more important than always winning. Profits may be important, but innovation and risk taking are prized as well. Since these firms are accustomed to exploiting environmental discontinuities, their executives may be more inclined to see change positively, regardless of the nature of that change.

The availability of FMS would allow the Prospector to maintain its present emphasis on being first in, while at the same time permitting the firm to infringe on the markets of Defenders. Prospectors could offer the low prices and high quality of the Defender plus their ability

to respond more quickly to the particular or changing needs of the customer. A reciprocal opportunity would exist for the Defenders, but given the tendency of Defenders to react slowly, such a response is not likely.

The Analyzer scenario describes to some extent a "me too" organization. Most importantly, the scenario describes a tendency to monitor carefully the actions of major competitors and to follow the leader if competitor actions are not out of line with present operational strengths. These firms may be aware of FMS developments because they are aware of the actions being undertaken by Prospectors and Defenders in the field. But since these firms are followers, which could imply they have little to do with the direction that change will take, they may at this point in time be alarmed by the changes they see occurring around them in their competitors' operations. This may account for their inclination to see the issue as less of an opportunity at the time the data were collected. After these changes become more defined, the perceptions reported could change abruptly as these firms got down to the business of adapting to the changes induced elsewhere.

More generally, the data suggested that strategy, as a reflection of an organizational mind set (Hedberg and Jonsson, 1977; Hedberg, 1981; Beer, 1975), could be influential with respect to executive perceptions. Few

executives were inclined to self-type the firm as purely Analyzer-oriented. Those who did were the least likely to see FMS positively. Moreover, tendencies to identify partially with the Analyzer scenario were related to less opportunistic perceptions. The wait-and-see attitude implicit in this organizational type did not correspond with opportunistic attitudes on the part of CEOs.

The more strongly an executive viewed the firm he ran as fitting into the Prospector or Defender category, the more opportunistic were reported perceptions of the strategic issue. Since the Analyzer is defined by Miles and Snow (1978) in terms of a balance between the Prospector and Defender types, the lack of commitment to one of the "extreme" approaches to the marketplace could induce less of a sense of confidence in the organization's ability to define its own destiny. This condition could influence the CEO's sense of controlling his own destiny and would thus lead to greater perceived uncertainty in a situation (Downey and Slocum, 1975; Duncan, 1972; Mohr, 1969). Regardless of the firm's actual capacity to respond to the issue, a strong sense of purpose, or a clear conception of the firm's strategic orientation at the extremes of the Prospector-Analyzer-Defender continuum, appeared to correspond with executive perceptual opportunism.

Organizational Structure

The results of analyzing organizational structural characteristics were ambiguous. Only formalization, specialization and decentralization were gauged for a majority of the sample. Of these three, only formalization came close to being significantly related to CEO perceptions of FMS. This relationship was negative.

Formalization, which is usually associated with a reliance on standardization and routines of activities (Child, 1973; Mintzberg, 1979a), does not appear to induce creative problem solving (Pierce and Delbecq, 1977). This may explain the negative relationship that formalization and CEO perceptions of FMS exhibited. What the CEO may sense is that given the uncertainty in the direction of FMS developments, an organization which is more attuned to problem solving versus performance (Hunt, 1970) is more desirable from his vantage point.

The item-by-item analysis of the formalization scale indicated that the presence of standardization of duties for managerial personnel showed the strongest negative relationship to CEO perceptions. This finding supports the proposition that an organizational emphasis on performance instead of problem solving is not conducive to top executive opportunism with respect to FMS.

The items dealing with standard operating procedure availability, report writing requirements and

organizational chart distribution also related to perceptions negatively. The only question that was positively related to perceptions was the extent to which operatives' duties were formally specified. Implementing change among non-managerial personnel could be enhanced by the existence of formalized procedures (Pierce and Delbecq, 1977).

Organizational specialization was positively related to CEO perceptions of FMS, but weakly. A high degree of specialization is normally associated with innovative tendencies on the part of firms (Pierce and Delbecq, 1977; Hage and Aiken, 1967). But implicit in discussions of specialization is the connection between differentiation of activities and the professionalism of those who oversee those activities (Pierce and Delbecq, 1977; Child, 1973; Hage and Aiken, 1967). The approach taken in this study did not capture the qualifications of managerial personnel. The insignificance of the relationship between specialization and executive perceptions of FMS could imply that professionalism does not necessarily accompany differentiation.

Another possibility is that the extent to which an organization is specialized works against the capability of the organization to adopt and implement change (Pierce and Delbecq, 1977). Since the firms surveyed are not at the forefront of FMS invention, but instead the recipients

of the technological development (Modern Materials Management, 1982), specialization may be exhibiting off-setting forces from the point of view of the CEO.

An intuitively puzzling outcome of this analysis was that specialization of the planning, capital budgeting and forecasting functions did not relate to CEO perceptions of FMS. Less than one-third of the sample reported that these functions were specialized.

The finding that the degree of decentralization in an organization was negatively related to CEO perceptions, although very weakly, was not in line with the relationship that had been hypothesized. The results of comparing the individual items in the decentralization scale with CEO perceptions of FMS revealed an interesting contradiction. On the one hand, the more autonomy afforded managerial personnel in setting objectives for their units, the more inclined the CEO was to view the strategic issue positively. One interpretation of this is that decentralized objective setting gives CEOs greater confidence in the ability of the organization to take advantage of the strategic issue. It may be this confidence in the members of the organization's management on the part of the CEO which leads to greater unit autonomy.

On the other hand, the more freedom managerial personnel were given in the handling of work exceptions,

the less inclined the CEO was to view FMS positively. These apparently contradictory findings may be due to the temporal nature of these two issues. In setting objectives for their units, managers probably work with the top executive in establishing premises, setting priorities and establishing courses of action. In the day-to-day management of exceptions, the unit manager is called upon to make decisions quickly, possibly without the counsel of top management.

Although only one-half the sample provided data on CEO span of control and levels of managerial personnel, the relationships of these variables with CEO perceptions of FMS were in the hypothesized directions. CEO span was positively related to perceptions. The rationale for hypothesizing this relationship was that a wider span would give the CEO access to more timely, specific information. The more opportunistic perceptions of FMS associated with a wider span would not necessarily come from the information presently being conveyed to the CEO on FMS. The opportunism would stem from the CEO's belief that more timely, precise information is conveyed to him on a regular basis, regardless of the issue under consideration. Furthermore, implementing change through direct control instead of being forced to rely on the managerial hierarchy would be facilitated by the larger span of control. In essence, the CEO would have a greater

sense of control of a situation.

With respect to levels of managerial personnel, more levels of managerial personnel may imply less information reaching the CEO directly and more chances of distortion of information flowing up and down the hierarchy of control. More levels of personnel would also imply that direct control of planned change would be more difficult for the CEO. The evidence supported this proposition. Levels of managerial personnel related to CEO perceptions negatively.

Strategy-Structure Gestalts

Examining the patterns among the measures of strategy and structure across cases was accomplished using K-Means cluster analysis (BMDP, 1981). Although the ability of the resulting "gestalts" to provide insight into differences in CEO perceptions of FMS was minimal, the results were interesting. Dividing the sample into three clusters provided the most convincing evidence that patterns in strategy and structure made a difference.

The cluster that reported the most opportunistic perceptions of FMS was defined by Defender strategy tendencies. This cluster reported the least formalization, specialization and decentralization of decision making. This cluster also reported the largest span of control for

the CEO and the fewest levels of managerial personnel. Two points about this outcome are important.

First, the structural characteristics of this cluster, given its strategy orientation, are not in line with Miles and Snow's (1978) findings. The structural characteristics of this cluster "belong" to firms which Miles and Snow found to be Prospector-oriented. But, even though these firms adhere to a Defender-oriented product and market emphasis, the structural characteristics that they exhibited related to more opportunistic perceptions of FMS.

Second, this particular pattern of structural variables would seem to suggest that the CEO plays a very active part in the directing of the firm. Centralized decision making, a large span of control and few levels of managerial personnel support this proposition. Further support for this came from the lack of formalization and specialization present in firms comprising this cluster. The proposition that a greater sense of control of a situation would be related to opportunistic perceptions was given some support.

The cluster reporting the next most opportunistic perceptions of FMS fit neatly into Miles and Snow's categorization scheme. This cluster was Defender-oriented, formalized, specialized, decentralized, had more levels of managerial personnel and the CEO had

the smallest span of control.

The cluster reporting the least opportunistic perceptions of FMS was Analyzer-oriented. This cluster fell in the middle on all the structural variables. Compared to the Defender-oriented cluster, this result is in line with Miles and Snow's findings. That is, they found that Analyzers were not as mechanistic as Defenders, but they were not as organic as Prospectors. Given strategy orientation, the structural extremes, and congruence among variables (Lorsch and Allen, 1973), appeared to foster more opportunistic perceptions of FMS.

Behavioral Response Repertoire

The variables included under the auspices of an individual's behavioral response repertoire did not provide a great deal of insight into his perceptions of FMS. The finding that time since completing one's formal education was positively related to perceptions of FMS was particularly perplexing. Since all of the executives who attended college majored in engineering, one could have expected that on a technical matter like computers and robotics, more up-to-date training would make an individual more confident. However, just the opposite seemed to be true. Possibly, individuals who are more aware of the technical implications of the changes, i.e.,

more recent college attendees, see more clearly the implications of the technology and, thus, reported less opportunistic perceptions of FMS.

The more areas of the firm the chief executive had experience in, the more opportunistic were reported perceptions of FMS. This had been hypothesized. Time spent in the production, data processing, quality control and research and development functions was positively related to FMS perceptions. Data processing experience probably implies experience with a computer.

IMPLICATIONS OF THE STUDY

Thirty-six top executives were polled on their views of a technological change that is only now taking shape. Their opinions on the implications of the change for the firms they direct were mixed.

At first glance, the findings on the relationships of the research variables suggest that, for the most part, executive perceptions of the strategic issue are unaffected by them. This was especially apparent for the average scores on measures of organizational specialization and decentralization. But few of the statistics that were calculated to analyze perceptions of FMS were clearly significant. One of the research variables, namely, locus of control, could not even be

analyzed due to the lack of internal consistency of the instrument.

If one considers the results in light of the fact that PMS is only now becoming a relevant issue for the firms surveyed, the findings can be viewed in a better perspective. The number of variables that were related to perceptions at close-to-significant levels could be interpreted to mean that as the strategic issue becomes more defined, these relationships could strengthen.

Also important to this discussion is the fact that when individual items of multi-item measures were correlated with perceptions, a number of very significant relationships were uncovered. This was true of organizational formalization, specialization and decentralization. Perhaps it is not the overall degree of the presence or absence of these organizational characteristics which is important for understanding perceptions. Instead it may be that the individual factors that define these organizational constructs are what is considered by an executive.

For example, whether or not an organization chart is distributed to personnel may be irrelevant to the top executive with respect to the firm's capacity to respond to changing environmental conditions. But the fact that managerial personnel are programmed, more or less, by the existence of organizational procedures, policies, rules,

etc., may actually be a source of concern for the top executive when it comes to organizational resiliency. Other examples could be given for the specialization of organizational functions and decentralization of decision making activities.

Whether or not the top executive's locus of control relates to opportunistic perceptions remains to be investigated. The literature reviewed with respect to locus of control surely suggested that other attempts to analyze locus of control and strategic issue perceptions would be worthwhile.

The very fact that there was so much variation in the views that the executives reported with respect to FMS indicates that there are factors which affect these differences. For the manager, the results of this study suggest at least two points for consideration. First, a manager should realize that he or she is not necessarily going to view environmental developments in the same terms as do his or her peers in the same or in different organizations. Differences in perceptions may subsequently have an impact on the actions the manager takes. Being aware of this potential should encourage managerial personnel to question the premises upon which they are basing their activities.

Second, some of the findings reported here do seem to suggest that differences in perceptions can be partially

explained by characteristics of the organization and of the individual. In scrutinizing why one views an issue as he or she does, it may prove useful to examine perceptions in light of these characteristics.

The organizational consultant should also take note of the findings reported here. The "reality" of a situation is dependent on the particular individual describing it. If an organization appears to have trouble in being innovative, in identifying opportunities, and so on, it may be that the dominant organizational factors in force and the individuals in control simply are not conducive or receptive, respectively, to such behavioral inclinations. The variables identified, operationalized, measured and analyzed in this study should provide a beginning for a better understanding of strategic issue perceptions.

LIMITATIONS OF THE STUDY

The boldness of the research study is probably its biggest limitation. Instead of replicating, and hopefully, improving upon prior research, this study embarked upon a new course of academic investigation. A number of research variables were analyzed with respect to perceptions, an undertaking with few precedents in strategic management research.

To do this, measures developed elsewhere were employed in a context for which they may not have been specifically designed. However, utilizing measures developed elsewhere allowed the efficient investigation of an important issue. One benefit that was derived from this was the finding that the measure of locus of control developed by Levenson and Miller (1976) did not appear to be reliable when administered to top executives. Other researchers in strategic management who might consider using this instrument will be alerted to this potential problem. With respect to the measures of strategy and structure, no obvious problems of measurement were encountered.

Another limitation of the study derives from the manner in which strategic issues were studied. A single development was identified for analysis. Two points are relevant.

First, it is possible that the findings (and non-findings) that emerged from the analysis were a function of the particular strategic issue that was investigated. True, all of the executives reported that the issue was relevant for their firm. But the exact nature of this relevancy was not measured, except that the issue posed a threat to, or offered an opportunity for the firm.

Second, since only a single strategic issue was

analyzed, it is not possible to generalize the results of this study. Entirely different results might be obtained if other, or many, strategic issues were analyzed. But, if the degree of opportunism of top executives uncovered with respect to additional strategic issues did relate to, say, a firm's strategic orientation, it might be possible to explain why firm behaviors are more or less unique. Studies of the perceptions of a number of strategic issues subsumed under a single analytical framework would overcome the limitation of this study's concentration on a single strategic issue.

Another limitation of this study was the sample size. Although the number of firms that responded to the solicitation was excellent, only a few firms from the entire S.I.C. were contacted. However, since this study was the first to tackle the research question addressed, it was appropriate to limit the scope of the study to determine if additional, more extensive research was merited.

Part of the findings reported here may be a function of the sample studied. This sample may have been unique and different outcomes may have emerged if a different sample had been identified. It is also possible that since the sample was limited to one industry, and one state, the relationships between perceptions and other variables were distorted. Nothing in the data indicated

that this was true.

Another potential limitation of the study stems from the use of survey data. This does not permit one to clarify ambiguities in the questionnaire for those completing it.

The use of survey data prohibited collecting anecdotal information, something Mintzberg (1979b) feels is important in strategic management research. On the positive side, a relatively large body of data was collected.

A final limitation is that other sources of variation in executive perceptions may not have been controlled for or measured. Field research is subject to this problem. Although a number of variables were measured which were suggested to be of importance, other potential sources of influence may not have been identified.

SUGGESTIONS FOR FUTURE RESEARCH

Considering the quantity of research directed at managerial perceptions of firm environments, there can be little doubt that this field of study is important. From the point of view of the strategic management researcher, little of this research is directly relevant for understanding, predicting and offering prescriptive insights for strategic management researchers and managers

responsible for the firm.

What appears to be needed is more research aimed at the issue of perceptions which is relevant for strategic management beyond the question of organization structure. Although this study looked at some factors which might relate to perceptions of one strategic issue, more research is needed to identify additional strategic issues and to either look at similar potential correlates that have been examined here, or to undertake to examine other factors that might relate to these perceptions.

If additional research on the factors measured here is pursued, it may be advantageous to limit the size of the samples and to concentrate on the collection of data through in-depth interviews. Such an approach would facilitate the collection of anecdotal information, to "flesh out" the bones of what is at this point only the beginning in understanding CEO perceptions of strategic issues. Case studies with an orientation toward this research question could prove valuable.

Another related approach would be to conduct longitudinal studies to determine if differences in perceptions of an issue result in different behaviors on the part of executives. Miles and Snow (1978) claimed that firms which were classified differently in terms of their strategic posture often pursued different approaches under basically similar circumstances. They did not

relate in their work whether different perceptions of similar circumstances existed. The question to be raised and studied is whether firms/executives who perceive an issue as an opportunity behave differently than do firms/executives who perceive an issue as a threat?

Another research area suggested by this study stems from the means employed here to ascertain organizational strategy. Apparently executives were willing and able to build composite pictures of their firms' strategic orientations, but it remains to be seen if these are realistic representations of the way firms actually behave. Using panels of experts or objective data, if available, to verify the accuracy of reported strategies remains as an avenue of important strategic management research (Snow and Hambrick, 1980).

Finally, it appears that much work remains to be done regarding the individual, personal side of strategic managers. There appears to be a trend away from this side of the field toward an emphasis on situational aspects of strategy (for example, Hambrick, 1983a; Hambrick, 1983b; Hambrick and Schecter, 1983). But these studies appear to be directed at the results, not the causes of firm similarities. Firm uniqueness is still not fully understood (Hatten, 1979).

Chandler (1962) suggested that the top executive may be the most important individual with respect to

organizational change. The top manager of a firm is, to some extent, in the position to "use" the firm to realize his or her aspirations. Major breakthroughs in technology, markets, and products are the result of people applying their skills and knowledge to the problems they perceive and the opportunities that present themselves. As this research indicated, individuals do not see the same issue identically as regards that issue's implications for the firms they manage. A more precise understanding of the reasons for these differences is needed. The findings reported here provide at least the beginnings for understanding these differences.

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APPENDICES

APPENDIX A

**Questionnaire Completed by Chief Executive Officers
of Metalworking Machinery and Equipment Firms
in Ohio, July, 1983**

INTRODUCTION

The questionnaire you are about to complete is designed to take about 15-20 minutes. It would probably be easier to respond to all the questions in one sitting, or you may answer sections as your time permits.

Each section is preceded by brief instructions. Please read these instructions carefully before proceeding to your responses. It is important that you respond in the manner requested in each section's instructions.

Basically, all sections are an inquiry about one of three topical areas:

- 1) Some sections address you, the chief executive
- 2) Some sections deal with the environment your firm operates within
- 3) Some sections deal with the organization you head

Answer questions as accurately as you can. There are no right or wrong answers.

Strict confidentiality is guaranteed, but as you proceed you will see that all questions are upfront and have no hidden meanings.

Thank you for participating. I hope that you find you enjoy answering many of the questions.

Please return the questionnaire as soon as possible.

Robert J. Amann

SECTION AENVIRONMENT DATA

Instructions: This section asks for your feelings and beliefs about issues in the environment your firm operates in. Some issues are presented in general terms, others are very specific.

Before you begin to appraise these issues, take a minute to examine the response scale labeled OPPORTUNITY/THREAT SCALE presented below. The purpose of this section is to ascertain your opinion on whether a particular issue in the environment has the potential to provide an opportunity or to pose a threat to your firm's ability to meet its objectives within the next 5 years.

You are requested to make a value judgment on each issue. Please place the number representing your choice from the O/T scale in the space provided below each issue.

OPPORTUNITY/THREAT SCALE

- 1) Definite threat potential
- 2) Probable threat potential
- 3) Possible threat potential
- 4) Relevant for consideration, but no threat/opportunity potential
- 5) Possible opportunity potential
- 6) Probable opportunity potential
- 7) Definite opportunity potential
- 8) Not relevant for consideration presently

ISSUES/ENVIRONMENTAL COMPONENTS

- 1) Trends in the growth rate of the gross national product.
O/T SCALE ___?
- 2) Trends in the national political/legal climate in the U.S.
O/T SCALE ___?
- 3) Trends in government spending on the military and defense.
O/T SCALE ___?
- 4) Trends in government taxation and spending policies.
O/T SCALE ___?
- 5) Trends in interest rates and funds sources in general.
O/T SCALE ___?
- 6) Trends in government policies on safety in the workplace.
O/T SCALE ___?
- 7) Trends in the rate of inflation.
O/T SCALE ___?
- 8) Trends in environmental protection laws.
O/T SCALE ___?
- 9) Trends in the production capabilities of industrial robots, the data processing capabilities of computers and the two linked together.
O/T SCALE ___?

- 10) Trends in foreign competition in your industry/markets.
O/T SCALE ___?
- 11) Trends in foreign markets for your products.
O/T SCALE ___?
- 12) Trends in energy - its price and availability.
O/T SCALE ___?
- 13) Changes in the technology of the products you manufacture,
in general.
O/T SCALE ___?
- 14) Changes in the technology your industry uses to manufacture
its products, in general.
O/T SCALE ___?

SECTION B

ORGANIZATIONAL DATA

Part 1

Instructions: In the following part of Section B there are three descriptions of hypothetical organizations. Please read all the descriptions carefully and as you read you should take brief notes on what you feel are the nuances and most distinguishing characteristics of each hypothetical organization. Additional instructions follow the descriptions. Read these additional instructions only after you have read the organization descriptions.

TYPE 1

This type of organization attempts to locate and maintain a secure market position in a relatively stable product or service area. The organization tends to offer a more limited range of products or services than its competitors, and it tries to protect its market position by offering higher quality, superior service, and lower prices. Often this type of organization is not at the forefront of developments in the industry -- it tends to ignore industry changes that have no direct impact on current areas of operation and concentrates instead on doing the best job possible in a limited arena.

TYPE 2

This type of organization typically offers many products to many markets and the products offered and the markets served frequently change substantially. The organization values being "first in" in new product and market areas even if not all of these efforts prove to be highly profitable. The organization responds rapidly to early signals concerning areas of opportunity, and these responses often lead to a new round of competitive actions on the part of competitors. However, this type of organization may not maintain market strength in all areas it enters.

TYPE 3

This type of organization attempts to maintain a stable, limited line of products or services while at the same time moving out quickly to follow a carefully selected set of the more promising new developments in the industry. The organization is seldom "first in" with new products or services. However, by carefully monitoring the actions of major competitors in areas compatible with its stable product-market base, the organization can frequently be "second in" with a more cost-efficient product or service.

Now that you have read the descriptions of the hypothetical organizations, please try to build a verbal description of the firm you head in terms of the characteristics mentioned in the above descriptions. Using 25 points, build a composite "picture" of the firm you head by allocating 25 points among the descriptions you have just read to generate a composite description of the organization you head as compared to other firms in the industry your firm competes against. You may allocate all your points to one description if that description is very similar to your organization. More points signify greater similarity.

Consider your company as a whole and note that NONE OF THE DESCRIPTIONS IS INTENDED TO CONNOTE A GOOD OR BAD ORGANIZATION.

$$\underline{\hspace{1cm}} \text{TYPE 1} + \underline{\hspace{1cm}} \text{TYPE 2} + \underline{\hspace{1cm}} \text{TYPE 3} = 25$$

Part 2

Instructions: Questions 1-4 below consider whether documents are available irrespective of whether they are actually used. A document is at a minimum a single piece of paper with printed, typed, or otherwise reproduced content - it is not handwritten.

1. Who is given a copy of the organization chart? (Check one)
 - a. No one; there is no formal organization chart.
 - b. The chief executive only.
 - c. The chief executive and heads of organizational units only.
 - d. The chief executive, unit heads and most all other supervisory employees.
 - e. All employees in the organization.
2. Are written instructions and/or job descriptions given to the following? (Check your answer.)

a. Heads of organization units:	yes <input type="checkbox"/>	no <input type="checkbox"/>
b. Supervisory employees:	yes <input type="checkbox"/>	no <input type="checkbox"/>
c. Nonsupervisory employees:	yes <input type="checkbox"/>	no <input type="checkbox"/>
3. Is a manual of standard operating procedures available?

yes

no
4. What percentage of the managers in your organization turns in written reports on a regular basis? (Check your answer)

a. <input type="checkbox"/> 0 to 10%	b. <input type="checkbox"/> 11 to 20%
c. <input type="checkbox"/> 21 to 30%	d. <input type="checkbox"/> 31 to 40%
e. <input type="checkbox"/> 41 to 50%	f. <input type="checkbox"/> 51 to 60%
g. <input type="checkbox"/> 61 to 80%	h. <input type="checkbox"/> 81 to 100%

5. Within your organization (exclusive of direct labor) how many of the following activities are handled by at least one person who concentrates almost exclusively on this function? (Check all of those that apply.)

<input type="checkbox"/> Public relations	<input type="checkbox"/> Accounting and bookkeeping
<input type="checkbox"/> Advertising	<input type="checkbox"/> Financial control
<input type="checkbox"/> Sales	<input type="checkbox"/> Market research
<input type="checkbox"/> Customer Service	<input type="checkbox"/> Job and product pricing
<input type="checkbox"/> Employee recruiting	<input type="checkbox"/> Workflow planning/scheduling
<input type="checkbox"/> Employee training	<input type="checkbox"/> Legal affairs
<input type="checkbox"/> Purchasing of materials	<input type="checkbox"/> Insurance planning
<input type="checkbox"/> Materials control	<input type="checkbox"/> Production planning
<input type="checkbox"/> Maintenance and repair	<input type="checkbox"/> Forecasting
<input type="checkbox"/> Long-range planning	<input type="checkbox"/> Capital budgeting

6. If your organization has an organization chart, please enclose a copy of it and return it with the questionnaire when you have completed it. If your organization does not have a chart, please sketch it on the back of the preceding page. Please show at least all the positions that report directly to the chief executive and the longest chain of command (number of levels) from the chief executive to the lowest level in the organization.
7. Listed below are some common decisions and actions concerning the work of different units in the organization you head. How much influence do unit heads, on average and in general, have over each? (Circle your choice to the right of each decision or activity.)

<u>Decision/Activity</u>	<u>None</u>	<u>Little</u>	<u>Some</u>	<u>Great</u>
a. Establishing a budget for the unit.	A	B	C	D
b. Hiring and firing personnel.	A	B	C	D
c. Promoting and demoting personnel.	A	B	C	D
d. Establishing a new project or program.	A	B	C	D
e. Setting unit objectives.	A	B	C	D
f. Establishing rules and procedures.	A	B	C	D
g. Determining how work exceptions are to be handled.	A	B	C	D
h. Purchase of supplies and equipment.	A	B	C	D
8. How many full time employees do you employ under normal economic and competitive conditions? _____				
9. Would you provide an estimate of your firm's total assets? \$ _____				

10. Would you provide an estimate of your average annual dollar sales under normal economic and competitive conditions (i.e., no recession)? \$_____
11. Considering the organization you head, would you consider it?
- ___ a) a sole proprietorship
 - ___ b) a partnership
 - ___ c) a closely held corporation
 - ___ d) a publicly held corporation
 - ___ e) an affiliate of another corporation
 - ___ f) a wholly owned subsidiary of another corp.

SECTION C

Attitudinal Data

Part 1

Instructions: In the following section there are 5 statements that describe various things people do or may try to do on their jobs. Using the 1 to 5 scale presented below, please indicate the degree to which you feel these statements describe your own behavior, considering all the years you have worked.

Response Scale

- 1 = NEVER
- 2 = SELDOM
- 3 = SOMETIMES
- 4 = USUALLY
- 5 = ALWAYS

Place the number corresponding to your response choice from the scale above in the space provided to the left of each statement presented below. There are no right or wrong answers. Please answer all questions frankly.

- ___ 1. I do/did my best work when my job requirements are/were fairly difficult, as compared to easy or very difficult.
- ___ 2. I try/tried very hard to improve on my past performance at work.
- ___ 3. I take/took moderate risks by sticking my neck out to get ahead at work.
- ___ 4. I try/tried to avoid any added responsibilities on my job(s).
- ___ 5. I try/tried to perform better than my co-workers.

PART 2

Instructions: Below is a set of statements. Each represents a commonly held opinion and there are no right or wrong answers. You will probably disagree with some statements and agree with others. I am interested in the extent to which you agree or disagree with such matters of opinion.

Please read each statement carefully and indicate the extent to which you agree or disagree by writing a number in front of each statement. These numbers are to be selected from the scale presented below.

First impressions are usually best. Respond to every statement using that response which is closest to the way you feel.

Response Scale

- 1 = Strongly agree
- 2 = Somewhat agree
- 3 = Slightly agree
- 4 = Slightly disagree
- 5 = Somewhat disagree
- 6 = Strongly disagree

- ___ 1. Whether or not I get to be a leader depends mostly on my ability.
- ___ 2. Whether or not I get into a car accident depends mostly on how good a driver I am.
- ___ 3. When I make plans, I am almost certain to make them work.
- ___ 4. How many friends I have depends on how nice a person I am.
- ___ 5. I can pretty much determine what will happen in my life.
- ___ 6. I am usually able to protect my personal interests.
- ___ 7. When I get what I want, it is usually because I worked hard for it.
- ___ 8. My life is determined by my own actions.

SECTION DPERSONAL DATA

Instructions: The following questions ask for data on you, the chief executive.

- 1) What is your official title? _____
- 2) How old are you? _____
- 3) How many years of formal education did you complete? _____
- 4) If you attended college, what area or areas of study did you concentrate on? (For examples, Liberal Arts, Foreign Language, Engineering, Business)
 - a. _____ (Primary concentration)
 - b. _____ (Secondary concentration)

- 5) How many years has it been since you completed your formal education? _____
- 6) Do you participate in continuing education programs (e.g., management development seminars, conferences, night classes, etc.)?
 ___ Never ___ Seldom ___ Sometimes ___ Often ___ Regularly
- 7) How many years have you worked in the industry your firm competes in? _____
- 8) How many years have you been associated with the firm you presently head? _____
- 9) How long have you held your present position? _____
- 10) Have you ever been the chief executive of another firm?
 ___ Yes ___ No
- 11) Considering your "apprenticeship years" before reaching the top position, please indicate below which functional area(s) you were assigned to according to the approximate number of years spent in each. (Leave blank if zero years)
- | | |
|----------------------------|-------------------------------|
| ___ Finance | ___ Personnel/Human Resources |
| ___ Marketing | ___ Research and Development |
| ___ Sales | ___ Data Processing |
| ___ Production | ___ Quality Control |
| ___ Engineering | ___ Accounting |
| ___ Procurement/Purchasing | ___ Other _____ |
| ___ Other _____ | |

Thank you for your time and your consideration. Would you care for a summary of my work when it is completed?

___ YES ___ NO

Name: _____
 Address: _____

It will take me from three to six months to complete my analysis and write-up. Any data reported will be aggregated findings. Your responses will be kept confidential.

Sincerely,

Robert J. Amann

APPENDIX B

List of Names and Addresses of Chief Executive Officers
of Metalworking Machinery and Equipment Firms in Ohio
Taken from 50,000 Leading U.S. Corporations, (1980)

NAMES AND ADDRESSES OF ALL TOP
EXECUTIVES AND FIRMS IN
S.I.C. 354, STATE OF
OHIO

Mr. J.A. Geier
Cincinnati Milacron
4701 Marburg Avenue
Cincinnati, Ohio 45209

Mr. C.R. Smith
Warner & Swasey
11000 Cedar Avenue
Cleveland, Ohio 44106

Mr. C.F. Moll
M.I.D. Prod. Inc.
P.O. Box 2741
Cleveland, Ohio 44111

Mr. W.P. Cooper
Acme-Cleveland and Co.
P.O. Box 5617
Cleveland, Ohio 44101

Mr. K.T. Kuck
Monarch Machine Tool
615 N. Oak St.
Sidney, Ohio 45365

Mr. M.J. Anderson
Aro Corp.
1 Aro Center
Bryan, Ohio 43506

Mr. H. Winch
Minster Machine Corp.
240 W. Fifth St.
Minster, Ohio 45865

Mr. P.G. March
Cincinnati, Inc.
Kilby Road
Cincinnati, Ohio 45211

Mr. L.P. Fox
PMC Industries
29100 Alkeland
Wickliffe, Ohio 44092

Mr. W.F. Zahn
National Machinery Co.
Greenfield & St.
Tiffin, Ohio 44883

Mr. J.H. Sheets
Automation & Measurement
721 Springfield St.
Dayton, Ohio 45403

Mr. A.C. McDaniel
Hill Acme Co.
1201 W. 65th St.
Cleveland, Ohio 44102

Mr. S.M. Taylor
Harris Caloric
5501 Cass Avenue N.
Cleveland, Ohio 44102

Mr. E. Richard
Magnetics International, Inc.
5400 Dunham Rd.
Maple Heights, Ohio 44137

Mr. R. Bredenbeck
Efficient Industries
5514 Old Brecks
Cleveland, Ohio 44131

Mr. J.E. Myers
Barth Industries
12650 Broodpark
Cleveland, Ohio 44130

Mr. C.J. Schott
E. Walter Schott, Co.
NW. Cor. Central
Cincinnati, Ohio 45202

Mr. M. Baker
Balas Division
1557 E. 27th St.
Cleveland, Ohio 44114

Mr. H. Kraus
General Tool Co., Inc.
101 Landy Lane
Cincinnati, Ohio 45215

Mr. J.R. Blakeslee
Ajax Mfg. Co.
1441 Chardon Rd.
Cleveland, Ohio 44117

Mr. R.J. Gargrave
Dayton Perforator
500 Progress Road
Dayton, Ohio 45449

Mr. J.H. Schron, Sr.
Jergens, Inc.
19520 Nottingham
Cleveland, Ohio 44110

Mr. D.J. Lionette
Porter Precision
2734 Banning Rd.
Cincinnati, Ohio 45239

Mr. John Keller
Laughter Corporation
319 Leo St.
Dayton, Ohio 45404

Mr. J. Kanfer
Swiss Laboratory
144 Cutahoga St.
Akron, Ohio 44039

Mr. H. Oliver
Bardons & Oliver
1133 W. 9th St.
Cleveland, Ohio 44113

Mr. N. Cammerer
Midwest Tool and Engineering
172 Webster St.
Dayton, Ohio 45402

Mr. J.R. Smith
Rexarc Inc.
Rexarc Place
W. Alexandria, Ohio 45381

Mr. John Treon
West Min Precision
830 Scholz Dr.
Vandalia, Ohio 45377

Mr. F. Zagar
Zagar Inc.
24000 Lakeland
Cleveland, Ohio 44132

Mr. F.B. Cauffiel
Cauffiel Industry, Inc.
1400 Hastings
Toledo, Ohio 43607

Mr. T.H. Clark
Clark Metal Products
370 W. Fairground
Marion, Ohio 43302

Mr. Roy Zimmer
Cowles Tool Co.
2245 W. 114th St.
Cleveland, Ohio 44102

Mr. A. Shashaty
Fairfield Machine
Lower Elkton Rd.
Columbiana, Ohio 44408

Mr. H.H. Ickes
Quaker Mfg. Corp.
187 Georgetown
Salem, Ohio 44450

Mr. K.A. Reuther
Reuther Mold & Machine
1225 Munroe Falls
Cuyahoga Falls, Ohio 44221

Mr. L. Storrer
Mohawk Tools, Inc.
910-14 E. Main St.
Montpelier, Ohio 43543

Mr. R.L. Bleicher
Dayton Progress Co.
500 Progress Road
Dayton, Ohio 45449

Mr. T.W. Nash
L.W. Nash Co., Inc.
Taggart St.
E. Palestine, Ohio 44413

Mr. Walter Krenz
Intercole Bolling Corporation
Yoder Division
5500 Walworth Avenue
Cleveland, Ohio 44102

Mr. M.L. Benjamin
Frickson Tool Co.
34300 Solon Rd.
Cleveland, Ohio 44139

Mr. N.D. Abbey
Abbey Etna Machine
831 E. Indiana Avenue
Perrysburg, Ohio 43551

Mr. L.D. Harmony
Stamco Inc.
125 S. Herman St.
New Bremen, Ohio 45869

Mr. M. Skolnik
Weldon Tool Co., Inc.
3300 Woodhill Rd.
Cleveland, Ohio 44104

Mr. J.B. Randolph
Ohio Knife Co., Inc.
1780 Dreman Avenue
Cincinnati, Ohio 45223

Mr. L.P. Fox
Pipe Machinery Co.
29100 Lakeland
Wickliffe, Ohio 44092

Mr. P.G. Saunders
Container Graphic
3537 Hill Avenue
Toledo, Ohio 43607

Mr. R.E. Doeden
Dotco
Box 182
Hicksville, Ohio 43526

Mr. J.E. Houston
Portage Machine Co.
1025 Sweitzer Avenue
Akron, Ohio 44311

Mr. W.H. Monteith
Akromold Inc.
1100 Main St.
Cuyahoga Fl., Ohio 44221

Mr. J.R. Bashor
c/o Mr. Jerry Nymberg
United States Drl.
5298 River Rd.
Cincinnati, Ohio 45233

Mr. H.H. Jones
Vulcan Tool Co., Inc.
730 Lorain Avenue
Dayton, Ohio 45410

Mr. P.J. Kunkler
Vaughn Division
P.O. Box 401
Cuyahoga Fl., Ohio 44222

Mr. G.L. Nord
Schauer Manufacturing
4500 Alpine Dr.
Cincinnati, Ohio 45242

Mr. L.C. Fischer
Wapakoneta Machine
North St. N/S
Wapakoneta, Ohio 45895

Mr. McCart
Akron Equipment Co.
633 E. Exchange
Akron, Ohio 44309

Mr. Frank Somogyi
Accurate Machine
3130 E. 93rd St.
Cleveland, Ohio 44104

Mr. L. Bills
Lenton Manufacturing Co.
3333 Lakeside Avenue
Cleveland, Ohio 44114

Mr. M.W. Klug
Toolcraft Products
1625 McCook Avenue
Dayton, Ohio 45404

Mr. R. Snell
Tipp Machine & Tool
211 S. First St.
Tipp City, Ohio 45371

Mr. M.F. Montag
Allied Tool & Die
16146 Puritas Avenue
Cleveland, Ohio 44135

Mr. J.E. O'Brien
Banner Tool & Die
1300-08 Holly Avenue
Columbus, Ohio 43212

Mr. R.F. Cook
R.F. Cook Mfg. Co.
4585 Allen Rd.
Stow, Ohio 44224

Mr. D.H. Montgomery
Dayton Machine Tool
1280 McCook Avenue
Dayton, Ohio 45404

Mr. L.W. Rice
Drop Dies & Forging
3097 E. 61st St.
Cleveland, Ohio 44127

Mr. F.C. Rongone
F.C. Machine Tool & Die
1474 Main St.
Cuyahoga Falls, Ohio 44221

Mr. E. Hackett
Estee Mold & Die
1467 Stanley Avenue
Dayton, Ohio 45404

Mr. R. Winkle
P & W Tool & Die
3751 Montgomery
Cincinnati, Ohio 45212

Mr. J.A. Haag
SGS Tool Co.
54 S. Main St.
Munroe Falls, Ohio 44262

Mr. C.J. Sekely
Sekely Industrial Tool
250 Pennsylvania
Salem, Ohio 44450

Mr. W.L. Dolle
Lodge & Shipley Co.
3055 Collerain
Cincinnati, Ohio 45225

SOURCE: 50,000 Leading U.S. Corporations, 1980 Ed.

APPENDIX C

Letter Sent to Chief Executive Officers (15) of
Metalworking Machinery and Equipment Firms
in Ohio, July, 1983, to Solicit
Participation in the Research Project

Robert J. Amann
Department of Business
Radford University
Radford, VA 24142
(703-731-5481)

July 5, 1983

Mr. Chief Executive Officer
Firm ABC
Nowhere, Ohio 33122

Dear Mr. Big Guys:

You undoubtedly have better things to do than to participate in academic research, what with the recession, intense competition and the like demanding your time and efforts. I would only ask that you consider the possibility that a little bit of your time given to a researcher like me might provide an answer or two to the problems that seem to emerge daily and consume so much of your time.

Being a native of the Ohio Valley (Dayton), I have always had an interest in the industry firms like yours compete in. When the time came to do the research necessary to complete my Ph.D. in Business, I was determined to analyze your industry and, hopefully, help that industry to overcome some of the problems it is now facing.

The realities of empirical research have forced me to lower my sights a little. The research I am asking you to participate in will only help me to begin to understand you and the firm you head. Hopefully after I have analyzed my data and begin to understand some of the problems you face, I can offer a few modest suggestions to repay your consideration.

I need approximately 30 minutes of your time to complete a mail questionnaire that delves into: (1) people like you who run firms similar to the one you head; (2) the organizations people like you head; and (3) the environments of firms like the one you head.

Would you be willing to at least take a look at my questionnaire? Confidentiality is guaranteed. Please complete the enclosed stamped post card with your response. Thank you for your consideration.

Sincerely yours,

Robert J. Amann

P.S. You may find that you even enjoy answering some of the questions on my questionnaire. They may make you think about some things you have been too busy to consider.

___ Yes, I will look at
your questionnaire-
NO OBLIGATIONS
___ No, I am not
willing to look.

Name _____
Firm _____

Robert J. Amann
Department of Business
Radford University
Radford, VA 24142

APPENDIX D

**List of Names and Addresses of Chief Executive Officers
Sent a Letter Requesting Participation in the Research**

NAMES AND ADDRESSES OF INDIVIDUALS SENT LETTER
REQUESTING THEIR PARTICIPATION
IN THE RESEARCH PROJECT

Mr. C.R. Smith
Warner & Swasey
11000 Cedar Avenue
Cleveland, Ohio 44106

Mr. M.J. Anderson
Aro Corp.
1 Aro Center
Bryan, Ohio 43506

Mr. R. Bredenbeck
Efficient Industries
5514 Old Brecks
Cleveland, Ohio 44131

Mr. D.O. Yoder
Yoder Co.
5500 Walworth Avenue
Cleveland, Ohio 44102

Mr. J.B. Randolph
Ohio Knife Co., Inc.
1780 Dreman Ave.
Cincinnati, Ohio 45223

Mr. J.R. Bashor
United States Drl.
5298 River Rd.
Cincinnati, Ohio 45233

Mr. H. Oliver
Bardons & Oliver
1133 W. 9th St.
Cleveland, Ohio 44113

Mr. M.F. Montag
Allied Tool & Die
16146 Puritas Avenue
Cleveland, Ohio 44135

Mr. F.C. Rongone
F.C. Machine Tool & Die
1474 Main St.
Cuyahoga Falls, Ohio 44221

Mr. C.J. Sekely
Sekely Industrial Tool
250 Pennsylvania
Salem, Ohio 44460

Mr. W.L. Dolle
Lodge & Shipley Co.
3055 Collerain
Cincinnati, Ohio 45225

Mr. R.J. Gargrave
Dayton Perforator
500 Progress Rd.
Dayton, Ohio 45449

Mr. F.B. Cauffiel
Cauffiel Industry, Inc.
1400 Hastings
Toledo, Ohio 43607

Mr. K.A. Reuther
Reuther Mold & Machine
1225 Munroe Falls
Cuyahoga Falls, Ohio 44221

Mr. C.G. Wyman
Akron Equipment Co.
633 E. Exchange
Akron, Ohio 44309

APPENDIX E

Transcript of Telephone Call Made to Chief
Executive Officers to Solicit Participation
in the Research Project, July, 1983

TRANSCRIPT OF RESEARCHER'S PHONE CONVERSATION
MADE TO SOLICIT CHIEF EXECUTIVE
PARTICIPATION IN STUDY

"Hello, Mr. Smith?"

"My name is Robert Amann. I am originally from Dayton, Ohio, but I presently am a graduate student in Virginia pursuing my Ph.D. in Business Administration. May I have a few minutes of your time?"

(All responses were affirmative once this point was reached.)

"Mr. Smith, I am pursuing research to complete my Ph.D. The research deals with top managers like you, the firms they head, and the environments of those firms. Some of the questions I am asking deal with structural variables, others deal with personal characteristics of you. The information I am seeking does not deal with issues of a competitive nature, nor could it be used by your competition for any reasons. Most importantly, if you agree to participate, all of your responses would be held in confidence.

"I am collecting the information I need with a mail questionnaire. The questionnaire would take you about fifteen minutes to complete. At this point, all I am asking is would you be willing to at least look at the questionnaire? After you see the questionnaire, you can decide if you would be willing to fill it out. Would you be willing to look at the questionnaire?"

If the executive responded "no" at this point, I thanked him and said goodbye. If the executive said he would examine the instrument, I told him I would send it to him immediately, thanked him for doing me a big favor and hung up.

48 executives responded they would examine the questionnaire. Four secretaries agreed to pass it on to the CEO.

APPENDIX F

**List of Names and Addresses of Chief Executive Officers
Who Agreed to Examine the Questionnaire**

EXECUTIVES WHO AGREED TO EXAMINE QUESTIONNAIRE
(CONTACTED BY PHONE)

Mr. M.J. Anderson
Aro Corp.
1 Aro Center
Bryan, Ohio 43506

Mr. R. Bredenbeck
Efficient Industries
5514 Old Brecks
Cleveland, Ohio 44131

Mr. Walter Krenz
Intercole Bolling Corporation
Yoder Division
5500 Walworth Avenue
Cleveland, Ohio 44102

Mr. J.R. Bashor
c/o Mr. Jerry Nymberg
United States Drl.
5298 River Rd.
Cincinnati, Ohio 45233

Mr. McCart
Akron Equipment Co.
633 E. Exchange
Akron, Ohio 44309

Mr. H. Kraus
General Tool Co., Inc.
101 Landy Lane
Cincinnati, Ohio 45215

Mr. J.H. Schron, Sr.
Jergens, Inc.
19520 Nottingham
Cleveland, Ohio 44110

Mr. D.J. Lionette
Porter Precision
2734 Banning Rd.
Cincinnati, Ohio 45239

Mr. John Keller
Laughter Corporation
319 Leo St.
Dayton, Ohio 45404

Mr. H. Oliver
Bardons & Oliver
1133 W. 9th St.
Cleveland, Ohio 44113

Mr. N. Cammerer
Midwest Tool & Engineering
172 Webster St.
Dayton, Ohio 45402

Mr. J.R. Smith
Rexarc Inc.
Rexarc Place
W. Alexandria, Ohio 45381

Mr. John Treon
West Mountain Precision
830 Scholz Drive
Vandalia, Ohio 45377

Mr. F. Zagar
Zagar Inc.
24000 Lakeland
Cleveland, Ohio 44132

Mr. Roy Zimmer
Cowles Tool Co.
2245 W. 114th St.
Cleveland, Ohio 44102

Mr. H.H. Ickes
Quaker Mfg. Corp.
187 Georgetown
Salem, Ohio 44460

Mr. Frank Somogyi
Accurate Machine
3130 E. 93rd St.
Cleveland, Ohio 44104

Mr. M.W. Klug
Toolcraft Products
1625 McCook Avenue
Dayton, Ohio 45404

Mr. J.E. O'Brien
Banner Tool & Die
1300-08 Holly Avenue
Columbus, Ohio 43212

Mr. R.F. Cook
R.F. Cook Mfg. Co.
4585 Allen Road
Stow, Ohio 44224

Mr. D.H. Montgomery
Dayton Machine Tool
1280 McCook Avenue
Dayton, Ohio 45404

Mr. L.W. Rice
Drop Dies & Forging
3097 E. 61st St.
Cleveland, Ohio 44127

Mr. F.C. Rongone
F.C. Machine Tool & Die
1474 Main St.
Cuyahoga Falls, Ohio 44221

Mr. E. Hackett
Estee Mold & Die
1467 Stanley Avenue
Dayton, Ohio 45404

Mr. W.P. Cooper
Acme-Cleveland Co.
P.O. Box 5617
Cleveland, Ohio 44101

Mr. H. Winch
240 W. Fifth St.
Minster, Ohio 45865

Mr. A.C. McDaniel
Hill Acme Co.
1201 W. 65th St.
Cleveland, Ohio 44102

Mr. S.M. Taylor
Harris Calorific
5501 Cass Avenue N.
Cleveland, Ohio 44102

Mr. E. Richard
Magnetics International, Inc.
5400 Dunham Rd.
Maple Heights, Ohio 44137

Mr. L. Storrer
Mohawk-Tools, Inc.
910-14 E. Main St.
Montpelier, Ohio 43543

Mr. William Eversole
Erickson Tool Co.
34300 Solon Rd.
Cleveland, Ohio 44139

Mr. George Briggs
Weldon Tool Co., Inc.
3300 Woodhill Rd.
Cleveland, Ohio 44104

Mr. L.P. Fox
PMC Industries, Inc.
29100 Lakeland
Wickliffe, Ohio 44092

Mr. Bill Baker
Dotco
Box 182
Hicksville, Ohio 43526

Mr. Richard Phillips
Portage Machine Co.
1025 Sweitzer Avenue
Akron, Ohio 44311

Mr. P.J. Kunkler
Wean United
Vaughn Division
P.O. Box 180
3805 Henricks Road
Youngstown, Ohio 44501

Dr. Nord
Schauer Manufacturing
4500 Alpine Drive
Cincinnati, Ohio 45242

Mr. John Gosnell
Wapakoneta Machine
North St. N/S
Wapakoneta, Ohio 45895

Mr. J. Kanfer
Go-Jo Industries
P.O. Box 991
Akron, Ohio 44309

Mr. R. Snell
Tipp Machine and Tool
211 S. First St.
Tipp City, Ohio 45371

Mr. M.F. Montag
Allied Tool & Die
16146 Puritas Avenue
Cleveland, Ohio 44135

Mr. R. Winkle
P & W Tool & Die
3751 Montgomery
Cincinnati, Ohio 45212

Mr. C.J. Sekely
Sekely Industrial Tool
250 Pennsylvania
Salem, Ohio 44460

Mr. J.A. Geier
Cincinnati Milacron
4701 Marburg Avenue
Cincinnati, Ohio 45209

Mr. K.T. Kuck
Monarch Machine Tool
615 N. Oak St.
Sidney, Ohio 45365

Mr. John Bosch
Automation & Measurement
721 Springfield St.
Dayton, Ohio 45403

Mr. Adam Sentz
Barth Industries
12650 Brookpark
Cleveland, Ohio 44130

Mr. Richard Thomas
Dayton Progress Co.
500 Progress Road
Dayton, Ohio 45449

Mr. Mullin
Abbey Etna Machine
831 E. Indiana Avenue
Perrysburg, Ohio 43551

Mr. Charles Bradley
Stamco Inc.
125 S. Herman St.
New Bremen, Ohio 45869

Mr. P.G. Saunders
Container Graphic
3537 Hill Avenue
Toledo, Ohio 43607

Mr. H.H. Jones
Vulcan Tool Co., Inc.
730 Lorain Avenue
Dayton, Ohio 45410

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