

**Strategy and Performance in a Volatile  
Environment – A Study of  
The Electronic Computing Industry**

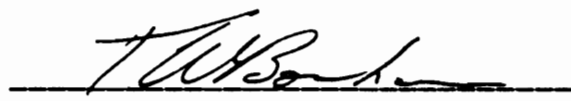
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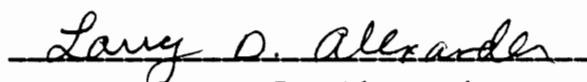
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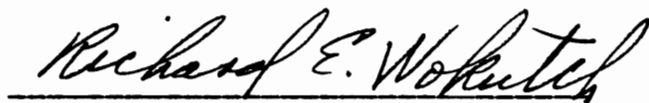
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(ABSTRACT)

This study had two objectives. The first was to extend the strategy paradigm by examining the relationship between strategy type and performance objective. The second was to test the idea of a contingency relationship between strategy and performance. The central research question guiding this effort was: What performance results arise from following different strategies within a given context? The intention of this study was to show that firms within a given environmental context could follow different strategies and be successful provided the strategy was related to a specific performance objective. The implication of this argument is that organizational success is a product of both proper implementation of a selected strategy, and the correct choice of a performance objective.

Strategy was operationalized using the Miles & Snow (1978) typology. The choice of a typology was made in order

to compare theoretical "ideal types" with methodological "ideal types." The empirical tests of the hypotheses demonstrated that each strategy type was related to different performance objectives. Analysis demonstrated that for firms which achieved a higher degree of coalignment with their environment, there was a positive and significant impact on performance for the Defender and Analyzer strategy types. This relationship was not supported for the Prospector strategy types, although the results were in the predicted direction.

The primary contribution of this study was to demonstrate that the basic strategic management research paradigm needs to be extended to allow for consideration of multiple performance objectives when examining the relationship between strategy and performance. While there is no single appropriate strategy for any given context, there are limitations to strategy choice after an organization has determined its objectives. This study was the first to demonstrate a contingency relationship between strategy types and differing performance objectives within a single environmental context. Also, the present study was able to operationalize the Analyzer strategy type using secondary data. This is one of the first studies to have done so.

## **ACKNOWLEDGEMENTS**

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## **CHAPTER ONE: INTRODUCTION**

### **INTRODUCTION**

A major thrust of research within strategic management has been directed toward identifying the relationships among environment, strategy and performance (Fahey & Christensen, 1986). Despite the wealth of research performed over the past ten years, no study has specifically established the existence of a contingency relationship between strategy and performance (Venkatraman & Prescott, 1987). Recent developments in research methodology present an opportunity to address this issue.

This study has two objectives. The first is to examine the assumption of a contingency relationship between strategy and performance by testing for coalignment between strategy and environment. The second is to extend the strategy paradigm by examining the relationship between strategy types and performance objectives. The central research question guiding this effort is:

What performance results arise from following different strategies within a given context.

## CONTINGENCY PERSPECTIVE

This study will be testing for coalignment between strategy and environment in order to examine the assumption of a contingency relationship between strategy and performance. In order to develop testable hypotheses, it is necessary to examine the central concepts of the contingency perspective as they relate to the research question. According to Ginsberg & Venkatraman (1985), these concepts are environment, strategy and performance. Each of these is discussed in turn. The definition of key terms is provided at the end of this chapter.

## ENVIRONMENT

In their review of contingency based research, Ginsberg & Venkatraman (1985) noted that most research has been directed toward understanding the relationship between environment and strategy, and relatively little toward the strategy and performance linkages. The traditional business policy literature is built around the notion that the function of the strategist is to find a match between environmental threats and opportunities and organizational strengths and weaknesses (Andrews, 1971). According to Jauch, Osborn & Glueck (1980), a central tenet of strategic management is that

the success or failure of an organization will be a function of its strategic response to environmental challenges.

The contingency perspective proposes that the appropriate organizational structure and managerial style will be a function of contingency factors produced by environmental uncertainty and instability (Tosi & Slocum, 1984). That is, as the degree of environmental volatility increases, it can have a more determinate effect on the choices of managers concerning strategy , structure, and management processes.

This study will examine firms in a volatile and mature industry. Organizational response to volatile environments has been a growing focus of research within strategic management, however there has been little theory-building work. Volatility is a product of the growing pace of social and technological change, and the increased interdependence of organizations within industries (Emery & Trist, 1965). Within the context of the present study, volatility is related to what Emery & Trist (1965) referred to as "turbulent fields." The relevance of the research question can be seen as particularly significant as environments become more complex. This logic is echoed by Terryberry (1968) who argued that there is a trend toward decreasing autonomy and increasing interdependence among organizations as industrial

economies evolve. Clearly further work in this area would be a contribution.

## STRATEGY

This study will use the Miles & Snow (1978) typology to operationalize the strategy concept. Miles & Snow (1978) have provided a typology with a theoretical framework that is both prescriptive and, according to the authors, applicable to any environmental context. According to Miles & Snow (1978), their three viable strategy types, the Prospector, Analyzer, and Defender, represent three alternative strategies which a firm can employ to take advantage of industry opportunities, and to be effective competitors over a considerable period of time.

Prior research has not entirely supported this argument. For example, Lawless & Finch (1989) did not find each of the strategy types in their study of a volatile environment. This would seem to support arguments that the choice options of individual managers, or of collectives called dominant coalitions, are secondary to the demands of environmental factors (Astley & Fombrun, 1983) and the constraints of current structural imperatives (Blau, 1981).

Other research streams have demonstrated empirically the existence of multiple strategies within definable environmental contexts; however, these studies do not demonstrate any consistency in their findings. Studies of strategic groups are an example. The study of strategic groups has evolved from industrial economics, and is based on the identification of symmetrical dimensions (homogeneous elements) between firms within an industry (McGee & Thomas, 1986). Environments are defined as industries or "basic businesses" (Newman, 1978), and groups are then defined as those firms following similar strategies. Research findings have identified as few as two strategic groups (Porter, 1979; Oster, 1982), and as many as eight groups (Baird, Sudharshan & Thomas, 1983), depending on the researcher's operationalization of the strategy concept and the environmental context. This approach has demonstrated that the existence of strategies is not random, but follows some identifiable patterns. However, these studies have either been industry specific or context driven, and thus lack generalizability (Thomas & Venkatraman, 1988).

The distribution of strategy types within any given environmental context is still an open question. One reason for this is the choice of data samples used in examining

relationships. Most studies employing the Miles & Snow (1978) typology have been across industries (Zahra, 1987), which is inappropriate with respect to this particular typology. The majority of other contingency studies have relied on the PIMS data base (Ginsberg & Venkatraman, 1985), thus are limited to only examining relationships across industries. The present study will address these problems by developing a large data base within one industry.

#### PERFORMANCE

Cool & Schendel (1988) pointed out that relatively little attention has been directed toward examining the question of how performance would differ among firms pursuing differing strategy types. Fahey & Christensen (1986) suggested examining the question of how strategic group membership differs based on performance outcomes. In that same study, they noted that strategy research has not concentrated on developing the legitimacy of organizational goals other than economic performance.

This study is an effort to address each of these issues. An argument within the strategic management literature is that managers can make choices among differing performance objectives. However, a limitation to studying performance is

that there is little agreement on what constitutes performance, or how performance should be measured (Chakravarthy, 1986; Ginsberg & Venkatraman, 1985; Shrivastava, 1986; Venkatraman & Ramanujam, 1987).

Bourgeois (1985) noted that contingency theory indicates that the better performing firms will be those that achieve a better fit between the organization and the requirements of the environment. Further, the strategic management literature emphasizes the development of distinctive competencies which can distinguish the firm regardless of the environmental context. Miles & Snow (1978) give the opinion that firms following one of the three viable strategies (Prospector, Analyzer, or Defender) will be equally likely to survive, and prosper, in any environment. An assumption being tested in this study is that these strategy types are associated with different performance objectives. It should then be possible to address the specific performance objective of each strategy type, and examine the relationships within a single industry.

## **METHODS & SETTING**

This study will examine firms identified as being in the electronic computing industry. This industry has been characterized as volatile by a number of researchers (e.g.,

Bourgeois & Eisenhardt, 1987). The use of a single industry setting for testing the typology is in keeping with the original work of Miles & Snow (1978), and is important for a number of reasons. By selecting a single industry, this study will be able to control for industry effects (Snow & Hrebiniak, 1980). The study by Snow & Hrebiniak (1980) showed that environmental uncertainty, a product of a volatile environment, varies across industries, thus making across industry studies inappropriate. This is discussed in greater detail in chapter three.

Strategy will be operationalized using measures developed from Miles & Snow's (1978) original work and subsequent empirical studies of the typology. The variables will thus represent those organizational factors within the control of managers (Jemison, 1987). Performance will be examined from the perspective of the expected performance outcomes of the strategies. Measures of strategy and performance will be operationalized using secondary data.

Ginsberg & Venkatraman (1985) suggested that studies attempting to test a contingency relationship should first be tried within a single industry setting. If successful, future efforts could then be made to generalize the findings to other industries. They also suggest that the use of a single

industry will help to avoid other problems, such as sample heterogeneity (the mixing of apples and oranges). Also, Harrigan (1983) warned of the necessity of carefully structuring the sample to insure that an industry sample represents the key factors. This is also discussed in more detail in Chapter Three.

### CONTRIBUTIONS

This study should accomplish the following objectives:

1. Contribute toward reconciling the question of a strategy - performance fit relationship.
2. Operationalize the Miles & Snow (1978) typology in a volatile context using secondary data. This will be one of the few studies to operationalize the Analyzer strategy in this manner.
3. Extend the Miles & Snow (1978) typology by examining its applicability in a volatile environmental context.
4. Examine the question of the performance implications of following different strategies within a single context.

### SUMMARY AND REVIEW OF SUBSEQUENT CHAPTERS

This chapter introduced the central research question which was, what performance results arise from following different strategies within a given context. Current

arguments within the literature were introduced in order to establish the relationships necessary for hypothesis development. Chapter Two will review the literature relevant to the research question, and will introduce the hypotheses to be tested in this study. Chapter Three will present the research methodology chosen to test the hypotheses.

### **Definition of Terms**

**Adaptation:** Adaptation is defined as change that obtains as a result of aligning organizational capabilities with environmental contingencies (Hrebiniak & Joyce, 1985, p. 337).

**Choice:** The extent to which individual actors (organizations) are able to exercise free will. This definition is derived from Hannan & Freeman (1989).

**Coalignment:** The degree to which strategic resource deployments adhere to an "ideal profile" for a given environmental context (Venkatraman & Prescott, 1987). Operationally defined, coalignment is the weighted euclidean distance from an ideal profile (Venkatraman & Prescott, 1987).

**Contingency:** A theory whose basic assumption is that there is no one best way to organize and that organizational effectiveness will be determined by the match between internal structure and relevant characteristics of an organization's task and environment (Galbraith, 1973).

**Environment:** The totality of physical and social factors that are directly taken into consideration in the decision making behavior of individuals in the organization. (Duncan, 1972: 314)

**Flexible:** Adjustable to change; capable of modification (Webster's New World Dictionary, 1970). From De Meyer, Nakane, Miller & Ferdows (1989), flexibility is finding a balance between market exploitation and cost efficiency.

**Fit:** A feasible set of equally effective, internally consistent patterns of organization context and structure (Van de Ven & Drazin, 1985: p. 335).

**High Velocity Environment:** An industry context in which there is rapid and discontinuous change in demand, competitors, technology and/or regulation, such that information is often

inaccurate, unavailable, or obsolete (Bourgeois & Eisenhardt, 1988)

**Strategy:** A pattern or stream of major and minor decisions about an organization's possible future domain (Mintzberg, 1976).

**Volatile Environment:** The accelerating rate and complexity of interactive effects exceeds the component systems' capacities for prediction and, hence, control of the compounding consequences of their actions (Terryberry, 1968: 593). As this term has been used by both the deterministic and choice writers, this definition should relate to both perspectives.

## **CHAPTER TWO: LITERATURE REVIEW**

### **INTRODUCTION**

Chapter One introduced the primary research question guiding the efforts of this study. That question was: What performance results arise from following different strategies within a given context? This chapter will examine key issues within contingency theory which relate to testing this question. It will also provide the underlying theoretical arguments to support development of hypotheses, and lay the foundation for the methodology selected to test the hypotheses.

### **CONTINGENCY THEORY**

Strategic management focuses on the relationship between an organization and its environment (Ginsberg & Venkatraman, 1985). A primary approach to examining and explaining that relationship has been the development of contingency theories. The recent criticism of contingency theory (e.g., Schoonhoven, 1981; Fry & Slocum, 1984; Van de Ven & Drazin, 1985) has resulted in efforts to re-establish this line of research within the body of mid-range theories of organizations.

Ginsberg & Venkatraman (1985) noted that a major problem with contingency approaches is that they lack generalizability, and that the domain of these research streams has not been established. Tosi & Slocum (1984) said that it is necessary for researchers to do two things: first, the key concepts must be better developed and the relationships between them clearly explained; second, the scope of the theory used needs to be broadened. Scope can refer to either extending the range of relationships encompassed within the theory, or to providing greater depth to those relationships under consideration. For this study, efforts will be made toward providing greater depth.

This study will be testing for a contingency relationship between strategy and performance. The definition of fit employed drives the collection of data, and the statistical analysis of the hypothesis (Van de Ven & Drazin, 1985). Van de Ven & Drazin (1985) noted that there are three approaches for examining contingency relations. These are the selection, interaction and systems approaches. This study will employ the systems approach as developed by these authors in order to test for the existence of a contingency relationship between strategy and performance. Within this approach, fit is defined as, "a feasible set of equally effective,

internally consistent patterns of organization context and structure (Van de Ven & Drazin, 1985: p. 335)." The test method employed is to examine deviations from an ideal type, and the relationship between the degree of deviation and the resulting performance implications. In other words, if a contingency relationship exists, it will be manifested through a negative correlation between strategy and performance as firms are observed to deviate from the "ideal" resource allocations necessary for proper strategy implementation. The specific statistical techniques employed are discussed in Chapter Three.

There are a number of advantages to using the systems approach. This approach avoids the reductionism associated with the other two approaches, thus allowing more information into the analysis. Multiple contingencies can be accepted as affecting an organization, but it is not necessary to operationalize all possible contingencies. The systems approach also relaxes the assumption of one best way, which is implicit in the selection and interaction approaches. Taken together, the researcher can theoretically allow for the exercise of choice, and for the existence of equally effective patterns in organizational performance. The primary assumption of the systems approach is that deviations from an

ideal pattern, along any theorized dimension, will have a negative effect on performance. The systems approach has received some support in the organization theory literature (Drazin & Van de Ven, 1985; Gresov, 1989), and has recently been introduced into the strategic management literature (Venkatraman & Prescott, 1987).

Venkatraman (1989) further elaborated on the use of the systems approach for research in strategic management. Assuming that the researcher can specify an ideal strategy profile for a given environmental context, then a firm's degree of adherence to the profile should be positively related to performance. Adherence to the ideal profile would theoretically indicate an environment and strategy coalignment. Further, deviations from this profile would imply that the coalignment between environment and strategy was weak, and the degree of deviation should have an impact on performance. Venkatraman & Prescott (1987) tested and proved this argument. They noted however, that their study was limited by the data base used to an assumption that there was only one ideal profile within an environment. It was suggested that another study be done within a single environmental context and employing a large data base. The objective would be to demonstrate that multiple ideal

profiles, consistent with a theory of generic strategies, could be successful.

## **STRATEGY**

This study will use the Miles & Snow (1978) typology to operationalize the strategy concept. The typology approach avoids the problem of generalizability because it is the product of theoretical efforts to deal with non-quantifiable elements (Hambrick, 1984) which are assumed to be represented in all contexts. Within the field of strategic management, typologies provide the opportunity for researchers to categorize strategies into broad classifications which can be applied across industries, organizational types, and environmental settings (Herbert & Deresky, 1997). Snow & Miles (1983) point out that among the significant contribution of typologies for any discipline are codification and prediction. For these reasons a typological approach will be used.

## **MILES & SNOW (1978) TYPOLOGY**

The Miles & Snow (1978) typology was selected for this study for several reasons. This typology is accepted within the field as one of the few typologies which represents an

organization as a holistic entity (Miller, 1988; Snow & Hrebiniak, 1980). A concern of the present study is being able to represent each strategy type using a parsimonious set of variables. According to Ginn & McDaniel (1987), an organization's strategy is reflected in all of its systems, thus a limited selection of theoretically relevant variables should be able to capture the strategy types. The Miles & Snow (1978) typology has been accepted as a business level typology (Hitt & Ireland, 1982), and the present study is concerned with business strategies, as opposed to corporate strategies.

According to the authors, perceptions of environmental conditions by organizational managers, and the interpretation of these perceptions, lead to an orientation toward the environment which can be classified as a strategy type. The strategy type observed represents the implementation of strategic choice. Strategy was defined as a pattern of decisions affecting a firm's possible future domain. Strategy was seen as being inferred from behavior rather than as being stated by management. The observable similarities in the patterns of adjustments among firms led to classifying possible strategies on a continuum of strategy adaptation.

The underlying assumptions of their theory of adaptation were that managers could exercise choice (Child, 1972); that the organization's dominant coalition could act to create their environment (Weick, 1969); that management's choices resulted in shaping the organization's structure and management processes; and that the resulting structure and processes acted to constrain future strategic choices. The function being served by the resulting structure and process was to prevent environmental uncertainty from overwhelming the organization's limited capabilities; in other words, to insure survival in the face of environmental uncertainty.

The typology has as its focus three strategy types. The three strategy types, Prospector, Analyzer, and Defender, are aligned on a continuum of "strategy adaptation." Each strategy type has its own set of distinctive competencies (Snow & Hrebiniak, 1980) based on product-market orientation. It is the similarities among the distinctive competencies that allow researchers to classify firms into one of the three strategy types.

The Prospector has as a performance objective growth through increase in market share and new product development, and utilizes a loosely coupled organizational structure to support this objective. This externally oriented strategy

requires management processes devoted to information processing and domain surveillance.

The opposite to the Prospector strategy is the Defender, which is primarily concerned with establishing its legitimacy through low cost and consistent production techniques. This establishes efficiencies relevant to its domain. Its efforts at rationalization of processes are key to its competitive advantage. The structure and management processes required to support such a strategy are opposite to those of the Prospector. The performance objectives for this strategy can be stated in terms of the stability achieved through realization of efficiencies.

The third strategy, the Analyzer, is a hybrid of the other two strategies. All three are seen as being aligned on a continuum of strategy adaptation. The Analyzer would correspond to Child & Kieser's management flexibility strategy. This strategy is able to respond to both the need for innovation (Prospector like) and efficiency (Defender like).

Miles & Snow (1978) also identified the Reactor strategy type. While this strategy type will not be a part of this study, it should be mentioned in order to complete the original typology. The Reactor is distinguished by not having

a consistent pattern of adjustment to environmental changes. It lacks the appropriate structural or managerial mechanisms to implement adaptation either of a reactive or proactive nature. In their empirical study, Snow & Hrebiniak (1980) identified firms in the then regulated airline industry as being Reactor types. It was explained that as these firms lacked the ability to change their environment due to heavy government regulation, they did not need any particular strategy.

## **PERFORMANCE**

Contingency approaches seem to be consistent in accepting that performance is a consequence of achieving a fit between several factors; among these are structure, technology, strategy and culture (Tosi & Slocum, 1984). One of the central concerns of this study is testing for a contingent relationship between strategy and performance. That is, while there may be diverse strategy types observed within the industry under study, there should be a consistent and predictive relationship between each of the strategy types and the performance objectives of each strategy type.

This leads to the question of what constitutes performance for each of the strategy types. Strategy is

concerned with how a firm should compete within an industry (Hofer & Schendel, 1978). The strategy selected should enable the firm to devise appropriate means for attaining defined ends, or objectives (Astley, 1984). While performance has primarily been measured in terms of profitability, other performance objectives are possible (Fahey & Christensen, 1986). Tosi & Slocum (1984) suggest that market share, morale, growth, flexibility, efficiency, and quality, are some alternative objectives that organizations strive for. Bourgeois (1980) and Shrivastava (1986) discuss alternative conceptualizations and lists of organizational goals. This study will employ alternative measures of performance within the concept of the Miles & Snow (1978) typology.

Miles & Snow (1978) state that each strategy types will have a different performance objective depending on its orientation to the environment. However, Miles & Snow (1978) did not specify how performance should be measured, nor have other studies of the typology definitively answered the question. Further, they did not develop the concept of performance in relation to their typology (Hambrick, 1983) in such a way that would allow a researcher to easily hypothesize specific relationships between strategy type and performance. As a first effort, this study will begin by using measures of

performance that have been used in past studies of the typology.

Hambrick (1983) used three measures of performance for comparing the strategies across groups. ROI (return on investment) was used as it represented the most conventional measure of business performance. Cash flow on investment examined the extent to which firms generate more money than they put into the business. Market share change, an external measure, indicated the growth of the firm. His findings within innovative industries (most relevant to this study) were that Defenders outperformed Prospectors on ROI and CFOI, but Prospectors outperformed Defenders on market share change.

The Prospector strategy has been described as externally orientated and its performance objectives as being related to product and market development. For this reason hypothesis one uses market share change as the performance measure. The Defender is internally oriented and its performance objectives are related to internal efficiencies. If the firm is able to maintain such an orientation, it should realize a higher return on investment than the other strategy types, as stated by hypothesis two.

While the use of Hambrick (1983) is sufficient for the Prospector and Defender, there is inadequate information from

his study to justify a measure for the Analyzer strategy. Hypothesis three states that the Analyzer will be a better performer on the performance measure, cash flow on investment. The following is intended to expand on this position.

According to Miles & Snow (1978), the Analyzer allocates a portion of its resources to a set of reasonably stable task environments, and conducts routinized scanning activities in a limited product-market area that has already been explored by the Prospector. In this manner the Analyzer builds in its own risk hedge by emphasizing both cost-efficient operations and rapid movement into successful areas opened by other firms. Being more externally oriented than the Defender, they will engage in relatively more environmental scanning which should put them in a better position to decide on the appropriate response to environmental changes. Being more internally oriented than the Prospector, they will have a foundation of efficient operations which can support the organization during economic down-turns, thus making them less adaptive than the Prospector.

De Meyer, Nakane, Miller & Ferdows (1989) report that a survey of manufacturers from the U.S., Europe and the Far East shows a growing concern among international firms for finding a balance between market exploitation and cost efficiency,

particularly in volatile environments. They state that finding this balance is considered important for maintaining a competitive advantage (Porter, 1985). Miles & Snow (1978) postulate that the Analyzer strategy is a hybrid of the market oriented Prospector and the cost efficient Defender strategies, and would seem intuitively to satisfy the specifics of De Meyer, et al (1989). From this perspective, the Analyzer strategy represents a moderate position along the strategy continuum.

## **ENVIRONMENT**

Emery & Trist (1965) introduced the concept of turbulent fields to explain the dynamic changes occurring within the environment of organizations. It was their contention that turbulence results from the transition of environments through an evolutionary cycle created by the growth and interaction of organizations within a given environment. Turbulence is taken to mean an environment in which the interactive effects of change, and the accelerated rate of change, act to reduce a firm's ability to adequately predict coming events and to control the consequences of their actions (Drucker, 1980; Terryberry, 1968).

According to Emery & Trist (1965), turbulent environments are created by several trends; among them, increased reliance on research and development, and the growth and linking of large organizations responding to the conditions of a disturbed-reactive environment. As firms within a disturbed-reactive environment take actions based on their perceptions of conditions, these actions lead to the creation of a volatile environmental context.

The effect of turbulence is to generate uncertainty for managers concerned with the future course of events (Child & Kieser, 1981). Duncan (1973) felt that turbulence was the best predictor of uncertainty, and Thompson (1967) emphasized that dealing with uncertainty was a central concern for administrators. A number of tactics have been suggested for dealing with the uncertainty created by turbulence, such as buffering, collusion, long-term contracts, and vertical integration (Dess & Beard, 1984). Galbraith (1973) suggested increased information flow; Pfeffer & Salancik (1978) proposed political alliances; and March & Simon (1958) advised segmenting the environment into homogeneous elements.

If these arguments can be accepted, then environmental volatility could contribute to a number of methodological problems for researchers. Not only may there be heterogeneity

among strategy types, but also the extent of heterogeneity may make it difficult to determine what constitutes a representative sample. At the extreme, it may not be possible to identify clearly any of the strategy types. There is theoretical justification for this concern. Some writers on contingency theory state that it is environments which define the strategy a firm must select in order to survive (Porter, 1979; Ulrich & Barney, 1984). Managers are responsible for determining the environmental requirements for their particular organization (Thompson, 1967). However, turbulence obscures an administrators ability to perceive the relevant factors within the task environment (Aldrich, 1979). As turbulence increases, it leads to uncertainty on the part of individual actors (Duncan, 1973), and loose-coupling among actors within the same environment (Pfeffer & Salancik, 1978). This loose-coupling can then lead to a diversity of interest among these same actors (Hannan & Freeman, 1984), and increases the possibility that perceptions of contextual factors will vary (Pfeffer, 1981) and that individuals will act independently of other actors within the same context (Downey, Hellriegel & Slocum, 1975).

## PRIOR STUDIES OF PERFORMANCE OF THE STRATEGIC TYPES

Three studies of the Miles & Snow (1978) typology addressed performance, but there was no uniformity in their approaches, or in the measures used. These are reviewed in turn.

Snow & Hrebiniak (1980) was the first study of the Miles & Snow (1978) typology to examine performance. They found that environment, defined as industry context, and strategy were related to performance. They also found that strategy was a stronger predictor of performance outcomes than was environment. In one highly regulated industry (air transportation) the Reactor strategy outperformed Defenders and Prospectors. In all other industries the Prospector, Defender and Analyzer strategy outperformed the Reactor.

An observation made by the study was that the Analyzer strategy appeared to be the better performer overall. The authors could not be more definitive due to the small sample size, thus the question is still open. This study used perceptual data, and was across industries. For these reasons, further research into their findings is justified.

Meyer (1982) performed a field study of three hospitals which were typed as Prospector, Defender and Analyzer. These hospitals were going through a period of relative

environmental turbulence, and the study centered on the strategic adjustment processes adopted by the three strategy types. Meyer found significant performance differences among the hospitals using financial measures. He described the Analyzer strategy as more economically viable and a better performer overall, but did not provide specific measures to allow replication. He concluded that the impact of dynamic environmental changes on an organization are influenced by strategies in place at the time, and are absorbed in part by slack resources for all three strategies.

Hambrick (1983) used the Analyzer as the base case for his analysis of the Prospector and Defender strategies, and also concluded that the Analyzer was a better performer overall. However, this strategy type was not specifically operationalized, it was used as the base case/dummy variable in the regression analysis. Also, no measure of performance was specifically attributed to the Analyzer; the performance measures were related to the Prospector and Defender, then compared to the Analyzer.

## **HYPOTHESES**

The first effort of the study is directed toward examining the question of the relationship between the

strategy types and differing performance outcomes, or goals. The second effort is toward examining the assumption of a contingency relationship between strategy types and performance.

The performance objectives of the Defender and Prospector strategies are stated by Miles & Snow (1978) in terms of internal efficiency and external effectiveness, respectively. The Analyzer strategy type is described as a hybrid of the Defender and Prospector, and its performance objectives can be stated as finding a flexible position between the extremes of the Defender and Prospector. Miles & Snow (1978) argue that the goal of the Prospector strategy is expansion of product-market domains through new product development. Lower profitability, overextension of resources and lower efficiency relative to the other strategy types are also possible outcomes of pursuing this strategy. Given this description of the Prospector, it can be hypothesized that:

H1: The Prospector will experience greater change in market share (as measured by absolute change in market share) than will the Analyzer or Defender.

The Defender strategy is described as concerned with maintenance of a stable domain, constancy in operations, and effectiveness in cost control. Efficiency in internal operations and stability in market relations are the primary goals. If an organization can achieve these objectives, it should realize a higher profit. In prior studies of the typology, it was found that the Defender outperformed the other strategy types on return on investment. Therefore, it is hypothesized that:

H2: The Defender will rank higher on a measure of profit, return on investment, than will the Analyzer or Prospector.

The Analyzer strategy type is concerned with differing levels of both efficiency and market share change. That is, it is both internally and externally oriented. In order to pay the price for this flexibility, it will have to generate more funds from operations than the other strategy types. It is then hypothesized that:

H3: The Analyzer will rank higher on a measure of flexibility, cash flow on investment, than the Prospector or Defender.

Hypotheses one through three are concerned with identifying the strategy types that are present within the given context (Van de Ven & Drazin, 1985) and their relationship with particular performance measures. The next part of the research question requires testing whether predictions of performance can be made based on these findings. According to Gresov (1989), the purpose of such performance predictions is to determine whether an ideal design configuration exists for a particular strategy type, and to show that deviation from that ideal design results in lower performance. If performance predictions are possible then a coalignment, or contingency, relationship will have been demonstrated (Gresov, 1989).

The variables selected to operationalize the strategy types can be seen to represent a series of resource allocations necessary for both the implementation of the selected strategy, and for the attainment of the selected performance goals. For the Defender strategy the measures total asset turnover, cost of goods sold per employee and

fixed asset investment per employee are intended as measures of the emphasis on internal efficiency. For the Prospector strategy the measures research and development to total investment and advertising to total assets are intended as measures of the external orientation of this strategy. The relationship among the variables represent different dimensions of strategy, and it is expected that the differential effect of each variable will vary among the strategy types. However, it is not possible to state *a priori* which of these variables will exhibit differential emphasis in the strategy performance relationship. For this reason, the following hypotheses must be considered as exploratory.

H4: There is a contingency relationship between the Defender strategy type and the performance objective, return on investment.

H5: There is a contingency relationship between the Analyzer strategy type and the performance objective, cash flow on investment.

H6: There is a contingency relationship between the Prospector strategy type and the performance measure, market share change.

#### **SUMMARY**

This chapter covered the primary theoretical literature relating to the development of hypotheses, and presented the hypotheses developed. A central argument developed was that organizations can have different performance objectives. Developments within contingency theory have provided a methodology for testing this question. Strategy will be operationalized using the Miles & Snow (1978) typology. The relationship of this typology to performance outcomes was developed.

## **CHAPTER THREE: RESEARCH METHODOLOGY**

### **INTRODUCTION**

From the previous chapters, the research question developed was, what performance results arise from following different strategies within a given context. This chapter outlines the methodology selected to test this question and the associated hypotheses.

### **CHOICE OF CONTEXT**

The selection of context for this study was the electronic computer industry for the year 1987. This context was chosen as representative of a volatile environmental context because of its acceptance as such within the literature. The electronics industry was an integral part of the work of Emery & Trist (1965), Katz & Kahn (1966), Lawrence & Lorsch (1967), and Miles & Snow (1978). Emery & Trist (1965) used the electronic industry as an example of a volatile environment. More recently, a segment of the electronics industry, the electronic computing industry, has been similarly characterized by Bahrami & Evans (1987),

Bourgeois & Eisenhardt (1988), Hannan & Freeman (1984), and Romanelli (1987).

The criteria for stating that the computer industry is volatile was summarized by Bourgeois & Eisenhardt (1988). A volatile environment can be characterized as exhibiting rapid and discontinuous change in demand, competitors, and technology. These factors can impede information flow to managers, limiting their ability to make correct decisions. Bourgeois & Eisenhardt (1988) equated volatility with dynamism (Dess & Beard, 1984), and stated that the computer industry was characterized by sharp and discontinuous changes which occurred at an unusually high rate, relative to other industries. Their study found that several paradoxes existed in such an environmental context. Managers had to make decisions carefully, but quickly; to have a powerful, decisive CEO, as well as a powerful top management team; and to seek risk and innovation, but to execute a safe, incremental strategy implementation.

Other conditions which characterized the industry during the time of this study included a high number of competitors; high variety in customer preferences; and a mature phase of industry development. The president of IBM noted in his 1988 annual report to stock holders that there were over 75,000

competitors world wide that could be identified as being in the computer industry. There were over 800 competitors, public and private, in the United States. Industry analyst, Standard & Poor's (1987), noted the continued break down in the traditional boundaries of the industry as customer preferences became more varied. Standard & Poor's also reported that during the period 1985 through 1987 the computer industry entered a mature phase based on total industry sales.

Other researchers have given similar descriptions. Bahrami & Evans (1987) described the computer industry as characterized by strategic, technological, and operational uncertainty which affects growth rates, competitive positions, and industry boundaries (p. 52). Romanelli (1987) described the effect of these environmental factors on several firms in the computer industry.

## OPERATIONALIZATION OF CONSTRUCTS

### STRATEGY

The underlying theory required conceptualization of strategy within the framework of Miles & Snow's (1978) typology. Following Mintzberg (1976), Miles & Snow (1978) defined strategy as a pattern or stream of major and minor decisions about an organization's possible future domains.

By using secondary data this study looked at elements of realized strategy (Snow & Hambrick, 1980).

An examination of the theory presented by Miles & Snow (1978) showed that their typology is an "organizational adaptation typology." Strategy is one of the elements contributing to a gestalt. Studies attempting to examine the totality of the organization would have to operationalize the three dimensions, or "problem areas" of engineering, entrepreneurship, and administration, mentioned in the original work. However, studies attempting a less holistic approach, that is, looking at strategy types, are not so restricted. This study falls into the latter category.

Measures were selected which were theoretically related to the strategy types. For example, Snow & Hrebiniak (1980) found that expenditure on research and development was a strong predictor of the strategy types. This does not mean that this measure, in and of itself, defines any particular strategy. However, a selection of measures derived from the literature can be taken to represent a strategy type. An analysis of the data should show that firms which score in the predicted direction on the selected measures can be classified as particular strategy types. The measures chosen were:

### R&D to Total Assets Ratio

The study by Snow & Hrebiniak (1980) showed that of all the distinctive competencies examined, R&D most clearly differentiated the strategies. Prospector type firms will invest more of their revenue in research and development in order to maintain a flexible position within their domain. The increased technological flexibility created through the R&D expenditure permits more rapid response to environmental change. Prospecting firms attempting to differentiate their products will place heavy emphasis on research and development (Lawless & Finch, 1989).

### Total Asset Turnover Ratio

This measure is accepted as a measure of the efficient utilization of resources (Weston & Brigham, 1981). Hambrick (1983) included a measure of asset utilization in his study. According to Miles & Snow (1978), the Defender strategy was characterized as being efficiency oriented. For a firm to improve this ratio requires routinization and mechanization of operations; again this defines the Defender strategy approach. The Prospector was expected to score low on this measure. The specific measure was Sales divided by Total Assets.

#### Fixed Asset Investment per Employee

Miles & Snow (1978) pointed out that the move toward efficiency would generally be measured as a ratio of capital intensity as firms strive to improve the production process. A similar measure was used by Hambrick (1983). This measure was viewed as the resource allocation necessary to implement a Defender strategy. The specific measure was Fixed Assets divided by the number of employees.

#### Cost of Goods Sold per Employee

A similar measure was used by Meyer (1982), and represents the relative level of productivity of the organization. It was expected that there would be a trade off between flexibility and efficiency. The Defender strategy type was characterized as having a higher sunk cost, thus a higher capital asset base, than the other strategy types. Higher levels of efficiency require higher sunk costs, but result in a higher unit cost per employee.

#### Advertising to Total Assets Ratio

This measure was included as it is related to the external orientation of management (Chaganti & Sambharya, 1986; Lawless & Finch, 1989). The greater efforts to project

the firm into the market through resource commitment to advertising is a reflection of management philosophy in keeping with the Prospector strategy.

The expected relationships for the measures chosen were as follows:

<u>STRATEGY VARIABLES</u>	<u>Prospector</u>	<u>Analyzer</u>	<u>Defender</u>
R&D to Total Assets	H	M	L
Advertising/Total Assets Ratio	H	M	L
COGS per Employee	L	M	H
Fixed Asset Investment per Employee	L	M	H
Total Asset Turnover Ratio	L	M	H

(H = high; M = medium; L = low)

#### PERFORMANCE

As mentioned in Chapter Two, this study used three measures of performance. These were return on investment (ROI), cash flow on investment (CFOI), and market share change. These measures were suggested by Hambrick (1983). Hambrick's performance measures were, by his description, complementary. Return on investment measured the profitability of the firm. Cash flow measured the extent to

which the firm is able to generate more money than is necessary to keep the enterprise operating. Change in market share indicated the growth of the firm and its fitness for the future. Hambrick recognized that it is normally difficult for firms to have both high cash flow and market growth at the same time, thus there was no necessity to assume that all three measures would be tapping the same dimension of performance.

#### GOAL-CENTERED PERFORMANCE

Empirical measures that attempt to directly measure strategy, or the attainment of strategic goals are rare (Venkatraman, 1987b). There have been several researchers who have called for more specific consideration of strategic goals in measures of performance (Downey & Ireland, 1985; Kirchoff, 1977; Steers, 1975; Schendel & Hofer, 1979). To the extent that firms are seeking economic performance as a primary goal, there would be little conflict or divergence between measures of economic performance and strategic performance. However, there is evidence that organizations also pursue objectives that are not entirely consonant with this perspective (Donaldson & Lorsch, 1983; Goffman, 1959; Mead, 1934).

Miles & Snow (1978) state that their strategy types adopt an orientation towards their environment and this orientation determines the resource allocation process and structural design process that follow as the organizations attempt to align themselves with their environment (p. 179). They also define strategy as a pattern in a stream of decisions (Mintzberg, 1976). Thus, the degree of coalignment achieved or attempted is a property of the strategy choice concept itself (Venkatraman, 1987a).

The performance objectives of the strategy types are not elaborated by Miles & Snow in financial terms, but in subjective terms as indicators of successful strategy adaptation. The Defender strategy type has an internal orientation with the specific goal of attaining stability and efficiency within its domain and over its technology and operations. It is described as being a risk averse strategy. The strategic objectives would then be a constant customer base, functional structure, continuity within the management hierarchy, and efficiency of operations.

The Prospector strategy type is externally orientated with the specific goal of exploiting new product and market opportunities. Its strategic objectives will be chosen so as

to achieve this type of goal. The Prospector is also describe by Miles & Snow as being a more risk oriented strategy.

The Analyzer is a hybrid of these two strategy types and therefore does not have distinctive characteristics apart from those mentioned for the Defender and Prospector. It is described by Miles & Snow as being more risk averse than the Prospector, and more adaptive than the Defender.

Given the above, the measures employed in this study, and the expected relationships were:

<u>STRATEGY TYPE:</u>	<u>Prospector</u>	<u>Analyzer</u>	<u>Defender</u>
<u>Performance Measure:</u>			
ROI			H
CFOI		H	
Market Share Change	H		

#### CONTROLS

Environment was controlled by selection of a single industry. All measures were ratios or standardized scores in order to control for size. Firms were identified as being in the computer industry by examination of their product offerings, and comparison of classification procedures across several sources; i.e., Dow Jones, annual reports, etc.

## DATA COLLECTION

A data base constructed initially consisted of firms which could be identified as being primarily in the electronic computing industry, SIC code 3573. Data were taken from the Dow Jones News Retrieval Service, annual reports, and 10K reports. The first effort at selection of firms was to examine all of these sources for firms identified as being in the computer industry. The second effort was to select those firms which produced hardware or peripherals for the computer industry based on the descriptive information provided by the data sources. The third effort was the selection of firms for which objective secondary data were available to allow operationalization of the relevant variables. Criteria for selection into the study were firms that were public, limited liability companies which could be identified as going concerns during the year 1987. These firms were to have sales of at least 70% in the primary industry of SIC 3573 (Rumelt, 1974). This information was available from annual reports, 10K reports, and the primary data source - the Dow Jones News Retrieval Service. Firms identified as holding companies, conglomerates, or foreign controlled will be eliminated.

An examination of other data sources, such as Ward's Directory of 51,000 Largest Corporations (1987), showed that

there are many firms in this industry which are not public. That is, there were no data available for non-public firms. For this reason, the data base assembled represents a sampling of the industry, rather than a population.

As mentioned earlier, there was a concern about the degree of homogeneity within the sample. One product of environmental volatility for the computer industry has been the loss of distinct industry boundaries (Juliussen & Juliussen, 1989). The theory outlined in chapter two indicated that an equally likely outcome of this study could have been the finding that there were no distinct strategy groups, or the finding of groups of such small number that statistical analysis would be difficult. Because the computer industry has been categorized as one of the most volatile industries in the country, almost any research would seem to be of significance in advancing understanding of significant theoretical relationships.

A number of steps were taken in an effort to insure that the sample will fairly represent the industry, and that the characteristics displayed by the data represent those of the firm's strategy. As mentioned under the heading of controls, the study used ratios to control for size. Additionally, the study used standardize measures in order to control for data

clumping, which can cause an apparent non-normal data distribution.

There is no single measure which can differentiate firms within the computer industry for the year 1987. Age has been pre-tested and found to be statistically non-significantly related to other environmental or organizational variables. Traditional means of differentiating products, such as by size, function, or market segmentation boundaries, have disappeared. In an effort to develop some degree of homogeneity, two clustering procedures were used. In the first procedure, all firms were clustered using the strategy variables. In the second procedure, those firms identified as being in the hardware segment of the industry (a smaller sample) were clustered using the same variables. If the strategy variables were able to discern firm strategies, it was expected that there would be a non-significant change in the reported strategies of the firms between the two tests. As a last test for homogeneity, firms were selected from each of the strategy groups for content analysis.

### **STATISTICAL PROCESS (METHODS)**

The first step in the analysis was to identify strategy groups within the identified environmental context. A cluster

analysis procedure was used following guidelines provided by Everitt (1986), and Hair, Anderson & Tatham (1987). The study employed the K means clustering algorithm of numerical classification, which operates by reducing the within-cluster sum of squares, to classify the firms into clusters representing the different strategies. All of the strategy variables identified above were used. This technique was chosen because it can deal with outliers. A preliminary examination of the data shows that there was significant dispersion within the measures chosen.

The use of clustering techniques as a means of operationalizing strategy types is well accepted within the literature (Fahey & Christensen, 1986; Lawless & Finch, 1989). Thomas & Ramaswamy (1989) note that the multivariate technique of cluster analysis avoids the unidimensionality of other statistical procedures, such as regression analysis, by mapping distinct groups based on independent constituent characteristics.

The number of clusters chosen for the k means procedure was determined by examination of changes in the amount of variance accounted for by the cluster solutions. It was expected that there would be more than three clusters created by the procedure, with some clusters not classifiable as any

particular strategy type. This follows from Miles & Snow's (1978) comment that their typology does not necessarily encompass all possible strategies (p. 153). Interpretation of the clusters concentrated on identifying the Prospector, Defender and Analyzer strategy clusters using content analysis of annual reports, and information from the Dow Jones data. All other clusters were to be discarded.

#### TEST OF HYPOTHESES

##### TEST OF HYPOTHESES 1, 2 & 3

The mean performance of all firms within each group was determined. An ANOVA test and t test was performed to determine the statistical significance of performance differences among groups, for each of the three performance measures. It was hypothesized that there would be a significant difference among the strategy types on the three measures of performance.

##### TEST OF HYPOTHESES 4, 5 & 6

The test of hypotheses 4, 5 & 6 was a test of the assumption that a coalignment between strategy and environment will have an impact on performance. It assumed that there were firms which properly aligned themselves with their

environment, and that the alignment of distinctive competencies represented by the strategy variables would have performance implications. It was intended to determine if the set of variables selected to identify strategy could be used to predict performance. If the variables could be shown to have predictability, this would support the contingency theory argument of coalignment.

The steps in this process were:

1. Rank order firms within each cluster on their respective performance measure, for each strategy type. For example, assume that the Defender strategy type does prove to be statistically related to the performance measure, return on investment. Each of the firms in the Defender cluster would be ranked in descending order based on their performance outcome. The Defender firm with the highest actual return on investment would be number one, and so forth.
2. Select top 10% of the firms in the Defender group for a calibration sample.

3. For the calibration sample of Defender firms, determine the ideal profile by determining the coefficient mean for each of the strategy variables. This step defines coalignment for this environmental context.
4. Run a correlation analysis comparing the coefficient means developed in step four with the corresponding performance measures of the remaining Defender firms.

This procedure was repeated for each of the strategy types and their respective performance measures as determined by testing hypotheses one through three. The theory was that firms which perform poorly were not aligned with environmental demands, and thus the correlation analysis from step five should show a negative correlation between strategy and performance. Theoretically, if this result occurs, then coalignment has been demonstrated.

Having demonstrated coalignment, the last step was to test for the significance of the variables which differentially contributed to this state. A separate correlation was performed between each of the strategy variables and each of the performance measures. Hypotheses 4, 5 & 6 would be supported if it could be shown that

deviation from an ideal type had a negative impact on performance.

To summarize the anticipated results of the study, it was anticipated that each of Miles & Snow's (1978) strategy types would be found, and that each strategy type would be related to a different performance outcome. The contingency perspective would be supported if coalignment (fit) could be demonstrated for each of the strategy types on their respective performance measures. It was expected that this study should add to the understanding of the performance outcomes of following different strategies in a volatile environmental context by examining these relationships.

#### **LIMITATIONS**

1. There was no intention of addressing the issues of causality, and the dynamic processes of adjustment between environment and strategy. Such understanding require longitudinal designs (Fahey & Christensen, 1986).
2. There was a single conception and operationalization of strategy which misses the efforts of managers to implement possible longer range intended strategies (Snow & Hambrick, 1980). Multiple measures of

strategy within the same study are needed (Hambrick, 1981).

3. It was accepted that other factors could have contributed to the outcomes observed. There has not been a call for closure on the dimensions of strategy, nor has the Miles & Snow (1978) typology been fully validated by prior studies.

#### **SUMMARY**

This chapter has outlined the procedures followed in addressing the research question and the associated hypotheses. Operationalization of constructs were given, along with the expected outcomes and relationships, within the specified context of the electronic computing industry. Performance measures were specified for each of the expected strategy types. The chapter concluded with a statement on the significance of the study and its limitations.

## **CHAPTER FOUR: DATA ANALYSIS AND RESULTS**

### **INTRODUCTION**

The preceding chapters provided the theoretical foundation underlying the research question concerning the performance implications of following different strategies within a given context. The purpose of this chapter is to report the results of testing the primary research question and the related hypotheses.

### **THE COMPUTER INDUSTRY**

As stated earlier, the electronic computing industry was selected because this industry has been described as existing in a volatile environmental context. It is necessary to discuss some of the characteristics of this industry in order to understand the problem of selecting firms for inclusion in the study. Two characteristics of interest are the structure of the industry, and the inter-relatedness between the computer industry and other closely associated industries.

At one point the computer industry was segmented based on the primary products: mainframe computers, minicomputers and microcomputers, and firms could be classified based on

their product offering. Developments in computer technology over the past thirty five years, and the resulting growth in the number and type of products, have led to a situation in which it is difficult to use this classification process. Further, these changes have made it difficult to see this as a distinct industry in some respects. For example, while it is relatively easy to discern where the steel industry ends and the auto industry begins, a similar observation is not so easy between the computer industry and say, for example, the electronics industry.

Table 4.1 shows that the computer industry is closely related to three other industries.

Table 4.1

### The Electronic Computing And Related Industries

#### Computer Industry:

Computers  
Peripherals  
Software  
Accessories  
Services

#### Electronics Industry:

Semiconductors  
Connectors  
Office Equipment  
Measurement & test  
Factory Automation

#### Consumer Electronics Industry:

Audio Products  
Video Products  
Electronic Games & Toys  
Home Computers  
Home Automation Products

#### Telecommunications Industry:

Communications Equipment  
Telephones  
Transmission Devices  
Switching Devices  
Communications Services  
Telephone  
Broadcast

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Source: Adapted from Juliussen & Juliussen (1989), The computer industry almanac, p. 1.3.

These are the electronics industry, the telecommunications industry and the consumer electronics industry. The electronics industry provides many of the components used in the production of computers. In fact, many of the components used in computers, such as rectifiers and diodes, are common to a large number of electronic products. The consumer electronics industry is now seen as including the microcomputer, or PC. In this industry segment the microcomputer is seen as being used for relatively unsophisticated applications, such as games, or for home use. The telecommunications industry segment is seen as becoming more closely related to the computer industry because of the growing demand for data transfer between geographically separated users.

As Table 4.2 shows, the computer industry is now seen as being made up of six interrelated segments, with the type of computer produced being of little relevance.

Table 4.2

### The Electronic Computing Industry Structure

<u>Peripherals Manufacturers:</u>	<u>Computer System Manufactures:</u>
Mass Storage	Mainframe Computers
Output Devices	Minicomputers
Input Devices	Microcomputers
<u>Software &amp; Accessory Suppliers:</u>	<u>Computer Service Companies:</u>
System Software	Processing Services
Application Software	Information Services
Accessories	Professional Services
	Repair Services
<u>Computer Product Resellers:</u>	
Computer Specialty Stores	
Software Stores	
Value Added Resellers	
Distributors	
Mass Merchants	
 <u>Consumers:</u>	
Large Companies	
Small companies	
Individual Consumers	
Government Agencies	
Educational Institutions	

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 Source: Adapted from Juliussen & Juliussen (1989), The computer industry almanac, p. 1.5.

Each of these sectors: peripherals manufacturers, computer system manufacturers, software and accessory suppliers, computer product re-sellers, and computer service companies; compete with each other for segments of the total market. The growing compatibility among computer products has the effect of increasing the available target markets, and the competition among firms for any given market segment.

#### **PRELIMINARY STUDY**

Given the above, it was difficult to define what constitutes the computer industry, and to make the determination of how to choose firms for inclusion in a meaningful sample. It was decided that a first effort would be made to accumulate data on as many firms as possible which were within each of the segments mentioned above. Only software firms were eliminated. The firms within these segments were identified through reference to several sources, including Standard & Poor's Industry Surveys (1987, 1989), Ward's Directory of 51,000 Largest Corporations (1987), Moody's Handbook of Common Stocks (1987-1988), Annual Reports, 10K Reports, and the Dow Jones News Retrieval Service. This effort identified 439 publicly owned firms. Of these, data were available for 291 firms.

#### **Chapter 4: Data Analysis and Results**

Cluster analysis was performed on the data using the strategy variables identified in chapter three. The result were five clusters with 19, 248, 21, 2, and 1 firms in each of the clusters. As mentioned earlier, the clustering procedure will insure that at least one firm is in each cluster. The presence of only one firm in a cluster meant that the result for this cluster was an artifact of the methodology, and this puts into question the results found within the other clusters. This then required further examination of the results to determine the cause of the problem. A further examination of the firms within the sample showed that while all of the firms could be identified as being within the computer industry, there was still a great deal of heterogeneity within the sample as far as the marketing and production activities of the firms was concerned. This heterogeneity could have contributed to the results found in the clusters. For this reason a more stringent sampling procedure was used for the next step of the study.

#### **SAMPLE SELECTION**

It was decided to concentrate on the two segments which are related to product manufacturing. While there was little

*a priori* justification for this decision, there was significant practical reasoning. The two manufacturing segments are more homogeneous on those characteristics most relevant for this study. That is, each of the firms in these two segments have an asset base used to support production, and both segments engage in product related research and development activities. In contrast, the software industry, for example, is a more labor intensive segment, requiring a relatively smaller asset base. The research and development activity for the software segment is more solution driven, rather than product driven.

The computer product re-sellers segment is broad based, and composed of business activities such as system houses. System house organizations purchase hardware from multiple vendors, and modify it for resale to customers. They also develop in-house software to address a particular customers needs. Research and development activities in this segment are solutions oriented, generally related to a single contract, and are usually paid for by the customer.

The computer service companies are similar to the service segments of other industries. These firms sell computer time, provide access to data bases, and in general support multiple information needs for a broad customer base. Other types of

firms found in this segment are consulting firms. These firms provide a wide variety of services, which can include product or process development. However, there is relatively little research and development activity within this segment.

The process of sample selection then followed these steps: 1) The business description provided by the firm had to identify the firm as a computer product manufacturer within either the peripherals manufacturing or computer system manufacturing segments; 2) The firms had to receive at least 70% of their revenue from such products (Rumelt, 1974); 3) There had to be some research and development expense reported; 4) There had to be adequate data for development of the measures; and finally, 5) All firms that were primarily defense contractors were eliminated. The final sample consisted of 162 firms.

A major criticism of this method of selecting the sample is that there is no assurance that the sample is representative (Churchill, 1983). This is particularly true given that there are some 800 firms identifiable as being in one segment of the computer industry or another (Juliussen & Juliussen, 1989). For this reason it could be argued that the results of this study can not be generalized to other settings. However, there are two counter arguments. As

#### **Chapter 4: Data Analysis and Results**

mentioned in chapters one and two, part of the purpose of this study is to examine the efficacy of the Miles & Snow (1978) typology within a volatile environmental setting. That is, part of the question being asked is, does the typology generalize to this setting. Second, the use of a typology assumes generalizability. For these reasons, if the measures perform as theorized, then the issue of generalizability will not be significant (Kaplan, 1964).

#### **DATA COLLECTION**

The primary source of data was the Dow Jones News Retrieval Service. This agency extracts the primary financial reports from a company's Annual Report and 10K Report, and provides this data in an ASCII II format that is easily translated by a computer. This saves many hours of data coding, and reduces the number of mistakes from manual coding. Where there were missing data items, it was possible to gather needed data from the actual Annual Report and 10K Report of the firms.

#### **MEASUREMENT AND CONTROL**

This study controlled for size by using ratios for the selected measures. Table 4.3 provides descriptive statistics for each of the variables and measures included in this study.

#### **Chapter 4: Data Analysis and Results**

Table 4.3

## Descriptive Statistics for Firm Data

Variable	Mean	Standard Deviation
ADV/TA	.362334	.2015385
CFOI	.033185	.22515
COGS/EMP	65105.72	41843.73
COST OF GOODS SOLD	347,704,332.21	1,843,118,200.0
CURRENT	3.702778	2.712857
EMPLOYEES	6196.781	30,495.9
FIX/EMP	27857.02	21074.4
FIXED ASSETS	364,263,388.32	3,157,437,759
MKTSHCH	65.143	282.45
R & D/TA	.1186055	.07805836
R & D EXPENSE	65,900,517.356	408,539,863.4
ROI	-.0729	.5069
SALES (1987)	707,743,408.13	4,124,548,339.0
SELLING EXPENSE	175,798,702.86	1,169,384,368.0
SIC	1.58642	1.07856
STOCK	19.33925	55.50883
TOTAL ASSETS	718,452,587.34	4,742,592,118.0
TURNOVER	5.937963	3.073718

N = 162

*Legend:*

ADV/TA = advertising expense divided by total assets  
 CFOI = cash flow on investment  
 COGS/EMP = cost of goods sold per employee  
 CURRENT = current ratio  
 FIX/EMP = Fixed asset investment per employee  
 MKTSHCH = market share change  
 R & D = research and development  
 R & D/TA = research and development divided by total assets  
 ROI = return on investment  
 SIC = number of SIC codes  
 STOCK = stock concentration  
 TURNOVER = total asset turnover ratio

**Chapter 4: Data Analysis and Results**

This table shows that there was considerable variation in both the size of the firms in the data set, and in the allocation of their resources. Venkatraman & Grant (1986) pointed out that relatively few researchers within the field of Strategic Management reported any checks for validity and reliability. It is recognized that all research is subject to some error. The following section reports on the procedures employed to address the issues of reliability and validity.

#### **RELIABILITY**

There are two issues of concern when considering reliability. One relates to the reliability of the concepts under study, the other to the collection and manipulation of the data. This study attempts, in part, to contribute to establishing the validity and reliability of the concept of strategy within the context of the Miles & Snow (1978) typology. The overall results of the study will, therefore, address this issue. As Hempel (1965) pointed out, the reliability of a concept is the consistency shown in its use by one observer, and the agreement in the use made of it by different observers. For this reason, the definition of strategy, and the measures of strategy employed are taken from

the original work of Miles & Snow, and subsequent studies employing the typology.

The other issue of reliability relates to the data itself. This study was a cross-sectional study employing secondary data exclusively. Therefore the issue of reliability relates to the manner in which the data were transferred and coded from the various sources. As mentioned earlier, the primary data source was the Dow Jones News Retrieval Service. Reference was made to other sources only when necessary to find missing data. Cross checks were made between Annual Reports and the data reported by Dow Jones in order to insure accuracy. A team of four researchers was employed in this task. No problems were found which would indicate that the Dow Jones data were inaccurate.

Five variables were selected to operationalize the strategy concept. These five variables were: R&D to total assets (R&D/TA), advertising to total assets (ADV/TA), cost of goods sold per employee (COGS/EMP), fixed asset investment per employee (FIX/EMP), and total asset turnover ratio (TURNOVER). The first two variables were intended to examine the degree to which an organization was externally oriented in its product-market strategy. Firms which measured high on these variables were referred to as Prospectors by Miles &

Snow (1978). The last three variables were intended to measure the degree of internal orientation of the firms. Those firms measuring high on these variables were referred to as Defenders.

Table 4.4 shows the results of testing for the correlation among those variables for the sample of 162 firms.

Table 4.4

**Correlation Matrix for Measures of Strategy Orientation**

	R&D/TA	FIX/EMP	COGS/EMP	ADV/TA	TURNOVER
R&D/TA	1.000 p=				
FIX/EMP	-0.144 p=.066				
COGS/EMP	-0.093 p=0.240	0.185 p= 0.018			
ADV/TA	0.485 p=-0.000	-0.238 p=0.002	0.0997 p=0.206		
TURNOVER	0.136 p=0.083	0.014 p=0.857	0.120 p=0.128	0.238 p=0.002	1.00 p=

Pearson Correlation Coefficients, 1-tailed Significance,  
n = 162

**Legend:**

R & D = research and development  
R & D/TA = research and development divided by total assets  
Fix/EMP = Fixed asset investment per employee  
COGS/EMP = cost of goods sold per employee  
ADV/TA = advertising expense divided by total assets  
TURNOVER = total asset turnover ratio

This table reports the Pearson correlation coefficients and probability tests for each of the five variables. As the table shows, there was relatively little correlation among the variables. Therefore, all of the variables were tapping different aspects of the strategy construct.

#### **DEVELOPMENT OF STRATEGY CLUSTERS**

The choice of cluster analysis to operationalize the strategy types was based on several factors. There was a desire to include firms which would be classified as outliers by many statistical techniques. It was intuitively felt that many of these outliers not only contribute substantially to the validity of the model, but also contribute substantially to the structure of the industry. Everitt (1986), and Smith, Mitchell & Summer (1985) noted that an advantage of the clustering technique was its ability to deal with the problems of model fitting. It was also found that several of the clustering techniques allow researchers to include outliers without compromising the data analysis.

The technique selected was the K-means algorithm. This technique has several advantages relevant to this study. It can be used with relatively large data sets, and is more robust than other techniques with respect to outliers (Hair,

Anderson & Tatham, 1987). In this respect, it has been shown to outperform Ward's method and the average linkage method (Hair, Anderson & Tatham, 1987). The K-means algorithm technique requires the researcher to begin by specifying the number of clusters to be found. The technique then assigns observations based on centroids relevant to each cluster. Reassignment among clusters continues until the within cluster sum of squares (variance) is minimized. This procedure compares favorably with methods which calculate euclidian distance among variables (Hair, Anderson & Tatham, 1987). Specifically, the technique is iterative, making several passes through the data in order to compensate for a possible poor initial cluster assignment. Also, each observation can only be assigned to one cluster, thus simplifying cluster interpretation.

A necessary step prior to clustering was to standardize the data. This was done for two reasons. First, Aldenderfer & Blashfield (1984) noted that when a similarity measure is used, such as euclidian distance, or k-means algorithm, standardization should be used to control for differences in measurement scales and variance. Second, the measures used in this study were ratios. There is a tendency for ratio data

to form "clumps" which distort the data distribution. Standardization of the data will compensate for this clumping.

The next step was to determine the number of clusters for the solution. There was no definitive analytical justification for choosing any one number of clusters over any other number, so the decision was made to start with a 10 cluster solution for initial evaluation, and then to reduce the number of clusters based on an analysis of the results. There were two criteria set for the selection of a cluster solution (as suggested by the statistical procedure used). The cluster solution should account for at least forty percent of the variance among clusters, and the classification error should be the minimum from among the ten possible cluster solutions. This first step resulted in a cluster analysis report of the variance accounted for as the number of clusters increased from one to ten. Table 4.5 shows the data from this report.

Table 4.5

**Cluster Analysis Variance Report**

No. of Clusters	Percent of Variance
1	100.0
2	79.8
3	62.4
4	49.4
5	44.8
6	35.0
7	32.5
8	30.6
9	27.7
10	25.9

n = 162

As the number of clusters increased, the amount of variance accounted for among the clusters decreased. This is to be expected in as much as variance is a measure of the degree of dispersion from the mean, and this clustering procedure is creating ten different solutions, each with an increasing number of groups. That is, the first solution contains all of the firms in one cluster, while the tenth solution has the firms distributed into ten clusters. As the clustering procedure progresses from one cluster to ten clusters, it is increasing the number of means (one per cluster) and therefore is increasing the amount of variance among the clusters, and subsequently reducing the amount of variance that can be accounted for by any given cluster solution. The next challenge for the researcher is to make a judgement call on the amount of variance that can be tolerated and still provide meaningful results. As stated earlier, it had been decided that the minimum acceptable level for variance accounted for was forty percent. This meant that only clusters one through five were acceptable.

An examination of the number of firms within each of the ten clusters showed that many of the clusters contained five or fewer firms, indicating that the forced addition of one firm per cluster may have created artificial clusters. This

indicated that cluster solutions above five might provide spurious information. This was supported by discriminant analysis which showed a classification error greater than 20%. Such a high error level supported the view that the cluster solutions above five were suspect. The decision was then made to select a five cluster solution, which accounted for 44.8% of the variance, and to perform the procedure again.

A five cluster solution analysis was then performed, along with the associated analysis. Table 4.6 reports the results of this analysis.

Table 4.6  
Cluster Analysis Report

Cluster Means

<i>Variable</i>	<i>Cluster 1</i>	<i>Cluster 2</i>	<i>Cluster 3</i>	<i>Cluster 4</i>	<i>Cluster 5</i>
R&D/TA	.104007	.098078	.131128	.102460	<del>.39459</del>
FIX/EMP	66126.3	21475.6	29954.5	29954.5	118780
COGS/EMP	69090.1	54849.1	54293.5	199798.	440019
ADV/TA	.267868	.306387	.508576	.447100	.712225
TURNOVER	5.98591	4.72677	9.70346	7.78700	5.79125
NUMBER	22	96	26	10	8

This table shows the value of the mean for each of the five variables employed in the analysis. A comparison of the results of this analysis with that of the first clustering procedure shows that the distribution of firms is broader, in that the majority of firms did not load into a single cluster. The variance accounted for remains at 44.8% because this solution was selected from among the ten possible solutions. A discriminant analysis showed that the classification error was only 6.3%.

The next step in the analysis was to determine if there were clusters which represented the Defender, Analyzer and Prospector strategy types. It was decided that the best way to identify the strategy types was to rank the relative strength of each variable within each cluster. Gresov (1989) suggested using one half standard deviations about the mean in order to achieve a low, medium and high ranking for the strategy variables. This method is similar to using a quartiles method for assignment. Assigning a value of high, medium or low to each of the clusters for each variable produced the following:

	Cluster 1	Cluster 2	Cluster 3	Cluster 4	Cluster 5
R&D/TA	L	L	M	M	H
FIX/EMP	H	M	M	M	L
COGS/EMP	H	M	L	H	L
ADV/TA	L	L	M	H	H
TURNOVER	M	L	H	H	L

Identification of the clusters was not possible because the measure TURNOVER did not perform as expected. This measure should have followed FIX/EMP and COGS/EMP, but this only happened in one cluster, cluster number five. All other measures provided satisfactory results. It was then necessary to examine this measure in greater detail.

Additional correlation analysis was performed to examine the effect on Cronbach's Alpha. The addition of the TURNOVER measure caused only a .032 change in the alpha level. Turnover was then correlated with the three performance measures, ROI, CFOI and MKTSHCHG. The correlations were .17580, .18657, and .007, respectively. Neither of these tests indicated that there was a problem with the measure.

Next, a discriminant analysis was performed. Using a stepwise method, each of the variables was entered into the equation based on its ability to improve the  $R^2$ . TURNOVER had

an  $R^2$  of .0708. This was the lowest measure for the five variables, and indicated that TURNOVER was not making a significant contribution to the analysis. It was then decided that this measure could be eliminated on the basis of its relatively low contribution, and because it did not perform as hypothesized (Kaplan, 1964). This is in keeping with the argument of Venkatraman & Prescott (1987) that studies within strategic management should consider the relative contribution of the measures employed.

It was then necessary to perform the cluster analysis again, and re-examine the results. Table 4.7 reports the results.

Table 4.7  
Cluster Analysis Report

Cluster Means and MANOVA Results

Variable	Cluster 1	Cluster 2	Cluster 3	Cluster 4	Cluster 5	F-Ratio
R&D/TA	.101421	.077710	.124821	.128953	.384568	84.40*
FIX/EMP	66789.7	23508.5	18514.8	22378.8	11878.0	71.55*
COGS/EMP	86167.4	89553.7	41161.2	94322.1	44001.9	11.61*
ADV/TA	.269084	.242798	.344304	.682523	.712225	73.11*
NUMBER	25	55	52	22	8	

MANOVA F = 24.0 p = <.0000

n = 162  
\*p < 0.0000

A one-way analysis of variance (ANOVA) was performed to determine if the differences among clusters was significant. The F-test for each variable is reported in the right hand column of table 4.7. Following the suggestion of Drazin & Van de Ven (1985), these data were also submitted to a one way MANOVA test to insure that the results were not spurious. The MANOVA produced similar results, with an overall F value of 24.00.

Several iterations were performed in an effort to reduce the classification error. The five cluster solution was found to be optimal, having a classification error of 5.4%, and was therefore selected for further analysis. Discriminant analysis was then performed to test the predictive strength of the classifications achieved. Table 4.8 shows the results of this analysis.

Table 4.8

**Classification Matrix**

Classification Variable: Cluster Assignment  
 Independent Variables: R&D/TA, FIX/EMP, COGS/EMP, ADV/TA

Group	All	P(1)	P(2)	P(3)	P(4)	P(5)
A(All)	162	26	60	47	21	8
A(1)	25	25				
A(2)	55		55			
A(3)	52	1	5	46		
A(4)	22			1	21	
A(5)	8					8

Classification error: 5.4%

n = 162

A = Actual Classification

P = Predicted Classification

The left column displays the actual classification, and the top row displays the predicted classification based on individual analysis by the statistical routine.

The next step in the analysis was to again examine the clusters to determine if there were clusters which represented the Defender, Analyzer and Prospector strategy types. As before, it was decided that the best way to identify the strategy types was to rank the relative strength of each variable within each cluster. Gresov (1989) suggested using one half standard deviations about the mean in order to achieve a low, medium and high ranking for the strategy variables. Assigning a value of high, medium or low to each of the clusters for each variable produced the following:

	Cluster 1	Cluster 2	Cluster 3	Cluster 4	Cluster 5
R&D/TA	L	L	M	M	H
FIX/EMP	H	M	M	M	L
COGS/EMP	H	M	L	H	L
ADV/TA	L	L	M	H	H

Having ranked the clusters on their respective variables, the next step was to "name the baby." Two clusters stood out as being immediately identifiable, as their variables were in

the hypothesized direction. Specifically, cluster 1 was identifiable as the Defender cluster, and cluster 5 was identifiable as the Prospector cluster. Defenders should, and did, rank higher on measures of internal orientation, and lower on measures of externally orientation. The Prospectors were the opposite, displaying higher ranking on measures of external orientation and lower on measures of internal orientation. The Analyzer strategy type was hypothesized to fall in a median range between the extremes of the Prospector and the Defender. Cluster 3 satisfies this condition, and was selected as the Analyzer.

Cluster 2 and 4 were not identifiable based on the measures used. While either of them could possible represent the Reactor strategy type as defined by Miles & Snow (1978), this study was not concerned with strategy types outside of those identified by Miles & Snow (1978) as viable within any context. Cluster 2 and 4 were then dropped from further consideration.

#### **THE STRATEGY TYPOLOGY**

It was decided to evaluate a sample of the firms in each cluster to determine if they were following the specified strategy. Firms were selected for which annual reports and

10K reports were available for content analysis. These were analyzed to determine if the results of the statistical procedure accurately reflected the actions of the firms. The annual reports of 5 Defenders, 8 Analyzers and 3 Prospectors were examined. An example of this analysis is provided with the description of each of the strategy types. The primary criteria for evaluating the strategy types, as mentioned in chapter three, was the degree of internal orientation for the Defender, and the degree of external orientation for the Prospector. The Analyzer was considered to be a strategy type which combines elements of both of these extremes.

#### The Defender Strategy Type

In order to maintain its internal orientation, the Defender strategy type will be concerned with the maintenance of a stable base-business, and a focused marketing strategy. This strategy type does not make changes in the market place, but incorporates changes with the intention of becoming the most efficient supplier. The emphasis for such a firm would be on satisfying the demands of its current customer base, and meeting the needs of an established market segment. An example of this strategy type selected for analysis was Prime Computer, Inc.

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The annual report for Prime Computer, Inc. emphasized the extent to which the firm had carefully targeted selected manufacturing segments. Those segments represent the markets for its computer-aided design, manufacturing and engineering workstations, which are the firm's primary product. The use of a focused marketing strategy was emphasized throughout the report.

Prime limited its expenditure on research and development to product enhancements, and purchased many of its products from other suppliers. For example, Prime introduced a new range of engineering workstations which complimented their product line, but these workstations were developed by Sun Microsystems.

During 1987, Prime Computers acquired Computervision Corporation through an all-cash tender offer. The acquisition was described as an opportunity for Prime to increase its support of its target market, because the product lines of the two firms were complementary. Within the context of the strategy type, Prime has secured its position within its market segment and focused more of its resources on the CAD/CAM product market segment.

### The Analyzer Strategy Type

The Analyzer strategy type was described as having a base business which serves as a cash generator. In this respect it incorporates characteristics of the Defender strategy type. Also, it takes advantage of product and market opportunities created by other firms. It then follows that such a firm would not identify itself with leading edge technology, but would identify with market opportunities.

The example selected for this strategy type was Barrister Information Systems Corporation. In their annual report, Barrister identified its primary market as the legal profession. It provides a variety of products and services to lawyers, corporate legal departments, and the court systems. The firm showed no inclination to branch out from this market, and employed its resources to address the needs of its customers. This is identifiable with the Defender like characteristics.

At the same time, Barrister is taking advantage of technological advances in product enhancements, and of market trends in computer developments to expand its penetration within its chosen market. It adopted industry standards, and an open architecture approach to its products in order to be more flexible in its product offerings, and to expand access

to additional market segments. Research and development for both new products and product enhancements was a continuing commitment of the firm. Organizational structure had been changed to meet the needs of an expanding market base. In sum, it was employing Prospector like characteristics to expand its product-market offerings.

#### The Prospector Strategy Type

In order to maintain its external orientation, the Prospector strategy type will be more product-market oriented than the other strategy types, and will place a greater emphasis on new product development. The Prospector firm exemplified by the data was SBE, Inc. The primary products for this firm were high performance computer products for original equipment manufacturers (such as Prime above), system integrators (such as Barrister above), and research and development laboratories. Also, they produced a line of specialized computer products such as boards, integrated circuits, and micro computer systems.

The annual report for SBE emphasized the firm's commitment to product development and to design engineering. They expanded both their physical plant and the number of technical staff during 1987. This growth was in response to

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a number of factors. Sales of their primary product line had increased; they were bringing to market a new line of equipment; and they were responding to opportunities to engage in advanced research and development joint ventures with other computer firms.

Probably the most telling characteristic of the Prospector strategy within this firm was the lack of identification of a specific, or focused, product market. The firm was apparently interested in every opportunity that was identifiable as being within its capability. At one point in the annual report, the chairman of the board notes that the development of new products would be the key to the firm's future success. The annual report closed by noting how successful it had been in introducing an increasing variety of complex products.

## TEST OF HYPOTHESES

### TEST OF HYPOTHESES 1, 2 & 3

Hypotheses 1, 2 & 3 stated that:

H1: The Prospector will experience greater change in market share (as measured by absolute change in market share) than will the Analyzer or Defender.

## Chapter 4: Data Analysis and Results

H2: The Defender will rank higher on a measure of profit, return on investment, than will the Analyzer or Prospector.

H3: The Analyzer will rank higher on a measure of flexibility, cash flow on investment, than the Prospector or Defender.

An ANOVA was performed to test the question of the relationship among strategy types and differing performance objectives. Table 4.9 shows the results of these tests.

Table 4.9

**Relationship Between Strategy Type and Performance Objective\***

	ROI	CFOI	MKTSHCH	F	p
DEFENDER	-0.0268 (.124)	0.0497 (.129)	17.977 (-29.2)	2.45 n = 25	0.0480
ANALYZER	-0.0949 (.056)	0.0565 (.137)	29.452 (-17.7)	7.09 n = 52	0.0000
PROSPECTOR	-0.4600 (-.31)	-0.3467 (-.267)	83.206 (36.00)	1.94 n = 8	0.0507

\*Means reported, with main effect in parentheses

One-way MANOVA:  $F = 20.48$ ,  $p = <0.0000$

Three performance measures (ROI, CFOI and market share change) were used as the response variables, and the strategy type (Defender, Analyzer, and Prospector) cluster assignments were the predictors. The table shows that the main effect of each performance measure was related to a different strategy types. Again, following the suggestion of Drazin & Van de Ven (1985), these data were submitted to a one way MANOVA test to insure that the results were not spurious. As table 4.9 reports, the results of the MANOVA show that the differences among groups are statistically significant.

Hypotheses 1, 2 and 3 state that each of the strategy types will rank higher on their respective performance measures. The results of testing these hypotheses can be said to have been supported. Each of the strategy types is related to a different performance measure. The Defender is related to the ROI measure; the Analyzer is related to the CFOI measure; and, the Prospector is related to change in market share.

#### TEST OF HYPOTHESES FOUR, FIVE & SIX

Hypotheses four, five and six were intended as tests for contingency relationships, and stated that:

H4: There is a contingency relationship between the Defender strategy type and the performance objective, return on investment.

H5: There is a contingency relationship between the Analyzer strategy type and the performance objective, cash flow on investment.

H6: There is a contingency relationship between the Prospector strategy type and the performance measure, market share change.

The results of testing hypotheses one through three established that each strategy type was related to a different performance outcome. It was then possible to address the question of the relationship between strategy and performance. The objective was to determine if there was a predictive relationship between the measures used to identify the strategy types and the relevant performance measure. If this could be established, it would provide support for a coalignment relationship between strategy and environment. This required a test for coalignment, or more correctly, misalignment. The intent was to show that deviation from an

ideal profile was negatively correlated with performance outcomes. As discussed in chapter three, this procedure assumes that there are firms which properly align themselves with their environment, and that the alignment of distinctive competencies represented by the strategy variables will have performance implications. The relationship among the strategy variables found within each ideal type will define the characteristics of an ideal type for that context. If the variables can be shown to have predictability, this would support the contingency theory argument that a strategy - environment coalignment will have performance implications. The techniques employed for this part of the study were derived from Drazin & Van de Ven (1985).

The relatively small number of firms in the Prospector and Defender clusters created a question as to whether the central limit theorem could have been violated. A review of a number of sources on statistical matters did not provide any consistent guidance on how to handle this matter. Nunnally (1978) suggested that there be at least ten observations for each variable used, while Kohler (1985) suggested that there needs to be at least 30 observations. Hair et al. (1987) advocate a ratio of at least four or five to one of subjects to measures. It was found that at least one study, Dess &

Davis (1984) used this latter recommendation for their study. The present study has a ratio of 5.75 for the Defender group (23/4), and 12.5 for the Analyzer group (50/4). The very small size of the Prospector group (only eight firms) does not allow for usable analysis. These ratios are adequate from the perspective of Hair et al (1987), and correspond favorably in light of previous research. Given that this portion of the study has been defined as exploratory in nature, it was felt that the sample size for the Defender cluster was not a significant limitation for adequate interpretation of the results.

The first procedure undertaken was a correlation analysis between the strategy variables and the performance measures to determine the relative relationship of each of the strategy variables. The results of this analysis are reported in table 4.10.

Table 4.10

**Correlation between Strategy Variables  
and Performance Measures**

Correlations reported with probability in parentheses

PERFORMANCE	R&D/TA	STRATEGY VARIABLES		ADV/TA
		FIX/EMP	COGS/EMP	
ROI	-0.1286 (0.102)	0.0982 (0.213)	0.0697 (0.377)	-0.2443 (0.001)
CFOI	-0.3362 (0.000)	0.1291 (0.101)	0.0997 (0.206)	-0.3114 (0.000)
MKTSHCHG	-0.0066 (0.932)	-0.2669 (0.000)	0.0298 (0.706)	-0.0212 (0.788)

n = 85

This analysis demonstrated two points of importance. First, no single variable was driving the performance outcomes. Second, separate variables are related to each of the performance outcomes. ADV/TA was related to ROI; R&D/TA and ADV/TA were related to CFOI; and, FIX/EMP was related to MKTSHCHG. As noted by Venkatraman & Prescott (1987), a major failing of past research in this area has been the assumption of equal importance among the selected variables. This step shows that the relative contribution of each of the variables is not equal, and supports a contention that different resource deployments are required to support different strategy objectives. The next step was to test to see if changes in those variables were related to the respective performance outcomes. The procedures and results are reported separately for each strategy type.

#### HYPOTHESIS FOUR

##### Defenders and ROI

The following analysis was performed on those firms in the Defender cluster. The objective was to test the argument that unit deviations from an ideal profile resulted in progressively inferior performance outcomes. Fit, or

coalignment was operationalized using a Euclidean distance measure suggested by Drazin & Van de Ven (1985):

$$\text{DISTANCE} = \Sigma (X_{is} - X_{js})^2$$

where,

$X_{is}$  = the score of the ideal unit on the  $s^{\text{th}}$  strategy variable,

$X_{js}$  = the score of the  $j^{\text{th}}$  focal unit on the  $s^{\text{th}}$  strategy variable,

$j$  = the number of the strategy variable.

The distances were calculated for all units in the cluster. The next step was to develop the ideal profile for the Defender firms. The firms within the ideal profile constitute the calibration sample for comparison with the remaining firms. This procedure begins by rank ordering the firms on the performance measure, ROI. The top ten percent (three firms) was then selected as having the ideal profile. The mean was then computed for each of the strategy variables for the three firms. The results of this step were:

	R&D/TA	FIX/EMP	COGS/EMP	ADV/TA
Mean:	-.6471	0.537	.07549	-.2252

Next, the bottom ten percent of firms (3) was dropped to reduce the bias in restricting the range, following a suggestion from Venkatraman & Prescott (1990). Then the calculated distance measure of each firm was correlated with that firm's performance measure, ROI, for the remaining firms within the cluster. The results of this step are shown in table 4.11.

Table 4.11

Corr Coeff. of  
Performance with

STRATEGY	DISTANCE
Defender n = 19	-.46159 (p=.0306)
Analyzer n = 42	-.32284 (p=.0269)
Prospector n = 4	-.63385 (p=.1766)

The table shows that the distance measure is negatively correlated with ROI ( $-0.462$ ), and statistically significantly different from zero ( $p = <.03$ ). These results provide support for hypothesis four.

## HYPOTHESIS FIVE

### Analyzer and CFOI

The analysis for this hypothesis followed the same procedure as for hypothesis four. The Euclidean distance metric was run on all firms in the Analyzer cluster. The firms were then rank ordered on the CFOI measure, and the top five firms (representing the top ten percent) were selected to develop the ideal profile. The mean was computed for the strategy variables for these five firms. The results of this step were:

	R&D/TA	FIX/EMP	COGS/EMP	ADV/TA
Mean:	-.4429	.14542	.22985	.65737

The misalign measure was then correlated with CFOI for each of the remaining firms (minus the bottom ten percent). The results are shown in table 4.11. The table shows that the misalign measure is negatively correlated with CFOI ( $-.323$ ),

and is statistically significantly different from zero ( $p = <.02$ ). These results corresponds with those of hypothesis five, and suggest a contingency relationship between strategy and performance for this strategy type.

#### HYPOTHESIS SIX

##### Prospectors and Market Share Change

The sample size for this strategy type was too small to allow adequately testing this hypothesis. However, there was an interest in determining if the data would perform as hypothesized despite the limited usability of the information. The procedure used for the other strategy types was repeated here. As there were only eight firms in the sample, it was impossible to select the top ten percent for development of an ideal profile. The firms were rank ordered on market share change, and the top two firms were selected to develop the means for the strategy variables. The results of this step were:

	R&D/TA	FIX/EMP	COGS/EMP	ADV/TA
Mean:	.2065	-.1536	.0697	.2122

The distance measure was correlation with the performance measure, market share change. These results are reported in Table 4.11. As the table shows, the misalign measure was negatively correlated with performance, as expected ( $-.634$ ), but the results were not statistically significant. The data only partially support hypothesis six. As will be discussed in chapter five, this is considered to be a product of industry factors and a small sample size.

#### **SUMMARY**

This chapter has discussed the methods of data collection, industry analysis, and issues of reliability and validity. The methodology used to test the hypotheses was discussed, and the results were presented. In the next chapter the results of the study will be discussed and related to the theoretical literature presented in Chapter 2.

## **CHAPTER FIVE: DISCUSSION AND CONCLUSIONS**

### **INTRODUCTION**

This study empirically examined the relationship between the strategic orientation of organizations and their performance objectives. The two goals of this study were to extend the strategy paradigm by examining the assumption that different strategy types have different performance implications; and to test the idea of coalignment between strategy and environment. The results of this study provided support for most of the hypotheses. This chapter discusses the results of the hypotheses tested, and the conclusions that can be drawn from this work. The theoretical and practical significance of the study is outlined, and several suggestions for future research in this field are provided.

### **THEORETICAL SYNOPSIS**

The central research question guiding this effort was what performance results arise from following different strategies within a given context. The basic research paradigm within the field of strategic management holds that within a given environmental context there will be a

contingency relationship between strategy and performance (Fahey & Christensen, 1986). Organizations are responsible for determining the demands of their respective environmental context, and for developing the distinctive competencies necessary for an effective competitive stance (Andrews, 1971; Miles & Snow, 1978) within that context. Successful organizations are then defined as those which establish a "fit," or coalignment, between environment and strategy.

One possible conclusion of this line of reasoning is that all firms within a given context will be similarly impacted by the same set of environmental forces, which would lead to a limited number of strategies being observed within any given environmental context. However, prior research in this field has demonstrated that firms within the same environmental context have often followed differing strategies (e.g., Lawless & Finch, 1989). This leads to the question of what will constitute an appropriate response to environmental imperatives in order to achieve the necessary coalignment? This question had no easy answer because there is little agreement on what constitutes performance, or how performance should be measured (Chakravarthy, 1986; Ginsberg & Venkatraman, 1985).

This study provided an alternative which addressed both of these concerns. Chandler (1962) introduced the idea of a "means-ends" relationship between strategy and structure. Organizations establish objectives (ends), and then devise strategies and structures (means) in order to achieve those ends. This study then made the assumption that organizations within any context are free to choose any objective, but having done so there is a necessity to choose an appropriate strategy and structure in order to achieve the objectives. The first effort was then to show that there was a relationship between a set of selected strategy types (the Miles & Snow (1978) typology) and specific performance objectives. The second effort was to show that a coalignment between strategy and environment has a contingency relationship with performance.

Venkatraman & Prescott (1990) tested the assumption of a fit between strategy and environment and showed that the degree of alignment achieved between the two had positive performance implications. Their study found that within each of eight environments there were firms, representing a single strategy type, which did align their strategic resource deployments to the specific requirements of the environmental context, and that those firms performed significantly better

than other firms which did not achieve the requisite match. For methodological reasons, they were limited to operationalizing only one strategy type for each environmental context. The present study attempts to extend the results of the Venkatraman & Prescott (1990) study by making two additional assumptions. The first assumption is in line with that segment of the strategic management literature which argues that there are multiple successful strategic types within a given environmental context (Bourgeois, 1985; Miles & Snow, 1978). The second is that coalignment between strategy and environment will have performance implications that are different among the strategy types (Hambrick, 1983; Venkatraman, 1987b). A limitation is an assumption that the mature environmental context used in the present study is comparable to the mature context of Venkatraman & Prescott (1987, 1990). This limitation is acceptable because the overall results of the study support and expand their findings. This study then tested several hypotheses related to this line of reasoning. A detailed discussion of these hypotheses follows.

## **Chapter 5: Discussion and Conclusions**

**HYPOTHESES 1, 2 & 3**

The first set of hypotheses were intended to test whether each of Miles & Snow's (1978) three viable strategy types were related to different performance objectives. These hypotheses stated that:

H1: The Prospector would experience greater change in market share (as measured by absolute change in market share) than would the Analyzer or Defender.

H2: The Defender would rank higher on a measure of profit, return on investment, than would the Analyzer or Prospector.

H3: The Analyzer would rank higher on a measure of flexibility, cash flow on investment, than would the Prospector or Defender.

The tests of these hypotheses achieved statistically significant results. In general terms, it can be said that there is a strong relationship between a given strategy type and a specific performance objective. That is, as a group, each strategy type outperformed the other strategy types on

a specific performance measure. The Prospector strategy types were more strongly related to the performance objective of market share change than were the other strategy types. The Defender strategy types ranked higher on the performance measure, return on investment. The Analyzer strategy types were more strongly related to a measure of flexibility, cash flow on investment. An argument against the findings of this study could be that some or all of the firms were attempting to achieve multiple objectives, possibly all three of the performance objectives selected for this study, and that the results of the study are an artifact of the sample. There is no argument that firms can, and do, pursue multiple objectives. However, to the extent that the measures have captured what Mintzberg (1976) referred to as realized strategy, this study has observed a relationship between the realized strategy and a dominant performance objective. The results of this study not only support those of Hambrick (1983), but also support a contention only briefly mentioned by Miles & Snow (1978) that there is a dominant performance objective associated with each of their viable strategy types. This lends credence to an argument that studies which intend to examine the relationship between strategy and performance

must first take into consideration that each strategy type is related to different performance objectives.

Miles & Snow (1978) stated that the Prospector would probably pay a price in terms of profitability for its efforts to create change in the market place. Hambrick (1983) demonstrated that this was true in his study. It would appear that this is true for the findings of this study. Among the three strategy types, the Prospector ranked lowest in terms of both return on investment and cash flow in investment. The strong relationship between the Defender strategy type and the performance measure, return on investment, can be attributed in part to the mature state of the industry at the time of the study. The internal orientation of this strategy type, and the emphasis on efficiency of operations, contributed to this strategy type being able to glean profits by servicing its established customer base in a time of dwindling sales.

Miles & Snow (1978) point out that the Analyzer strategy type balances the demands of exploiting new product and market opportunities with the need to maintain a stable base of traditional products and customers. This is the primary argument for considering this strategy type to be more closely associated with the performance measure of cash flow on investment. This cash flow, primarily assured by an efficient

basic business, is necessary to fund expansion operations into new market opportunities. They also fund the occasional termination of unsuccessful operations.

These findings support those of De Meyer et al (1989). Their thesis was that the more advanced manufacturers put greater efforts into finding a balance between flexibility and cost efficiency. Their study gathered data from managers in many industries in Japan, Europe and the United States. From the standpoint of their study, flexibility referred to the ability to move quickly into new product or market opportunities, while at the same time maintaining an efficient production operation. In other words, they were describing, though not directly mentioning, the trade off between being a Prospector or a Defender. It was the contention of the De Meyer study that more firms were moving to adopt the balance achieved by the Analyzer strategy type (without using those strategy names). The results of the present study, which looked at the manufacturing segment of a high technology industry, would seem to support the De Meyer et al (1989) study, as it was demonstrated that the numerically dominant strategy type was the Analyzer.

**HYPOTHESIS 4, 5 & 6**

Hypothesis four, five and six were concerned with demonstrating that the relationships found in hypotheses one through three were not spurious, but were related to specific resource allocation decisions of the firm designed to achieve specified performance outcomes. These hypotheses stated:

H4: There is a contingency relationship between the Defender strategy type and the performance objective, return on investment.

H5: There is a contingency relationship between the Analyzer strategy type and the performance objective, cash flow on investment.

H6: There is a contingency relationship between the Prospector strategy type and the performance measure, market share change.

The test of these hypotheses four and five demonstrated that there is a predictive relationship between the degree of strategy orientation and performance outcome. The Prospector strategy type (hypothesis six) was included in the analysis

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even though the Prospector cluster size was only eight firms, which indicated that the results would not be significant. That notwithstanding, the results for the test of hypothesis six were in the predicted direction. This indicates that further testing with a larger sample is warranted.

These findings support those of Venkatraman & Prescott (1990). The Venkatraman & Prescott (1990) study was based on the assumption that there was a single appropriate strategy type within each of the environments under study. However, they noted that this assumption was necessary for methodological reasons (they were limited by the data base employed), and that a future study examining the relevance of generic strategies within a single context would be a useful future enquiry. Also, they only considered one measure of performance, return on investment. From this perspective, the present study can be seen as an extension of their work, and has addressed both of these issues.

#### **IMPLICATIONS OF FINDINGS**

The results of this study indicate that future research into the question of the environment-strategy-performance relationship must allow for consideration of multiple performance objectives, and the relationship between a given

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strategy type and its appropriate performance objective. This could help to explain the contradictions between the findings of this study and past studies of strategy and performance. For example, Zajac & Shortell (1989) studied the effects of change in the health care industry. They found that Defender firms were poorer performers on the same performance measure (ROI) than were the other strategy types after the environment had changed. However, their study was concerned with an anomalous environmental discontinuity rather than a continuous environmental state. Based on their study, practitioners would be advised to avoid the Defender strategy type during and after an environmental disruption. However, the results of the present study would indicate that the Defender is an acceptable strategy. Had the Zajac & Shortell (1989) study considered the other performance objectives it is possible that all strategy types suffered roughly equally.

Zajac & Shortell (1989) also stated that the Defender strategy was not an appropriate strategy type for a volatile environmental context. Burns & Stalker (1961) also state that a mechanistic structure is inappropriate for a volatile environment, and their work has formed a foundation for contingency theory within the field of strategic management. Miles & Snow (1978) describe the Defender strategy as having

a mechanistic structure, but say that this strategy type should be able to survive in any environmental context. The results of this study support the Miles & Snow (1978) contention and demonstrates that the Defender can survive and thrive in a volatile and mature environmental context.

It should not be construed that organizations follow only one performance objective. That organizations have multiple goals is well accepted within the literature (Dess & Davis, 1984; White & Hamermesh, 1981). Also, it is well accepted that return on investment is a primary measure of economic performance. The intent of testing these hypotheses was specifically to demonstrate that there is a strong correspondence between the environment and strategic profile fit and a dominant performance objective. These results support the contentions of several writers who have suggested that studies which are concerned with measuring organizational effectiveness should make reference to the specific goals that the organization is pursuing (e.g., Steers, 1975).

#### **THEORETICAL CONTRIBUTIONS OF THE STUDY**

The results of this study indicate that the basic strategic management research paradigm needs to be extended to allow for consideration of multiple performance objectives.

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As strategic management has incorporated perspectives from other fields, such as industrial economics (Porter, 1980), emphasis has shifted to determining how industry structure constrains firm conduct (e.g., Hatten, Schendel & Cooper, 1978), and to examining patterns of relationships among variables identified as relevant to market structure and strategy content (Bourgeois, 1985). A major emphasis of this line of research has been to examine the relationship between environment and strategy, and its effect on performance, without *a priori* limiting the possible strategy options (Miller & Friesen, 1984). However, there has been a tendency to limit the number of performance variables considered within this line of research. The results of the present study suggest that emphasis should be placed on the selection of performance objectives, and then the implication of that decision on the selection and implementation of strategy. Finally, for those studies concerned with examining relationships across strategy type, it would appear that another dimension is needed for comparison other than performance.

Miles & Snow (1978) expressed concern that emerging organizational forms, and the tendency toward more volatile environmental contexts could act to invalidate their typology.

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This study has shown that the typology is applicable at the time of the study (1987), and that it is useful in discerning strategy types within a volatile environmental context. This should be encouraging to researchers seeking to use a parsimonious typology in complex settings.

The results of this study has applicability for practitioners as well. The basic means-ends relationship offered by Chandler (1962) is still applicable for managers attempting to select an appropriate strategy for today's dynamic environments. While there is no single appropriate strategy for any given context, there are limitations to strategy choice after an organization has determined its objectives.

#### **METHODOLOGICAL CONTRIBUTIONS OF THE STUDY**

Early research in this field which has tried to establish a link among environment, strategy and performance (or combinations of these) have met with limited empirical success (Van de Ven & Drazin, 1985). However, this has been due in part to a lack of adequate methodological techniques with which to "see" the hypothesized relationships. More recently, researchers have been successful using the systems approach introduced by Drazin & Van de Ven (1985). For example,

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Venkatraman & Prescott (1990) demonstrated a contingency relationship between environment, strategy and performance using a similar methodology with the PIMS data base. Gresov (1989) demonstrated a multiple contingency relationship between elements of organizations and environmental contingency variables. A contribution of this study has been that it has demonstrated a predictive relationship between strategy type and performance.

The present study was able to operationalize the Analyzer strategy type using secondary data. This is one of the first studies to have done so. The use of the standard deviation as a measuring device (suggested by Gresov, 1989) was a key to being able to accomplish this. Other researchers should be able to extend the usefulness of this typology for other research efforts. Probably the greatest difficulty for a study of this type was the lack of valid measures of strategy. Very few studies have attempted to operationalize the typology using secondary data.

#### **SUGGESTIONS FOR FUTURE RESEARCH**

This study did not address the Reactor strategy type, and found two unidentified strategy types in the data analysis. A question for future research would be how these firms effect

the industry as a whole? Do these unidentified strategy types have characteristics that make them more or less adaptable within the environment? The development and validation of other measures of strategy using secondary data may help in identifying these strategy types and discerning their role within the environment.

One of the disappointing findings of this study was the relative absence of the Prospector strategy type. According to the strategic choice view, this strategy type is the most adaptable. According to some theoretical perspective, highly volatile environments should favor strategy types which are highly adaptable. This study found a numeric dominance of both Analyzers and Defenders, which can be viewed as more adapted organizational forms. A tentative effort to identify the largest of the clusters, which was not a part of the study, showed it to contain firms which exhibited characteristics of both the Defender and the Analyzer. A theoretical explanation of these results is lacking, and clearly further research is needed.

Zahra (1988) noted that there are relatively few studies employing the Miles & Snow (1978) typology. Hempel (1965) noted that for a field to grow and develop requires, in part, the development of typologies which can move the field into

realms of more extensive theory building and model construction. The relative lack of concentration on typology development and testing contributes to keeping the field in the pre-paradigmatic phase. While this study has reasonable success with the Miles & Snow (1978) typology, the difficulty encountered with the measure of turnover indicates that Snow & Hrebiniak (1980) were correct when they called for a reconceptualization of the typology. Alternatively, researchers could employ the approach used in this study of first examining the data to determine which measures of the typology are applicable within the chosen context. This was done by Prescott (1986), as well as by Venkatraman & Prescott (1987). While there may be an a priori justification for the selection of measures, this, in itself, is not sufficient for assuming that each variable will have equal weight or impact.

## **LIMITATIONS**

In summary, the study did achieve the stated objectives. However, there are limitations that must be considered. This was a cross sectional study, which means that the issue of causality has not been addressed. Perhaps, as Bourgeois (1985) pointed out, the inter-relationship between

organizations and their environment is of such a nature that it will be impossible to discern any cause and effect relationship. However, longitudinal studies are needed in this field in order to better understand those relationships which are an integral part of our theory.

Hambrick (1981) noted the need to employ multiple measures of the strategy concept within the same study. This study only used secondary data to operationalize strategy. While this can be taken to represent realized strategy, there is need to extend the work by incorporating the perceptions of managers as to the direction of their organization. We cannot say with certainty that what we call strategy is, in fact, strategy.

Lastly, as mentioned in chapter four, it must be accepted that factors other than those which were observed may have contributed to the outcomes. This study does strengthen the validity of the Miles & Snow (1978) typology, but the results should be compared with a gestalt type approach (Miller, D. 1988) for validation of the findings.

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## References

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***Education:***

1990 PhD – Management  
Virginia Polytechnic Institute  
& State University  
Blacksburg, Virginia

Major Field of Study: Strategic Management  
Minor Areas: International Management  
Financial Management

Preliminary Dissertation Title: Empirical  
test of Environmental Determinism vs  
Strategic Choice.

1980 Master of Science in Management  
Troy State University  
Troy, Alabama (European Division)

1979 Bachelor of Science in Business Admin  
Summa Cum Laude  
University of Maryland  
College Park, Maryland

Various U.S. Air Force schools in management  
and electronics.

***Experience:***

1990 – Present Assistant Professor  
East Carolina University, Greenville, North  
Carolina. Teaching introduction to mana-  
gement and international business.

1986 – 1990 Doctoral Candidate  
Pursuing degree in management with primary  
emphasis in Strategic Management. Minor  
areas of concentration are International  
Management and Financial Management.

1983 – 1988 Senior Lecturer in Management  
(Tenured)  
University of Bophuthatswana, southern Africa  
Primary strength was bringing practical  
knowledge of business world into classroom in

order to reinforce and demonstrate concepts and theories presented.

Efforts during this period directed toward development, particularly in rural areas. Formed association of professionals working in development to facilitate information flow and exchange of ideas throughout the region. Organized conferences, training programs and seminars on social and economic development. Provided free management consultation for small businesses. Developed and conducted management training programs. Addressed conferences on business development conducted by government and chambers of commerce.

**1981 - 1982 General Manager**

General Manager of national chain of micro computer stores. Responsible for developing product enhancements for established line of computers in order to increase market share. Additionally, developed marketing strategy for introducing a new line of micro computer.

**1980 - 1981 Procurement**

Developed and implemented centralized procurement system for major supplier of electrical energy in Nigeria. Imported from England, Europe and Asia. Broadened the base of suppliers to improve service and competition; evaluated performance of major shipping lines and clearing agents; developed a guide for exporters to Nigeria owing to peculiarities of that market; financed imports through four international banks.

**1958 - 1980 United States Air Force**

**(1977 - 1980) Resource Manager**

Member of major aircraft maintenance logistics support team located in England. Responsible for: maintenance operating plans and contingency plans development; aircraft and personnel deployment and utilization; and

a nine million dollar operating budget. Established and supervised a maintenance resource management system which improved inter-agency coordination and reduced support requirements and costs. Based on the work accomplished, I was awarded a Meritorious Service Award.

(1972 - 1977) **Production Management**  
Managed an electronic equipment maintenance, calibration and programming section. Established program for personnel training and development. Created production scheduling system designed to maximize production flow and test station usage, while providing for personnel upgrade and proficiency training.

(1958 - 1971) **Summary of earlier experience**  
Positions of successively increasing responsibility in management and extensive experience as an electronic technician.

**Teaching  
Experience:**

Virginia Polytechnic Institute and State University:  
Principals of Management  
Business Policy & Strategy  
University of Bophuthatswana:  
Business Policy & Strategy, including one year at graduate level  
Principals of Management  
Small Business Management  
Production Management

**Personal Data:** Date of Birth: 26 July 1940  
Marital Status: Married, five children  
Health: Excellent

In one capacity or another, I have lived and worked in Thailand, Okinawa, Guam, England, Nigeria, Malawi, South Africa, and Bophuthatswana. Extensive travel to other countries, such as Swaziland, Botswana, Japan and Israel.

**Membership:** Academy of Management  
Strategic Management Society  
Kiwanis

