

**THE EFFECT OF
STRATEGIC ORIENTATION AND ADAPTABILITY
ON
ORGANIZATIONAL BEHAVIORS AND PERFORMANCE:**

The Case of Electronic Commerce in the Hosiery Industry

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CHAPTER 1

INTRODUCTION

The primary purpose of this research is to bring together the existing evidence about the relationships among strategy, adaptability, behavior and performance into an integrated theoretical model and to empirically test the hypothesized relationships in a particular context. The past two decades have witnessed a proliferation of conceptual approaches describing the relationships among these variables. However, empirical evidence is noticeably sparse. Specifically, this study investigates the interrelationship among strategic orientation, adaptability, behaviors and performance within the context of the adoption of Electronic Commerce¹ in the hosiery industry.

Individually, both strategy and adaptability appear to have important performance implications. Studies have found that strategy (using different conceptualizations and measures of strategy) influences firm performance (e.g., Miller & Friesen, 1978; Hambrick, 1983; Venkatraman & Prescott, 1990; Venkatraman, 1989a). Some other recent studies have found impressive correlations between adaptability (defined as a set of cultural values) and firm performance (Gordon & DiTomaso, 1992; Kotter & Heskett, 1992). Several questions arise from these observations. What is adaptability, and is it exclusively a cultural phenomenon? Are strategy and adaptability

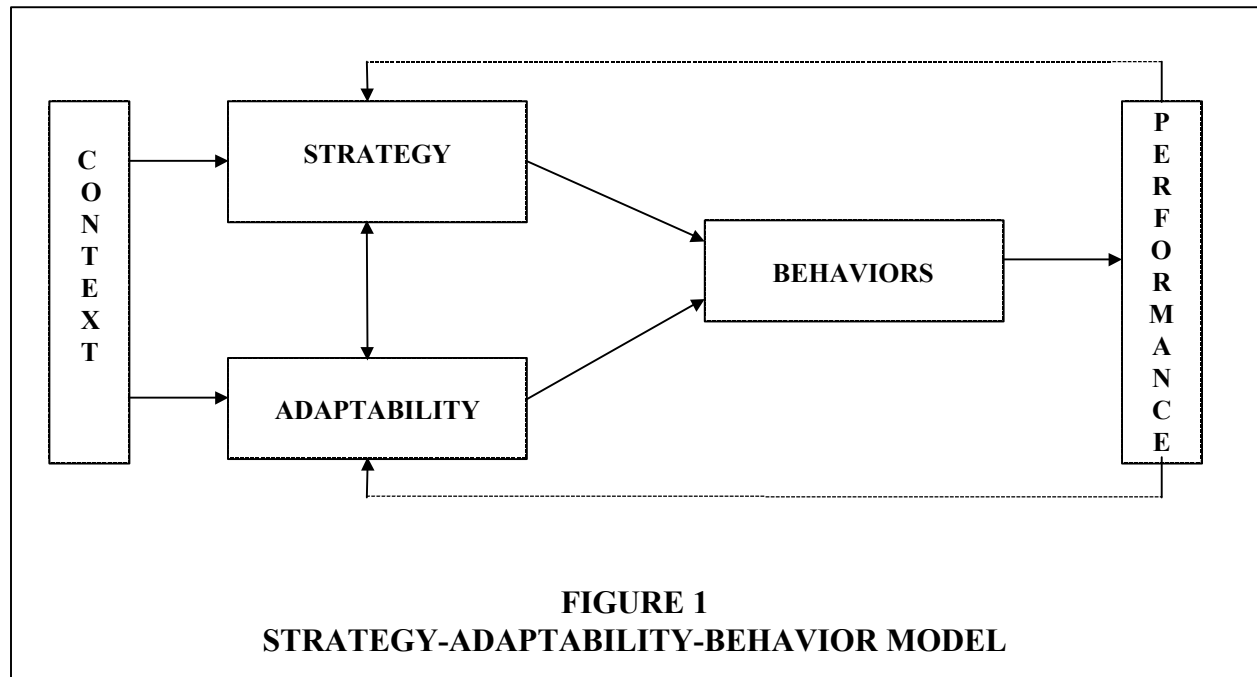
¹ Electronic Commerce is the intercompany computer-to-computer exchange of business information and documentation. Electronic Commerce has also been referred to as Interorganizational Information Systems in the information systems literature (Johnston & Vitale, 1988). A core technology of Electronic Commerce is Electronic Data Interchange (EDI) which includes the transmittal (in standard digital formats) of business documents such as purchase orders, confirmation notices, shipment bookings and notices, electronic funds transfer, insurance claims, or any other business transaction for which standard data formats have been developed. For a more complete description of EDI see Crowley (1993). Other technologies included under the broad heading of Electronic Commerce include electronic catalogues, groupware, other Internet applications, data capture and data consolidation technologies, and reporting systems.

In essence, Electronic Commerce is the replacement of paper-based methods with digital electronic means to conduct intercorporate business transactions.

related in some way? How are strategy and adaptability translated into behaviors which lead to superior performance?

Behavioral implications of concepts such as strategy and adaptability are two other generally underresearched areas. According to many researchers (those most closely aligned with strategic choice and prescriptive approaches to strategy), the ability to collectively perceive and react to critical external and internal forces is important for successful adaptation (e. g., Child, 1972; Porter, 1985; Ansoff, 1965; Andrews, 1987; Miles & Snow, 1978). Some intermediate activities must occur between the concept of strategy and firm performance. For example: plans may be adopted and communicated; resources may be allocated; employees may be hired, trained and compensated. The relevant intermediate behaviors between conceptual organizational variables (such as strategy and adaptability) and firm performance have not been adequately addressed in prior research. Previous models (Nutt, 1983; Allaire & Firsirotu, 1984; Bourgeois & Brodwin, 1984; Kotter & Schlesinger, 1979; Alexander, 1991) and empirical studies (Nutt, 1986; Marcus, 1988; Bryson & Bromiley, 1993; Macoulides & Heck, 1993) suggest a wide variety of potentially relevant behaviors.

The general form of the model, which will be explained and justified in Chapter 2, is introduced here in Figure 1.



This model inserts organizational behaviors as an intermediate variable between strategy and performance, and adaptability and performance, respectively. A reciprocal effect between strategy and adaptability (strategy affects adaptability and vice versa) is also shown. Allaire and Firsirotu (1984), Macoulides and Heck (1993) and Bryson and Bromiley (1993) have proposed related models which illustrate the importance of various intermediate behavioral variables.

The feedback loops from performance to strategy and adaptability, respectively, are well justified in the strategic management, organizational learning, and organizational culture literature (e.g., Wheelen & Hunger, 1992; Schein, 1992). This feedback is important to an understanding of the complete process but will not be explicitly examined in the empirical study. A full derivation of this model will be presented in the literature review (Chapter 2).

Evidence points to the likelihood that both strategy and adaptability are strongly influenced by various contextual factors, the most critical of which is environmental dynamism. Successful firms in stable environments need not adapt to remain successful. On the other hand, changing environments require nimble, adaptable firms. It is important, therefore, to conduct this study in a changing environment where a variation in firms' abilities to adapt can be observed without that variation being attributable to variation in the dynamism of the environments that firms face. The hosiery industry has been chosen because the environment faced by firms is relatively homogeneous.

This study focuses on adaptability, which has been empirically linked with firm performance (Marcoulides & Heck, 1993; Hansen & Wernerfelt, 1989). More specifically, a strong relationship between adaptability (viewed as a set of cultural values) and firm performance has been demonstrated (Dennison, 1984 & 1990; Kotter & Heskett, 1992; Gordon & DiTomaso, 1992). These researchers contend that firms which better internalize values that lead to a superior ability to recognize and adapt to changing conditions are more likely to reap superior rewards.

Adaptability is inextricably linked to the concept of strategy and appears to be more complex than a simple set of cultural values. The ability to adapt to changing conditions is an underlying premise of the strategic choice perspective (Child, 1972). It also permeates the organizational change literature. If one believes that organizations can overcome inertia, then adaptability could be conceived of as the converse of inertia. The recent work of Rumelt (1994) provides additional guidance on this front.

Another important aspect of this study is that it focuses on the shift toward Electronic Commerce, a technological change of strategic importance affecting the firms in many industries today. Electronic Commerce, with its underlying technologies of Electronic Data Interchange (EDI), electronic mail, and interfirm network linkages through services such as the Internet, is altering the structures of organizations. Job descriptions are changing for many individuals such as purchasing agents, inventory control specialists and even marketers who now must conduct business over electronic networks. Large scale organizational structures are changing because communications among networks of workers and customers are facilitated by the use of this technology. These information networks enable reengineering to occur and succeed in many organizations (Hammer & Champy, 1993; Crowley, 1993). Reengineering is, "the fundamental rethinking and radical redesign of business processes to achieve dramatic improvements in critical, contemporary measures of performance, such as cost, quality, service, and speed (Hammer & Champy, 1993: 32)."

Empirical testing of parts of the model in Figure 1 has been extremely limited. Construct specification, construct measurement, data availability and data collection issues have impeded empirical investigation. This research will attempt to resolve some of these concerns.

Study Objectives and Research Questions

The study objective is to investigate the characteristics of the interrelationship among the organizational variables introduced above; strategy, adaptability, behaviors, and performance. Testable hypotheses are derived from the theoretical model. Controlling for context by examining the implementation of a particular technological innovation within a single industry makes it possible to examine the interrelationship among the subject variables in some detail.

In order to better understand the interrelationship among these organizational variables, the following research questions are the most critical:

Research Question 1: How is adaptability related to strategic business unit strategy?

Research Question 2: How do strategy and adaptability together influence organizational behaviors and, ultimately, performance?

Research Question 3: How can one best describe and measure the construct of adaptability?

Study Significance

Organizational scholar, Karl Weick (1985), speculates that in at least some cases, organizational culture and strategy may be “synonymous”; or possibly, an “outgrowth (p. 382)” of one other. Since adaptability as conceived by several authors (Dennison, 1990; Gordon & DiTomaso, 1992; Kotter & Heskett, 1992) may be highly intertwined with organizational culture, it is likely that Weick’s speculation also applies to adaptability. Therefore, the careful specification of adaptability would appear to be an important prerequisite to the examination of its relationship with strategy.

This particular study is significant for three main reasons. First, it simultaneously addresses the interrelationships among multiple organizational constructs; strategy, adaptability, behaviors and performance. Past research in this area has usually focused on dichotomous relationships.

Second, it rigorously examines the definition, specification and measurement of a nebulous construct, adaptability. Generally, previous specification and measurement of adaptability has been accomplished as a small part of a multidimensional organizational culture construct (Gordon & DiTomaso, 1992; Gordon, 1991; O'Reilly, Chatman & Caldwell, 1991); adopted by convenient

access to an existing instrument (Gordon & DiTomaso, 1992); or judged by external experts without strong reliability and validity checks (Kotter & Heskett, 1992). Not to take away from these pioneering works, it is important at this stage to more rigorously examine this construct, which appears to be generating impressive correlations with performance.

Third, many previous empirical studies (e. g., Venkatraman, 1989a; Kotter & Heskett, 1992; Gordon & DiTomaso, 1992) have simply correlated broad concepts (strategy, adaptability) directly with firm performance without examining how they are translated into the activities which ultimately lead to firm success. This research introduces a particular set of organizational behaviors (implementation actions) within a particular context (the adoption of electronic commerce) into the conceptual model.

Compared with strategy formulation, strategy implementation receives far less prominence in the academic journals. Strategy implementation seems to suffer from conceptual confusion since implementation involves so many different topics. Authors have taken varying approaches to the issue. Some authors use implementation in a prescriptive fashion (e.g., Wheelen & Hunger, 1992; Thompson & Strickland, 1987; LeBreton, 1965) indicating that implementation involves taking a formulated strategy and specifying how the formal plan should be executed. Other researchers have developed more holistic models, with implementation assuming the role of integration of many components (Galbraith & Kazanjian, 1986; Waterman, Peters, & Phillips, 1980; Stonich, 1982; Hambrick & Cannella, 1989). Implementation components most consistently cited are structure, control mechanisms, rewards, objectives, human resources, information/decision processes, and culture (Alexander, 1991). Classificatory approaches to describe implementation have been developed by Kotter and Schlesinger (1979), Nutt (1983), and Bourgeois and Brodwin (1984). Still another group of authors have described a strategy-making process which blurs the distinction between formulation and implementation (e.g., Quinn, 1981; Majone & Wildavsky, 1979; Mintzberg, 1973; Braybrooke & Lindblom, 1963). Together, these researchers describe an incremental learning process which focuses on the political nature of decisions and activity within the organization.

It is clear that strategy and adaptability (being primarily conceptual ideas) cannot lead to firm performance without some intermediate activity that has been influenced in some way by these notions. This intermediate activity -- whether planned or unplanned -- is at least part of what strategy implementation must be. This study will attempt to shed light on these intermediate activities for a particular strategic innovation, the adoption of Electronic Commerce.

Study Overview

Chapter 1 introduced some general background into the current status of research into the relationships among strategy, adaptability, behaviors and performance. An outline of a general

research model was presented. The primary purposes, objectives, major issues, research questions, and significance of the study were also explained.

Chapter 2 summarizes the relevant background information regarding the theoretical relationships among strategy, adaptability, behaviors and performance presented in previous conceptual and empirical research. A theoretical model is developed and operationalized. Hypotheses are generated to test this model and address the research questions.

Chapter 3 addresses research methods used in carrying out this study. The choice of the industry and sample is discussed. Definitions and measurement of the relevant constructs are described. Assessment of reliability and validity is addressed. Finally, the statistical methods relevant to the testing of hypotheses and research questions are presented.

Chapter 4 presents the results of the empirical study. It examines the observed characteristics of the sample and the data. Reliability and validity estimates of the construct measures are reported. Most significantly, the results of statistical tests of the hypotheses are presented and explained.

Chapter 5 discusses the relevance and implications of the study results obtained in Chapter 4. Results are compared with the general theoretical model providing support, or lack thereof. Limitations of the study are discussed and productive avenues for further research are proposed. Finally, the practical implications of this research for working managers is presented.

CHAPTER 2

LITERATURE REVIEW

This chapter examines the relevant literature and constructs the logic from which study hypotheses are drawn. The relevant conclusions are integrated to form a model of the interrelationship among the constructs of strategy, adaptability, behavior, and performance.

Selection of Strategy Concept

Strategy and adaptability are closely related concepts. Specifying exactly what that relationship is, however, is a complex issue. Strategy is intended to serve as a vehicle which helps a firm be successful within its environment; that sets the organizational direction which will result in a superior competitive position within that environment. Of the many definitions of strategy, here is a rather general one from two leading strategy experts:

“A strategy is the pattern or plan that integrates an organization’s major goals, policies, and action sequences into a cohesive whole. A well formulated strategy helps to marshal and allocate an organization’s resources into a unique and viable posture based on its relative internal competencies and shortcomings, anticipated changes in the environment, and contingent moves by intelligent opponents.”

(Mintzberg & Quinn, 1991: 5)

One of the more common elements in strategy definitions is the interrelationship of strategy to the changing organizational environment. In other words, a strategy is meant to help an organization adapt to a changing world.

In a strategic sense, adaptability is the ability of a firm to form and execute an effective strategy. The ability to adapt, however, seems to include much more than just the ability to do strategy. As will be demonstrated below, a variety of factors and perspectives help illustrate the relationship between strategy and adaptability. It is not at all clear from recent research where one begins and the other ends. Sorting this issue out is a primary purpose of this investigation. We begin with a short discussion of strategy.

There are many conceptualizations and measurements of strategy that have been proposed in the literature. Venkatraman and Grant (1986) summarized the various approaches including measures of strategic posture, generic strategies, competitive strategy, diversification strategy, characteristics of strategic orientation, strategic decision-making, and strategic planning. Mintzberg (1987) also addressed this issue by identifying five general ways that strategy can be viewed (plan, ploy, pattern, position and perspective).

This definitional and measurement diversity makes the relationship between strategy and adaptability somewhat dependent on the choice of strategic concept. The choice of a strategy

concept and its measurement is a key issue in this study. Three criteria may help make the selection of strategy approach. First, the approach should be compatible with a strategic choice perspective. The strategic choice perspective proposes that strategy, structure and process be consistent (fit) with the environmental context (Child, 1972; Lawrence & Lorsch, 1967; Thompson, 1967). It can be argued that the four representative approaches presented in Table 1 can all represent options that can be chosen by firms.

Table 1 Comparison of Strategy Approaches (PDF: tbl1.pdf)

Second, since the control of certain elements of context appears to be an important condition of this study (see the section on contextual issues later in this chapter), this suggests that a sample of firms be chosen from a single industry. Therefore, the strategic business unit level of analysis would be a reasonable place to start. Consequently, some other conceptions of strategy such as diversification strategies and corporate-level schemes have been eliminated from consideration. Schemes such as Rumelt's (1974) diversification strategies, for instance, have not been considered.

Third, a scheme which has superior measurement properties (validity and reliability) would be useful. Significant criticism of the validity and reliability of various measures of strategy was made by Venkatraman and Grant (1986). Although the generic typologies of Porter (1980) and Miles and Snow (1978) have been widely used, the debate remains about the mutual exclusivity of their strategic categories. One only needs to observe businesses today that appear to have superior positions in both cost and differentiation (e.g., Toyota, Wal-Mart) to question mutual exclusivity of Porter's generic types. This raises the idea that strategies may fall into certain configurations (profiles) of strategic dimensions.

Venkatraman's (1989a) Strategic Orientation of Business Enterprises (STROBE) was developed to address measurement shortcomings of the other approaches while addressing important theoretical considerations. The STROBE approach has the advantage of not having to be concerned with mutual exclusivity since it measures relative scores on a profile of strategic characteristics. Venkatraman's profile describes more fully a firm's strategic posture without losing information by forcing an ambiguous typology upon a sample of firms.

Adaptability

The values, elements, factors or dimensions used to describe and measure adaptability differ from study to study, as do the survey methods, sample characteristics and statistical techniques employed. Therefore, a major contribution of this dissertation is to rigorously develop the adaptability construct. To that end, the following discussion attempts to answer the question; What is adaptability? The measurement instrument for adaptability will be based on this discussion.

Definitions and measurement of adaptability differ by author (See Appendix A). According to strategic choice theorists, adaptability is the ability to adjust to changes in the external environment in order to maintain organizational viability (e.g., Child, 1972; Miles, Snow, Meyer & Coleman, 1978). There is, however, a wide interpretation about how adaptability is achieved and what issues it must address. Child (1972) sees an adaptive organization as one whose roles are open to continual redefinition and where coordination is achieved by frequent meetings and considerable lateral communication. Miles, Snow, Meyer and Coleman (1978) describe an adaptive cycle where managers solve three fundamental organizational problems; entrepreneurial, engineering, and administrative. Within this framework, the authors describe the solution of the administrative problem as “a pivotal factor in the cycle of adaptation...the administrative system must facilitate the organization’s future capacity to adapt by articulating and reinforcing the paths along which innovative activity can proceed (p. 550).”

Another view of adaptability was expressed by Orton and Weick (1990). These authors describe three types of adaptability which help an organization to assimilate and accommodate change. These include experimentation (actions that untangle causality), collective judgment (agreement on preferences), and preservation of dissent (the retention of multiple understandings and minority influence).

A series of definitions describe adaptability in cultural terms as a set of shared values. However, even culturally based definitions contain substantial variation in what values should be included. Specific culture-based definitions of adaptability by Kilmann, Saxton and Serpa (1985) and Schein (1992) reveal detail about the set of values that may be relevant. Kilmann, et. al. (1985: 356) defines an adaptive culture as one having the following characteristics:

- Risk-taking
- Trusting and proactive approach to organizational and individual life
- Members support others’ efforts to identify problems and implement workable solutions
- Shared feeling of confidence that members can effectively manage new problems and opportunities
- Widespread enthusiasm
- Spirit of doing what it takes to achieve success
- Receptivity to change and innovation

Schein (1992) describes culture as a pattern of shared basic assumptions that a group learns as it solves problems of external adaptation and internal integration. He goes on to describe the types of assumptions which groups learn in order to solve their external adaptation problem. They are assumptions about:

- Mission and strategy
- Operational goals
- Means to achieve goals
- Criteria for measuring results
- Remedial and repair strategies

Angle and Perry (1981), in a study on the correlates of organizational commitment, measured adaptability using a part of an organizational climate instrument by Mott (1972). This instrument used four questions to assess people's ability to (1) anticipate problems, (2) keep up with changes in equipment and ways of doing things, (3) adjust quickly to changes, and (4) cope with emergency situations.

More recently, the attempts to clarify and utilize adaptability have continued. Kotter and Heskett (1992) measured adaptability by asking financial analysts to evaluate the extent to which firms value customers, employees, shareholders, and people/processes that create useful change. Gordon and DiTomaso (1992) observed that previous research by Gordon (1985) identified two cultural factors that were related to performance. These factors, called (1) innovation/risk-taking, and (2) action orientation, were extracted from a larger, eight factor measurement instrument and called adaptability. O'Reilly, Chatman and Caldwell (1991) considered adaptability as one of a set of 54 cultural items that may describe a firm.²

It is clear from the above discussion that adaptability may include many factors. Certainly, the previous attempts at measuring adaptability have been incomplete efforts based on limited definitions and conveniently available instruments designed for other purposes. It is apparent that a more rigorously designed measurement of adaptability would be useful to scholars. Chapter 3 contains a section which develops, from the definitions presented above, an instrument for the assessment of adaptability.

Performance Evidence

The performance implications of strategy and adaptability are investigated in the following pages.

Strategy and Performance

The relationship between strategy and performance has been convincingly established in the literature. The prescriptive school views improved performance as an explicit goal of strategy. The descriptive approaches, however, vary in the level of emphasis placed on economic performance and may consider a wide variety of outcomes (including survival, learning, etc.) in addition to, or in conjunction with, economic performance.

A number of studies provide evidence that the choice of strategy is related to firm performance. Conceptually, both White and Hamermesh (1981) and Lenz (1981) summarized several models of firm performance. White and Hamermesh (1981) describe five models

² It is interesting to note that in this study, adaptability, as a single item, did not load significantly on any of the eight factors identified in that study. However, some of the factors identified by O'Reilly, et.al. (1991) (innovation, aggressiveness, decisiveness), appear to correspond somewhat with factors cited by Gordon and DiTomaso (1992) as being components of adaptability (innovation/risk-taking, action orientation).

incorporating various combinations of industrial organization economics, organization theory and strategy. In all but the pure organization theory model, strategy is an important component of performance. Lenz (1981) identifies six distinct research streams, two of which explicitly consider strategy as a critical component. The first considers the strategy--structure--performance model of Chandler (1962). The second describes an environment--strategy--performance model consistent with contingency and industrial organization models.

Empirical evidence generally supports the relationship between strategy and performance. For example, Miller and Friesen (1978) identified ten different strategic types. Six of these strategies were generally successful (Adaptive Firm under Moderate Challenge, Adaptive Firm in Very Challenging Environment, Dominant Firm, Giant Under Fire, Entrepreneurial Conglomerate, and Innovator). The remaining four strategies were unsuccessful (Impulsive - Running Blind, Stagnant Bureaucracy, Headless Giant, Swimming Upstream). Using the Miles and Snow (1978) strategic typology, Hambrick (1983) found significant performance differences between prospectors and defenders. Using Porter's (1980) generic strategy typology, Dess and Davis (1984) found some evidence of performance differences among strategic clusters (representing Porter's generic strategies) in the paint industry.

Besides the generic strategy literature, the strategic group literature also identifies performance differences. Mascarenhas and Aaker (1989) found significant performance differences among strategic groups in the oil drilling industry while Fiegenbaum and Thomas (1990) also found differences among strategic groups in the insurance industry. Cool and Schendel (1987) found some performance differences among groups in the pharmaceutical industry, although a later study concluded that strategic group effects were overpowered by risk-return relationships. Venkatraman and Prescott (1990) discovered a relationship between the alignment of strategic resource deployments and performance. Those firms whose resource profiles were further from the ideal profile experienced significantly poorer performance.

A dimensional profile of strategic orientation was suggested by Venkatraman (1989a) to be useful for interfirm comparisons and examination of performance differences. In this cross-sectional study of many industries, Venkatraman found five of six STROBE dimensions to be correlated with profitability (aggressiveness, analysis, defensiveness, proactiveness, and riskiness). Two of the six were correlated with sales growth (analysis and proactiveness).

More recently, the discussion of strategy has centered on idiosyncratic (by firm) themes focusing on consistent innovation (e.g., Oster, 1990), core competencies (e.g., Prahalad & Hamel, 1990), firm specific capabilities (e.g., Stalk, Evans & Shulman, 1992), organizational learning (e.g., Dodgson, 1993), and high-performance human resources practices (e.g., Pfeffer, 1994).

Consistent with past empirical evidence one should observe performance differences based on strategy. Specifically which strategies should result in superior performance depends upon the industry and should be discernable through empirical investigation. Therefore, the first hypothesis

suggested by the literature is that performance differences based on strategic characteristics will be observed.

Hypothesis 1: Choice of strategy will have a differential effect on firm performance.

Adaptability and Performance

Miller and Friesen (1978) found a relationship between their adaptiveness variable (measured from analysis of case studies as the responsiveness and appropriateness of decisions to external environmental conditions) and performance. Three successful strategies; (1) adaptive firm under moderate challenge, (2) adaptive firm in a very challenging environment, and (3) dominant firm, were rated high on adaptiveness. One of their unsuccessful strategies, stagnant bureaucracy, was rated very low on adaptiveness.

Also applicable here is the discussion about r-strategists and K-strategists by Zammuto and Cameron (1985). The r-strategist firms move quickly to exploit new resources (adapt) as they become available in an environment. They are more likely to survive in a growing environment than K-strategists who are better at gaining efficiency advantages and are more likely to be successful in densely populated environments. Theoretically, in a changing environment, adaptability and success should be positively related. Since business environments are changing drastically, one would expect to find this relationship between adaptability and performance to hold in most industries.

A growing body of research, primarily from the organizational culture literature, makes a strong case that adaptability is significantly related to firm performance. Jay Barney (1986) proposed three conditions under which organizational culture can be a source of sustained competitive advantage and, therefore, sustained financial performance. First, the culture must allow a firm to behave in a manner that results in high sales, low costs, high margins, or to act in other ways that add financial value. Second, the culture must be rare and have characteristics that are not found in many other firms. Third, the culture must be difficult for competitors to imitate.

Table 2 summarizes the empirical studies which have found a relationship between elements of culture and performance. Two distinct streams of research seem to be emerging. One explores the correlation of a cultural profile of values (Dennison, 1984; Gordon, 1985; Peters & Waterman, 1982), individual values such as adaptability (Gordon & DiTomaso, 1992; Kotter & Heskett, 1992), or strength of culture (Dennison, 1984; Gordon & DiTomaso, 1992) with common measures of financial performance. The other examines the relationship of culture with intermediate outcomes. Some of the outcomes that have been explored are employee retention (Sheridan, 1992), person-organization fit (O'Reilly, Chatman, & Caldwell, 1991), and strategic marketing implementation (Badovick & Beatty, 1987).

Table 2 Elements of Culture Related to Performance (PDF: tbl2.pdf)

Special mention needs to be made of a recent study by Marcoulides and Heck (1993). These authors have attempted to develop and test a structural equations model of organization performance. Task organization, organizational climate, and worker attitudes/goals are presented as intervening variables between the two initial exogenous variables (organizational values, organizational structure/purpose) and the ultimate endogenous variable (organizational performance). This study is important because of the recognition of intermediate variables between organizational performance and organizational values. Other intermediate variables (norms, status, roles, individual personality and individual cognitions) were suggested by Allaire and Firsirotu (1984) focusing on an individual rather than organizational level of analysis.

In their 1982 book, *In Search of Excellence*, Peters and Waterman spawned what is now a nearly fifteen year search for the link between culture and performance. The authors provided mostly anecdotal evidence that adherence to eight general principles or values leads to excellent performance. According to the authors, excellent organizations should try to achieve an openness to opportunities in a changing environment in order to adapt. Although Peters and Waterman did not name this objective adaptability, its description matches closely some of the definitional elements of adaptability explained above and presented in Appendix A.

Two years after the publication of *In Search of Excellence*, some of its conclusions came under criticism. Evidence was presented which showed that 14 of the 43 excellent companies discussed in their book had experienced financial difficulties (“Who’s Excellent Now”, 1984). In 12 of the 14 companies which had stumbled, the problem was attributed to ineptitude in “adapting to a fundamental change in their markets (p. 78).”

Other researchers took up the challenge and attempted to rigorously analyze the link between culture and performance. At first, research focused on evidence linking performance to either the strength of culture or to particular dimensions of culture. In addition to the excellent firms identified by Peters and Waterman (1982), case study evidence for the benefits of a strong culture were also touted by Deal and Kennedy (1982). Dennison (1984) found evidence that the levels of two cultural dimensions differed between high and low performing firms. The two dimensions were, (1) organization of work and (2) decision-making practices. Organization of work is the degree to which work is sensible, adapted to changing conditions, appropriate decisions are made, and that goals are clear and reasonable. Decision-making practices are the degree of individual involvement and extent that information is shared. Gordon (1985) found that high performers in an industry displayed a different profile of cultural values from low performers. Gordon further noted that these profiles were different for the high performers in different industries.

Recent research has begun to focus simultaneously on strength of culture and particular dimensions as the determinants of superior performance. Gordon and DiTomaso (1992) discovered that firms with strong cultures and which were adaptable, were also high performers. This conclusion supports the findings of Kotter and Heskett (1992). They concluded that high performing firms were likely to have strong cultures, values which encourage adaptable behaviors,

and to value customers, employees and shareholders equally. These authors also concluded that (1) corporate culture will become more important for performance in the future, (2) cultures which inhibit strong performance are common and easily developed, and (3) that cultures can be changed to enhance performance.

This discussion supports the conclusion that firms which are more adaptable should perform better. Evidence in this research should be expected to show a confirmation of the results of Gordon & DiTomaso (1992) and Kotter & Heskett (1992).

Hypothesis 2: Adaptability will be positively related to firm performance?

Strategy and Adaptability

The relationship between strategy and adaptability can be viewed through a number of different but related lenses. In the strategic choice literature, strategy is a series of adaptive choices by a dominant coalition influenced by contextual variables (environment, technology and size) and by internal considerations (e.g., existing structures and politics) (Child, 1972). The organizational culture literature defines adaptability as a set of shared organizational values which can influence strategy, be influenced by strategy, or fit with strategy in a variety of ways (e.g., Allaire & Firsirotu, 1984). Discussions of organizational inertia focus on the inability of firms to adapt and the organizational strategies and changes required to overcome inertia (e.g., Rumelt, 1994). Finally, the organizational learning literature generally addresses the strategic expansion of firm capabilities through a process of acquiring, retaining and expanding collective knowledge (Dodgson, 1993). These literatures exhibit striking overlap, explaining similar phenomena from somewhat different perspectives. These perspectives will be more fully examined in the following sections.

The Strategic Choice Lense

Child (1972) expressed the basic premise of strategic choice as a process by which the members of the firm's dominant coalition accomplish four things:

- (1) evaluate the organization's position with regard to owner's expectations, environmental trends, recent performance, and internal structure,
- (2) choose organizational goals and objectives,
- (3) take strategic action with regard to external variables by choosing appropriate market activities, and
- (4) take strategic action regarding internal variables by establishing a consistent configuration of manpower, technology and structure.

Successful application of this process is intended to result in an effective and efficient organization appropriately adapted to its conditions. Child (1972) further defines an adaptive organization as one whose structure is open to continual redefinition, and achieves coordination through frequent meetings and lateral communications.

In the strategic choice perspective, the ability of a firm to adapt is inextricably linked to the process of strategy formation and implementation and is, in essence, the objective of strategy in the first place. From this viewpoint one would expect strategy and adaptability to exhibit significant overlap.

Organizational Culture Lense

Some researchers view adaptability as a set of shared values that are a part of organizational culture (Gordon & DiTomaso, 1992; Kotter & Heskett, 1992). Many researchers have proposed that the strategy development and implementation process can be partially explained through an understanding of organizational culture. However, only limited empirical research has rigorously investigated the role that culture plays in the strategy process.

Many strategy models ignore the role of culture (e.g., Andrews, 1987; Glueck, 1980; Schendel & Hofer, 1979; Steiner, Miner, & Gray, 1986; Thompson & Strickland, 1987; Pearce & Robinson, 1991). According to other organizational researchers, there are at least five ways in which strategy and organizational culture may be related.

First, culture and strategy may be two of a variety of interrelated elements which together lead to the accomplishment of organizational objectives (e.g., Waterman, Peters and Phillips, 1980; Allaire & Firsirotu, 1984). Of particular significance here is that culture (shared values) can be both an antecedent and succedent of strategy. Second, the relationship may be primarily one-way with strategy formulation leading to an alteration of culture (Stonich, 1982; Stringer & Uchenick, 1986). Third, some prescriptive models of strategic management propose the reverse relationship with culture as an influence on the strategic management process (e.g., Wheelen & Hunger, 1992; Digman, 1986; Thompson & Strickland, 1995). A fourth perspective sees organizational culture as an integral part of the strategy-making process leading to the incremental emergence of strategy (Quinn, 1981; Mintzberg, 1973, 1994; Johnson, 1988) or style of strategy-making and implementation (Bourgeois & Brodwin, 1984; Nutt, 1983). The fifth approach proposes a much more complex relationship whereby superior performance is predicated on an appropriate fit between culture and strategy (Arogyaswamy & Byles, 1987; Scholz, 1987).

It appears that there is little agreement on the form of the relationship between strategy and culture, nor on the form of the effect that these two variables jointly may have on outcomes such as firm performance. Authorities would generally agree on two points. First, that there should be a reciprocal relationship between firm strategy and firm culture. Second, the relationship between strategy and culture is supportive at its best. An appropriate strategy can be enhanced by an appropriate culture or hindered by an inappropriate culture.

Organizational culture is an enigmatic organizational concept. It has proven to be a difficult concept to define, measure and interpret (Smircich, 1983; Alvesson & Berg, 1992). There are numerous ways to conceive of culture (Smircich, 1983; Alvesson, 1993). There are also at

least eleven levels of culture that have been identified in the literature (See Table 3). This complexity and the conceptual overlap of other perspectives make it prudent to explore other avenues in addition to culture for a complete treatment of adaptability.

Table 3 Levels of Culture (PDF: tbl3.pdf)

Organizational Inertia Lens

The population ecology literature introduces the concept of organizational inertia (Hannan & Freeman, 1977). Inertia is the characteristic which impedes an organization from changing its structure in material ways. Therefore, it is either appropriately adapted to its environment and survives or its form is inappropriate for the environment and it fails. Changing forms to meet changing environmental conditions is viewed as extremely difficult to do if not impossible.

Some researchers take a less extreme view of inertia. Rather than being absolute, they contend that inertia is something that is difficult, but possible to overcome (Rumelt, 1994). It is well recognized that organizational change is often very difficult to implement. But case evidence is overwhelming that some organizations can change or adapt to changing environmental conditions. Some organizations are more bound by inertia than others. Therefore, adaptability could be viewed in this context as the converse of inertia, or as the ability to overcome inertia.

From a strategic point of view, the objective becomes to institute structures and activities which assist in overcoming organizational inertia. For example, Rumelt (1994) identifies five sources of inertia (frictions); distorted perceptions, dulled motivation, failed creative response, political deadlocks, and action disconnects. Organizational transformation requires effort directed at overcoming these sources of inertia. But change is possible and some firms should be better at it than others.

Organizational Learning Lens

Another direction from which to assess adaptability and strategy is through organizational learning. There are many definitions of organizational learning. In a summary of the organizational learning literature, Dodgson (1993) defines it as “the ways firms build, supplement and organize knowledge and routines around their activities and within their cultures, and adapt and develop organizational efficiency by improving the use of the broad skills of their workforce (p. 377).” Learning is important because it is a “requirement for adaptation and improved efficiency in times of change (p. 378).” The ability of an organization to learn, therefore, improves its ability to adapt.

Levitt and March (1988) state that, “Learning itself can be viewed as one of the technologies within which organizations develop competence through use and among which they choose on the basis of experience (p. 332).” Organizations can learn to learn, and some do it better than others. Those who do are more likely to adapt to changing conditions.

Learning has become an important concept in the strategic management literature. The learning or experience curve has been a key concept in strategic management (Boston Consulting Group, 1968). It states that as a firm doubles its experience with a product, it should expect to lower its unit cost by thirty percent. Learning is also key to the currently fashionable strategic concept of developing firm-specific or core competencies (Prahalad & Hamel, 1990). Continuous product and process innovation, which has been proposed as a possible sustainable competitive advantage (Oster, 1990), is clearly related to organizational learning. To enhance adaptability, it becomes strategically important for firms to do things which enhance organizational learning. Training, motivation, retention and a multitude of other employment practices focused on enhancement of human resources are critical to this objective.

A Multi-Perspective Approach to Adaptability

Clearly, adaptability can and should be addressed from a number of different perspectives. Cultural values of innovation and action orientation which have been used to define and measure adaptability in recent research only partially describe adaptability. Therefore, it is important in a treatment of this topic to assume a multi-perspective approach and develop a measurement scheme for adaptability from the ground up.

The discussion of the relationship of strategy and adaptability from the perspective of four lenses or perspectives leads to the conclusion that the two constructs are closely related. At a minimum, a reciprocal relationship should exist. Strategy may be used to affect the ability of a firm to adapt. Conversely, the more adaptable the firm, the more likely it will have an effective strategy, particularly when that strategy requires significant change. Specifically, a defensive posture by a firm implies an attempt to prevent change from occurring. Miles, Snow, Meyer and Coleman (1978) described the defender strategy as one which tries to maintain a stable environment and stable structure through choice of a narrow product-market domain, attention to efficient production and distribution, and strict control systems. The primary risk of a defensive strategy is one of being unable or unwilling to respond to major shifts in the market; or in other words, of being unadaptable to market forces.

Porter's (1985) low cost strategy has similar features to the defender strategy of Miles and Snow. Porter argues that a low cost strategy focuses on, "tight control systems, overhead minimization, pursuit of scale economies, and dedication to the learning curve (p. 23)," and a culture based on, "frugality, discipline, and attention to detail (p. 24)." Miller and Friesen (1978) found four unsuccessful strategy types. Two of these; (1) stagnant bureaucracies, and (2) headless giants, have very conservative and tradition driven characteristics and were found to be very low in adaptiveness. The implications of these descriptions are that these strategies are necessarily rigid and difficult to change when they are engrained in the organizational psyche and, therefore, less adaptable than more outward-looking strategies. As a hypothesis this can be stated as:

Hypothesis 3: Firms with more defensive strategies will be less adaptable than firms with less defensive strategies.

The differentiation strategy of Porter (1985) and the prospector strategy of Miles and Snow (1978) also share some characteristics. Differentiators must continually find and maintain product attributes which command premium market prices above the costs required to provide the attribute. Choices of how to do this are greater (quality, features, service, image, etc.) and many different approaches may be successful in the same industry. Prospectors, according to Miles and Snow (1978), continually find and exploit new market opportunities and are often the creators of change in an industry. This argues for a greater ability to adapt to opportunities and changing conditions.

Miller and Friesen (1978) found six successful strategy types. Three of these strategies, (1) adaptive firm under moderate challenge, (2) adaptive firm under very challenging conditions, and (3) dominant firm, are very high in dynamic characteristics such as proactiveness, innovation and, not surprisingly, adaptiveness. Therefore, firms with characteristics related to these strategies would be expected to be more adaptable on average. This suggests the hypothesis below:

Hypothesis 4: Firms with more dynamic strategic characteristics will be more adaptable than firms with less dynamic characteristics.

Another category of strategies could be termed indistinct strategies. Miles and Snow (1978) describe a reactor strategy which is characterized by inconsistency and inability to cope with a changing environment. This is very similar to Porter's (1985) stuck-in-the-middle strategy which describes those firms who seem to be unable to differentiate, develop a low cost structure or to focus. These firms may attempt to adjust and change, but these changes are unfocused and ineffective. They are never able to achieve either a differentiated, low cost or focused position. Porter expects these firms to have below average performance.

The four unsuccessful strategies identified by Miller and Friesen (1978) also describe firms with indistinct competitive approaches. Those four strategies are; (1) Impulsive - Running Blind, (2) Stagnant Bureaucracy, (3) Headless Giant, and (4) Swimming Upstream. All four of these strategic types are either unwilling or unable to develop a distinctive competitive approach, thereby, relegating them to inferior competitive positions.

Firms with indistinct strategies as described by all of these researchers are ineffective at adapting to changing conditions and would, therefore, be expected to exhibit relatively low adaptability. However, some of these firms attempt to adjust and achieve a distinctive strategy. So it is possible that certain indicators of adaptability may be fairly high. This suggests an intermediate level of adaptability of these firms, somewhere between the dynamic and the defensive strategies.

Hypothesis 5: Firms with indistinct strategies will exhibit relatively lower levels of adaptability than firms with dynamic strategies.

Organizational Behaviors: Strategic Implementation/Actions

There should be behavioral implications to the concepts of strategy and adaptability and their combination. Firm performance cannot occur without the firm making certain decisions and taking appropriate actions. What are the appropriate behaviors in the course of undertaking high priority strategic activities like the adoption of Electronic Commerce? The strategy and project implementation literature provides some assistance in specifying what these appropriate actions may be.

There are several different avenues in the strategy implementation literature which may be useful here. For example, generalized implementation approaches (Bourgeois & Brodwin, 1984; Marcus, 1988, Nutt, 1983), implementation tactics (Nutt, 1986), implementation processes (Bryson & Bromiley, 1993), and implementation problems (Alexander, 1985) would be interesting to investigate, but have received limited follow-up support and investigation.

Additional guidance in choosing appropriate behaviors may be found in models developed by Allaire and Firsirotu (1984) and Marcoulides and Heck (1993). In their model of the role of organizational culture, Allaire and Firsirotu (1984) see a sociostructural system which affects and is affected by the cultural system of the organization. Besides strategies, this sociostructural system forms an interconnected web of various organizational design variables (structure, policies and processes). These variables encompass the organizational aspects of formal goals and objectives; human resource programs such as recruitment, selection, training, education, rewards and motivation; authority and power relationships; control mechanisms; and managerial style and processes. Additionally, both the cultural and sociostructural systems influence organizational norms, status, roles; and characteristics of individual actors (knowledge, cultural competence, values, assumptions and expectations, needs, motives, leadership roles). Ultimately, this complex web of variables influences organizational outputs defined as, “ongoing streams of individually purposeful actions and collectively meaningful acts (p. 214).”

Another fairly complex study by Marcoulides and Heck (1993) looked at the interrelationship of numerous organizational variables leading to organizational performance. These authors developed a structural equations model which included interrelationships among organizational structure and purpose, organizational values, task organization, organizational climate, and worker attitudes and goals.

The works described above suggest that nearly every organizational behavior and design variable could be fertile ground for inclusion in this study. Therefore, a fairly straightforward approach is taken. Alexander (1991) assesses the relative importance placed on various categories of actions appearing in the implementation literature over the years. Comparing the implementation models of eight different authors yielded seven variables which appeared in a majority of models he reviewed (See Table 4). The variables most commonly cited were organization struc-

ture, control mechanisms, objectives, reward systems, people/human resources, culture, and information and decision processes.

Table 4 Summary of Strategy Implementation Models (PDF: [tbl4.pdf](#))

Although not explicitly considered in Alexander's (1991) analysis, additional elements of implementation should also be considered. First, the development of a formal plan to carry out a strategic activity should indicate that the activity is of a high priority. Secondly, the extent to which the motivations, goals, objectives, and plans of a project are communicated to organizational members is an important indication of that project's priority. Alexander (1985) reiterated the responses of senior executives in stressing the role of communications in implementing strategy. One would expect extensive communication of high priority items to members of the organization.

The accomplishment of appropriate implementation activities should result in effective results of the project; and, when aggregated across all such projects, superior performance of the firm. Many researchers suggest that implementation or execution may be more important than strategy formulation. For example, Wheelen and Hunger (1992) state that, "Poor implementation of an appropriate strategy can result in the failure of that strategy. An excellent implementation plan, however, will not only cause the success of an appropriate strategy, it can also rescue an inappropriate strategy (p. 237)." Thompson and Strickland (1995) state that, "it is a whole lot easier to develop a sound strategic plan than it is to make it happen (p. 238)." Therefore, one would expect that firm performance would be better in those firms which are better at implementation. This suggests that:

Hypothesis 6: Firms which place greater emphasis on important implementation actions will realize better performance than firms which place less emphasis on important implementation actions.

Certain strategies, particularly those which are more action oriented should result in the emphasis on high priority implementation actions. Similarly, adaptability implies the willingness to change; therefore, one would expect more change to occur and more emphasis on implementation activities. Relatively higher levels of adaptability should also lead to deciding on avenues that could lead to a strategic advantage such as deciding to exploit Electronic Commerce in the first place. Therefore, inserting the intermediate variable (organizational behaviors) between the independent variables (strategy, adaptability) and the previous dependent variable (firm performance) in the discussions leading to Hypotheses 1 and 2 should be valid. This leads to the following hypotheses:

Hypothesis 7: Firms with more dynamic strategies will place more emphasis on important implementation actions than firms which are more defensive.

Hypothesis 8: Firms which are more adaptable will place greater emphasis on important implementation actions than firms which are less adaptable.

From the previous discussions, one would expect that the three constructs (strategy, adaptability, and high priority implementation behaviors) would lead to superior results when all three occur in combination. Choosing a distinctive and appropriate strategy should lead to better performance (e.g., Porter, 1985; Miles & Snow, 1978; Miller & Friesen, 1978). Being better at identifying and reacting appropriately to environmental conditions (adaptability) should also lead to improved performance (e.g., Gordon & DiTomaso, 1992; Kotter & Heskett, 1992). Being more effective at implementing the appropriate changes should also enhance a firm's ability to perform (e.g., Alexander, 1991). So, if a firm chooses the correct strategy, adjusts to the needed changes well, and is effective at implementation, it is reasonable to expect that these characteristics in concert would constitute a triple performance threat. This "best of all worlds" scenario should result in the highest levels of performance. This leads to the following hypothesis:

Hypothesis 9: Firms with distinct strategies, high adaptability, and utilizing important implementation actions will exhibit superior performance compared with firms which are lacking in one or more of these characteristics.

The Influence of Context

Strategy is usually linked with the external environment in which the firm operates. Whether formulated with specific environmental threats and opportunities in mind (e.g., Learned, et.al., 1965; Ansoff, 1965; Porter, 1980; Thompson & Strickland, 1987), or emerging incrementally from within the organization (e.g., Quinn, 1981; Johnson, 1988; Mintzberg, 1994), much of what becomes, or is interpreted as strategy has evolved with at least some sensitivity toward the external world.

In the strategic management literature, many contingency factors have been suggested to influence strategy. Numerous summaries of the contingency literature have concluded that the external environment exerts a strong influence on strategy formulation (e.g., Bourgeois, 1980; Ginsberg & Venkatraman, 1985; Porter, 1980) or on the relationship between strategy and other variables such as performance (Prescott, 1986). Empirical evidence tends to support this contention (e.g., Lenz, 1980; Hambrick & Lei, 1985; Miller, 1987).

Adaptability, as well as strategy, is at least partially related to the context within which the firm exists. Schein (1992) argues that the fundamental problems of groups are, "(1) survival, growth and adaptation in their environment, and (2) internal integration that permits daily functioning and the ability to adapt (p. 11)." From a cultural perspective, formation and adjustment is, ultimately, about the development of a shared method of surviving in the world. It is a learning process where an organization discovers what works and internalizes that knowledge into a shared understanding of reality.

The extent to which the environment is changing influences both the strategy of the organization and its adaptability. In a stable environment the need to adjust successful strategies and structures is not very important. In fact, frequent change would require energy and resources to be expended that are not necessary. Too much change under this condition would actually be detrimental. In a dynamic environment, those firms which are more sensitive to environmental changes, are able to identify the right adjustments, and are able to make changes expeditiously have a better chance of survival and success. For example, the pace of change in the environment has been linked to the type of organizational structure used (Burns & Stalker, 1961).

Technology is another contingency factor which has been cited extensively as having an effect on organizational structure (e. g., Thompson, 1967; Woodward, 1965; Grinyer & Yasai-Ardekani, 1981). For example firms using a process technology are likely to be organized differently from those having a long-linked technology (Thompson, 1967). Their resulting strategies are also likely to differ (Grinyer & Yasai-Ardekani, 1981).

Evidence indicates that adaptability is at least partially industry dependent. Kotter and Heskett (1992) argue that the role of leadership in the organization is to help preserve an adaptive core which focuses on staying in tune with customer, shareholder and employee needs. The most important external focus of adaptability, according to these authors, is a marketplace focus. Gordon and DiTomaso (1992) argue that adaptability is a set of cultural values (innovation and action orientation). Earlier, Gordon (1985, 1991) presents evidence that the industry within which a firm operates is a major influence on organizational culture. Gordon (1985) found that a firm's culture was strongly influenced by industry characteristics such as competitive actions, customer requirements and societal expectations. For many researchers, the formation of organizational culture is a process of adaptation and learning (Schein, 1992). It is often argued that inertia is partially due to common knowledge, a dominant paradigm, common wisdom, or assumptions that have not been questioned. Therefore, when conditions change, adaptation may be impeded by this common wisdom which may no longer be valid.

Besides controlling for industry, it is also important to control for size. Electronic Commerce, especially electronic data interchange (EDI) was adopted by the bigger firms first. Larger firms with greater economic power and influence over their customers or suppliers have a greater incentive to link up electronically to improve service or reduce costs. The larger firms see more strategic opportunity and have more resources available to experiment. It is likely that this phenomenon has carried through to all of Electronic Commerce. Therefore, controlling for the size of firms is necessary.

Hambrick and Lei (1985) attempted to rank the importance of ten contingency variables regarding their effects on the strategy-performance relationship. The top five are: (1) user sector (consumer vs. industrial), (2) purchase frequency, (3) stage of product life cycle, (4) dollar importance of product to customer, and (5) technological change.

Other than size, the factors discussed above are related either to the product being produced or the customer being served. This provides justification for taking industry conditions into consideration in this research. Picking firms within an industry which face similar customers, suppliers, and that use similar production methods will help control the most likely confounding factors in this study. Execution of the study within a controlled setting by industry allows conclusions to be drawn with more confidence. However, generalizability of results will be more difficult to support, thus requiring replication of the results in different settings. Without this control, one could not draw the conclusions that the performance or behavioral effects of the interrelationship of strategy and adaptability were due to variations in those variables or just due to a difference in the pace of change or technologies faced by firms in different environments.

A Strategy-Adaptability-Behavior-Performance Model

The evidence presented above outlines the construction of a general model of the relationships among the designated organizational variables. This model, previously summarized in Chapter 1, can now be reintroduced as Figure 2 with annotations (major sources supportive of each of the links in the model).

Figure 2 General Strategy-Adaptability-Behavior Model (PDF: fgr2.pdf)

Two additional links need explanation. The feedback links (illustrated by dotted lines) from performance back to adaptability and strategy, respectively, are theoretically well justified. The link between performance and adaptability arises from descriptions of organizational learning surrounding the formation of organizational value systems. Although there are many different definitions of culture, many authors agree that it arises from a learning process related to past success in solving organizational problems. For example, Schein (1992) describes culture as, “a pattern of shared basic assumptions that the group has learned...that has worked well enough to be considered valid...(p. 12).” Kotter and Heskett (1992) state that what is necessary to create a culture of adaptability is, “that a group of employees interact over a significant period of time and be relatively successful at whatever they undertake (p. 6).” Mitroff and Kilmann (1984) describe culture as, “a set of shared philosophies, ideologies, values, beliefs, expectations, attitudes, assumptions, and norms” which are, “...learned by living in the organization and becoming a part of

The second feedback link shown is between performance and strategy. This connection has been described repeatedly in the prescriptive strategy literature, usually under the heading of strategic control. Numerous authors include this control/feedback loop in their models of strategy (e.g., Digman, 1986; Pearce & Robinson, 1991; Steiner, et. al., 1986; Wheelen & Hunger, 1992; Thompson & Strickland, 1987). Researchers who support the more incremental approaches to strategy argue that formulating strategy and acting are often inextricably linked in a learning process (Mintzberg, 1994). Therefore, this feedback loop becomes shorter and more frequent under the incremental perspective.

In Figure 2, the box illustrated with the dashed line contains the variable called behaviors and, in this study, represents those activities which are likely to occur during implementation of a high priority project. Other types of behaviors could have been examined and may be interesting for further research. For example, Marcoulides and Heck (1993) proposed a model which included task organization, organization climate, and worker attitudes and goals as intermediate variables between the exogenous variables of organizational structure/purpose and organizational values, and the dependent variable, organizational performance. Allaire and Firsirotu (1984) included norms, status, roles, individual personality and individual cognitions in their conceptual model. Kotter and Heskett (1992) examined the role of leadership behaviors. Bryson and Bromiley (1993) considered the style of the implementation process. So, it is clear that there is a wide range of intermediate phenomena which could be studied in the context of this research. The research presented here will concentrate on several important implementation behaviors that have been identified in the strategy implementation literature.

The model described above requires operationalization. Clearly, it would be impractical to test the entire model. Therefore, it is necessary to limit the domain of this study somewhat, and specify the operationalized variables with which to work. These choices delineate a specific model within which empirical testing can take place.

In addition, this study addresses multi-level and cross-level issues which require careful examination. According to Rousseau (1985), good theory is the first defense against poor research designs when multi-level and cross-level phenomena are under investigation. The research in this study involves phenomena on two levels: (1) strategy and firm performance on the firm level of analysis; and (2) adaptability, behaviors and group/project performance on a lower organizational level. Strategy is conceived as a firm level variable in this study and firm performance is clearly at the firm level of analysis. Adaptability has been seen as a firm level variable by Gordon and DiTomaso (1992) and Kotter and Heskett (1992). But we have evidence that organizational subgroups are affected differently by their different sub-environments (Lawrence & Lorsch, 1967). We also have theory and evidence that certain groups are encouraged to be flexible and entrepreneurial (Pelz & Andrews, 1976) while other groups (their technical cores) are protected from change and disruption (Thompson, 1967). This suggests that organizational phenomena such as adaptability may be different in different sub-groups as each reacts to different forces in its subenvironment. Therefore, since this research is focusing on a single area (Electronic Commerce) and is measured by surveying knowledgeable people in specific organizational departments (likely, information systems and purchasing) it is more appropriate to examine adaptability as group level construct. Similarly, implementation behaviors and project performance are specific to Electronic Commerce and are conceived and measured at the group level.

Theoretically this is consistent with the idea that firm level strategy is translated into group level perceptions and behaviors which in aggregate (summed over all groups and all projects) lead to firm performance. Figure 3 illustrates the fully operationalized model.

Figure 3 Specific Strategy-Adaptability-Behavior-Performance Model (PDF: fgr3.pdf)

All strategic contingencies would be too numerous to handle within the bounds of a single dissertation. As a consequence, the area of specific interest to be addressed here is the interrelationship among strategy, adaptability and behaviors. Therefore, the study will control for context by choosing a sample from a single industry. This study will also avoid the complications posed by the feedback loops between performance and strategy, and between performance and adaptability. These control linkages should serve to reinforce the relationships within the specific model.

The strategy construct itself is problematic because there are numerous conceptions of strategy that could be used. Since adaptability should have a pervasive influence on decisions and actions in the firm it seems appropriate to use a concept of strategy that describes some pervasive strategic characteristics. Venkatraman's (1989a) Strategic Orientation of Business Enterprises (STROBE) construct has been chosen since it encompasses a broad range of competitive and environmental posture dimensions. Venkatraman found six potential dimensions; aggressiveness, analysis, defensiveness, futurity, proactiveness, and riskiness.

Behavior variables used will be those identified in the review of the strategy implementation literature above as described by Alexander (1985, 1991). Those high priority implementation actions are organization structure, control mechanisms, objectives, reward systems, people/human resources, culture, information and decision processes, existence of a plan, and communications. In addition, a few items suggested by the Electronic Commerce and project management literatures (Cash & Konsynski, 1985; Clemons & Row, 1988, 1991; McFarlan, 1984; Porter & Millar, 1985; Oster, 1990; Benjamin, de Long & Morton, 1990) have been added for reasons detailed in the measurement section of Chapter 3. These additional indicators are the priority accorded Electronic Data Interchange (EDI), date of adoption of EDI, and the extent to which EDI is integrated with the firm's systems and processes.

A number of authors propose that organizational culture will have a significant effect on the ability of a firm to take advantage of an information technology innovation (Wiseman, 1988; Oster, 1990; Cash & Konsynski, 1985; Benjamin, de Long & Morton, 1990). It is not clear from these authors, however, which specific aspects of culture have the most influence on the implementation of an innovation. For that insight one must turn to the discussion of culture and performance earlier in the chapter. Adaptability (Gordon & DiTomaso, 1992; Kotter & Heskett, 1992) has been identified as the most likely candidate.

CHAPTER 3

RESEARCH METHODS

This chapter explains the study methodology including sections on the research setting and sample, data collection methods, study variables, and statistical analyses.

Research Setting and Sample

This research focuses on a particular technological innovation, Electronic Commerce, implemented within a particular industry. Electronic Commerce is the intercompany computer-to-computer exchange of business information and documentation. Electronic Commerce has also been referred to as “Interorganizational Information Systems” in the information systems literature (Johnston & Vitale, 1988). A core technology of Electronic Commerce is Electronic Data Interchange (EDI). EDI includes the transmittal (in standard digital formats) of business documents such as purchase orders, confirmation notices, shipment bookings and notices, electronic funds transfers, insurance claims, or any other business transaction for which standard data formats have been developed. For a more complete description of EDI see Crowley (1993).

Other systems included under the broad heading of Electronic Commerce include applications such as electronic catalogues, groupware, other Internet applications, data capture and consolidation technologies, and reporting systems. Telecommunications technologies are also core technologies for EC which are used for data transmission over a variety of public and private networks including value added networks (VAN) and the Internet. In essence, Electronic Commerce is the replacement of paper-based methods of documentation with digital electronic means to conduct business.

Industry: In order to control for some of the contextual factors related to strategy and adaptability (See Chapter 2), a single industry was chosen as the setting for this study. Two of the most critical factors discussed are the technology used and the dynamism of the external environment. Preliminary investigation of an appropriate industry centered on various segments of the textile and furniture industries located in North Carolina and adjacent states. Ultimately, the socks segment of the hosiery industry (SIC 2252) was chosen because it possesses the following characteristics:

- Similar products, manufacturing technology, and markets served
- Wide variability in the extent of electronic commerce adoption and implementation by individual firms
- Fairly recent experience with electronic commerce implementation by many of the firms
- Sufficient number of potential respondents
- Accessibility of firms to the researcher
- Proximity and support of the industry trade association

Sheerwear (panty hose) firms (SIC 2251) were not generally included in the sample because of marketing and operational differences with the socks segment. The sheerwear segment has experienced substantial consolidation recently, thereby limiting the number of firms which could be surveyed. Sheerwear firms (SIC 2251) were included in the sample when a significant portion of their business was in socks. Whenever possible, data from only the sock segment of a firm's business was included in the analysis. It should be noted that both sock and sheerwear firms are represented by the same trade association (NAHM - National Association of Hosiery Manufacturers).

In order to facilitate the process of arranging numerous site visits to conduct personal interviews, the cooperation of two industry organizations was solicited. First, the Piedmont EDI Business Forum agreed to provide expert assistance on issues concerning Electronic Commerce and EDI. The Piedmont EDI Business Forum has approximately 200 members representing over 70 firms in North Carolina. This group also provided some funding for the research. Second, the hosiery industry trade association (NAHM) in Charlotte, NC, agreed to cooperate in this study. They provided a letter of introduction which included an endorsement of the research and a request to each firm to participate. NAHM represents over 500 firms in various segments of the hosiery industry in the United States.

Sample: Initially, 48 mid to large-sized sock manufacturers (115 employees or more) were identified as having headquarters and manufacturing facilities in the states of North Carolina, South Carolina, Kentucky and Tennessee. Phone calls were made to identify the information systems executives of each of the firms. During these calls it was discovered that five of the 48 companies were no longer in business as separate entities. The information systems executives of the remaining 43 targeted firms were contacted first by letter, then by phone. Twenty-one companies agreed to participate in this study, resulting in a participation rate of nearly 50 percent.³ Twenty-one senior executives were interviewed in person about their firm's strategic orientation and experience with Electronic Commerce (Appendix B). Twenty MIS executives (personal interviews) provided operational information about the implementation of Electronic Commerce in their firms (Appendix C). Fourteen marketing managers (personal interviews) provided responses to the adaptability questions and general information about the use of Electronic Commerce (Appendix D). Another 76 managers and employees involved with information technology returned written questionnaires addressing various indicators of adaptability (First 30 questions of Appendix D).

Site visits and personal interviews were scheduled and conducted from July through October 1996. One additional visit was conducted during January 1997.

³ One firm severely limited data collection once the interviewer arrived. Data from that firm was adequate for inclusion in the assessment of the strategic orientation variable only, but not for other analyses. This firm was, therefore, dropped from subsequent analyses.

Data Collection Methods

Three survey instruments were developed. The first instrument was administered by personal interview (approximately 45 minutes long) to a senior executive at each of the 21 firms. Each executive was asked to respond to a questionnaire designed to measure strategic orientation, actions and firm performance (Appendix B).

The second instrument (Appendix C) was administered in a personal interview (approximately one hour long) with the senior officer responsible for information systems. The information systems executives answered questions concerning the implementation of Electronic Commerce. They also responded to the adaptability questions. However, adaptability information provided by these respondents was not used in any statistical analysis due to the potential for common method variance when examining adaptability and behavior measures concurrently.

A third instrument (Appendix D) was prepared for personal interviews (approximately 30 minutes long) with marketing managers when they were available at the time of the site visits. Marketing managers were asked the adaptability questions and some open-ended questions about the use of Electronic Commerce in their firms.

The fourth questionnaire included only the adaptability questions (First 30 questions of Appendix D). The information systems executive of each firm was asked to identify between three and six managers and administrative employees who were involved with the development and utilization of information technology within the organization. These respondents include individuals in the operations, purchasing, marketing or other operating departments. A written questionnaire and a stamped envelope was distributed to these employees to be returned directly to the researcher.

Variables

This section contains discussions of the measurement, validity and reliability of each of the study variables.

Definition and Measurement

Strategy: Strategy is measured using an measure called Strategic Orientation of Business Enterprises (STROBE). The measurement instrument was designed and validated by Venkatraman (1989a). His instrument was designed in response to theoretical and measurement issues regarding other strategy measures. Venkatraman criticized strategic typologies such as Porter (1980) and Miles and Snow (1978) for being derived from narrowly drawn criteria. Empirical taxonomies such as Miller and Friesen (1978) and Galbraith and Schendel (1983) were criticized for poorly reflecting any within group differences on underlying dimensions. The measurement characteristics (reliability, unidimensionality, convergent and discriminant validity, nomological validity) of existing measures of strategy were also questioned. STROBE was developed in re-

response to this perceived inadequacy of previous classificatory (typology/taxonomic) approaches and to provide a more fine-grained measurement of underlying strategic traits or dimensions for inter-firm comparisons.

Venkatraman developed a 29 indicator instrument (See the first 29 questions of Appendix B) which was administered to a cross section of firms in various industries, then factor analyzed to arrive at six dimensions of strategy. The dimensions identified were; *aggressiveness*, *analysis*, *defensiveness*, *futurity*, *riskiness*, and *proactiveness* (See Figure 4 for descriptions of each STROBE dimension).

Figure 4 STROBE Dimensions (PDF: fgr4.pdf)

All six STROBE factors may not be observed in a single industry study. Tan and Litschert (1994), using a modified STROBE approach, were able to identify only three relevant dimensions in the Chinese electronics industry (*analysis*, *defensiveness* and a composite dimension containing aspects of three closely related dimensions; *proactiveness*, *futurity*, and *riskiness*). The STROBE approach using Venkatraman's full 29 indicators will be used in this study to determine which factors exist in the hosiery industry.

Adaptability: As discussed in Chapter 2, the construct of adaptability has not been rigorously examined in previous empirical research. Some authors have proposed that adaptability is a combination of two or more cultural values (including innovation and action orientation) which allow a firm to adjust to environmental conditions better than others, thereby, leading to superior performance (Angle & Perry, 1981; Gordon & DiTomaso, 1992; Kotter & Heskett, 1992). A plethora of additional definitions of adaptability (see Appendix A) include other possible factors which were not measured in the empirical studies. Past measurement instruments have not been specifically designed to measure adaptability as it has been defined.

Through factor analysis of an instrument designed to incorporate the diverse definitions of adaptability, it is possible to more completely specify the construct of adaptability. An instrument was developed (See the first 30 questions of Appendix D) for the purpose of measuring adaptability. It includes questions used by Gordon and DiTomaso (1992), which were extracted from a much larger instrument developed by Gordon (1985). Additional questions were developed from the various definitions of adaptability presented in Appendix A (Dodgson, 1993; Kotter & Heskett, 1992; Orton & Weick, 1990; Kilmann, et. al., 1985; Angle & Perry, 1981; Mott, 1972; Child, 1972).

Data from this instrument is factor analyzed at the individual employee level of analysis (non-aggregated data from individual questionnaires) using exploratory factor techniques (Hair, et. al., 1992). This factor analysis provides a means to screen the number of indicators down to a manageable number for the firm level analysis. The use of a reduced set of questions is necessary since the firm level sample size is twenty firms. To satisfy the minimum sample size requirement

(twice the number of variables) suggested by Hair, et. al. (1992), it is necessary to reduce the number of indicators which enter the analysis to approximately ten.

The reduced set of approximately ten questions (those which load strongly on the factors identified in the individual level of analysis) is used to create the firm level variable by computing the mean of the individual level observations in each firm. The firm level variable is created by performing a factor analysis of those indicators and using the factor scores generated as the variable values. Results of the individual and the firm level factor analyses are compared for reasonableness.

It has been argued that revalidation of a variable must be conducted in order to use the same measure aggregated to the firm level of analysis (Dansereau & Alutto, 1990; Glick, 1985; Rousseau, 1985). There is insufficient data in this study at the firm level to be able to revalidate the adaptability variable at the firm level using all thirty original indicators.

In this study it seems reasonable to assume that aggregation of individual perceptions to the firm level is justified. Past empirical studies have aggregated individual perceptions of adaptability indicators to the firm level by calculating mean values (e.g., Gordon & DiTomaso, 1992). These researchers derived both an absolute measure of firm adaptability (the mean value) and a strength of adaptability (dispersion statistics) which were shown to have predictive validity with performance. A similar aggregation approach is used here except that the strength variable has not been used.

Subjects were asked to assess firm attributes, albeit from their own personal perspectives. Adaptability has been defined as a firm level variable and individuals have been asked to assess the indicators as firm variables. Taking the average of those individual responses to create a firm measure is a reasonable approach as long as outliers do not significantly bias the results.

Behaviors: Several behavioral indicators are suggested by the information systems literature. Electronic Commerce has been chosen for this study because it is a technological innovation that may have a differential strategic impact on firms within an industry (Cash & Konsynski, 1985). Some firms may see adoption of Electronic Commerce as a potentially strategic advantage because it has the capability to improve customer service, reduce costs or enhance some other complementary resource (Clemons & Row, 1991). Some firms may see an advantage in being early implementers (first mover advantage) of Electronic Commerce (McFarlan, 1984; Porter & Millar, 1985; Oster, 1990). Other firms in the same industry may see Electronic Commerce as a strategic necessity because others have already adopted the technology. The laggard firm may be unable to forge a leading position from which to make Electronic Commerce a true competitive advantage and must adopt the technology to keep from falling behind (Clemons & Row, 1988; Benjamin, de Long & Morton, 1990).

The comprehensiveness with which firms implement Electronic Commerce may also vary within the same industry. For example, Electronic Data Interchange (EDI), a core technology of

Electronic Commerce, can be used to do business with either suppliers or customers - or it may even be used with support partners such as banks, brokers, etc. The extent to which EDI is integrated with existing information systems may vary depending upon strategic and operational considerations. Information received through EDI may be automatically saved, stored, consolidated, or manipulated for a variety of operational or decision support purposes. The extent to which this integration occurs often depends upon how strategically important EDI is viewed as a vehicle to improve particular competitive advantages such as reducing costs, improving customer service, or enhancing quality.

Therefore, some relevant behaviors or postures that firms may take in relation to the adoption of Electronic Commerce are:

- (1) To adopt aspects of Electronic Commerce earlier and to a greater extent than other firms and to integrate EC with other information and control systems
- (2) The relative importance with which Electronic Commerce is viewed

These have been translated into the following indicators:

- The extent to which Electronic Commerce has been adopted within the firm (ECADOPT)
- Level of priority accorded to Electronic Commerce (ECPRIORITY)

The extent of EC adoption variable (ECADOPT) was measured by combining (through factor analysis) four indicators from questions asked of the information systems executives (Appendix C). Those indicators are; initial year of adoption of EDI (EARLYADOPT), the number of different EDI document types currently being processed (EDIDOCS), the extent of EC integration with internal information systems (INTEGRATION), and the current level of Internet usage (INTERNET).

The initial year of adoption of EDI indicator (EARLYADOPT) was recoded into categories (EARLYADOPT2) as follows:

<u>Year of Initial Adoption of EDI</u>	<u>EARLYADOPT2</u>
Before 1984	6
1984 - 1988	5
1989 - 1990	4
1991 - 1992	3
1993 - 1995	2
Have not yet adopted EDI	1

The number of EDI document types currently being processed (EDIDOCS) ranged from zero to eleven and was coded as follows:

<u>Number of EDI Document Types</u>	<u>EDIDOCs2</u>
None	1
1 - 3	2
4 - 6	3
7 - 9	4
10 - 11	5

The extent of EC integration (INTEGRATION) came directly from a response to a question on the information systems executive questionnaire (Appendix C). The final indicator of ECADOPT, Internet usage (INTERNET), was determined by placing each of the sample firms in one of four categories of increasing involvement as follows:

- (1) No current Internet usage or plans
- (2) Currently evaluating Internet feasibility or experimenting with it
- (3) Currently use Internet for E-mail and simple informational uses
- (4) Currently have a homepage or on-line catalogue

These four indicators of ECADOPT were factor analyzed to confirm unidimensionality and to construct a measure using the factor scores for the values of the variable.

Although INTEGRATION and INTERNET indicators are not strictly interval-ratio scales they have been included in the ECADOPT index. Kerlinger (1986: 397) recommends in the social sciences, “liberal relaxation” of the strict views of measurement. In this case, INTEGRATION and INTERNET are measured using Guttman scales, where each higher value means that the firm also has reached the level of each previous condition. INTERNET, for instance, could be constructed as four zero/one indicators which, when added together, would yield the same total as the Guttman-scaled measure. Using INTERNET as an indicator in the ECADOPT scale, therefore, is not likely to cause significant measurement problems. Construction of the actual ECADOPT measure using factor scores from a factor analysis should yield a measure with acceptable properties. On the other hand, elimination of indicators about the level of EC integration or the level of Internet usage would result in a less complete measure of Electronic Commerce adoption.

The second behavior variable, the priority placed on electronic commerce (ECPRIORITY), was constructed by factor analyzing three indicators from the information systems executive questionnaire (Appendix C). Those indicators are; the extent to which EC is seen as a priority activity (PRIORITYACT), The extent to which EC is viewed as a strategic advantage (STRATADVANTAGE), and the extent to which EC is seen as a strategic necessity (STRATNECESSITY). These indicators have also been combined into a scale using factor analysis to confirm unidimensionality and to create factor scores to be used as variable values.

A third behavior variable, the extent to which important implementation activities were utilized (IMPLEMENT), draws on work done by Alexander (1985, 1991). As explained in

Chapter 2, Alexander identified nine frequently cited implementation activities. Those actions are:

- Organization Structure (extent of changes in work processes, job descriptions, etc.)
- Control Mechanisms (extent of use of control mechanisms to monitor the implementation of Electronic Commerce)
- Objectives (extent to which a formal action plan was established and objectives were set for the implementation of Electronic Commerce)
- Reward Systems (extent to which rewards have been established for the successful implementation and use of Electronic Commerce)
- People/Human Resources (extent to which human resource programs such as training and development have been emphasized in conjunction with Electronic Commerce)
- Culture (extent to which organizational culture was considered while implementing Electronic Commerce)
- Information and Decision Processes (extent to which information and decision processes were considered during implementation of Electronic Commerce)
- Formal Plans (extent to which formal plans were used to implement Electronic Commerce)
- Communications (extent to which formal communications were used to assist with the implementation of Electronic Commerce)

Questions reflecting these indicators were developed and included in the instrument administered to the information systems executives (See Appendix C; Questions 32, 37, 39, 43, 50, 53, 55, 56, 57). As with the other behavior scales above, these nine indicators were combined into a measure by using the factor scores derived from a factor analysis.

Performance: Condensing the voluminous and disparate literature on firm performance, Venkatraman and Ramanujam (1986) concluded that, “the treatment of performance in research settings is perhaps one of the thorniest issues confronting the academic researcher today (p. 801).” They identified and assessed the relative benefits of financial (e.g., sales growth, profitability, earnings per share) versus operational (e.g., market share, product quality, marketing effectiveness, manufacturing value-added, new product introduction, technological efficiency) measures. The relative merits of data collection from either primary or secondary sources were also addressed. They concluded that a combination of approaches and sources is often useful and that the approaches to be used should be carefully considered.

Often, the characteristics of the research setting limit what information is available. Since most of the companies surveyed in this study are privately held, the collection of precise financial and operating performance data was difficult. Therefore, it is necessary in this study to consider measures of performance that are appropriate and accessible through self-reported means or from outside experts.

Performance measures developed for this study are, therefore, a mix of qualitative and quantitative elements which provide an array of performance criteria. The performance-related

data that is available for this study falls into five categories; (1) self-reported quantitative measures of sales and number of employees for the years 1990 through 1995, (2) measures of growth and efficiency derived from the raw quantitative data, (3) categorical assessment of the extent that Electronic Commerce has resulted in reduced cost and better service as reported to the interviewer by a senior executive of each firm, (4) categorical assessment of relative performance within the industry on ROI, sales growth, overall performance, and competitive position, as reported to the interviewer by a senior executive of each firm, and (5) relative performance rankings of the 21 sample firms in 1992 and 1996 as assessed by an industry expert.

The first category, self-reported quantitative data, includes annual sales (SALES) and number of employees (EMPLYS#) by year for 1990 through 1995 for most of the sample firms. In some cases not all years were provided. In one case, only a sales index (1990 = 100) was provided. In another case, only unit sales rather than sales dollars were provided. One firm provided no numbers at all and was, therefore, dropped from any operational performance analyses.

The second category of performance measures is derived from the raw data in the first category. Measures of the compound rate of growth of each firm were calculated by fitting a compound growth model (using least squares regression) to the sales time-series data. The standardized beta coefficient of each regression, which represents the slope of the growth curve, was used for a value of this variable (GROWSALES). A derived measure of efficiency, sales per employee, was calculated for 1995 (SLS/EMPL95) and for the average of the years 1992 to 1995 (AVGSLS/EMPL).

The third category of performance measures is the relative performance assessment (in quintiles) of ROI (RETURNS), sales growth (SALESGROWTH), overall performance (SUCCESS) and competitive position (POSITION), as judged by senior executives of each firm. These measures were taken directly from questions posed during the personal interview (Appendix B).

The fourth set of performance measures was obtained by having an industry expert (with over 20 years of industry experience) rank the study firms in the order of their overall performance in 1992 (at the end of the last recession) and again in 1996. A composite measure of overall performance was developed by combining the 1996 rank order data (RANKORDER96) with a measure of the change in position over the period 1992 to 1996 (IMPROVEDRANK). Factor analysis was used to calculate factor scores for the combination of RANKORDER96 and IMPROVEDRANK. This variable represents the expert's assessment of firm performance (EXPERT).

Since this study specifically addresses the adoption of Electronic Commerce, measures of the performance of Electronic Commerce within each firm were also developed. The adoption and use of EDI should result in concrete organizational results (Crowley, 1993; Benjamin, de Long & Morton, 1990). Since EDI is a technological innovation which has been touted as a way to reduce costs (e.g., administrative, inventory, work redesign) and improve customer service

(e.g., reduce response time and error rates), executives were asked to rate their firm's performance on these factors. Objective operating and financial data such as inventory turns or cost reductions as a proportion of revenues were not consistently available. Therefore, a subjective assessment of Electronic Commerce success was generated by asking managers to assess the following items:

- Extent to which cost reductions have been realized (LOWCOST)
- Extent to which EDI has improved service levels (BETR SERV)

Analytical Methods

Methods to be used for assessment of the validity and reliability of the study variables are presented next, followed by discussion of the approaches for testing hypotheses and research questions.

Validity

Kerlinger (1986: 417) states that validity investigation is about the question; "Are we measuring what we think we are measuring?" There are several ways to examine validity. First, the measure of a construct should be logically and reasonably related to the construct (face validity). Secondly, content validity is, "the representativeness or sampling adequacy of the content.....of a measuring instrument (Kerlinger, 1986: 417)." A third type, construct validity, examines the logical relationships among variables (Babbie, 1992). Construct validity is primarily concerned with the convergence (that alternative measures tend to indicate a similar meaning of the construct) and with discriminability (the ability to differentiate among constructs and point out what is related and unrelated to each). Finally, criterion-related validity refers to the ability of a measure to predict some other (criterion) variable and is usually of most interest in practical research rather than theoretical investigations.

Strategy: The STROBE measure of strategic orientation was carefully developed by Venkatraman (1989a) to specifically address measurement as well as theory-building concerns. Using confirmatory factor analytical techniques, Venkatraman was able to assess unidimensionality (that each dimension was unitary and not a composite of more than one dimension), construct (convergent and discriminant) validity and predictive (criterion-related) validity. Using Venkatraman's 29 indicator instrument, this research attempts to confirm the dimensions and validity observed by Venkatraman. The sample in this study is within a single industry and may, therefore, not exhibit all the dimensions identified by Venkatraman, who used a sample drawn from a cross section of industries.

The analysis in this research also differs in that LISREL has not been used. LISREL requires a minimum sample size of about 100 (Hair, et.al., 1992) whereas, this study has a sample of approximately 20 at the strategic business unit (SBU) level of analysis.

Adaptability: On its face and from previous theoretical and empirical literature it appears reasonable that adaptability could be a useful and valid construct in organizational research. Content validity of past measures, however, has not been adequately examined and will be remedied somewhat in this study. This will be done through a measurement instrument which builds on relevant theoretical and empirical work and constructed through factor analytical techniques. Adaptability is examined at both the individual and firm level of analysis and a correlation analysis compares the new measure of adaptability with previous measures (Mott, 1972; Gordon & Di-Tomaso, 1992). This provides some assessment of convergent validity.

Behaviors: The measures used for this variable have been chosen to be consistent with the strategy implementation literature and their relevance to the particular circumstances of the adoption of Electronic Commerce in an industry. Expert judgment has been relied upon for the development of appropriate indicators as described in a previous section on construct measurement.

Performance: Performance is assessed through multiple means. Some quantitative financial information was collected for the firms in the sample. Sales and number of employees data was collected for most firms in the study. This allows the use of three operational measures of performance; sales per employee in 1995 (SLS/EMPL95), average sales per employee (AVGSLS/EMP), and compound growth in sales (GROWSLS). Since operational data is quite limited, we must rely upon self-reported performance information assessed by senior executives (See Measurement section above). Appendix B contains the questions which were asked of the executives surveyed and includes an assessment of performance on after-tax return on investment (RETURNS), sales growth (SALESGROWTH), overall firm performance and success (SUCCESS), and competitive position (POSITION) (Tan & Litschert, 1994; Khandwalla, 1976). In addition, EDI specific performance questions about the level of cost reduction (LOWCOST) and service improvement (BETRSERV) are included.

To supplement these performance measures an industry expert with over 25 years experience and intimate knowledge of the firms in the industry provided an assessment of the relative performance of the study firms in both 1992 and 1996. This allowed the construction of a performance measure called EXPERT.

Reliability

Reliability refers to the ability of a particular instrument, applied repeatedly to the same object, to yield the same result each time (Babbie, 1992). The first line of defense for the assessment of reliability is to use previously established methods of measurement.

Strategic orientation is an instrument developed, validated and checked for reliability by Venkatraman (1989a). A similar process was used by Tan and Litschert (1994).

The adaptability measure was comprehensively developed as described above. Some of the questions used are derived from existing questionnaires (Mott, 1972; Gordon & DiTomaso, 1992). Others are derived directly from various definitions of the construct. To assess convergent validity, a correlation analysis examines the relationship between the adaptability measure constructed for this study (ADAPTABILITY) and other measures of adaptability used in previous studies; Mott (1972) and Gordon and DiTomaso (1992).

The three organizational behavior variables (ECADOPT, ECPRIORITY, IMPLEMENT) have been constructed through expert judgment, and factor analysis. Reliability of these measures is judged through the examination of the reliability coefficient, Cronbach's alpha (Cronbach, 1971).

Several performance variables (perceptions and self-reported) have been used previously by Tan and Litschert (1994) as developed by Khandwalla (1976). Other variables (cost reduction and service improvement) have been derived from research and logic specifically related to the expected performance implications of the adoption of Electronic Commerce.

A standard approach to reliability measurement is to assess the internal consistency of an index (Kerlinger, 1986). Cronbach's alpha, also referred to as the reliability coefficient, is calculated for each of the index variables (adaptability, strategic orientation, behaviors) used in this study. Cronbach's alpha for a particular variable scale is the mean of all possible split-half reliability coefficients. It measures the extent to which the items in the scale are related (Frankfort-Nachmias & Nachmias, 1992). An alpha of .70 or higher is considered acceptable.

Hypothesis Testing

Methods of statistical analysis for testing of the hypotheses (listed in Figure 5) include examination of the correlation matrices, multiple regression analysis, cluster analysis, and t-tests of mean differences.

If it were practical to collect the appropriate data, the model generated in this research could be tested with structural equations modeling techniques using LISREL. This would allow simultaneous testing of all branches of the model. However, the sample size for testing these hypotheses at the firm level of analysis is too small (20 firms) to use LISREL, which requires a sample size of at least 50, and preferably 100 - 200 (Hair, et. al., 1992). The next best alternatives are multivariate techniques such as regression and cluster analysis.

Hypothesis 1:	Choice of strategy will have a differential effect on firm performance.
Hypothesis 2:	Adaptability will be positively related to firm performance?
Hypothesis 3:	Firms with more defensive strategies will be less adaptable than firms with less defensive strategies.
Hypothesis 4:	Firms with more dynamic strategic characteristics will be more adaptable than firms with less dynamic characteristics.
Hypothesis 5:	Firms with indistinct strategies will exhibit relatively lower levels of adaptability than firms with dynamic strategies.
Hypothesis 6:	Firms which place greater emphasis on important implementation actions will realize better performance than firms which place less emphasis on important implementation actions.
Hypothesis 7:	Firms with more dynamic strategies will place more emphasis on important implementation actions than firms which are more defensive.
Hypothesis 8:	Firms which are more adaptable will place greater emphasis on important implementation actions than firms which are less adaptable.
Hypothesis 9:	Firms with distinct strategies, high adaptability, and utilizing important implementation actions will exhibit superior performance compared with firms which are lacking in one or more of these characteristics.

**FIGURE 5
STUDY HYPOTHESES**

Regression Analysis: “Multiple regression analysis is a general statistical technique used to analyze the relationship between a single dependent variable and several independent variables (Hair, et.al., 1992: 19).” It takes the general form of:

$$Y = b + b_1(X_1) + b_2(X_2) + b_3(X_3) \dots$$

where Y is the dependent variable and X1, X2, X3, etc., are the independent variables. The terms b, b1, b2, b3, etc., are the regression coefficients representing the relative slope of the regression line for each variable with respect to the Y axis.

Cluster Analysis: “Cluster analysis is a technique for grouping individuals or objects into clusters so that objects in the same cluster are more like each other than they are like objects in other clusters (Hair, et.al., 1992:265).” These groups of objects can then be profiled along other characteristics of interest. The differences between groups are then tested using t-test of mean differences or ANOVA.

Hypothesis 1 and 2: The first hypothesis investigates whether or not choice of strategy has performance implications. The second hypothesis looks at whether firms which are more

adaptable experience better performance. To test these premises, initially, the correlation matrix is examined for significant correlation coefficients between strategic orientation dimensions and performance measures, and between adaptability and performance measures.

Two higher level techniques are also used to evaluate these questions. First, multiple regression analysis is used to examine the relationship of strategic orientation and adaptability combined on performance. Second, an examination of whether there are particular profiles of strategy dimensions that are related to high performance is conducted. Cluster analysis is used to determine groups of firms with similar strategic/adaptability profiles. The mean performance of the groups is compared using t-test of the means.

Hypothesis 3, 4 and 5: These three hypotheses examine the relationship between strategic orientation dimensions and adaptability. First, the correlation matrix between strategy dimensions and adaptability is examined. Second, the mean adaptability score of the strategic clusters developed initially to test H1 and H2 are compared using t-tests to check for significant differences.

Hypothesis 6: This hypothesis is tested through examination of the correlation matrix between the extent of use of important implementation actions (IMPLEMENT) and the operational performance variables for Electronic Commerce (LOWCOST, BETRSERV).

Hypothesis 7 and 8: The seventh hypothesis investigates whether or not choice of strategy has behavioral implications. The eighth hypothesis looks at whether adaptability influences the use of important implementation actions. To initially test these premises the correlation matrix is examined. An examination of the strategic clusters is also undertaken to determine whether certain clusters score highly on both adaptability (ADAPTABILITY) and important implementation actions (IMPLEMENT).

Hypothesis 9: This hypothesis expects to find particular combinations of strategy, adaptability and important implementation actions (IMPLEMENT) which yield superior performance. Correlation, regression and cluster profiles are all used to draw conclusions about this hypothesis.

Research Questions

The research described above addresses crucial issues involved with each research question originally raised in Chapter 1.

Research Question 1 - How is adaptability related to SBU strategy? - This question is addressed by examining a multi-perspective conception of adaptability in conjunction with a particular conceptualization of strategy (STROBE). Correlation analysis between adaptability and STROBE dimensions are examined.

Research Question 2 - *How do strategy and adaptability together influence organizational behaviors and, ultimately, performance?* - This question is investigated using correlation, regression and cluster analysis profiles. The form of this interrelationship examined by regression analysis has been called mediation (Venkatraman, 1989b). There may be other interactions between strategy and adaptability, however, the theoretical literature provides little evidence about the form of such a relationship. Venkatraman (1989b) explains five additional forms of interrelationship or *fit*. They are; moderation, matching, covariation, profile deviation, and gestalts. The statistical analyses above, however, are not designed to detect the other five possible forms of interrelationship.

Research Question 3 - *How can one best describe and measure the construct of adaptability?* - This question is examined by creating a new multi-perspective instrument to measure adaptability. The measure is constructed from multiple definitions of adaptability in the literature, and by performing a factor analysis on this array of potential indicators to identify common elements. This approach has been chosen to counteract earlier measurement efforts which exhibit some deficiencies.

CHAPTER 4

RESULTS

This chapter presents the results of the study. It begins with a discussion of characteristics of the hosiery industry, which was chosen as the domain for this study. Characteristics of the industry, sample firms, and a short history of EDI in the hosiery industry are then explored. Next, the construction of the study variables is addressed including sections on strategic orientation, adaptability, behaviors and performance. Finally, results of analyses used to test the nine hypotheses and three research questions are addressed.

Sample

This section presents details about the selection of the hosiery industry as the domain for this research. It also describes the final sample of firms which were surveyed in this research.

The Industry

The hosiery industry has been experiencing significant changes in recent years. Sales have been stagnant and erratic. Significant socio-cultural trends are changing demand patterns. For instance, the trend toward “casual Fridays” and, in many businesses, “casual workplaces,” has reduced the demand for more formal types of hosiery. Additionally, the fitness and casual trends are increasing the market for athletic socks.

The power differential between retailers and manufacturers is also altering the competitive landscape of this industry. The major retailers (discount stores and department stores) are wielding substantial power over their suppliers, insisting upon more sophisticated business interactions. In interviews, K-Mart, Wal-Mart, Target, Sears, Penneys, and Mervyn’s were mentioned most often as the most demanding retailers. Suppliers are now often required to bypass distribution centers of the major retailers and ship directly to individual stores in smaller order sizes and on tighter time schedules. This has resulted in the need for the manufacturers to manage large in-process and finished goods inventories and to become more sophisticated in all phases of the logistics process. Many firms are struggling with information aspects of the process such as demand forecasting, inventory control, and EDI. In some cases, hosiery vendors are even exploring direct shelf-space management at major retailers. In essence, retailers are forcing suppliers to assume much of the risks of forecasting, delivery, stocking and inventory formerly handled by the retailers themselves.

These demand shifts coupled with the aggressive demands of major customers have created a very challenging competitive environment over the past few years. This dynamic environment has arisen even though the penetration of foreign competition has been modest. Only approximately 10-12% of hosiery products sold in the United States are foreign-made (NAHM estimate). This is likely due to the relatively low labor content of the product and the relatively high

capital investment in equipment required to produce quality hosiery in volume. New computer programmable knitting machines cost approximately \$40,000 apiece, whereas, the old mechanically controlled machines were less than \$10,000. Product availability and delivery time are also critical factors to hosiery retailers making foreign sourcing and delivery a difficult and risky endeavor.

The dominating position of the major retailers dictates, to a great degree, the pattern of adoption of Electronic Commerce in this industry. If a retailer such as Wal-Mart or Penneys wishes to place purchase orders using EDI, a manufacturer who wishes to do business must comply. Therefore, for most of the large and mid-sized hosiery manufacturers, adoption of EDI has been a necessity in order to remain in business. Some firms have realized that the effective use of EDI could actually provide some strategic advantage by lowering costs and improving customer service. Other firms have resisted the move to Electronic Commerce. Some to the extent that they will not do business with the major retailers. These firms continue to target the small chains and “mom and pop” stores, of which there are fewer and fewer every year.

More recent developments in Electronic Commerce, such as the emergence of the Internet, have had almost no impact on the hosiery industry. Few firms have even investigated the need for Web pages. Many firms view the Internet as a vehicle for mass marketing to individual consumers. Since most hosiery firms do not have branded products and sell directly to large retailers they have not seen the need to develop a presence on the Web.

Consequently, these dynamic industry forces are substantially changing the industry structure. Two major trends are becoming apparent. First, consolidation is occurring at a rapid pace. An original list of 48 firms was obtained through various industry directories. During initial telephone contacts during the summer of 1996, it was discovered that five of those 48 firms had either been acquired or gone out of business in the previous year. Second, many smaller hosiery firms are now concentrating exclusively on greige goods (unfinished hosiery) knitting rather than trying to provide complete knitting, dying, packaging, and marketing services. They often supply the larger firms with unfinished goods when the larger firms have insufficient capacity to fill orders from the large retailers.

Surprisingly, with these increasing competitive pressures, competitive rivalry among firms remains relatively subdued. Substantial industry cooperation and information exchange exists. A strong industry trade association which sponsors various users groups and symposia may be an important reason. This industry cooperation appears to be in direct contrast to other segments of the textile industry.

Reading, understanding and responding to this changing landscape appears to be important for success and may become more important in the future. Finding a successful position in the industry requires an awareness of industry dynamics and an ability to adjust to the new realities of cost control, customer service, and of course, fashion.

Therefore, several industry characteristics appear to be important when analyzing and interpreting study results. First, a dynamic market environment includes changes in fashions and markets. Second, advances in manufacturing and information technology are being adopted. Third, the industry is dominated by large powerful retailers whose requirements for costs and service must be met. Fourth, industry structure and competitive dynamics are changing quickly although substantial industry cooperation and goodwill continue to exist.

The Sample

The twenty-one sample firms range in size from 115 employees to 2,200 employees, while annual sales start at \$4.7 million and rise to \$200 million for the largest firm. Average sales per employee range from \$35,967 to \$108,571.

The headquarters of seventeen of the firms were located in North Carolina. Two firms were located in Tennessee and another two firms were located in Kentucky.

The total number of persons surveyed is summarized below:

Senior Executives	21
Information Systems Executives	20
Marketing Managers	14
Administrative Managers/Employees	76
TOTAL	131

Electronic Commerce in the Hosiery Industry

The adoption of Electronic Commerce in the hosiery industry began with the implementation of electronic purchase orders (using Electronic Data Interchange) during the late 1970s and early 1980s. Between 1979 and 1982, four of the sample firms implemented electronic purchase orders with Sears, Penneys, K-Mart, and Wal-Mart. These were proprietary systems developed by the retailers. A second wave of EDI implementation started in the late 1980s and continues today. At this time two additional major retailers, Target and Mervyns, also began to push EDI on their suppliers. Between 1987 and 1994 sixteen more of the sample firms in this study began to implement EDI at the request of one or more of these major customers. Implementation of EDI continues at most firms as additional customers adopt the technology for their transactions.

Most of the major retailers are currently using several versions of the ANSI X.12, VICS standards. The most common version currently supported is Version 3040. Often retailers interpret the standards broadly, resulting in idiosyncrasies in the way each retailer requires the supplier to implement them. This results in many implementation headaches for the hosiery firms who supply multiple large retailers. Manufacturers may need to support multiple versions of a particular document. The variety in documents, translation software, telecommunications networks and computer platforms/architectures creates a major EDI support problem for most firms. EDI

programming skills are in short supply and very expensive. Some firms are beginning to consider having some of their EDI programming done on an outsourcing basis.

Almost all of the large hosiery firms have implemented EDI to some degree. Nearly all of the firms indicated that the use of EDI was a competitive necessity in order to stay in business. Surprisingly, even though the use of EDI is primarily dictated by the major retailers, many of the sample firms now see EDI as a competitive advantage. The service benefits of EDI are obvious; faster, more accurate, and more responsive service to the retailers. However, there also seem to be perceived cost benefits. There is a critical mass of transactions which a company handles beyond which EDI results in cost savings. This is supported by significant correlations between the extent to which an executive sees EDI as a competitive advantage (COMPADV) and whether or not he/she views EDI as a cost saver (LOWCOST) ($r = .475$; $p = .030$); or as providing better service to the customer (BETR SERV) ($r = .6806$; $p = .001$). There is, of course, common method variance reflected in these results. However, it demonstrates the relationship between the expectation of competitive advantage of EDI and the perception of results from EDI in the senior executive.

This perception is not universal. A number of executives at smaller firms indicated to the researcher a particular frustration and even annoyance with the requirements of doing business through EDI. One firm which declined to participate in the study, explained that they did not wish to deal with the EDI requirements of the large retailers. Instead, they chose to serve only the smaller “mom and pop” retailers even though this segment of the market is dwindling. In the long run this appears to be a losing strategy for this firm. Their unwillingness or inability to adapt to the requirement of doing business by EDI is likely to result in poor performance as small retailers continue to close their doors.

Beyond EDI, more sophisticated uses of Electronic Commerce technologies in the hosiery industry have been slow to be adopted. At the time of the survey only two of the large (over 1000 employees) hosiery firms in this study were investigating the feasibility of developing a site on the Internet. Two large and one medium-sized (250 - 700 employees) firm were using the Internet for e-mail with their customers or between multiple plant locations. Use of Electronic Funds Transfer (EFT) was also very infrequent. Three large and one medium-sized firm transfer funds by EFT with at least one customer. Extensive use of EFT does not appear to be on the horizon.

It is clear that the hosiery industry is still struggling with the adoption of the EDI portion of Electronic Commerce and has not even begun to tap the Internet. There are some signs that this is about to change. The industry, through its trade association (NAHM), has initiated an information systems/electronic commerce users' group. This organization is intended to help these relatively modest-sized organizations help themselves to become more sophisticated about Electronic Commerce and other information issues. Besides Electronic Commerce these companies are facing a number of serious technology and resource issues including:

- Cost and availability of EDI/EC programming and support

- Choice of EDI software and services
- Systems architecture and maintenance issues
 - Mainframe (e.g., IBM AS-400 platform) versus,
 - Network development and maintenance
- Proliferation of VICS standards used by different customers
- Opportunities for EDI with yarn suppliers and greige goods knitters

Adaptation to technological changes has become important for the success of some hosiery firms. It is likely that the ability to adapt to accelerating technological changes will be key to survival and success in the future.

Pretest

The study instruments were pretested in July 1996 at a medium-sized sheerwear firm. A sheerwear firm was chosen so that a potential respondent in the sock segment would not be lost, thereby preserving as many potential participant firms as possible.

The senior executive questionnaire (Appendix B) was administered to the Vice President of Operations in a personal interview. The information systems executive questionnaire (Appendix C) was also administered in a face-to-face interview. These two individuals were debriefed about the duration, wording, understandability, and sensitivity of the questions. Suggestions were reviewed and the instruments were revised accordingly.

The administrative/managerial employee instrument (First 30 questions of Appendix D) involving indicators of adaptability was distributed to two administrative/managerial employees to be filled out and mailed back to the researcher. No difficulties were observed with this collection method. A stamped self-addressed return envelope was included with each questionnaire when distributed at the sample firms.

Variables

This section turns to the development of the primary variable measures used in this study. It begins with a discussion of the development of the strategic orientation dimensions and then progresses through the development of measures for adaptability, behaviors, and finally, performance.

Strategic Orientation

Personal interviews were conducted with senior executives from the twenty-one hosiery firms. The instrument which was administered contained Venkatraman's (1989a) 29 indicators of strategic orientation. These indicators appear as the first 29 questions in Appendix B. A number of performance-related questions are also included in this instrument.

A preliminary factor analysis on the complete set of indicators was used as a screen to select a subset of highly significant indicators. Due to the small sample size and large number of indicators, it was necessary to thin the number of indicators in order to arrive at a correlation matrix which was appropriate for factor analysis. This analysis included all 29 indicators of strategic orientation and all 21 firm observations. Selection of indicators was accomplished by setting a high threshold for eigenvalues (higher than 2.0) and factor loadings (greater than .65). Normally, thresholds of 1.0 for eigenvalues and .30 for factor loadings would be considered sufficient for retention of the factors and indicators, respectively (Hair, et. al., 1992). Due to the relatively small sample size, only a limited number of factors and indicators could be retained for further analyses and still allow for meaningful statistical analysis. Therefore, thresholds were chosen to yield approximately four observations per strategic orientation factor and to reduce the number of total indicators in the analysis close to a 2:1 ratio, observations to indicators. An additional condition was that any factor should include at least two indicators.

Both the preliminary and firm level factor analyses were conducted using a varimax rotation. Since the dimensions (factors) of strategic orientation found in this analysis are used in further analyses (including correlation and regression analyses), an orthogonal rotation method is preferred (Hair, et. al., 1992). This minimizes the correlations among the factors, thereby also minimizing potential colinearity among these dimensions when used in subsequent analyses.

In the preliminary analysis, five factors were identified with eigenvalues of over 2.0. Examination of the scree plot shows that factors one and two explain the largest proportion of variance. Beginning with factor three, the scree plot gradually flattens with no distinct break to assist with the selection of useful factors. Thirteen indicators satisfy the initial conditions set for eigenvalue (2.0) and factor loading (.65) and were selected for inclusion in the firm level factor analysis.

Table 5 shows the results of the second factor analysis using the reduced set of indicators. The correlation matrix produced during this analysis has an acceptable Bartlett test of sphericity (146.242, sig. = .000) indicating that the correlation matrix is not an identity [See Norusis (1994) for information on Bartlett's test]. The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy is .593 which is marginally acceptable for factor analysis.

“KMO is an index for comparing the magnitudes of the observed correlation coefficients to the magnitudes of the partial correlation coefficients...Small values for the KMO measure indicate that the factor analysis of the variables may not be a good idea, since correlations between pairs of variables cannot be explained by the other variables.”
(Norusis, 1994)

Table 5 Strategic Orientation Factor analysis (PDF: tbl5.pdf)

A KMO of about .60 is characterized as only “mediocre” by Kaiser (1974) as referenced by Norusis (1994). But the KMO for the correlation matrix of strategic orientation variables is still well above .50, which is the threshold below which factor analysis is not recommended.

The factor analysis identified five factors with eigenvalues greater than 1.0. Five indicators loaded highly on the first factor including, emphasis on (1) information systems for decision-making (INFOSYSTEMS), (2) production management techniques (PRODUCTIONMGT), (3) use of planning techniques (PLANNING), (4) use of cost control systems (COSTCONTROL), and (5) forecasting key indicators of operations (KEYINDICATORS). This was by far the most influential factor, with an eigenvalue of 4.8 and explaining 37.3 percent of the variance. This factor appears to represent a combination of Venkatraman's (1989a) defensiveness and analysis dimensions. Two of the five factors (INFOSYSTEMS and PLANNING) were included in the analysis dimension. Another two (PRODUCTIONMGT and COSTCONTROL) appeared in the defensiveness dimension. The remaining indicator (KEYINDICATORS), however, was a part of Venkatraman's futurity dimension. Analyzing the five indicators together, they all appear to represent aspects of planning and control. So the first factor of strategic orientation has been labeled PLAN/CONTROL. A separate reliability test of this scale was conducted. The reliability coefficient (alpha) was determined to be high (.91) as would be expected from an orthogonal factor analysis and high factor loadings.

The second factor includes the indicators measuring emphasis on (1) quality through quality circles (QUALITYCIRCLES) and (2) “What-if” analysis of critical issues (WHATIFANALYSIS). It has an eigenvalue of 1.9 and explains an additional 14.7 percent of the variance in the data. This factor was more difficult to interpret. One indicator appeared in Venkatraman's (1989a) defensiveness dimension while the other was an indicator of futurity. Together, perhaps they represent a measure of the extent to which people in the firm pay attention to details and are constantly trying to improve the performance of the firm. It seems appropriate to give this factor a label like VIGILANCE to represent continuous improvement.

The third factor is fairly easy to interpret. Indicators representing an (1) emphasis on seeking new opportunities (NEWOPPS) and (2) being usually the first ones to introduce new products/brands (NEWPRODUCTS), are both indicators which appear in Venkatraman's (1989a) proactiveness dimension. The same label (PROACTIVENESS) has been retained in this analysis. Factor three has an eigenvalue of 1.72 and explains 13.2 percent of the variance in the data.

Factor four was also quite easy to interpret. Two of Venkatraman's (1989a) riskiness indicators, a tendency (1) to support projects with certain returns (CERTAINRETURNS) and (2) to adopt a rather conservative view on major decisions (CONSERVATIVE), loaded on factor four. Venkatraman's label for this dimension (riskiness) is somewhat misleading since lower values of the variable represent higher levels of risk per se. To be accurate the variable should be labeled risk aversion. To be consistent with the values of the variables this study labels this dimension RISK AVERSION rather than riskiness. Factor four has an eigenvalue of 1.36 and explains 10.4 percent of the variance.

Factor five, like factor two, was very difficult to interpret. The extent to which competitors expand capacity first (ADDCAPACITY) and an emphasis on sacrificing profitability to gain market share (SACRIFICEPROFIT), represent two different dimensions of strategic orientation according to Venkatraman's study (1989a). These two indicators would also seem to be inconsistent with each other. One might expect that firms which focus more on gaining market share than on profitability would be the ones to expand capacity first. Both indicators, however, have positive factor loadings indicating that they vary in the same, not opposite, direction. Since this factor's eigenvalue of 1.06 is very close to 1.0, and since interpretation is ambiguous at best, it was determined to drop this factor from further analyses.

In summary, this analysis of strategic orientation in the hosiery industry suggests four interpretable dimensions; PLAN/CONTROL, VIGILANCE, PROACTIVENESS, and RISK AVERSION. PLAN/CONTROL seems to be a hybrid of Venkatraman's (1989a) analysis and defensiveness dimensions but can be interpreted in the context of the hosiery industry as a meaningful composite with its own distinct label. VIGILANCE is a new factor with questionable lineage with Venkatraman's dimensions. PROACTIVENESS and RISK AVERSION are clearly consistent with Venkatraman's corresponding dimensions. Venkatraman's STROBE (1989a) approach, therefore, is at least partially confirmed in that three hosiery dimensions (PLAN/CONTROL, PROACTIVENESS, and RISK AVERSION) correspond with four of the STROBE dimensions (analysis, defensiveness, proactiveness, and riskiness). Two of Venkatraman's dimensions (futuraity and aggressiveness) do not appear in this analysis of the hosiery industry although some of their indicators loaded individually on other factors.

The most curious finding of this analysis is the possibility of a new strategic orientation dimension which here is called VIGILANCE. Could this be a combination of the STROBE dimensions of futuraity and aggressiveness since its two indicators come from those two STROBE dimensions respectively? Certainly the small sample size creates a hesitancy to speculate further. But the results surely raise the issue of whether or not the construct of strategic orientation may

include other dimensions than those found by Venkatraman (1989a). Or perhaps particular industries experience other relevant strategic dimensions than those identified in Venkatraman's research.

To summarize what has been discovered about the strategic orientation construct, Table 6 presents a comparison of the STROBE dimensions found by Venkatraman (1989a), Tan and Litschert (1994) and this study. Venkatraman (1989a) found six dimensions in a study across numerous industries. Tan and Litschert (1994) found analysis and defensiveness dimensions which were similar to Venkatraman, and a proactiveness dimension which represented a combination of Venkatraman's proactiveness, riskiness and futurity dimensions. This study has found proactiveness and risk aversion dimensions which agree with Venkatraman and a plan and control dimension which appears to be a combination of analysis and defensiveness. Additionally, a vigilance dimension was found which was difficult to interpret.

Table 6 Comparison of STROBE Dimensions Found in Three Studies (PDF: tbl6.pdf)

In an environment changing from a planned economy to a controlled market economy, it seems reasonable that Tan and Litschert (1994) would observe the dimensions that they did. Thinking (analysis), resistance (defensiveness), and action (proactiveness) should be characteristics that would begin to emerge in a more open and competitive environment. It should not be surprising to find firms attempting to first differentiate themselves along these dimensions.

The dimensions which appear in the hosiery industry also seem to be readily explainable by the environmental conditions faced by these firms. The emergence of powerful discount retailers who buy on the basis of price should result in a focus on efficiency, which is represented by the PLAN/CONTROL dimension. Fashion changes and market dynamics should result in some firms taking an aggressive, proactive approach to their business and focus on those segments of the market where differentiation and product development are important. Many firms in an established industry undergoing dynamic changes will be unwilling or unable to quickly react. It is reasonable to expect a certain amount of RISK AVERSION by many firms and others more willing to take chances in order to succeed. VIGILANCE also makes some sense as a differentiating strategic dimension. An attention to detail and in some cases distrust and a mild paranoia was detected at some firms during the site visits.

Adaptability

The array of adaptability indicators was also determined using a two-step process. First, a factor analysis was conducted on the individual level data by including the thirty potential indicators of adaptability (See the first 30 questions of Appendix C). Eighty-two useable responses (all managerial and administrative employees who did not provide data for the assessment of strategic orientation or organizational behaviors related to electronic commerce) provided data to assess adaptability. It yielded a correlation matrix with a KMO of .89, which is considered "marvelous" by Kaiser (1974) as referenced in Norusis (1994). An acceptable Bartlett Test of Sphericity was

also obtained (1943.644, sig. = .000). The rotated (varimax) factor matrix shown in Table 7A suggests a five factor solution of which the first factor is by far the most significant (eigenvalue = 14.669; percent of variance explained = 48.9%). Factors two through five have eigenvalues declining from 1.82 to 1.11. The scree plot strongly suggests a one factor solution although the amount of variance explained by the first factor is less than 50 percent.

Table 7A Adaptability Factor Analysis - Individual Level (PDF: tbl7a.pdf)

The objective of this factor analysis at the individual level of analysis was to screen the number of indicators for inclusion in constructing a firm level measure. Eleven indicators loaded significantly on the first factor. This is close (20:11) to the suggested two to one ratio of observations to indicators mentioned previously. The firm level analysis cannot accept any more than these eleven indicators since it is severely limited by the small sample size (20 observations). Therefore, only one factor containing these eleven indicators was retained for construction of the firm level measure of adaptability:

- (1) Extent people are encouraged to take reasonable risks to increase effectiveness of the firm (REASONABLERISK)
- (2) Extent people are encouraged to be creative (or innovate) in their jobs (CREATIVITY)
- (3) Extent company values customers (VALUCUSTOMERS)
- (4) Extent company encourages experimentation (EXPERIMENTATION)
- (5) Extent company values employees (VALUEEMPLOYEES)
- (6) Extent people are free to take independent action (INDEPENDENTACTION)
- (7) Extent roles that people play in the company are open to redefinition (ROLREDEFINITION)
- (8) Extent company is responsive to changes in its business environment (RESPONDTOCHANGE)
- (9) Extent company values people and processes that create useful change (USEFULCHANGE)
- (10) Extent company is willing to change culturally engrained behaviors (CULTURECHANGE)
- (11) Estimate of the overall vitality of the company as reflected by a sense of urgency and rapid pace of activities (VITALITY)

To construct the firm level measure of adaptability, individual responses for each firm were aggregated by calculating the means of each of the eleven chosen indicators. This was done for each of the twenty firms. A factor analysis of the firm level data was performed to calculate factor scores which would serve as the firm adaptability values. The results of this analysis are displayed in Table 7B.

Table 7B Adaptability Factor Analysis - Firm Level (PDF: tbl7b.pdf)

The correlation matrix for this analysis has a KMO Measure of Sampling Adequacy of .80 which is characterized as “meritorious” by Kaiser (1974) as referenced in Norusis (1994). The Bartlett Test of Sphericity of 252.08 (sig. = .000) is indicative of a non-identity. Therefore, factor analysis of this correlation matrix appears to be appropriate. As in the individual level analysis, all eleven indicators load on a single factor as expected. The factor has an eigenvalue of 8.74 and explains 79.4 percent of the variance in the data.

A separate test of the reliability of this scale was conducted by calculating the reliability coefficient (alpha). Alpha was found to be .97 as would be expected from the strong factor results above.

As a test of convergent validity, the adaptability measure (ADAPTABILITY) developed in this study was compared with the results obtained from other measures of adaptability. Two previous measures of adaptability were examined; Gordon and DiTomaso (1992) and Angle and Perry (1981). Gordon and DiTomaso used a six indicator instrument which was included as a subset of the instrument in this study. Five of these six indicators loaded significantly on the adaptability factor (ADAPTABILITY) derived above. Only the timeliness of decision-making (TIMELYDECISION) indicator did not appear. Therefore, five of the eleven indicators which loaded on the adaptability factor (ADAPTABILITY) in this study come from the Gordon and DiTomaso (1992) instrument.

Angle and Perry (1981) used four indicators from a culture scale developed by Mott (1972). These indicators were also included in the instrument used to assess adaptability in this study. None significantly loaded on the first factor in the individual level factor analysis of adaptability and were, therefore, not included in subsequent firm level analyses. A separate measure of adaptability using the Mott (1972) scale alone was derived for each of the twenty sample firms by calculating the means of the individual responses. The correlation between the adaptability measure in this study (ADAPTABILITY) and the Mott (1972) measure (MOTTADPT) was found to be highly significant (-.806, $p = .000$). It should be noted, however, that common method variance may be substantial since the responses to all indicators were provided by the same respondents. In total, these tests provide some comfort in the convergent validity of the adaptability measure used in this study.

A closer investigation of the composition of the final adaptability measure yields some interesting observations. The lower half of Table 7B suggests that the eleven indicators may be comprised of three complimentary groups of indicators. The first element contains four indicators which seem to be related to innovation. Adaptable firms encourage experimentation, reasonable risk-taking, independent action, and creative activity. The second group appears to be related to the ability to implement significant changes when necessary. Adaptable firms, therefore, appear to be responsive to their environments, can redefine the roles people play within the organization, are able to make cultural changes, and value people who create useful changes. The third group includes characteristics of the firm which are supportive of innovation and change. These characteristics are a focus on employees, customers, and vitality.

These elements and indicators appear to both confirm and enhance the definition of adaptability developed by Gordon and DiTomaso (1992) who suggest that adaptability includes innovation and an action orientation. Kotter and Heskett (1992), who argued strongly for a focus on customers and employees as critical to adaptability, are also reflected in this definition/measure of adaptability. However, their inclusion of an indicator which stressed valuing shareholders/owners needs was not duplicated in the study here.

Organizational Behaviors

As explained in Chapter 3, three behavior variables were developed. These variables are, (1) the extent of Electronic Commerce adoption (ECADOPT), (2) the priority placed on Electronic Commerce (ECPRIORITY), and (3) the use of important implementation activities (IMPLEMENT).

The four indicators used to construct the scale for ECADOPT were combined through factor analysis and factor scores were derived. The factor analysis confirmed the use of a single factor for the variable ECADOPT (KMO = .77; Bartlett Test = 28.95, sig. = .000; eigenvalue = 2.65; percent of variance explained = 66.4%).

The three indicators used to construct ECPRIORITY were also combined through factor analysis. A single factor solution for this variable was confirmed and factor scores were generated for use in further analyses (KMO = .65; Bartlett Test = 15.50, sig. = .001; eigenvalue = 2.06; percent of variance explained = 68.6%).

The third behavior variable, effective implementation activities (IMPLEMENT), was also constructed through factor analysis by combining nine indicators from the information systems executive questionnaire (Appendix C). Those indicators are; (1) the extent that changes were made to work practices (WORKPRACTICES; Appendix C, Question #32), (2) the extent to which supporting policies and procedures were established (POLICIES; Q #43), (3) The extent of usage of performance standards or goals (PERFORMGOALS; Q #37), (4) the extent appropriate rewards were established (REWARDS; Q #50), (5) the extent to which formal training sessions were utilized (FORMALTRAIN; Q #53), (6) the extent to which changes to organizational culture were considered (ORGCULTURE; Q #55), (7) the extent to which information and decision processes were considered (DECISIONPROCESS; Q #56), (8) the extent that formal communications channels were used (FORMALCOMM; Q #57), and (9) the extent that a formal action plan was used (ACTIONPLAN; Q #39). Again, a single factor solution was confirmed (KMO = .88; Bartlett Test = 114.34, sig. = .000; eigenvalue = 5.88; % of variance explained = 65.4).

Using factor analysis to construct these measures has several advantages. It weights the component indicators by their importance (factor loadings). The resulting measure is centered around zero with a standard deviation and variance of 1.0.

Reliability of the three scales constructed to measure behaviors was tested by calculating the alpha coefficient for each. The results are as follows:

<u>Behavior Variable</u>	<u>Alpha</u>
Extent of EC Adoption (ECADOPT)	.81
EC Priority (ECPRIORITY)	.76
High Priority Implementation Actions (IMPLEMENT)	.93

Table 8 summarizes the construction of the behavior variables.

Table 8 Behavior Variables and Indicators (PDF: tbl8.pdf)

It was observed that those firms which have implemented EDI most extensively (ECADOPT) are all suppliers of Sears, Penneys, and/or K-Mart. Penneys and K-Mart in particular are recognized as two of the earliest and most demanding proponents of EDI. Therefore, in this industry the extent of Electronic Commerce adoption (ECADOPT) may be more related to who your customer happens to be rather than through any proactive decisions on the part of the hosiery firm.

During interviews the use of important implementation actions (IMPLEMENT) appeared to be related to the availability of resources. For the most part, the size of the organization and the existence of a substantial information systems department appeared to be key determinants of whether formal implementation activities were used. Additionally, the style of management (formal or informal) seemed to play a part. Since many of the firms are quite small it was not surprising to encounter few firms which utilized formal implementation plans and extensive management techniques to implement and control the adoption of EDI.

Performance

Performance measures were developed as explained in Chapter 3. In order to simplify the presentation of results involving performance measures they have been categorized as follows:

- (1) Operational Measures
 - Sales per Employee 1995 (SLS/EMPL95)
 - Average Sales per Employee (AVGSLS/EMP)
 - Compound Growth in Sales (GROWSLS)
- (2) Executive Assessment of Performance
 - Extent EC has Resulted in Lower Costs (LOWCOST)
 - Extent EC has Resulted in Improved Service (BETR SERV)
 - Return on Investment in Industry Quintiles (RETURNS)
 - Growth in Sales in Industry Quintiles (SLSGROW)
 - Overall Firm Success in Industry Quintiles (SUCCESS)
 - Competitive Position in Industry Quintiles (POSITION)

(3) Expert Assessment

- Combination of Current Performance Ranking and Improvement in Performance
1992-1996 (EXPERT)

Tests of Hypotheses

Results of the tests on nine study hypotheses are presented in the following pages.

Performance Implications of Strategic Orientation (H1)

Many studies have found strategy to be related to firm performance as discussed above in Chapter 2. In the hosiery industry it is reasonable to expect that particular strategic characteristics or combinations of characteristics will be related to performance.

Hypothesis 1: Choice of strategy will have a differential effect on firm performance.

Four dimensions of strategic orientation were found to exist in the hosiery industry; (1) PLAN/CONTROL, (2) VIGILANCE, (3) PROACTIVENESS, and (4) RISK AVERSION. The dominance of discount retailers and the resulting competition based on price suggests that the PLAN/CONTROL dimension should be related to lower cost structures and, therefore, profit performance for many firms. One might also expect that PROACTIVENESS would be related to performance for those firms which focus on design, quality, and other differentiating factors and who sell to less price sensitive retailers. It is more difficult to predict how VIGILANCE and RISK AVERSION by themselves should be closely related to performance.

Table 9 presents the correlation coefficients between study variables and indicators of firm performance. Only three significant correlations were found with performance measures. The PLAN/CONTROL dimension is correlated with sales per employee (.425, $p < .10$) and with average sales per employee (.482, $p < .05$). PROACTIVENESS is correlated (.462; $p = .062$) with the executive assessment of overall firm performance (SUCCESS). This does not constitute an overwhelming amount of support for a strong link between strategic orientation and performance. However, as expected, PLAN/CONTROL and PROACTIVENESS are at least correlated with particular performance indicators.

Table 9 Relationship with Performance: Bivariate Correlations (PDF: tbl9.pdf)

A cluster analysis was performed to determine groups of firms with similar strategic orientations and to profile those groups along performance indicators. Agglomerative hierarchical cluster analysis (SPSS; Norusis, 1994) was used to determine an appropriate number of clusters. Both within and between groups linkage approaches were examined. Cases were clustered according to the strategic orientation variables (PLAN/CONTROL, VIGILANCE, PROACTIVENESS, RISK AVERSION). From examination of the icicle plots and dendograms, a six cluster solution seems most appropriate. One case/firm did not enter into any cluster until

many steps into the process and was, therefore, being counted as a cluster of one until late in the clustering process. In the final analysis, this single-case cluster was dropped from further consideration.

Using the k-means cluster procedure (SPSS; Norusis, 1994) a six cluster solution was specified. The results of this analysis, including cluster centers for each strategic orientation variable, are displayed in Table 10.

Interpretation and naming of the clusters is the next step in cluster analysis. It appears that firms in the hosiery industry can be classified into five distinct strategic patterns; *Risk Takers*, *Very Cautious*, *Plan & Control Driven*, *First Movers*, and *Indistinct*. Only clusters with at least two firms were interpreted.

TABLE 10
STRATEGIC ORIENTATION
Cluster Analysis

Cluster (Name, n)	STRATEGIC ORIENTATION DIMENSION CENTERS			
	Plan/Control	Vigilance	Proactiveness	Risk Aversion
1) <i>Unnamed</i> (1)				
2) <i>Risk Takers</i> (4)	-.104	-.116	.095	-1.717
3) <i>Very Cautious</i> (4)	.085	-.461	-.999	1.126
4) <i>Plan & Control</i> (5)	1.070	-.083	.262	.034
5) <i>First Movers</i> (2)	-1.570	-1.194	1.088	.346
6) <i>Indistinct</i> (4)	-.318	.996	.586	.497

Cluster #1 contained just one firm and was dropped from further consideration. The distinguishing characteristics of cluster #2 are an extremely weak value for RISK AVERSION (-1.717) and relatively neutral (near zero) values for the other three dimensions. The four firms in cluster #2 might be labeled the *Risk Takers*. These *Risk Takers* were of two types. Three of the four firms in this cluster are poor performers while the fourth firm was one of the best performers according to the EXPERT assessment. Apparently, in this industry a firm can either afford to take risks or can't afford not to. For many firms the *Risk Taker* strategy may be the strategy of last resort.

A strong value for RISK AVERSION (1.126) and weak PROACTIVENESS (-.999) lead the four firms in cluster #3 to be characterized as *Very Cautious*. These firms are rather conservative when making major decisions and don't take many risks unless the returns are clear. A search for new opportunities is not high on the priority list. Generally, these firms have been very

unsophisticated and reluctant users of EDI in the past. The *Cautious* firms are all undistinguished performers as might be expected in a dynamically changing industry

Cluster #4 exhibits a relatively high value on the PLAN/CONTROL dimension (1.070) while showing moderate values for the remaining dimensions. These five firms have, therefore, been named *Plan & Control*. The typical firm with a *Plan & Control* strategy expends much effort on forecasting and planning, emphasizes formal production management and cost control techniques, and is relatively sophisticated in its use of information systems. A certain amount of resources are needed to accomplish these things, so these firms are larger than average. Very small firms did not score particularly high on PLAN/CONTROL. It should be noted that many of these firms also scored fairly high on PROACTIVENESS. It seems that plan and control in the hosiery industry does not necessarily mean inactive or defensive. The proactive adoption of manufacturing and information technologies, and management techniques makes this strategy more dynamic than would be expected. The researcher noticed that almost all of the high PLAN/CONTROL firms had extremely knowledgeable information systems directors who were able to navigate the ever changing tides of EDI. Typically, these companies were also above average performers.

A high value on PROACTIVENESS (1.088) and very low values on PLAN/CONTROL (-1.570) and VIGILANCE (-1.194) indicate that the firms in cluster #5 could be considered the *First Movers*. These firms are focused on a search for new opportunities and new products. It should be noted that *First Movers* do not also mean risk takers in the hosiery industry. The two firms in this cluster which rely heavily on new products and opportunities appear to do so very carefully as indicated by above average scores on RISK AVERSION. These firms are both fairly small. Nevertheless, they both specialize in a wide range of products and designs. These firms participate in all five of the sock segments; (1) infants' and children's, (2) girls', (3) women's, (4) boys', and (5) mens' socks. The researcher was impressed by the wide variety of styles and designs of stocks displayed for visitors at these two firms.

Cluster #6 is fairly high in VIGILANCE (.996), moderately negative on PLAN/CONTROL (-.318), moderately strong on RISK AVERSION (.497), and moderate on PROACTIVENESS (.586). Since the VIGILANCE factor was difficult to interpret during the strategic orientation factor analysis, and the values of the other dimensions are not stellar, it seems appropriate to consider cluster #6 to be rather *Indistinct* or unremarkable. As mentioned previously, VIGILANCE was difficult to interpret as is this overall strategy. The firms in this group seem to pay attention to quality and contingencies as identified in "what if?" analysis. They also occasionally investigate new opportunities but are very careful about which ones they exploit as illustrated by the moderate level of RISK AVERSION. Primarily medium-sized and respectable performers, these firms may be strong enough to wait out the industry consolidation before settling on a more distinct strategy.

Although there are some general patterns as identified above, strong and weak performing firms were found in each of the groups. Profiles of the groups along performance indicators pro-

vides some evidence that the *Plan & Control* cluster of firms may exhibit better performance than other groups. Table 11 shows the consistency of mean performance rankings for the *Plan & Control* group. The *Plan & Control* group ranks number 1 or 2 along each of the five performance indicators shown.

Table 11 Performance Implications (PDF: tb111.pdf)

This finding makes sense within the hosiery industry. The key indicators of the plan and control dimension include the use of information systems, production management techniques, planning techniques, cost control systems, and forecasting of key indicators. These activities are important in an industry where the major customers, the retailers, have substantial power over the bargaining process and are looking for the best price and response characteristics from their suppliers. Planning, information, forecasting, and control all play a significant role in the growth and profitability of many of the surviving firms in the industry.

Although the differences among mean performance scores among the strategic groups do not reach statistical significance at least the rankings of the *Plan & Control* group are consistently high. **This provides some evidence in support of Hypothesis 1.**

Performance Implications of Adaptability (H2)

The theoretical and empirical evidence of a relationship between adaptability and performance is also quite strong as discussed in Chapter 2. This led to the second hypothesis.

Hypothesis 2: Adaptability will be positively related to firm performance?

Referring back to Table 9, adaptability is correlated with the two most comprehensive indicators of performance. Senior executives' assessment of their firm's competitive position (POSITION) is correlated with adaptability (.555, $p = .011$). The expert's rankings of overall firm performance and improvement (EXPERT) is also significantly correlated with adaptability (.455, $p = .044$). This supports past findings and provides some additional evidence that there is an important relationship between adaptability and performance. **Hypothesis 2 is supported.**

The three firms which scored the highest on adaptability were above average in size and also above average performers. Interestingly, they also scored above average on the PLAN/CONTROL dimension of strategic orientation. Being larger in this industry is not necessarily a barrier to adaptability as would be expected from the organizational inertia literature. This observation may be explained by the fact that even the largest firms in this industry are still relatively small (about 2000-2500 employees). Conversely, the two firms scoring the lowest on adaptability are both very small firms (under 200 employees) and poor performers.

It was clear from the site visits to the high adaptability firms that they were active, vital organizations with an excitement lacking in many other firms. They were clearly three of the most

active firms in the implementation of EDI with very knowledgeable and experienced information systems professionals.

Adaptability and Strategic Orientation (H3, H4, H5)

One of the important questions that this research addresses is the relationship between adaptability and strategic orientation which is reflected in the next three hypotheses.

Hypothesis 3: Firms with more defensive strategies will be less adaptable than firms with less defensive strategies.

Hypothesis 4: Firms with more dynamic strategic characteristics will be more adaptable than firms with less dynamic characteristics.

Hypothesis 5: Firms with indistinct strategies will exhibit relatively lower levels of adaptability than firms with dynamic strategies.

By design, strategic orientation dimensions have been structured to be orthogonal and are, therefore, not highly correlated. Adaptability was developed separately from strategic orientation. A correlation analysis of adaptability with strategic orientation yields the following results:

Strategic Orientation Dimensions
Correlation Coefficients (n = 20)

	<u>PLAN/CONTROL</u>	<u>VIGILANCE</u>	<u>PROACTIVENESS</u>	<u>RISK AVERSION</u>
ADAPTABILITY	-.079	.260	.245	-.194
p =	.741	.269	.297	.411

None of the correlation coefficients in this analysis is significant. This provides support for the use of adaptability as an independent variable in further analyses. Colinearity should not be an issue in later analyses.

This is a somewhat surprising result. Definitions of adaptability and the resulting measure of adaptability used in this study include aspects related to action orientation, ability to change, and vitality. Therefore, one might expect a correlation between adaptability and the PROACTIVENESS dimension. That does not appear to be the case, thereby, suggesting an orthogonal orientation of adaptability to any strategic orientation dimension. This is discussed further in the discussion section (Chapter 5).

Regression analysis using adaptability as the dependent variable and strategic orientation dimensions (PLAN/CONTROL, VIGILANCE, PROACTIVENESS, RISK AVERSION) as the independent variables yielded no additional insight. This was not unexpected due to the low level of bivariate correlation among the variables. Therefore, an alternative analysis was performed.

An association between adaptability and certain combinations of strategic orientation dimensions, not shown in the bivariate correlations, begins to appear in a cluster profile analysis. To adequately address **Hypotheses 3, 4, and 5**, an adaptability profile of the strategic clusters, developed initially to examine Hypothesis 1, was undertaken. This analysis is presented in Table 12.

TABLE 12
STRATEGIC CLUSTERS AND ADAPTABILITY
Profile Analysis

Cluster Name (n)	ADAPTABILITY (Mean)
2) <i>Risk Takers</i> (4)	.374
3) <i>Very Cautious</i> (4)	-.684
4) <i>Plan & Control</i> (5)	-.095
5) <i>First Movers</i> (2)	.429
6) <i>Indistinct</i> (4)	.141

First Movers have the highest mean adaptability score (.429) followed closely by the *Risk Takers* (.374). The *Indistinct* group was next (.141) followed by the *Plan & Control* group (-.095). The *Very Cautious* strategy had the lowest adaptability score as a group (-.684).

These results are somewhat supportive of both **Hypothesis 3**, which predicts that firms with more defensive strategies will be less adaptable than firms with less defensive strategies, and **Hypothesis 4**, which predicts that firms with more dynamic strategies will be more adaptable than firms with less dynamic strategies. The *Plan & Control* and *Very Cautious* groups were classified as more defensive than *First Movers* and *Risk Takers* which can be considered more dynamic. Clearly, the mean adaptability scores of the defensive orientations (-.095 and -.684) are both less than those for the more dynamic orientations (.429 and .374). The relatively small cell sizes, however, limit conclusion from being more definitive. The difference in the mean adaptability scores for the defensive orientations combined and the dynamic orientations combined are not statistically significant even at a relatively high ($p < .10$) level. In total, this analysis provides at least some **partial support for Hypothesis 3 and Hypothesis 4** and some tantalizing evidence for further research.

The pattern of results is also **suggestive of support for Hypothesis 5**, which predicts that firms with indistinct strategies will exhibit relatively lower levels of adaptability than firms with dynamic strategies. Table 12 shows that the mean adaptability score for the *Indistinct* cluster is .141. This is lower than both the *Risk Taker* group (.374) and the *First Mover* group (.429). Again, these differences are not dramatic enough within this small sample to reach statistical significance.

Of the six dynamic firms (*Risk Taker* and *First Mover* strategies), five ranked quite highly on adaptability. Their high ratings on adaptability can be easily explained through observations made by the researcher during site visits. These companies rely on one or more of the following capabilities which require an adaptable organization: product extensions of a modest brand image, superior design capability, a multiple niche market strategy, and sophisticated information systems. One of these firms has recently undergone a dramatic culture change prompted by a management transition from an old autocratic approach to a more dynamic open atmosphere for all employees.

In comparison, the firms with defensive strategies (*Very Cautious* and *Plan & Control* strategies) appear to rely on a different set of capabilities. Narrow product lines, financial control, quality control, efficiency, and volume production were the most common topics of discussion during interviews with these firms. These skills require, arguably, less innovation and change and, therefore, adaptability.

Behaviors and Performance (H6)

Hypothesis 6 addresses the relationship between organizational behaviors (the adoption of new technology in this study) and firm performance.

Hypothesis 6: Firms which place greater emphasis on important implementation actions will realize better performance than firms which place less emphasis on important implementation actions.

A correlation matrix showing the relationship between the various performance variables and the three behavior variables was presented in Table 9. Several of the correlation coefficients are significant. In particular, three of the operational performance measures; growth in sales (GROWSALES), sales per employee in 1995 (SLS/EMPL95), and average sales per employee 1992-1995 (AVGSLS/EMPL), are significantly correlated with the extent of adoption of Electronic Commerce (ECADOPT). Additionally, average sales per employee (AVGSLS/EMPL) is correlated at the $p < .10$ level with emphasis on important implementation actions (IMPLEMENT).

During the study it was suspected that the size of the firm might have an important relationship to the adoption and implementation of Electronic Commerce. To check this supposition, the correlation of the behavior variables with a measure of size [number of employees in 1995 (EMPLYS#)] was added to this analysis. One can observe from Table 9 that the number of employees (EMPLYS#) is indeed significantly correlated with two of the behavior variables; extent of adoption of EC (ECADOPT) and emphasis on important implementation actions (IMPLEMENT).

To examine this relationship even further, firms with very limited resources (less than 200 employees) were removed from the sample. These are the firms which would be most restricted when trying to formalize complex implementation activities. When this was done all of the significant correlations between behavior and performance variables disappear while the significant relationship between size and the extent of adoption of EC remains.

Examining Table 9 further one notices that all three behavior variables are significantly correlated with two measures of performance that were assessed by senior executives, LOWCOST and BETRSERV. Further analysis was performed to determine whether these relationships were also due to size. Regression analysis was performed using LOWCOST as the dependent variable and ECADOPT as the independent variable. This resulted in a beta of ECADOPT with significance of T of .052. When the size variable (EMPLYS#) was added to the analysis the significance of the beta of EDADOPT dropped somewhat to .067 while the beta of EMPLYS# was not close to significance (sig. of T = .547).

A similar regression analysis was performed using BETRSERV as the dependent variable. The significance of the beta for ECADOPT was initially found to be very high (sig. of T = .0002). When EMPLYS# was added to the analysis the beta of ECADOPT remained highly significant (sig. = .0001) while the beta of EMPLYS# was marginally significant (sig. = .093).

Similar analyses incorporating the other behavior variables, ECPRIORITY and IMPLEMENT, show that the correlation of these variables with the two performance variables, LOWCOST and BETRSERV, disappear when the size variable (EMPLYS#) is included.

This series of tests suggest that regardless of size of the firm, the extent of adoption of Electronic Commerce may be related to specific elements of performance; improved service and lower cost in particular. This is logically consistent. Therefore, **Hypothesis 6 is partially supported** under the conditions of this study.

The adoption of a technology is only one of numerous organizational behaviors which together result in overall firm performance. These results are suggestive of the narrow influence of Electronic Commerce on performance which becomes obscured in a small data set when observing more general and comprehensive measures of firm performance. The effective adoption and utilization of Electronic Commerce is only one of an extensive list of possible activities which impact upon firm performance. These would include countless operational, marketing, financial, human resources, and many other categories of potentially beneficial activities.

By observing the industry it is clear that a number of strategic directions have potential performance implications. Those firms serving primarily discount retailers are concerned with cost control, inventory, and responsiveness to demand patterns. Hosiery manufacturers serving upscale department stores should be more concerned with product design and quality. Manufacturers serving “mom and pop” retailers may even be relationship driven for awhile longer. The importance of EDI varies with each of these approaches. Therefore, the effectiveness of the

adoption of Electronic Commerce is going to depend upon the situation. A one size fits all solution is not likely to do the job. Therefore, there may be an interaction effect of Electronic Commerce with other variables which have not been included in the study. These other variables may be related specifically to the type of customer and market domain that a firm chooses.

Strategic Orientation and Behaviors (H7)

This section addresses analyses concerning the relationship between strategic orientation and behaviors as proposed by **Hypothesis 7**.

Hypothesis 7: Firms with more dynamic strategies will place more emphasis on important implementation actions than firms which are more defensive.

A correlation analysis of the four strategic orientation variables and adaptability with the three behavioral variables is presented in Table 13 below. None of the bivariate correlations is statistically significant at any reasonable significance level.

TABLE 13
STRATEGIC ORIENTATION AND BEHAVIORS
Bivariate Correlations
n = 20

	STRATEGIC ORIENTATION DIMENSIONS				
	<u>PLAN/CONTROL</u>	<u>VIGILANCE</u>	<u>PROACTIVENESS</u>	<u>RISK AVERSION</u>	<u>ADAPTABILITY</u>
<u>BEHAVIORS</u>					
ECADOPT	.230	-.197	.078	-.186	.299
ECPRIORITY	-.219	-.245	.129	-.036	.294
IMPLEMENT	.083	-.061	.044	-.110	.372

A further analysis was conducted by developing behavior profiles of each strategy cluster/type identified earlier. Table 14 presents these profiles.

One can see from Table 14 that, on average, the firms with dynamic strategies scored higher than the defensive groups on the extent to which important implementation actions were utilized during implementation of Electronic Commerce (IMPLEMENT). The dynamic groups (*Risk Takers, First Movers*) scored .169 and .151, respectively. The defensive groups (*Very Cautious, Plan & Control*) scored -.177 and .032, respectively. This provides some support for **Hypothesis 7** even though statistical significance is not reached when comparing these differences.

TABLE 14
STRATEGIC ORIENTATION AND BEHAVIORS
Cluster Analysis - Profiles

	BEHAVIOR VARIABLES (Mean Scores)		
	<u>ECADOPT</u>	<u>ECPRIORITY</u>	<u>IMPLEMENT</u>
<u>Cluster Name (n)</u>			
2) <i>Risk Takers</i> (4)	.582	.259	.169
3) <i>Very Cautious</i> (4)	-.109	-.047	-.177
4) <i>Plan & Control</i> (5)	.096	-.522	.032
5) <i>First Movers</i> (2)	-.170	.442	.151
6) <i>Indistinct</i> (4)	.042	.223	-.029

The same pattern holds true for the extent to which firms considered Electronic Commerce a priority activity (ECPRIORITY). However, the pattern did not hold exactly for the extent to which firms had adopted Electronic Commerce (ECADOPT). In this case only the *Risk Taker* group scored higher than both defensive groups. The *First Mover* strategy scored below both of the defensive strategy groups primarily due to one negative score from one firm in this group. If the mean score on ECADOPT of the six firms in the dynamic strategy group (.331) is compared to the mean score of the nine firms in the entire defensive strategy group (-.102), the pattern returns. As with previous cluster profiles, all of the differences described above failed to reach statistical significance even though the pattern of expected differences is consistent.

Four of the five firms scoring highly on the extent of EC adoption (ECADOPT) also utilized dynamic strategies (*Risk Taker* or *First Mover*). These firms were also fairly large with greater information technology resources than average. Those firms which scored lowest on ECADOPT had only single person information systems departments. Similar observations can be made concerning the extent to which important implementation actions (IMPLEMENT) were used.

It is very difficult to determine whether strategy or size is the key variable in this situation. On the one hand, the existence of size and resources may have provided firms with the ability to adopt EDI sooner, more formally, and more extensively. The existence of larger, more demanding customers may have been the driving force behind these phenomena. Or, a third possibility is that a dynamic strategy led to having an EDI capability which in turn supported growth, thereby resulting in the current size of the firm. At best, data and observation is ambiguous and provides only **weak support for Hypothesis 7.**

Adaptability and Behaviors (H8)

This section examines the relationship between adaptability and certain organizational behaviors. In particular, it explores the adoption and implementation of a new technology. In this case, that new technology is the adoption of Electronic Commerce technologies. **Hypothesis 8** directly addressed this issue.

Hypothesis 8: Firms which are more adaptable will place greater emphasis on important implementation actions than firms which are less adaptable.

Table 13 displays the correlation coefficients between adaptability and the three behavior variables. None of the correlations is statistically significant. However, the correlation between adaptability (ADAPTABILITY) and emphasis on important implementation actions (IMPLEMENT) comes close to being significant at the $p < .10$ level (actual, $p = .106$). On closer examination, the correlations between adaptability and the three behavior variables are all greater (and closer to significance) than any correlation between strategic orientation dimensions and behaviors. This pattern again provides some possibility that these are not phantom relationships and that a somewhat larger sample size may have identified significant relationships with adaptability.

Qualitative review of information collected during the surveys suggests that the relationship between adaptability and behaviors should be significant. As determined in the construct development portion of this study, adaptable behavior includes emphasis on innovation, change, and supporting factors such as a focus on customers, employees and a vital organization. In the hosiery industry, even though large retailers substantially drive the initial adoption of EDI and the addition of new documents, the attitude and approach to EDI that an organization adopts is under its control. Doing purchase orders and invoices by EDI is driven by the retailers. Linking purchasing and invoice related data to internal accounting, inventory control, management information and other systems is more internally driven. The retailers don't really care whether or not a firm's systems are integrated. They just care that the orders arrive on time.

It was clear during interviews that the attitude of the senior executive toward EDI was instrumental in the extent of its adoption and the priority with which it was viewed. Of the nine firms which scored high or moderately high on adaptability, seven were bullish on the ability of EDI to be an advantage rather than a disadvantage to the firm. These firms espoused a number of extensions and forward-looking applications of Electronic Commerce such as:

- Doing EDI with yarn suppliers and/or greige good knitters
- Implementation of advanced vendor-managed inventory, quick response systems, bar coding
- Utilization of Internet for product design, e-mail, and catalogue
- Adopting less common EDI document applications (e.g., forecast data, carrier notification, inventory status)

A closer examination of Table 12 and Table 14 shows that the strategic groups with the highest adaptability scores, *Risk Takers* (.374) and *First Movers* (.429) are also the two groups with the highest mean scores for emphasis on important implementation actions (.169 and .151, respectively). These relationships are, again, not statistically significant but the continuing pattern of results in the predicted pattern is suspicious. **Hypothesis 8 is, therefore, only weakly supported** by these analyses but a relationship between the variables is still indicated and suspected.

Strategic Orientation, Adaptability and Behaviors (H9)

In **Hypothesis 4** we investigated the relationship between behaviors and performance and found only weak associations. This section now turns to a more comprehensive examination of performance relationships among the full array of variables.

Important performance implications among strategic orientation, adaptability and behaviors are expected as specified in **Hypothesis 9**. As with previous hypotheses some directional/pattern evidence indicates potential support for **Hypothesis 9**. But as before, differences observed did not reach statistical significance.

Hypothesis 9: Firms with distinct strategies, high adaptability, and utilizing important implementation actions will exhibit superior performance compared with firms which are lacking in one or more of these characteristics.

Correlation Analysis: An examination of the bivariate correlations of the strategic orientation, adaptability and behavior variables with performance indicators was presented previously in Table 9. The plan and control dimension is the only strategic orientation variable which is correlated with operational performance measures. In particular, PLAN/CONTROL is significantly correlated with both sales per employee in 1995 (SLS/EMPL95) ($r = .425$; $p < .10$) and average sales per employee (AVGSLS/EMPL) ($r = .483$; $p < .05$). The PROACTIVENESS dimension is significantly correlated with the executive assessment (subjective) of overall firm performance and success (SUCCESS) ($r = .453$; $p < .05$). Caution is warranted here since this correlation could be influenced by common method variance. Strategic orientation was assessed by the same executives who judged overall firm performance and success.

Adaptability, on the other hand, is significantly correlated with two of the more comprehensive performance indicators, competitive position (POSITION) as assessed by executives ($r = .555$; $p < .05$) and overall performance (EXPERT) as judged by an industry expert ($r = .455$; $p < .05$). This result provides some support of the results reported by Gordon and DiTomaso (1992) and Kotter and Heskett (1992), who also found significant correlations between adaptability and firm performance.

As discussed in the results of tests on **Hypothesis 6** above, several operational measures of performance are correlated with behavior variables. However, firm size appears to be an explanation for these correlations, not the behaviors themselves. Narrow performance measures

related specifically to lower cost and better service appear to be related to the adoption of electronic commerce even when one has controlled for size. Size, however, is not significantly correlated with any strategic orientation variables or with adaptability. One behavior variable, the extent of EC adoption (ECADOPT) is correlated with two narrow operational indicators (LOWCOST and BETRSERV) as judged by executive assessment.

As an additional control, the correlation of size with performance indicators was examined. Table 9 shows that in the hosiery industry, size is not significantly correlated with any individual performance indicator.

The conclusion drawn from the correlation analyses is that all three constructs (strategic orientation, adaptability, behaviors) exhibit some bivariate correlations with particular indicators of performance. Multivariate techniques must be used to assess these constructs' joint influence on performance.

Regression Analysis: Regression analyses were performed using several of the performance indicators (AVGSLS/EMPL, GROWSALES, SUCCESS, POSITION, EXPERT) as dependent variables. Independent variables included those strategic orientation, adaptability, and behavior variables which showed significant correlation with at least one performance indicator as observed above (PLAN/CONTROL, PROACT, ADAPTABILITY, ECADOPT, IMPLEMENT). Results of these regressions reveal no additional insight into the performance relationship than what was revealed in the correlation analysis above. In general, only the same bivariate relationships between the independent variable group (strategic orientation, adaptability, behaviors) and the dependent variables (performance indicators) were found.

Cluster Analysis: Table 11 presents a more comprehensive profile of the five strategic clusters. The most interesting observation is the consistently high performance rankings turned in by the *Plan & Control* group. This group has the highest average sales per employee (AVGSLS/EMPL), executive assessment of overall firm performance (SUCCESS), executive assessment of competitive position (POSITION), and expert assessment of overall firm performance (EXPERT). The *Plan & Control* firms also have the second highest mean compound growth rate (GROWSALES). This cluster, however, has only undistinguished mean scores on adaptability and behavior variables.

Hypothesis 9 predicts that firms which have distinct strategies, high adaptability, and utilize important implementation actions will exhibit better performance than those firms which are lacking in one or more of these variables. The *Risk Takers* group, which has relatively high adaptability and behavior scores, exhibits poor to inconsistent results among the performance indicators. The *Indistinct* cluster, which has fairly mundane adaptability and behavior scores, shows promising but still inconsistent performance numbers.

The results of these correlation, regression and cluster analyses provides only **weak evidence in support of Hypothesis 9**. The interrelationship among these variables is very difficult

to interpret in this industry setting. It appears that the *Plan & Control* strategy is linked to somewhat greater performance than the other strategic orientations. It also appears that adaptability has an important effect on performance. Since the behavior indicators are closely linked to size in this industry it is difficult to see any residual effects with such a limited sample size.

It appears that the interaction among the study variables is more complex than expected. Although the statistical results are ambiguous at best, important relationships among the study variables can be observed in certain instances. Let's examine the four top performing firms as judged by the expert (EXPERT). The first firm uses a distinctly *Risk Taker* strategy by emphasizing a modest brand image and new product design. This firm also scored very high on adaptability. They place a high priority on EDI (ECPRIORITY) although implementation is not particularly formal as shown by a low score on important implementation activities (IMPLEMENT). They have one of the most extensive information systems capabilities in the industry and are experimenting with new systems and the Internet. Formal planning for Electronic Commerce is not necessary in this firm since keeping up with information requirements is a normal and accepted part of the way the business operates. Enhancements to EDI and EC in this firm are incremental activities and, therefore, not part of a formal implementation effort.

The second high performing firm rates highly on adaptability (ADAPTABILITY), EC priority (ECPRIORITY) and important implementation actions (IMPLEMENT). Even though this firm has an *Indistinct* strategy, it is the only *Indistinct* firm which rates very highly on adaptability. This may be an example of the importance of adaptability itself as a strategic dimension. Previously in this paper it was observed that the indicators of adaptability are substantially under management influence and that adaptability is uncorrelated with other strategic orientation dimensions. The conclusion drawn was that perhaps adaptability could be considered another separate strategic dimension. This second high performing firm may be an example of the strategic importance of adaptability.

The third high performance firm has chosen a different approach. This company is very strongly *Plan & Control* oriented, moderately adaptable, and moderately involved with EDI. They concentrate on a fairly narrow product line; primarily athletic socks. This firm focuses very strongly on productivity including progressive human resources practices which are both morale building and productivity enhancing. This is a clear example of the power of the *Plan & Control* strategy when done consistently well. It should be noted that although this firm clearly stresses strategic consistency, nevertheless, it does not rank low on the other variables. The firm seems to maintain enough flexibility to adapt within its rather defensive strategy.

The story of the fourth high performance hosiery firm is substantially the same as the third. Primarily a *Plan & Control* driven firm, the fourth firm scores consistently in the middle on adaptability and behavior variables.

This examination of the high performing firms demonstrates two potentially important points. First, a firm in this industry should have either a very distinct strategic orientation or be

very adaptable. Second, consistency among strategy, adaptability and behaviors may also be a critically important characteristic. This provides some interesting observations for further research.

Overall, the results of the analyses testing the nine study hypotheses are summarized in Figure 6. Partial or weak support has been attributed to hypotheses where pattern/directional evidence was found even though the differences did not reach statistical significance at the $p < .10$ level.

Hypothesis 1:	Choice of strategy will have a differential effect on firm performance.	<i>(Plan and Control appears most related to performance)</i>
Hypothesis 2:	Adaptability will be positively related to firm performance?	(Supported)
Hypothesis 3:	Firms with more defensive strategies will be less adaptable than firms with less defensive strategies.	(Partial Support)
Hypothesis 4:	Firms with more dynamic strategic characteristics will be more adaptable than firms with less dynamic characteristics.	(Partial Support)
Hypothesis 5:	Firms with indistinct strategies will exhibit relatively lower levels of adaptability than firms with dynamic strategies.	(Weak Support)
Hypothesis 6:	Firms which place greater emphasis on important implementation actions will realize better performance than firms which place less emphasis on important implementation actions.	(Partial Support)
Hypothesis 7:	Firms with more dynamic strategies will place more emphasis on important implementation actions than firms which are more defensive.	(Very Weak Support)
Hypothesis 8:	Firms which are more adaptable will place greater emphasis on important implementation actions than firms which are less adaptable.	(Very Weak Support)
Hypothesis 9:	Firms with distinct strategies, high adaptability, and utilizing important implementation actions will exhibit superior performance compared with firms which are lacking in one or more of these characteristics.	(Very Weak Support)

FIGURE 6
STUDY HYPOTHESES - SUMMARY OF RESULTS

Research Questions - Results

Results of the analyses on the three research questions are presented in the following pages.

Research Question #1: How is adaptability related to Strategic Business Unit strategy?

Construct development and correlation analyses described above illustrate two important indications about adaptability in the hosiery industry. First, this research supports the view that adaptability is a single dimension construct. Although factor analysis of individual level data identified several other potential adaptability factors, the overpowering importance of the first factor suggests the adoption of a single factor solution. This single factor and its indicators are retained at the firm level although a complete revalidation analysis is not performed.

Second, this research suggests that adaptability is not significantly correlated with any strategic orientation dimensions. This was somewhat surprising since several definitions of adaptability describe adaptability as being related to aggressive activity and innovation (i.e., Gordon & DiTomaso, 1992). Adaptability in this research was not found to be significantly correlated with either the PROACTIVENESS or the RISK AVERSION dimensions of strategic orientation in the hosiery industry. This suggests that the ability to adjust to a changing environment (ADAPTABILITY) is a separate characteristic from either the proactive search for new opportunities/products (PROACTIVENESS) or a firm's risk profile (RISK AVERSION). This finding may be somewhat surprising to some researchers. Kilmann, Saxton and Serpa's (1985) description of adaptability includes the characteristics of both risk-taking and proactive approach to organizational life. Gordon and DiTomaso (1992) also include risk-taking in their definition of adaptability.

The measure of adaptability developed in this study contains eleven indicators, most of which seem to be under management's control. Adaptability also appears to be significantly related to firm performance and independent of any strategic orientation dimension.

Research Question #2: How do strategy and adaptability together influence organizational behaviors and, ultimately, performance?

This research provides some evidence that both strategic orientation and adaptability have an effect on performance. The *Plan & Control* cluster appears to perform somewhat better on average than other strategic groups. Adaptability is significantly correlated with the two comprehensive performance measures (POSITION and EXPERT). The interaction of strategic orientation and adaptability, however, was difficult to discern given the limitations of the research design and sample. More definitive results will have to wait for somewhat larger samples, more precise

performance information and perhaps a more stable industry. Given these limitations, however, it is encouraging to find these modest indications of relationships among these variables.

The analysis for **Hypothesis 9** above included a description of four high performing firms. This analysis describes a complex relationship among strategic orientation, adaptability and behavior variables that is difficult to observe statistically with a small data set. Further research is warranted to extract more precise conclusions about the interrelationships among these variables.

Research Question #3: How can one best describe and measure the construct of adaptability?

This research found eleven indicators to be most related to adaptability in the hosiery industry. A single dimension of adaptability is supportable. The eleven indicators are:

- (1) Extent people are encouraged to take reasonable risks to increase effectiveness of the firm (REASONABLERISK)
- (2) Extent people are encouraged to be creative (or innovate) in their jobs (CREATIVE)
- (3) Extent company values customers (VALUCUSTOMERS)
- (4) Extent company encourages experimentation (EXPERIMENTATION)
- (5) Extent company values employees (VALUEEMPLOYEES)
- (6) Extent people are free to take independent action (INDEPENDENTACTION)
- (7) Extent roles that people play in the company are open to redefinition (ROLREDEFINITION)
- (8) Extent company is responsive to changes in its business environment (RESPONDTOCHANGE)
- (9) Extent company values people and processes that create useful change (USEFULCHANGE)
- (10) Extent company is willing to change culturally engrained behaviors (CULTURECHANGE)
- (11) Estimate of the overall vitality of the company as reflected by a sense of urgency and rapid pace of activities (VITALITY)

This scale may serve to provide a more valid and reliable measure of adaptability in future research. Additional confirmation of the findings here would be welcome. Duplication of these results in other industries or through cross-sectional studies would provide valuable extensions and confirmation of this work.

Figure 7 summarizes the results found from analyses relating to the research questions posed.

Research Question #1:	How is adaptability related to SBU strategy?	(Adaptability is independent of strategic orientation)
Research Question #2:	How do strategy and adaptability together influence organizational behaviors and, ultimately, performance?	(Plan and Control strategies and Adaptability influence performance individually, more complex interactions were not observed)
Research Question #3:	How can one best describe and measure the construct of adaptability?	(Unidimensional, eleven indicator scale, under management influence)

FIGURE 7
RESEARCH QUESTIONS - SUMMARY OF RESULTS

CHAPTER 5

DISCUSSION

This study proposed an ambitious agenda to examine the interrelationships among several key variables of interest to strategy researchers. Findings can be classified into four main areas; (1) the nature of strategic orientation and its manifestation in the hosiery industry, (2) the nature of adaptability, (3) the interrelationship of strategic orientation and adaptability with the adoption and implementation of new technology (Electronic Commerce), and (4) performance implications of these variables and their interrelationships.

This research was moderately successful at describing strategies in the hosiery industry and the nature of adaptability. The nature of the interrelationships of strategic orientation and adaptability with behaviors, however, remains quite murky due to the overwhelming effects of firm size on the nature of technology adoption in individual firms. However, some important performance implications were identified. In particular, adaptability and the *Plan & Control* strategic group seem to have important relationships to firm performance.

Significance of Results

The following discussions describe the importance of the findings of this research.

The Nature of Strategic Orientation in the Hosiery Industry

First, the STROBE construct (Venkatraman, 1989a) seems to be useful in identifying strategic dimensions in the hosiery industry. Four dimensions were identified, two of which (PROACTIVENESS and RISK AVERSION) correspond with dimensions found by Venkatraman. A third hosiery dimension (PLAN/CONTROL) seems to be a composite of two other STROBE dimensions (Defensiveness and Analysis). The fourth hosiery dimension (VIGILANCE) is somewhat ambiguous. A similar pattern of results was found by Tan and Litschert (1994) in the Chinese electronics industry. However, not all of the original STROBE dimensions were found to exist and others combined to form a composite dimension.

These five observed strategic dimensions in the hosiery industry were successfully used to identify meaningful strategic clusters/groups which were then profiled to provide additional results. This is believed to be the first time that the STROBE dimensions have been used to successfully identify strategic groups.

The modest sample size in this study requires that certain statistical techniques be stretched to their limits. Consequently, a check of the reasonableness of the results may help improve our confidence in them. The strategic orientation dimensions found in this analysis are consistent with knowledge of the industry and observations made during site visits to the subject firms.

Strong established cultures, entrenched management styles and long proud histories argue for the existence of substantial organizational inertia in many firms. Numerous hosiery companies are well established family firms that have been in business for decades. Cultures and management styles are well entrenched. The traditional autocratic management style or at least vestiges of it was observed at several firms. Therefore, it was not surprising to observe defensive, risk averse strategies

An obsession with planning and control is prevalent as would be expected in a price/cost sensitive industry serving a retail environment shifting toward satisfying the requirements of large retailers. Firms concentrating on a narrow product line and long efficient production runs were observed. Some firms place particular emphasis on planning, quality control, inventory control, and information systems. Other firms concentrate on human resources practices which lead to efficiency, morale, and productivity. The observance then of PLAN/CONTROL, RISK AVERSION and VIGILANCE dimensions of strategic orientation should not be surprising; neither should the appearance of *Plan & Control* or *Cautious* strategic groups.

Several firms in the sample clearly employ differentiation strategies based on such factors as product design and customer response. Some firms specialize in short runs of highly fashionable socks. These firms were noticeable by the colorful production areas where many different runs of socks were in process simultaneously. Pattern, color and design experimentation was clearly important at these firms. Therefore, it is also unremarkable that a PROACTIVENESS dimension appear, as well as the *Risk Taker* and *First Mover* strategic clusters.

The existence of *Indistinct* strategies which focus primarily on watchfulness were also unsurprising. Changing market and competitive dynamics prevalent in this industry result in hesitation, confusion, and resistance to change. Firms without clear strategic direction were very noticeable. This group appears to be similar to Porter's (1985) "stuck in the middle" firms and the "reactor" strategy of Miles and Snow (1978). Some of these firms appear to be in distinct trouble while others appear to be in good shape awaiting the current consolidation and shakeout before embarking on a distinctive strategy.

The Nature of Adaptability

Results of the construct development efforts to better define and measure adaptability were also quite promising. Many conceptions, definitions, and instruments have been used to describe and measure adaptability. As described in Chapter 2, a rigorous construct development effort had never been performed on adaptability until this study. The findings here are helpful in coming to more definitive conclusions regarding the nature of adaptability.

Three significant conclusions can be drawn from this construct development exercise. First, this research argues strongly for a single dimension construct of adaptability. Factor analy-

sis suggests the use of a single dimension comprised of eleven related indicators as identified in Table 7.

Second, adaptability was found to be relatively independent of any strategic orientation dimension. Adaptability appears to be a substantially different characteristic of a firm than that represented by proactiveness, riskiness, or aggressiveness as defined by Venkatraman (1989a). This somewhat mirrors the findings of O'Reilly, Chatman and Caldwell (1991) who found that adaptability (measured as a single indicator) did not load on innovation or aggressiveness factors identified in their study.

Third, one might even argue for the use of adaptability as a separate dimension of strategic orientation. The literature has extensively addressed the idea of adaptability in both cultural and strategic contexts as discussed in Chapter 2. If one argues that adaptability can be influenced by managerial activity and is related to firm performance, then perhaps, adaptability could be considered another strategic dimension to be consciously influenced by management for the purpose of improving firm performance. One of the hosiery firms provides a possible example of this. Even though this firm is in the *Indistinct* strategic group, nevertheless, it has been one of the best recent performers. A high level of adaptability could be a reason for this performance in absence a distinct strategy at this point in time.

Examining the list of indicators that were found to be related to adaptability in this study, one finds that most of them are under management's influence to at least some degree. It is reasonable to expect that managers should be able to encourage employees to (1) take reasonable risks, (2) be creative, (3) be flexible, (4) value customers, (5) experiment, and (6) be aggressively active. It is also reasonable to expect management itself to (7) be flexible, (8) value employees, (9) be responsive to a changing business environment, and to (10) change difficult, culturally engrained behaviors, or at least attempt to change them. The eleventh indicator of adaptability, vitality, is an observed property of the firm. Certainly management also has some influence on whether or not employees perceive a vital organization.

Venkatraman (1989a) "anchored" his development of the STROBE construct by asking four theoretical questions about the conceptual domain of strategy and hypothesizing the six STROBE dimensions a priori based on predominant themes in the literature. Characteristics of flexibility and ability to adjust to environmental changes was not considered by Venkatraman when prespecifying his six dimensions, perhaps because these issues were being raised in the culture rather than the strategy literature. Since Venkatraman's study in 1989, adaptability has gained higher visibility through the work of Kotter and Heskett (1992) and Gordon and DiTomaso (1992). The research contained herein now raises the question of whether adaptability should be examined as a strategic dimension subject to management manipulation rather than as a purely organizational culture construct.

From a practitioner's standpoint the eleven indicators used in the adaptability scale could be the beginning of a very useful management tool to evaluate a firm's posture on adaptability.

Since this scale was developed on data from just one industry, the results should be interpreted with some caution. Additional construct development on data samples from other industries or on a large cross-sectional sample of firms would be advisable.

Some of the adaptability data in this research was collected through personal interviews. The interviewer noticed a moderate hesitancy on the part of some subjects to answer the questions based on the company as a whole. Quite frequently the subjects indicated that their answer would differ depending on the department, usually the marketing versus the production departments. This supports the contention that adaptability may also be a valid construct at the sub-group level. This supposition has been suggested by organizational culture scholars (e.g., Schein, 1992). Organizational structure variables at the sub-group level have also been hypothesized to be related to their external sub-environments (e.g., Lawrence and Lorsch, 1967). Exploration of the complications this observation creates will have to wait for further research.

Behavioral Relationships

Only sparse evidence of a link between strategic orientation, adaptability and the implementation of new technology was found. Three reasons for the weak support of the study hypotheses are possible. First, the relatively modest sample size makes it difficult for any differences to appear statistically significant. There are a multitude of potentially important organizational behaviors to consider simultaneously. It is difficult to sort out any but the most profound relationships using a small sample.

Second, size of the subject firms may have had a greater effect on the behavior variables than either strategic orientation or adaptability, thereby, obscuring any effects from the variables of interest. Since small firms have fewer resources to draw upon, implementation activities occur much more informally and are more difficult to measure. The proliferation of established family firms with entrenched cultures, relative lack of computer sophistication, and longstanding industry patterns of behavior also serve to obscure the linkage between macro variables like strategic orientation and more specific (frequently sub-group or individual) behaviors/activities such as the use of a new computer program.

Third, it is likely that the imbalance in the power relationship in the hosiery industry limits the ability of hosiery firms to take independent actions when implementing new technology. Large retailers drive most of the Electronic Commerce decisions in the hosiery industry. Differential adoption and implementation characteristics among the hosiery firms may depend more upon a firm's customer base and size (resources available) than upon proactive decisions. In industries which are further upstream in the value chain with more power over suppliers (like the retail industry) one might expect to find stronger relationships among strategy, adaptability and implementation behaviors. Context, therefore, may play a critical role in the relationship between macro-level strategy variables and the micro-level activities and decisions made in the firm.

Interrelationship with Performance

Performance measures in this study were limited by data availability. To a great extent, qualitative assessments of performance indicators were relied upon. It is encouraging to find that the two most comprehensive assessments of performance (POSITION and EXPERT) were significantly related to adaptability even if individual operational measures were not.

The hosiery industry has been experiencing substantial turmoil and uncertainty over the past few years. Poor growth, substantial domestic and foreign competition, consolidation, and intense pressure by hosiery customers (big retailers) have combined to produce an extremely challenging environment for hosiery firms. Inconsistent performance has been the rule. Many firms have exited the industry in the past few years, thereby removing the poorer performers from any chance of being included in this study. Those remaining are probably the better overall performers. Additionally, it is likely that those firms which agreed to participate in this study are somewhat better performers, on average, than those which declined to participate. These factors likely combine to limit the variance in performance. To find any significant performance differences under these restrictive conditions is actually quite encouraging. Turbulence in an industry may not be as critical an environmental factor as might be expected when doing empirical research into these organizational variables.

Although statistical significance was difficult to demonstrate, the pattern of performance evidence in the hosiery industry is reasonable. That *Plan & Control* strategies should exhibit the most evidence of a link with performance is entirely expected in a price sensitive, quality conscious marketplace with stagnant demand and changing industry dynamics. Relatively poor performance is exhibited by both the *Risk Takers* and by the *Very Cautious* firms. Table 11 shows that these two strategic groups have the lowest rankings on sales growth (GROWSALES) and overall performance (EXPERT) as judged by the industry expert. *Risk Takers* often make incorrect strategic decisions, especially in a turbulent environment. *Very Cautious* firms, on the other hand, are likely to miss important changes and opportunities.

That adaptability should be correlated with overall firm performance is also expected in this industry. Although not specifically tested, differential adaptation to particularly important industry conditions should be a predictor of overall performance. Theoretically, a stable environment should require no adaptation for successful firms to remain successful. Therefore, high adaptability, as a firm characteristic, should have little effect on performance under stable conditions. In a dynamic situation, however, effective adaptation should be critically important. In the hosiery industry one would expect adaptation to the following industry conditions to be most critical:

- Changing demands of major retailers
- Changing fashion
- Production technology innovations
- Logistics and information requirements
- Changing competitive landscape

The Hosiery Industry Story - Final Words

In the hosiery industry, having a distinctive strategy helps. A consistent *Plan & Control* strategy appears to give a firm the best chance of success. Being proactive and taking reasonable risks from a strong competitive position also appears to be quite successful for at least one firm. Being highly adaptable in this volatile environment also appears to be a viable approach in absence of a distinctive strategy.

Adaptability by itself and in conjunction with a distinct strategy also appears to be an important element for overall success in this industry. The impact of adaptability, however, does not show up on narrower measures of performance. This could be due to the limited coverage of the potential performance factors available for this study. Nevertheless, this observation raises interesting questions about the role of adaptability in the firm. Is adaptability pertinent as an overall firm variable or is it more appropriately assessed at the subgroup level? Can a firm be overly adaptable and thereby dissipate its potential benefits?

In an industry dominated by the power of large retailers, the adoption of Electronic Commerce is a necessity if one wishes to be a supplier of those firms. With large retailers continuing to increase their dominance of the retail landscape for hosiery, the adoption of these technologies is a necessity. How well one accepts, implements and enhances the technology to exploit its potential benefits depends upon management understanding and acceptance, resource availability and the ability of the firm to adjust and adapt to changing conditions.

Limitations of the Research

Interpretation of the results of this research should consider the limitations under which this study was conducted. In particular, generalization to other settings should be done carefully since this study was conducted in a single industry with primarily privately-owned firms and with a limited sample size. As discussed previously, the existence of particular industry conditions may also circumscribe the results of this research. Those particular conditions are a dynamic market environment, manufacturing and information technology innovations, the dominance of large powerful retailers, and changing competitive dynamics.

Validity and reliability of the indices used would be enhanced through replication in other settings. The strategic orientation measures, although developed and validated by Venkatraman

(1989a), were found to be somewhat different in this study than in Venkatraman's original presentation of the six STROBE dimensions. For the first time, adaptability was constructed through factor analysis from a complete set of individual indicators suggested by the literature. Replication and corroboration of the findings in this research would be welcome. Behavior variables measuring characteristics of the adoption and implementation of a new technology were assembled specifically for use by this study. Also, performance indicators used were limited by data availability and do not necessarily represent the full range of potential performance measures.

It should also be noted that data was collected during a narrow time window. Some of the relationships tested would be more clearly observed in a time series moving forward rather than from a snap shot. For instance, adaptability today should logically be related to current and future performance and not necessarily to past performance. To find the significant performance relationships that were uncovered in this study is possible evidence of the lingering effects of these variables.

Implications for Practitioners

As in earlier studies (Hansen and Wernerfelt, 1989; Gordon and DiTomaso, 1992; Kotter and Heskett, 1992), this research found adaptability to be significantly related to a couple of general indicators of firm performance. This research points to the possible use of adaptability as a strategically manipulable variable. The precise specification of adaptability developed in this study identifies eleven indicators of adaptability, most of which can be influenced by management, albeit with substantial effort. A valid and reliable adaptability index could be a useful diagnostic tool to assist management in pinpointing specific strengths or weaknesses in adaptability which may be impacting upon firm performance.

The use of a dimensional approach to strategy which focuses on effective strategic characteristics of the firm may be a useful way to think about positioning for long term success. The STROBE approach (Venkatraman, 1989a), with the possible addition of adaptability as an additional dimension, may help managers develop an organization with appropriate characteristics to be able to arrive at a defensible strategic position. This approach would be more future oriented than defining strategy by existing resources or current industry position.

Directions for Future Research

Certainly, this research makes a strong argument for an expanded research agenda into the implications of adaptability as a strategic construct. Adaptability's influence on firm performance is becoming clearer with each succeeding finding of a strong positive correlation. Adaptability's component indicators are things which managers can control to some degree, thereby, providing a new management tool for diagnostics and influence. This research should be duplicated in additional settings and contexts to confirm and strengthen the validity and reliability of the construct and measurement instrument.

The STROBE construct (Strategic Orientation of Business Enterprises) deserves further exploration and application as a way of identifying strategic postures. The use of STROBE to identify strategic groups is an interesting and potentially beneficial extension of this construct. The efficacy of including adaptability as an additional STROBE dimension should be explored and debated.

Although the findings of this study regarding organizational behaviors were disappointing, attempts to further understand elements of organizational behavior such as strategy implementation and the adoption of technology should continue. The interrelationships among strategy and behavioral variables are poorly understood and deserve serious attention.

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