THE EFFECTS OF RAPID ENVIRONMENTAL CHANGE ON COMPETITIVE STRATEGIES: AN ORGANIZATIONAL LEARNING PERSPECTIVE

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ABSTRACT

This model presents the both direct and indirect effects of incremental and major environmental change on competitive strategies employed by organizational participants in rapidly changing environments; specifically, environmental change is viewed as having both incremental and major components. The model developed in this paper predicts that organizations that are accustomed to rapid environmental change will gain competence at learning under incremental environmental change. However, accurate learning for firms under conditions of major environmental change will continue to be problematic.

INTRODUCTION

This paper develops a predictive model of the impact of environmental change on the relationship between past performance and strategic change for rapidly changing environments. This model aims to enhance our understanding of how firms learn to navigate in rapidly changing environments and set an agenda for empirical research on the impact of environmental granularity on strategic change. Using an organizational learning perspective, this paper describes the forces that drive volatility in this competitive environment. The extreme volatility and ambiguity of this environment may make it difficult for organizations to interpret changes in their performance. Organizational interpretation of performance feedback leads to firms' strategic action or inaction. An example of this type of environment is the microcomputer hardware industry has been described as the quintessential turbulent or high velocity industry (Eisenhardt & Bourgeois, 1990).

BACKGROUND

The ideas contained in this research are based on the underlying assumption that organizations respond to their experience, including their prior performance and their perceived environment, as adaptive learning systems (Cyert & March, 1992; March & Simon 1993; March & Olsen, 1976). It is proposed that an organizational learning perspective can explain the strategic adaptations of organizations in rapidly changing environmental, such as microcomputer makers.
Some authors suggest that superstitious learning occurs when spurious correlations are drawn from learning based on erroneous perceptions and interpretations of environmental signals or performance feedback in ambiguous environments (March & Olsen, 1976; Levinthal & March, 1981). However, others suggest that organizations can learn to cope with rapid environmental change as a baseline condition (Milliken & Lant, 1991; Levitt & March, 1988).

The strategic responses of organizations to an ambiguous, turbulent environment and to their own performance are investigated over time. This paper develops theoretical mechanisms for including both the direct and indirect effects of environmental change in an organizational learning framework and dividing environmental change into incremental and major components. This conceptualization may explain why some prior research has indicated that accurate learning is problematic under conditions of rapid environmental change while others have suggested that firms can gain competence at learning in rapidly changing environments. The model developed in this study predicts that organizations that are accustomed to environmental change will gain competence at learning under conditions of incremental environmental change. However, accurate learning for these firms under conditions of major environmental change will continue to be problematic.

ADAPTIVE ORGANIZATIONAL LEARNING

The model of learning used in this study is consistent with an adaptive organizational learning perspective that models organizations as goal-oriented systems that respond to experience (Cyert & March, 1992; Glynn, Lant, and Milliken, 1994; March & Simon 1993; March & Olsen, 1976; Milliken & Lant, 1991; Levinthal & March, 1981; Levitt & March, 1988; Lant & Mezias, 1990, 1992). Organizations continue or repeat actions that have been successful and search for alternatives in light of negative feedback. Glynn, Lant, and Milliken (1994) point out "the key components of organizational learning are goals, attention and search rules, routines, shared understandings, and organizational beliefs (pp. 44-45)." New organizational actions or adaptations are based on the interpretations of organizations' past performance, experience, and environment.

Following Lant and Mezias (1992) and Mezias and Lant (1994), there are four basic elements of the organizational learning perspective as shown in Figure 1. First, organizations have performance goals or aspirations to which they compare their actual performance (Cyert & March, 1992; Lant, 1992). Second, organizations analyze performance feedback and scan their environment to assess their level of goal attainment. Third, organizations search for alternative strategies under conditions of failure, where gathering and processing information about alternative behaviors is a relatively costly process (Cyert & March, 1992; Nelson & Winter, 1982). Fourth, organizations change their strategies based on the alternative selected by their search process (Mezias & Lant, 1994).
ASPIRATIONS

Aspirations come from organization's assessments of their own performance, competitors' performance, and environmental conditions. Organizations face the complex process of filtering through the goals of multiple coalitions and interest groups from inside the organization, from its prior performance, and from its environment to distill organizational aspirations. The level of an organization's aspirations may be set by satisficing due to limited search and processing capabilities. Simon (1955) presents the notion of satisficing, where utility maximization is not possible and individuals accept some satisfactory, but less than optimal, decision solution.

Cyert and March (1992) posit that in the steady state these aspirations will exceed performance by a small amount. However, when performance increases at an increasing rate, aspirations will lag behind performance in the short-run. When performance decreases, aspirations will be above the level of performance. Their model assumes that aspirations are an optimistic extrapolation of previous performance and aspirations. Lant's (1992) examination of aspiration level adaptation by teams in a competitive behavioral simulation provides empirical support for this model.

PERFORMANCE FEEDBACK

Performance feedback comes from an organization's own actual performance. This is a backward looking process where organizations compare prior actual performance information to organizational goals. Organizations' perceptions of success and failure are outcomes of this comparison process. Organizations perceive success when actual performance is above target levels and failure when actual performance is below target levels (Cyert & March, 1992; Lant & Mezias, 1990, 1992; Milliken & Lant, 1991). Organizations are less likely to repeat their behaviors when
they perceive conditions of failure and are more likely to repeat successful behaviors (Levinthal & March, 1981; Levitt & March, 1988; Lant & Mezias, 1990, 1992).

March and Olsen (1976) posit that when performance feedback is unclear, superstitious learning may occur, i.e., spurious correlations may be drawn from coincidental events and interpreted as meaningful information. This learning may be based on erroneous perceptions and interpretations of anomalous performance improvements in unclear environments. This causal ambiguity may lead to spurious attributions of performance data (Rumelt, 1974). Firm level responses to rapid performance changes may be the organizational equivalent of a deer transfixed by the headlights of an approaching car -- failure to act. Rapid and or frequent changes may lead to organizational inertia (Staw, Sandelands, & Dutton, 1981; Hannan & Freeman, 1989).

The clarity and accuracy of performance feedback affect organizations' abilities to adapt aspirations. Lant (1992) found that when feedback was very clear and accurate the behavioral outcomes of groups were roughly consistent with both an adaptive learning model and a rational expectations model. In a computer simulation Lant and Mezias (1992) modeled organizations in an ambiguous world (cf. March & Olsen, 1976) and found that the effect of ambiguity decreased organizations' responsiveness to performance information.

SEARCH

March and Simon (1993) view organizations as action oriented and adaptive systems. Organizations are sequential processors of alternative solutions due to their limited processing capacity. Furthermore, organizations have limited search capabilities; they limit the range of alternative solutions that they seek for a given problem or issue.

Building on previous work (Simon 1955; March & Simon 1993), Cyert and March (1992) view organizations as using acceptable-level decision rules and paying sequential attention to goals. When performance is below the aspiration level organizations engage in what Cyert and March (1992) term problemistic search. The search for alternative solutions to aspiration attainment is triggered by problems. At first, a simple-minded search procedure is used to seek alternatives. If this simple procedure does not yield a satisfactory solution, then more complex search mechanisms are employed to find a problem solution. The search for aspiration attainment is biased by the experience, the environment, and the performance history of an organization. When performance is above the aspiration level organizations engage in opportunistic search. The search for alternative solutions to aspiration attainment is triggered by organizational slack, the abundance of organizational resources beyond those necessary to the organization (Cyert and March, 1992).

CHANGE

Based on the above aspirations, feedback, and search, organizations may elect to change their strategies and or capabilities. These changes may refine current strategies or implement new strategies. Thus, change includes both a aspiration level adaptation component and a random
component in organizational responses to experiences (March & Simon, 1993; Cyert & March, 1992; Mezias & Glynn, 1993).

**EFFECTS OF PAST PERFORMANCE ON STRATEGIC CHANGE**

Organizational performance influences strategic persistence and change (Lant, Milliken, & Batra, 1992; Milliken & Lant, 1991; Lant & Montgomery, 1987). Previous research suggests that following successful performance, firms are unlikely to change their strategies; however, following unsuccessful performance, firms are more likely to change their strategies (Lant, Milliken, & Batra, 1992; Milliken & Lant, 1991).

The recent performance history of organizations may play a critical role in influencing organizational decision making about strategic change or persistence. Following successful performance, organizations are unlikely to change their strategies. However, following unsuccessful performance, organizations are more likely to change their strategies than under conditions of success. While inertial forces are still strong, there tend to be fewer competency traps (Levitt, & March, 1988), positive reinforcement, and slack resources to encourage persistence.

Lant and Mezias (1990, 1992) investigated the longitudinal effects of organizational performance on organizational learning using computer simulations. Their results show that organizations below the median population performance were significantly more likely to adapt their behaviors than those above the median population performance. In a simulation study, Levinthal and March (1981) used a weighted average of past performance, which suggests that aspirations are updated over time, and found that past performance was associated with strategic change. Lant, Milliken, and Batra (1992) found that past performance was a significantly associated with strategic organizational reorientation in both stable and turbulent environments, though more strongly in the stable environment condition.

**PROPOSITION 1:** Decreases in performance will be positively related to the likelihood of strategic organizational change.

**DIRECT AND INDIRECT EFFECTS OF ENVIRONMENTAL CHANGE ON STRATEGIC CHANGE**

Environment is the context in which organizations interpret and respond to performance feedback and set strategies. Many scholars have recognized the importance of congruence between organizations and their environments (Burns & Stalker, 1961; Lawrence & Lorsch, 1967; Child, 1972). Organizations are also dependent on their environments (Pfeffer and Salancik, 1978). The notion that as the environment changes organizations should change their strategies has long been held (Thompson, 1967; Miles and Snow, 1978; Miller and Friesen, 1978; Porter, 1980; and others).

Environment has a greater impact on strategic decision making in more technologically intensive industries than in simpler industries (Jemison, 1981; Kim and McIntosh, 1999).
Complexity challenges organizations' abilities to interpret their surroundings and respond to changes in their environments. With rapid change, interpretation and response become all the more difficult tasks for organizations. Complex environments that change rapidly are labeled turbulent environments (Ansoff, 1979).

With some notable exceptions there have been few empirical studies in this area (Smith and Grimm, 1987; Zajac and Shortell, 1989; Ginsberg and Buchholtz, 1990; Kraatz and Zajac, 2001; Zajac and Kraatz, 1993). Smith and Grimm (1987) suggest that a dynamic view of the relationship between the environment and strategic change is necessary to explore this relationship. Zajac and Shortell (1989) address the question as to whether or not organizations change strategies in response to changing environmental conditions and found that that while this is a generally appealing concept relatively little empirical work has been pursued. While Zajac and Shortell (1989) found general agreement with the notion that organizations change strategies in response to changing environmental conditions, their findings were less than conclusive. Ginsberg and Buchholtz (1990) in their study of health maintenance organizations found that organizations did in part change strategies in response to changing environmental and regulatory conditions. Kraatz and Zajac (2001) were consistent with their earlier work and the behavioral perspective in their studies of small colleges and found that while the resources held by firm did constrain strategic change, that organizations did respond to changing environmental conditions (Zajac and Kraatz, 1993).

Environmental change affects the ways in which organizations interpret strategy and performance. While internal organizational members and membership dynamics are integral contributors to organizational strategies, understanding the context in which an organization is embedded may enhance evaluation and understanding of organizational strategies (Chakravarthy and Doz, 1992; Denis, Lamothe, & Langley, 2001; Ginn, 1990; Stacey, 1995). Chan (1986) and Jackson (1991) found to varying degrees that organizational change results from a dynamic combination of environment, strategy, structure, and technology factors.

As environments change rapidly, there is increasing pressure on organizations to produce valuable outputs faster and more efficiently. Gupta and Wilemon (1990: 24) argue that the rules of the game of new product development have changed. They suggest that the environment for new product development is characterized by increased competition, new technologies that make existing products obsolete, changing customer needs and shorter product life cycles, higher development costs, and increased need for involvement of customers, vendors, and strategic partners in the development process.

Bourgeois and Eisenhardt's (1988) and Eisenhardt and Bourgeois' (1988) investigations of rapidly changing environments found that successful firms have an ability to react to environmental changes. Bourgeois and Eisenhardt's finding are also supported by Ginn's (1990) investigation of acute care hospitals in the 1980s. These organizations have the ability to make strategic decisions both carefully and quickly in light of sudden environmental changes. Milliken and Lant (1991) suggest that:
Contingency researchers have used a multiplicity of terms to describe and categorize the environment. Early research described the organizational task environment as factors from the external environment that affect organizational goal setting (Dill, 1958). Other research studied how organizations segment their environment (Lawrence and Lorsch, 1967). Duncan (1972) develops two dimensions that distinguish between the essence of different environments: complexity and dynamism. Complexity deals with the number of factors an organization must consider from its environment when making decisions. Relatively simple environments require that few factors be considered and relatively complex environments require that a large number of factors be considered. Dynamism describes the level of stability of those environmental factors.

Organizations experiencing rapidly changing environmental face both high complexity and dynamism. Assuming a highly complex and dynamic environment, implicitly leads to the issue of continuity. Continuity deals with the magnitude of the changes in those parts of the environment that are changing (Tushman & Romanelli, 1985). Since we focus on environments that experience many changes it is interesting to understand what factor differentiates various changes. Continuity is considered high during relatively incremental changes that build upon previous experiences. Incremental environmental change describes those changes that represent incremental or convergent shifts in salient environmental factors. Continuity is considered low during major changes that break from or are incongruent with previous experiences. Major environmental change describes revolutionary changes in environmental factors. These revolutionary changes tend to reorient or transform affected segments of the environment.

There is less consensus about the abilities of firms to learning from prior experience during periods of incremental environmental shifts than during periods major change (Eisenhardt & Bourgeois, 1988; Bourgeois & Eisenhardt, 1988; Eisner, 1997; Ginsberg & Buchholtz, 1990; Tushman & Romanelli, 1984; Tushman & Anderson, 1985). However, while there are competing theoretical perspectives about the nature of major change in the literature, there appears to be agreement about the disruptive effects of that change (Tushman & Romanelli, 1984; Tushman & Anderson, 1985; Lant & Mezias, 1990, 1992). The next section explores various arguments on the effects of incremental and major environmental changes and present research propositions.

**INCREMENTAL ENVIRONMENTAL CHANGE**

Since incremental environmental changes occur more often than major environmental changes, it is likely that most changes in the literature that have been labeled as conditions of high environmental turbulence are the result of a large number of incremental environmental change events. Most learning theories suggest that rapid environmental change and the condition of ambiguity it creates will attenuate successful organizational learning (March & Olsen, 1976; March, 1991; Lant & Mezias, 1992; Keck & Tushman, 1993). However, others suggest that the ambiguity
generated by rapid environmental change will present firms with "equivocal experiences and opportunities for learning" (Milliken & Lant, 1991: 146). In persistently changing environments firms may come to expect rapid environmental changes as an equilibrium condition of their world (Milliken & Lant, 1991). This paper addresses these apparent inconsistencies in the adaptive organizational learning literature by suggesting that incremental environmental changes are described by theories viewing rapid environmental change as an opportunity for learning; while major environmental changes are described by theories viewing rapid environmental change as a threat to learning.

Rapid environmental change describes a commotion that adds ambiguity to an environment (March, 1991: Lant & Mezias, 1992). This ambiguity complicates the relationship between organizations and their environments. Organizational perceptions of their environments may be clouded by the introduction of ambiguity, a random component, in their otherwise systematic understanding of their environments (Lant & Mezias, 1992).

Haleblian and Finkelstein (1993) argue that as environmental change increases, a firm's decision making tasks become more difficult and managers may have greater information processing requirements. However, in stable environments information-processing requirements are not as intense (Ancona, 1990). Environmental change may increase erroneous perceptions and interpretations of environmental signals during information processing. Successful organizational learning may be curtailed under conditions of rapid environmental change (March, 1991; Lant & Mezias, 1992; Keck & Tushman, 1993).

However, firms in some industries are able to develop processes for coping with incremental environmental changes and have been successful at adapting to these environments. It is possible for organizations embedded in rapidly changing environments to thrive on incremental changes (Eisenhardt & Bourgeois, 1988; Eisenhardt, 1989; Milliken & Lant, 1991). Perhaps, only some populations of organizations learn to adapt in the face of rapid environmental change.

Only some organizations appear to have developed this second-order organizational learning process by which they can adapt to incremental environmental change. Second-order learning refers to exploration of alternative processes, routines, or technologies where first-order learning indicates improvement within the realm of current processes or technologies (Watzlawick, Weakland, & Fisch, 1974; Hedberg, Nystrom, & Starbuck, 1976; Lant & Mezias, 1992).

For organizations that are able to initiate second-order learning processes, the continuity of the organizational environment may not affect their abilities to cope with their environments. These organizations live in a world where incremental environmental change is the equilibrium condition of their environment. Perhaps these organizations have developed mechanisms for filtering or ignoring immense amounts of information about their environment and a large number of relatively small changes to their environment. Alternatively, these organizations may not need to filter information, but have developed the capabilities to process large quantities of environmental data and change information.

Organizations that are faced with an almost constant stream of new innovations and generational improvements must cope with these innovations and respond to the market and adapt their internal processes to incorporate changes. These organizations essentially must learn the art of learning to incorporate new components, processes, and services into their organizations...
efficiently and effectively simply to remain in the game, let alone achieve superior performance. Incremental environmental changes are viewed as the equilibrium condition in this industry and are not expected to degrade the value of performance feedback information.

**PROPOSITION 2A:** Incremental environmental change will not affect the relationship between past performance and strategic change

Environmental conditions have been traditionally considered to have the same relationships as or to be a part of performance feedback in the adaptive learning literature (Cyert & March, 1992; March & Simon 1993; March & Olsen, 1976). However, organizations that survive by adapting their internal processes to incorporate environmental changes may directly use that information. For example, Langlois (1992: 4) characterized the microcomputer industry as one where "... growth proceeds through the generation of external rather than internal capabilities." These organizations rely on adapting their internal processes the external capabilities of its supplier industries (Langlois, 1992; Rosenbaum, 1993).

Environmental conditions are vital to organizational aspirations, performance assessment, search, and change processes. As organizations attempt to understand their environments' they interpret additional information that is separate and distinct from performance feedback information. These incremental environmental changes may directly affect organizational strategic change decisions.

**PROPOSITION 2B:** Incremental environmental change will increase the likelihood of strategic change

**MAJOR ENVIRONMENTAL CHANGE**

Major changes in markets, technologies, or government regulations may elicit different organizational responses and strategies than incremental change may evoke. During convergent periods, even rapidly changing convergent periods, organizations may factor different environmental elements into their strategic decision making process than during discontinuous periods (Meyer, 1982; Tushman & Romanelli, 1985).

Meyer (1982) coined the term "environmental jolts" to refer to sudden and unprecedented external events in organizations' environments that affect them. These environmental jolts are high magnitude changes or major shifts in salient environmental factors. Meyer (1982) found that there is a random component to organizations' response to the pressure of disruptive environmental shifts.

Tushman and Romanelli (1985) discuss convergent organizational periods as separated by reorientations where discontinuous environmental phenomena are introduced into a population. They suggest that organizational performance will decrease during episodes of significant environmental change. Tushman and Anderson (1986) studied major changes in the cement, minicomputer (larger multi-user computers), and airline industries and found that environmental...
conditions after discontinuities are markedly different. Advances from technological discontinuities fuel new growth, increase environmental ambiguity, and increased munificence.

Following an organizational learning perspective, Lant and Mezias (1990, 1992) viewed major change not only in terms of technological change, but also as events that fundamentally restructure a formerly stable system. Their model implies that major environmental changes would precipitate short-run downturns in performance for all organizations. Lant and Mezias (1992) found that conditions of high ambiguity moderated the number of organizational changes, especially during periods of major environmental change. Further, Mezias and Lant (1994) found that high magnitude environmental change had a negative effect on the proportion of organizations following or changing to a strategy of imitating their competitors. This finding suggests that major environmental change creates ambiguity about the utility of current industry recipes (Spender, 1989). With no clear industry leaders to follow, organizations may question the nature of many fundamental assumptions about their industry environment and the relationships among key variables.

Major environmental changes shake the core of organizational assumptions and lead organizations to question relationships that previously appeared clear. Organizations that rely on performance feedback to initiate strategic organizational changes may question the validity of performance feedback in light of a significantly changed organizational environment. Major changes will disrupt the feedback relationship between performance and strategic change.

**PROPOSITION 3A:** Major environmental change will reduce the magnitude of the effect of performance on strategic change

Organizations may directly access environmental information. Major environmental changes are interpreting information that is separate and distinct from performance feedback information and may directly affect organizational strategic change decisions.

**PROPOSITION 3B:** Major environmental change will increase the likelihood of strategic change

**DISCUSSION**

As emphasized by an organizational learning perspective, it is essential to understand how a firm's past experience affects its future capabilities for change in order to understand this ability to respond to a dynamic environment (Lant & Mezias, 1990; 1992). However, prior adaptive learning theories lack complete and robust specification about the impact of environmental change on strategic change and on the relationship between performance and strategic change. This model contributes to the foundation of an organizational learning perspective by explicitly adding environmental dimensions to the adaptive learning perspective. In such, the model suggests that successful firms have the ability to make risky, innovative decisions both carefully and quickly, yet effect safe and incremental implementations of those innovations (Cyert & March, 1992; March, 1991; March & Simon 1993; March & Olsen, 1976).
How can we predict what other drivers or levers will be, and what are the underlying mechanisms and processes that organizations focus their attention on particular environmental levers or drivers? Perhaps organizations in some industries, such as the computer software industry studied by Lant, Milliken, and Batra (1992), rely on internally generated technological drivers, while others, such as organizations in the PC hardware industry rely on external sources of innovation or technological drivers. By broadening the scope and nature of strategic decisions processed by organizations, future research may capture both the breath and depth strategic decisions processed by organizations. Further, several studies advocate the simultaneous investigation of changes in organizational leadership with the study of changes in strategic content (Korn, 1994; Miller, Lant, Milliken, and Korn, 1996; Lant, Milliken, and Batra, 1992; Virany, Tushman, and Romanelli, 1992). These studies suggest that the changes in organizational leadership and may be associated with a greater potential for strategic flexibility and change.

As researcher embark upon studies of organizations in rapidly changes environment the issue of timing and dynamics may become more salient. As Smith and Grimm (1987) suggest that a dynamic view of the relationship between the environment and strategic change is necessary; the more often organizations researcher 'take pictures' of organizations the closer these observations or 'still pictures' can become to looking like a full motion video of organizations research. Thus, as information and communication technologies increase the pace of information flows and decision making for organizations, observations taken more often may enhance the robustness of future adaptive organizational learning research.

This paper presents a separation of the direct and indirect effects of both incremental and major components of environmental change on strategic change to the organizational learning perspective. Further, reframing environmental change in terms of these components provides a logic for formulating predictions about the relationship between performance and strategic change and allows researchers to generate predictions about rapidly changing environments that are consistent with an organizational learning framework. This paper contributes to our understanding of organizational learning and strategic change in rapidly changing environments.

REFERENCES


