

FLEXIBILITY IN STRATEGIC DECISION MAKING: INFORMATIONAL AND IDEOLOGICAL PERSPECTIVES*

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ABSTRACT

Adaptation is a crucial challenge for organizations, and an important theme in the strategy and organization theory literature. We still have much to learn, however, about the strategic processes by which adaptation is achieved. In this paper we focus on a basic element in the adaptation process, i.e. flexibility within the strategic decision-making process. We concentrate on strategic decisions because these choices are the most important adaptations the firm makes. We suggest that the core of all organizational adaptation is a decision-making process. Unless the decision-making process itself is flexible, it is unlikely the organization can be flexible enough to adapt. We derive hypotheses concerning the factors that lead to flexibility (versus rigidity) from both information processing and ideological perspectives, and test them in a study involving 57 strategic decisions in 25 companies. Our results identify three contextual factors related to both perspectives – including competitive threat, slack and uncertainty – that are helpful in understanding flexibility in strategy decision making. While managers appear to be more flexible when decisions are uncertain, we found that in the very conditions where managers need the most flexibility (high competitive threat and low slack), they are least likely to be flexible.

INTRODUCTION

In the constantly changing business environment organizations are regularly called upon to adapt to environmental change. As the barrage of disruptions that characterizes the modern business environment increases, adaptation becomes a crucial task faced by organizations, and guiding change a pre-eminent management challenge. Academic interest in adaptation is expressed by three related themes in the management literature: strategic change, innovation, and decline. Research in each of these areas demonstrates that the failure to adapt is common, even when the need for change is manifest.

Why do many firms fail to change when the need is so great? Perhaps the

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most familiar explanation is that strong inertial pressures reinforce firms' current structures and practices (e.g. Hannan and Freeman, 1989). Population ecology research, however, typically has not sought to discover the sources of variation in the adaptive abilities of *individual* firms, focusing instead on conditions that inhibit adaptation of firms in general. Nor has it paid much attention to the *processes* by which individual firms either succumb to or escape from inertial forces. To understand organizational adaptation, we must study the processes of adaptation among top managers (Bantel and Jackson, 1989; Greiner and Bhambri, 1989; Thomas et al., 1993).

A comprehensive study of organizational failure to adapt is beyond the scope of this or any other paper. Rather, we focus on what we believe to be the core of the adaptation process, i.e. decision making. We suggest that adaptation is fundamentally a series of choices about how the organization should respond to perceived threats or opportunities. Virtually any idea with the potential to substantially change an organization must be approved (if not initiated) by top executives, as part of the strategic decision-making process. Further, we know that the procedures by which managers make decisions affect the degree to which the entire process will be flexible (Nutt, 1993b). Unfortunately, the strategic decision-making process has been largely ignored as a source of understanding adaptive behaviour, despite its ability to 'highlight the breadth of choice' faced by top managers in attempting to reconcile their organizations to the environment (Miller and Friesen, 1980, p. 269).

This paper's premise is that organizational adaptation can fruitfully be studied by examining strategic decision-making processes among top managers. We will focus in particular on the *flexibility* of this process, that is, the extent to which decision makers explore new ideas and assumptions about their firm and its strategic context. The adaptive potential engendered by managerial flexibility is nicely illustrated by Greiner and Bhambri's (1989) case study, in which major strategic change and performance improvement resulted from management team decisions reflecting fresh assumptions about their business. While, due to implementation problems, flexible strategic decisions will not always result in organizational adaptation, only rarely will organizations adapt in the absence of flexible decision making by top management (Mintzberg and McHugh, 1985; Normann, 1985). In other words, managerial flexibility in decision making is generally necessary but not sufficient for adaptation.

Our goal in this study is to identify factors that promote flexibility. Understanding what leads to the willingness (or unwillingness) of top managers to consider new courses of action should make an important contribution to understanding organizational adaptation. First we provide a conceptualization of the flexibility construct, based on a variety of ideas in the decision-making literature. We then bring to bear two perspectives – information processing and ideological – on the question of why some decision processes are more flexible than others. We derive hypotheses from these perspectives and report the results of a field study.

FLEXIBILITY IN STRATEGIC DECISION MAKING

There is a growing body of evidence suggesting that failure to be flexible in making strategic choices can have severe implications for firms. Firms that fail to

make flexible strategic choices may enter into organizational decline, which has been described as a 'failure to adapt or change to fit external environmental demands' (Weitzel and Jonsson, 1989, p. 94). Even when their decline is apparent, many organizations still fail to demonstrate adaptive behaviour. For example, two-thirds of the failing companies in a study of the microcomputer industry initiated no strategic reorientation (Tushman et al., 1987). Similarly, Nystrom and Starbuck (1984) describe a declining newspaper company that constituted a task force to recommend turnaround strategies. Of the five alternatives the task force proposed, the board selected the only one that did not involve any strategic reorientation. Within a few years, the company was bankrupt.

A study of companies in the railroad industry, for example, revealed that only about half made new strategic choices in response to deregulation (Smith and Grimm, 1987). Firms that changed their strategies improved their performance significantly, while performance declined significantly among those that did not. Similarly, only about half of the hospitals in a survey changed strategies in response to the Medicare Prospective Payment System, a federal programme with critical implications for hospitals (Zajac and Shortell, 1989).

Against a backdrop of upheaval in the financial services industry, the average bank implements fewer than half of the technical and administrative innovations available, and many implement substantially fewer (Bantel and Jackson, 1989). In a study of several industries O'Reilly and Flatt (1989) observed that while some companies implemented as many as 18 innovations in one year, others implemented none at all. Firms implementing more innovations were found to be significantly more profitable, as measured by return on equity.

To understand the conditions leading to adaptation and innovation, we look to core decision-making processes. We suggest that flexible processes will lead to the novel choices that firms need for adaptation and change to occur. To adapt, managers often must make flexible choices that are unusual, innovative or, at minimum, different from the norm. On this point, Nutt (1993b) suggests that: 'By opening up the decision process to new possibilities, stakeholders are more apt to recognize the value of new ideas. This opening up allows people to move away from stereotyped responses and traditional ways of acting' (p. 246). There are several advantages to flexibility. Nutt (1993a) argued that managers who have a flexible style will be 'more immune to the distractions that arise from uncertainty and ambiguity' (p. 718) inherent in strategic decision making. He also argues that managers with access to more decision-making approaches will probably make better strategic choices given the equivocality of strategic issues.

Flexibility itself is a common theme in a great deal of organizational and strategic literature. Its pervasiveness has been somewhat obscured, however, by the tendency to refer to the flexibility construct using terms which are its rough opposite, e.g. rigidity (Staw et al., 1981) or groupthink (Janis, 1972). For example, MacCrimmon refers to a 'mechanistic' model in which:

[The] decision unit does not adapt ... Problems are classified into regular categories for which there is a routine response. No checks are made for whether the environment is being misperceived. The framing of the situation depends upon the routines available. The decision unit ... does not adequately

revise beliefs in accord with new information ... Only standard scenarios are considered. (MacCrimmon, 1985, p. 89)

To further our examination of the construct, we categorized the various flexibility-related ideas in the decision-making literature into two dimensions that we refer to as 'openness' and 'recursiveness'.

Openness

The first dimension of flexibility is the extent to which decision makers are open to new ideas, information sources, and roles. While the importance of considering a wide variety of alternatives is well known (Alexander, 1979; Janis, 1972), decision makers are often seduced by familiar alternatives close to the status quo (Cyert and March, 1963; Lindblom, 1959) and prefer 'off-the-shelf' over 'custom-made' solutions (Mintzberg et al., 1976). In fact, many decisions are actually 'solution-driven' so that the entire exercise is oriented toward a particular idea (Cohen et al., 1972; O'Reilly, 1983).

Flexible decision processes are open to diverse information sources inside and outside the organization (Smart and Vertinsky, 1977; Tushman et al., 1986), but the innovative ideas of outsiders are sometimes ignored by top managers (Wright, 1979). Staw (1981) notes that the search may be narrowed so as to justify past decisions, and declining organizations in particular often seek information from fewer sources (Weitzel and Jonsson, 1989). Finally, flexible processes open ways for participants to contribute to the decision in a variety of ways that may not match their job descriptions. Managers unwilling to abandon their usual roles in unusual circumstances limit decision-making flexibility (Wilson et al., 1986). In general, decision processes characterized by openness to novel alternatives, information sources, and roles are more likely to produce the types of innovative decisions that facilitate organizational adaptation.

Recursiveness

While textbooks often discuss the 'stages' of decision making (e.g. problem definition, search, analysis, choice and implementation), research often reveals a process that is much less sequential. Few decisions flow inexorably from start to finish; more often they are characterized by frequent cycling back to earlier stages of the process (Mintzberg et al., 1976; Witte, 1972). Thus the decision-making process has been portrayed as 'not linear but more circular' (Pffiffer, 1960, p. 129).

The force behind all this cycling and circling is often the need to re-examine the assumptions that have brought the decision to a given point. Nevertheless, decision makers sometimes actively avoid re-examination of assumptions and alternatives, even when ample evidence indicates that they should do so (Janis, 1972; Maier, 1970).

The need to improve decisions through a systematic examination of assumptions has been argued forcefully in the literature on structured conflict (e.g. Mitroff and Mason, 1981; Schwenk, 1988). This literature, oriented primarily toward promotion of either the devil's advocacy or dialectical inquiry techniques, is permeated with a recognition of the importance of flexibility (e.g. Cosier, 1981). As summarized by Schweiger et al. (1989, p. 747): 'Both [techniques] force debate about key assumptions, data and recommendations ... to prevent uncritical acceptance of the seemingly obvious.'

We refer to this tendency of decision makers to cycle back in order to re-examine key assumptions as recursiveness, our second dimension of flexibility. The recursiveness concept can be extended to include the interplay between choice (or formulation) and implementation. Rather than planning comprehensively, decision makers often find ways to take a few tentative steps, and then to refine their plans in accord with the feedback they receive (Cyert and March, 1963; Quinn, 1980). The ability of decision makers to cycle between implementation and formulation is clearly an advanced form of recursiveness, which should greatly improve the flexibility and adaptiveness of the decision process.

THEORETICAL PERSPECTIVES

Having defined flexibility as openness and recursiveness, we now discuss the two perspectives – information processing and ideological – that provide the theoretical grounding for our study. Our choice of these perspectives is based on the premise that strategic decision making is both an exercise in information processing and an occasion to venerate organizational values and traditions (March and Olsen, 1976). Either a constriction of information processing or a zealous adherence to organizational canons may lead to rigidity, and thus a missed opportunity for adaptation. It is thus not surprising that cognitive limitations and ideological pressures often have been identified as the two fundamental causes of rigidity in organizational decision making (Louis and Sutton, 1991; Staw, 1981; Walsh and Fahey, 1986).

The Information Processing Perspective

This perspective emphasizes the centrality of information processing (IP) in organizational decision making (O'Reilly, 1983). A number of scholars have portrayed organizations as information processing systems (e.g. Galbraith, 1977; Tushman and Nadler, 1978; Walsh and Ungson, 1990) and firms' capacity to process information has been linked to their adaptiveness in responding to competitors' actions (Smith et al., 1991). IP theories are built on a base of experimental research on verbal learning, memory, and problem solving. They all assume that a person operates on representations of the world that exist in the mind. Their emphasis is on the steps that follow perception: encoding, representation and organization of encoded material, memory and retrieval (Kiesler and Sproull, 1982, p. 556). Many strategy scholars have noted, consistent with this perspective, that flexibility is often constrained by management's mental barriers or cognitive limitations (e.g. Anderson and Paine, 1975; Hambrick and Mason, 1984; Harrigan, 1985).

A major theme in the IP literature is the importance of cognitive structures, which dominate the ways in which people think and make decisions (e.g. Louis and Sutton, 1991). Cognitive structures – including schemata (e.g. Weick, 1979), and scripts (e.g. Gioia and Poole, 1984) – constrain the ways in which people interpret and respond to situations. Once present in the minds of managers, they limit flexibility, by blinding managers to innovative strategic possibilities. Thus, 'organizations succumb to crises largely because their top managers ... live in worlds circumscribed by their cognitive structures' (Nystrom and Starbuck, 1984, pp. 57–8). These cognitive structures, while clearly individual phenomena, are

influenced by the context within which the organization finds itself. As examples, Milliken and Lant (1991) suggest that the organization's recent performance biases managers' strategic thinking and the range of actions managers are likely to take. Dutton and Dukerich (1991) show how perceptions of an organization's image and identity frame managerial cognition and action – often in very narrow ways.

In general, this literature conveys the impression of conservatism in information processing. People continue to apply lessons from past decisions even when their similarities to present situations are trivial (Gilovich, 1981). Managers tend to passively rely on the information that comes to them under existing arrangements (Connolly, 1977), and thus is likely to support the status quo. When forced to search, managers focus on familiar areas for ideas (Cyert and March, 1963). Once they seize upon an idea, they 'show strong tendencies to . . . seek confirmatory evidence [and] fail to generate or to assess alternative hypotheses' (Singer and Benassi, 1981, p. 50). When exposed to new information that contradicts their ideas, people change their ideas less than they 'should' (Connolly, 1977). In other words, people tend to be cognitively inflexible, which does not bode well for organizational flexibility.

The Ideological Perspective

Students of organization and strategy have used a variety of terms to describe the powerful effects of socially constructed belief systems (Walsh and Fahey, 1986). The concepts of ideology (e.g. Beyer, 1981), institution (e.g. Scott, 1987; Zucker, 1987), culture (e.g. Schein, 1985) and paradigm (e.g. Johnson, 1988), while possessing their own traditions and shades of meaning, share the notion that people in social structures collectively forge ideas of truth and virtue, which serve to regulate and constrain the behaviour of actors within these structures (Hambrick and Finkelstein, 1987). For the sake of simplicity, we refer to the common thrust of these ideas as 'the ideological perspective'.

Ideologies are 'coherent sets of beliefs that bind people together and that explain their worlds in terms of cause-and-effect relations' (Beyer, 1981, p. 166). Ideologies perform important roles in organizations: they establish a link to the organization's past, thus giving meaning to everyday events, as well as providing a rationale for commitment to the organization that goes beyond economic self-interest (Meyer, 1982b).

Organizational ideologies shape the decision-making process in several ways. For example, ideologies can help to focus problem definitions, and make it easier for people to agree on what objectives are legitimate and what alternatives are worth pursuing (Beyer, 1981; Brunsson, 1982). The link between ideology and decision-making flexibility is explicitly noted by Donaldson and Lorsch (1983, pp. 99–100): 'An interrelated pattern or system [of] beliefs in each company provides corporate managers with a framework for thinking about complex and uncertain choices . . . It sets important limits on the strategic choices these managers are willing to make . . . [The] interrelated wholeness [of these beliefs] creates . . . a powerful psychological constraint on top management's specific choices.'

Thus ideologies may serve to limit managers' flexibility in making strategic choices. Strongly held intersubjective beliefs make it less likely that managers will be open to new ideas, re-examine their assumptions, and so on. Organizations

characterized by such ideologies will be less likely to engage in adaptive behaviour, thus risking rigidity and stagnation (Meyer, 1982b; Pettigrew, 1985). In the extreme case, an ideology may be so entrenched that managers do not even perceive the constraints it imposes on their choices (Beyer, 1981).

In summary, both information processing and ideological limitations will circumscribe flexibility in strategic decision making. While a virtually infinite universe of ideas could be utilized by managers in devising strategy, most will not be considered seriously, because information processing and ideological constraints put them beyond discussion. For an adaptive course of action to be chosen, it must overcome both types of constraints. Flexible processes result from the subset of ideas that survive this winnowing out process enforced by informational and ideological restrictions. When considered from this vantage point, it is not surprising that the failure to demonstrate flexibility and adaptation continues to preoccupy managers and academics alike.

HYPOTHESES

Our discussion has focused on the limits placed on decision-making flexibility by the firm's information processing and ideological constraints. It is clear, however, that the strength of these constraints varies across settings. For example, the degree to which information processing is 'automatic', and therefore inflexible, depends on a range of contextual factors, including the type of decision being addressed (Lord and Smith, 1983; Saunders and Jones, 1990). Similarly, while ideological constraints likely affect all organizations to some extent, some organizations are much more deeply affected than others (Johnson, 1988; Pfeffer, 1981).

Using the two perspectives as our foundation, we identify specific conditions likely to influence the amount of decision-making flexibility demonstrated by top management teams. To identify potential constructs, we examined a wide range of empirical studies of strategic change, innovation and organizational decline to find connections between flexible decision making and its potential precursors. From this review, we developed five criteria to guide the development and selection of constructs for study. First, the constructs had to be reflective of the theoretical perspectives we described above. Secondly, because we wanted to examine the effects on context on decision-making processes, we looked to Dean et al. (1991) to narrow our selection. Dean et al. posit a contextually based model of the antecedents of strategic decision making. The model suggests that the processes that decision makers use are strongly influenced by the context within which they find themselves. Dean et al. identified four decision-making contexts, i.e. the business environment, the organization itself, the nature of the team involved in making the decision, and the decision content itself (cf. Hickson et al., 1985). We chose constructs that our literature review suggested would best represent these four contexts. Because of our contextual approach, the next criterion we used to guide construct selection was that the constructs not be 'Upper Echelon' (individual differences) variables (Hambrick and Mason, 1984). There is a growing body of literature in this area (e.g. Hitt and Tyler, 1991; Thomas et al., 1993) and mixing that perspective with our contextual one likely would lead to more confusion than clarity. Fourth, the constructs had to be

theoretically related to both types of flexible decision making. If we are going to understand how managers make decisions in flexible ways, we believe it is important to examine all elements in a consistent manner. Last, we were concerned with parsimony in our models. We chose constructs that we believed would have the most explanatory power while allowing us to use the fewest variables.

The specific constructs we chose are the level of competitive threat in the firm's industry (the business environment context), the amount of slack possessed by the firm (the organizational context), the heterogeneity of the top management team (the team context), and the uncertainty of the decisions themselves (the decision content context). While we present detailed theoretical rationales below, in general these constructs are expected to influence managerial information processing capacity, and/or managerial acceptance of ideological constraints.

Competitive threat is the extent to which firms in an industry are endangered by intense competition and flat or declining demand. In proposing their 'threat-rigidity hypothesis', Staw et al. (1981) define threat to include both competition and declining demand, so it is a close match to our construct. Staw et al. argue that people respond to threat by restricting their information processing. Specifically, people experience a narrowing in their fields of attention and a decrease in the number of information channels used. Decision makers have been found to consider fewer alternatives under threatening conditions (e.g. Holsti, 1964), and to standardize organizational procedures (e.g. Bozeman and Slusher, 1979).

Information processing research has also found that individuals being overwhelmed by information are likely to use existing categories to process it, rather than adapting their category structure (Shaw, 1990; Srull, 1981). Under the assumption that an industry high in competitive threat will create a greater volume of information to be processed (more competitors taking actions, more rapid evolution of strategies, etc.), one would expect less flexibility in such environments.

Contributing to this conclusion is the finding that automatic information processing is faster (Taylor et al., 1978), which fits the demands for quick responses as imposed by highly competitive environments. Taking all these arguments into consideration, it appears that from an information processing perspective, competitive threat will be associated with diminished flexibility.

Social pressures for conformity also have been found to magnify under competitive and threatening conditions (e.g. Festinger, 1950; Janis, 1972). In particular, people's sense of group identity intensifies (e.g. Dion, 1979; Sherif et al., 1961), and groups demand greater loyalty and tighter adherence to ideological standards (Schein, 1970). This tightening of the ideological net is captured by this description of a group involved in an intense simulation that featured a high degree of intergroup competition (Smith, 1982, p. 83):

[The group] became overly sensitive to any signs of disagreement within their own group [and] developed strong ground rules, limiting explicitly what members could or could not do ... This led to a stifling of the ... group and shrouding them for long periods in an atmosphere of stagnation. [The group] became encased by the protection devices they developed to defend themselves from the [other group].

Thus, the prediction that flexibility will be diminished by competitive threat also can be derived from the ideological perspective.

Hypothesis 1: Competitive threat will be negatively related to flexibility in strategic decision making.

We define *slack* as resources intentionally kept by a firm beyond those needed by an organization to meet its known commitments (Cyert and March, 1963; Sharfman et al., 1988). Cyert and March argued that when managerial decision makers perceive slack in their organizations, they begin their search with the most accessible and familiar sources, only widening the search when forced to do so. Thus, as noted above, managers have a built-in conservative bias in their decisions, since familiar sources are likely to produce familiar choices.

There are three sets of arguments in the literature concerning the relationship between slack and flexibility and we propose hypotheses describing each. The first view is that slack should help to overcome the tendency towards restricted search and increase flexibility, because it provides the resources to make more sources accessible to managers. Managers operating with little slack, on the other hand, will be severely constrained by their lack of access to new sources of information. This is compounded by the fact that slack is necessary for the implementation of certain more sophisticated information processing activities, such as the use of integrated computer systems (Smith et al., 1991). Thus the relationship between slack and flexibility is seen as positive from an information processing viewpoint.

The adaptation literature provides some support for this prediction. Under conditions of decline, which includes severe resource scarcity (i.e. low slack), organizations tend to narrow their scope of attention (Whetten, 1980). Declining firms are also reported to seek information from fewer sources, thus facilitating their continued decline (Greenhalgh, 1983; Kaufman, 1985). These arguments give rise to our first slack hypothesis:

Hypothesis 2a: Slack will be positively related to flexibility in strategic decision making.

The second argument comes from studies from an ideological perspective, which suggest the opposite relationship. Donaldson and Lorsch (1983) argue that intersubjective beliefs are held in place by (among other things) the success they have generated in the past. As one of their CEOs explained: 'If you have a way that's working, you want to stay with it ... This is not the only way to run a company, but it sure has worked for us' (Donaldson and Lorsch, 1983, p. 123). When the company's survival is threatened, however, beliefs that are normally sacrosanct (e.g. commitment to a no-layoff policy, or to a particular product) are called into question. As Donaldson and Lorsch summarize it: 'Persistent cash deficits ... challenge even the most cherished corporate beliefs' (p. 136).

These ideas are echoed by others writing from an ideological perspective. Beyer (1981) argues that failure will lead to ideological change, while Dunbar et al. (1982) state that 'without having suffered some clearly recognized losses, organizations are usually unwilling to change their ideologies' (p. 95).

Further evidence of the link between declining slack and increased flexibility is

provided by Pettigrew's (1985) case study of Imperial Chemical Incorporated (ICI). The need to change had been discussed for some time at ICI, but there were 'no business problems, so it was theory against theory' (Pettigrew, 1985, p. 293). It was not until the firm's performance 'fell off a cliff' in 1980 that substantial strategic change was undertaken. This tendency for firms to be more flexible when experiencing reduced slack is also noted by Miller and Friesen (1980), Bowman (1985) and Johnson (1988). Further, Milliken and Lant (1991) suggest that 'slack acts as a buffer between the organization and environmental variation reducing managers' perceived need to change' (p. 138). Slack also may inhibit the perceived need to change because its presence reduces 'the organizations' vigilance to environmental activity since they view the environment as less of a threat' (Milliken and Lant, 1991, p. 139). Thus we have the basis for our second slack hypothesis:

Hypothesis 2b: Slack will be negatively related to flexibility in strategic decision making.

The third perspective on the relationship between slack and flexibility comes from Fombrun and Ginsberg (1990), who argue that both motivation and resources are necessary for adaptive behaviour. Firms with a low level of slack are characterized by motivation to adapt but little resources, while firms with a great deal of slack have plenty of resources but little motivation to adapt (Sharfman et al., 1988). From this perspective only firms with a medium level of slack will exhibit flexibility. This argument leads to our third slack hypothesis:

Hypothesis 2c: Slack will have an inverted-U shaped relationship with flexibility in strategic decision making.

We define *heterogeneity* for the purposes of this paper as the number of functions represented on the decision-making team. We chose this way to operationalize the heterogeneity construct because of the extensive use of this approach (cf. Hitt and Tyler, 1991; Milliken and Lant, 1991). A team of managers making a strategic decision is more heterogeneous if their functional backgrounds are diverse. From an information processing standpoint, Bantel and Jackson (1989) argue that 'cognitive diversity is a valuable resource' invoking a long line of research to the effect that heterogeneous groups consider more diverse solutions, make more original decisions, etc. (e.g. Hoffman and Maier, 1961; Janis, 1972; Nemeth, 1985). Further, Milliken and Lant (1991) suggest that functional diversity will increase the amount of such basic information processing activities as discussion and examination of alternatives.

In an application of this principle, managers interviewed by Quinn (1980) stressed diversity in assembling a team to guide strategic change. Similarly, more diverse teams have been suggested to avoid crises (Smart and Vertinsky, 1977), to reverse decline (Weitzel and Jonsson, 1989), and to improve strategic choices (Hitt and Tyler, 1991). In a study of the banking industry, Bantel and Jackson (1989) found that innovative banks had more functionally diverse managements. The long-term effects of a lack of diversity in the management team are discussed by Pettigrew (1985) in terms of the institutionalization of a particular world-view. The combination of engineering and production bias and the

location in the British national culture were two key determinants of inertia at ICI. One manager reported: '[T]he line of succession [to top positions] has been 90 per cent technologists of one sort or another, all coming out of the same kinds of schools, playing rugby together at the same kinds of places, and having the same kinds of orientations to life.' Our next hypothesis is as follows:

Hypothesis 3: Heterogeneity (number of functions) will be positively related to flexibility in strategic decision making.

Uncertainty is the extent to which the problems faced by managers are complex, novel, and have unclear means–ends connections (cf. Milliken, 1987). Information processing research has found that uncertainty leads decision makers to more closely scrutinize their environment, resulting in increased exposure to information (Kiesler and Sproull, 1982). Similarly, this literature implies that uncertain problems are more likely to lead to controlled, as opposed to automatic, information processing (e.g. Shaw, 1990). Many studies also suggest that uncertainty increases information processing in organizations – e.g. the number of information sources – implying increased flexibility (Connolly, 1977; Daft et al., 1988).

Organizational ideology often has less impact when novel, uncertain problems are being considered, because conventional approaches are simply inappropriate (Wilson et al., 1986). Thus, uncertain problems with poorly understood means–ends connections may increase managerial discretion over choices (Hambrick and Finkelstein, 1987). It may be for this reason that uncertain decisions have been characterized by Mintzberg et al. (1976) as having many comprehension cycles (i.e. highly recursive). This argument leads to our final hypothesis:

Hypothesis 4: Uncertainty in strategic problems will be positively related to flexibility in strategic decision making.

METHODS

Research Sites

Using industrial directories, we selected firms for this study from manufacturing industries – as defined by four-digit standard industrial classification (SIC) codes – that varied widely in competitive threat. We contacted their top managers first by letter, then by telephone, and later in person to secure participation. A total of 25 firms participated, with annual sales ranging from \$1.5 million to over \$3 billion. Sixteen different industries are represented in the sample, including apparel, steel, chemicals, electronics, paint and coatings, and printing and publishing. The sample includes firms with both consumer and industrial markets, and represents a wide range of technological sophistication.

Data Collection

As Mintzberg et al. (1976) have noted, since strategic decisions take a long time to complete, and seldom leave reliable paper trails, 'the best trace of the completed process remains in the minds of those people who carried it out' (p. 248). We interviewed several top managers for each decision, each of whom

had played a central role in making the decision. Overall we conducted 167 interviews with 113 managers, consisting of a protocol of closed-choice items about the decision process and the factors that had shaped it.

We followed a number of suggestions from Huber and Power (1985) to reduce any potential error from the use of retrospective reports. First, in spite of the fact that research has shown that moderate amounts of elapsed time do not affect the stability of managers' reports about important decisions (Eisenhardt, 1989; Huber and Power, 1985), we conducted the interviews as soon as possible after the decisions had been made. Fifty per cent of the interviews were conducted within six months of the decision, and 75 per cent within a year. Second, we triangulated perspectives by interviewing an average of 2.6 people per decision. Third, we guaranteed confidentiality. Fourth, we built relationships with our informants over the three years we conducted the study, so that the interviews took place within an atmosphere of mutual respect and trust.

Measures

We measured flexibility, slack, and uncertainty with sets of seven-point Likert-style items (see Appendix). To assess the dimensions of flexibility (openness and recursiveness), we asked informants to assess the extent to which they used new methods and new sources of information, developed and utilized new ideas, adopted new roles, changed their minds, reconsidered previous choices, and felt safe in disagreeing. The items used to measure slack asked informants for their perceptions of the availability of cash and overall discretionary resources. To assess the uncertainty of the decision, we asked how predictable the outcomes of various courses of action were, as well as questions concerning the complexity of the problem and the lack of necessary information.

Competitive threat measures both competition and munificence, and is intended to assess the dangerousness of the organization's environment. For competitive threat we used Sharfman and Dean's (1991) archival measure; an industry's level of competition divided by its level of munificence. This measure increases as competition increases and decreases as munificence increases. Consistent with Klein (1977), competition was measured by both changes (from 1976 to 1983) in the firms comprising the eight-firm concentration ratio, and changes in the market share of those firms remaining on the list. Munificence was measured following Dess and Beard (1984), i.e. the growth or decline of each industry during the period 1973–82. (See the Appendix for further details.) To validate this measure, we asked informants how difficult it was to make a profit in their industry. This item and the competitive threat index were correlated at .41 ($p < .05$).

Unit of Analysis

The researchers and the companies jointly selected which decisions we would study using the criteria that the decisions be considered strategic by both parties, and had been made recently. There is little consensus in the literature as to what makes a decision 'strategic', beyond simply being important to the future direction and success of the firm (e.g. Mintzberg et al., 1976; Hickson et al., 1985), so this was the criterion we used. In practice, however, 'selecting' decisions did not pose any problems. Firms generally made only a few very

significant decisions during the period of the study, and we often included all of them in the sample. The 25 participating companies provided data on from one to three decisions. We eliminated six decisions from the final analysis due to missing data, leaving a sample of 57 decisions.

Choosing the unit of analysis for a study of decision making is a difficult undertaking. On the one hand, researchers such as Fredrickson (1984) and Eisenhardt (1989) have proposed that top management teams have a typical approach that they use when making all strategic decisions. This would argue for a team-level analysis. (In both of these studies, however, only one decision per team was studied, so the unit of analysis was really not an issue.) Other researchers (e.g. Ancona and Nadler, 1989; Hickson et al., 1985) have found empirically that firms exhibit different processes when making different types of strategic decisions, which would call for a single decision as the unit of analysis. Based on their study of 150 decisions, Hickson et al. (1985) concluded: '[D]ecisions at the strategic level cannot be organized into a uniform pattern of action so that in a given organization they all take place the same way ... the currents of activity change from one strategic decision to the next. The processes of decision making that wend their ways through it frequently differ' (p. 247).

Our decision, based on the Hickson et al. findings, was to cast the analysis at the level of the individual decision episode, rather than to aggregate to the team level. We use the term 'episode' because strategic decisions are not singular choices but rather a collection of choices made as part of a process that culminates in the strategic 'decision'. This choice of level of analysis is supported by several concerns about aggregation. First, there were differences in the membership of the decision-making teams across decisions within organizations in our sample. While an engineering vice president may be heavily involved in an R&D decision, he or she may not play any role in a decision concerning capital structure. Thus, it is not exactly clear what we would be aggregating to, since there is no invariant team that transcends decisions. Second, some of our variables become ill-defined when aggregated, especially problem uncertainty and flexibility itself, thus failing the test of isomorphism (Rousseau, 1985). Third, cross-level analyses such as this should be cast at the level of the dependent variable, which is in this case the individual decision process (Rousseau, 1985). Fourth, aggregation would involve a substantial loss of statistical power in the analysis.

One concern that analysis at the decision level presents is that the assumption of independence of error terms (for decisions made in the same firm) would be violated. But note that this assumption would be violated for any level of analysis smaller than the industry, as industry effects would create some degree of similarity even among decisions in different firms. Fortunately, violating this assumption does not bias the calculation of regression coefficients (Massy, 1971), and the significance tests for regression coefficients are robust with respect to violations of this assumption (Cohen and Cohen, 1975). Thus, considering all of these factors, it was clearly preferable to analyse the data at the decision episode level.

To create values for flexibility and uncertainty, we calculated item means across informants for each decision, and summed item means to form scales. Because slack is an organization-level variable, we calculated item means across all infor-

ments in a firm (across decisions). These means were then summed and that value assigned to all decisions for a firm. Scale scores for all variables were divided by the appropriate number of items, in order to promote comparability. The number of functions variable was measured for the team at the decision episode level, and the appropriate competitive threat score was assigned to each firm. Variable means, standard deviations, coefficient alphas, estimates of inter-rater consistency (James et al., 1984) and intercorrelations are presented in table I.

Because data for several of the constructs in this analysis came from the same interview protocol, we wanted to limit the potential for common method response bias. We did several things in our design of the interview protocol, each chosen to minimize the likelihood of response bias. First, each construct's set of items was located throughout a large protocol. Within the protocol there were a wide variety of topics covered and different types of questions within each topic area. This meant the protocol required informants to think about a variety of topics. The variety itself should limit response bias by increasing the informant's attention to any given topic. The more attention an informant gives a topic, the less likely he/she is to maintain a response bias. Throughout the protocol and within the relevant scales there were several different metrics with which informants responded. Again, by asking informants to respond to different types of metrics requires the respondent to think about issues in different ways. These different ways of thinking should also limit common method response bias. Also, when we constructed the items, we made sure that when feasible we switched the 'direction' of the items. In some cases, a '7' response would indicate a high level of phenomenon where in other cases a '7' would indicate a low level. An example of this protocol structure technique can be seen in the slack items (see Appendix). For the first slack item, a '1' response is indicative of a high level of slack. In the second slack item, a '7' response was indicative of a high level of slack. We should note that while the informant would see the items as we have included them in the Appendix, when we did the analysis we recoded the items (reverse scaled them) to make them all unidirectional. While none of the techniques we mention above will eliminate common method response bias, the sum of the techniques limits the likelihood that such a response bias will develop.

Table I. Descriptive statistics and correlations

<i>Variable</i>	<i>Mean</i>	<i>SD</i>	<i>IRR</i>	<i>Openness</i>	<i>Recursiveness</i>	<i>Competitive threat</i>	<i>Slack</i>	<i>Number of functions</i>	<i>Uncertainty</i>
Openness	4.32	0.96	0.60	(0.66)					
Recursiveness	3.55	1.26	0.75	.35**	(.79)				
Competitive threat	0.12	1.10	N/A	-0.8	.22*	(N/A)			
Slack	4.32	1.03	N/A	.04	-.13	.14	(.70)		
Number of functions	1.97	0.75	N/A	.03	.15	-.20	.01	(N/A)	
Uncertainty	4.24	0.99	0.65	.25*	.29**	.02	-.49**	.00	(.58)

Note: Coefficient alphas are on the diagonal.

* = $p < .05$

** = $p < .01$

RESULTS

We have argued that flexibility has two dimensions – openness and recursiveness. To test this assumption we factor analysed the flexibility items (see table II). Factor 1 represents openness; the items loading on this factor represented the use of new sources of information, the introduction of novel ideas into the decision process, the serious consideration of these ideas, and the openness of the members of the management team to new roles in the process, which may not correspond directly to their job titles. Factor 2 represents recursiveness; the tendency of the team to reconsider provisional decisions, and the willingness of individuals on the team to change their minds loaded on to this factor. The use of new methods in the decision process also loaded less strongly on to factor 2, but was eliminated in order to achieve acceptable scale reliability. Thus in our analysis we use factor 1 to operationalize openness, and factor 2 to operationalize recursiveness.

In order to test the hypotheses, we estimated two multiple regression equations, one for openness and one for recursiveness. Thus each of our hypotheses is actually tested twice, once in each equation. We present the results of this regression analysis in tables IIIa and b. From an overall standpoint, we were somewhat successful in predicting openness: the prediction equation accounted for 18.8 per cent of the variance, and was statistically significant ($F = 3.01$; $p = .03$). We were not successful in predicting recursiveness: the equation accounted for only 7.8 per cent of the variance, and was nonsignificant ($F = 1.01$; n.s.).

Hypothesis 1 predicted that the level of competitive threat in a firm's industry would be negatively associated with flexibility in strategic decision making. This hypothesis was confirmed for openness ($T = -2.19$; $p = .03$), but not for recursiveness ($T = .98$, n.s.). Thus, strategic decision makers are found to be less open to new ideas, information sources, and roles in more competitive environments, but no less likely to reconsider their provisional decisions and change their minds.

Table II. Factor analysis of flexibility items (Varimax rotation)

	<i>Factor 1</i>	<i>Factor 2</i>
New sources	.577***	.153
Novel ideas	.802***	.150
New ideas taken seriously	.717***	-.087
New roles	.611***	.339
Reconsideration	.147	.740***
Change minds	-.001	.861***
New methods	.226	.523*
Safe to argue	.498	-.499
Eigenvalue	2.429	1.736
Percentage of variance	30.4	21.7
Cumulative percentage	30.4	52.1

Notes:

*** Indicates factor loadings over .5

* Item ultimately deleted from scale

Table IIIa. Regression results: openness

<i>Variable</i>	<i>B</i>	<i>SE B</i>	<i>Beta</i>	<i>T</i>	<i>Significant T</i>
<i>Step 1</i>					
Competitive threat	-.250	.114	-.306	-2.195	.03
Slack	.424	.143	.431	2.973	.01
Number of functions	-.271	.172	-.217	-1.574	.12
Uncertainty	.265	.141	.255	1.882	.06
(Constant)	2.055	1.021		2.012	
	<i>DF</i>	<i>Sum of squares</i>		<i>Mean square</i>	
Regression	4	8.794		2.199	
Residual	52	37.994		.731	
<i>F</i> = 3.01		Significant <i>F</i> = .03		<i>R</i> ² = 18.8%	
<i>Step 2</i>					
Slack squared	-.0120	.074	-.163	-.269	.78

Table IIIb. Regression results: recursiveness

<i>Variable</i>	<i>B</i>	<i>SE B</i>	<i>Beta</i>	<i>T</i>	<i>Significant T</i>
Competitive threat	.148	.152	.145	0.976	.334
Slack	.208	.191	.169	1.094	.279
Number of functions	.063	.230	.040	0.274	.785
Uncertainty	.291	.188	.223	1.544	.128
(Constant)	1.406	1.365		1.030	
	<i>DF</i>	<i>Sum of squares</i>		<i>Mean square</i>	
Regression	4	5.742		1.436	
Residual	52	67.883		1.305	
<i>F</i> = 1.010		Significant <i>F</i> = .37		<i>R</i> ² = 7.8%	

Hypothesis 2, which dealt with the relationship between slack and flexibility, had three variations. Hypothesis 2a predicted a positive relationship, hypothesis 2b a negative relationship, and hypothesis 2c a curvilinear relationship. Hypothesis 2a was supported for openness, as the relationship between slack and openness was positive and significant ($T = 2.97$; $p = .01$), but neither 2a nor 2b were supported for recursiveness ($T = 1.09$; n.s.).

Since a positive and significant linear relationship was found between slack and openness, we were able to test hypothesis 2c, which predicted an inverted-U shaped relationship. This hypothesis was tested by adding a second step to the openness equation, in which the square of the slack variable was entered. A significant coefficient for the squared term would have provided evidence of curvilinearity, but none was found ($T = .27$; n.s.). Our data indicate that increasing levels of slack are simply associated with increasing levels of openness to new ideas, sources of information, and roles.

Hypothesis 3 predicted a positive relationship between the heterogeneity of the top management team and flexibility. This hypothesis was not confirmed for either openness ($T = -1.57$; n.s.), nor for recursiveness ($T = .27$; n.s.). Thus in our sample, management decision-making teams in which a more diverse set of functions was represented were no more likely to be flexible in their decision processes.

Hypothesis 4 predicted that the uncertainty of the problem faced by the strategic decision makers would be positively associated with flexibility. This hypothesis was marginally supported for openness ($T = 1.88$; $p = .06$), but not for recursiveness ($T = 1.54$; n.s.). Thus our data indicate that decision makers faced with more uncertain problems are somewhat likely to be more open to new ideas, etc., but no more recursive in their decision processes.

DISCUSSION

The research question that guided our investigation was: 'What are the factors that encourage or discourage flexibility in strategic decision making?' Our answer to this question, based on the study results described above, is that competitive threat in a firm's industry discourages flexibility (or at least openness), while organizational slack and uncertain problems encourage it.

It was surprising, given past research, that the functional heterogeneity of the decision-making team was not found to be associated with flexibility. One possible explanation for this outcome was a restriction of range in the number of functions variable; the mean number of functions represented on the teams was only about two, and the standard deviation was relatively low (.75). Perhaps a sample of teams with wider dispersion on this variable would have yielded the predicted results.

Our inability to predict recursiveness was also unexpected. It appears that variation in strategic process recursiveness must be driven by factors other than those we included in this study. Perhaps managers are stimulated to reconsider their assumptions and provisional decisions by events that occur during the process (for example, the arrival of a new manager, or the failure to identify an acceptable solution to a problem) rather than the contextual factors we investigated. Uncovering such factors would require a finer-grained observation of decisions than was possible with our relatively large sample.

Implications of the Findings

One interesting implication of our findings is that the variables related to flexibility represent a variety of segments of the strategic context. It is clear from the findings that the openness of senior managers is a function of contextual factors characterizing the business environment (competitive threat), the firm itself (organizational slack), and the specific problem being addressed (uncertainty). This supports the growing consensus that the strategy formulation process is influenced by factors at several levels of analysis (e.g. Hickson et al., 1985), and is not simply a function of the industry or decision-making team alone.

It is interesting that the combination of factors that places the strongest limits on flexibility – a great deal of competition and little slack – characterize a situation

in which organizations most need flexibility. Necessity certainly does not appear to be 'the mother of invention' in our sample. In fact, one might even speculate that these results capture part of a vicious circle, in which competitive threat reduces flexibility, which leads to poor performance, which reduces slack, further reducing flexibility, and so on.

With regard to the uncertainty findings, it is important to keep in mind that problem characteristics such as uncertainty are not inherent in the problems that arrive on the desks of top managers, but rather are themselves the outputs of an interpretation process through which managers make sense of the problems they face (e.g. Thomas and McDaniel, 1990; Thomas et al., 1993). One team of managers may perceive the entry of a new competitor into their industry as a familiar, well-understood event, and act accordingly, while another may perceive it as a unique and poorly understood event, and react more flexibly. Thus how groups of managers depict the uncertainty of the problems they face may tell us as much about the managers as it does about the problems.

These findings also have implications for strategic management practice. Managers would be well advised to be particularly wary of rigidity in their decision processes when the conditions favouring it are in place, particularly intense competition and limited resources. As noted above, these conditions both make flexibility important and lessen the likelihood of it being practised. Structured conflict techniques (e.g. Schwenk, 1988) may be most appropriate in such settings. At a minimum, however, managers in such circumstances should resist the temptation to believe that more of the same behaviour will somehow pull them through.

Along similar lines, managers should take it as a warning signal when all problems coming to them seem to call for a routine response. While there may be placid environments somewhere in the world where routine problems predominate, in most organizational environments this should be seen as an indication that the novelty and uncertainty in problems is either not being recognized or is being downplayed by their firms. The inflexible responses that result from the false perception of well-understood problems will put firms at a competitive disadvantage relative to firms who respond more flexibly.

Methodological Issues

The above discussion implies that our findings indicate a causal relationship between competitive threat, organizational slack, problem uncertainty and flexibility. Of course, it is not possible to demonstrate causality unequivocally in non-experimental studies. In this section we consider the plausibility of alternative interpretations of our findings that might stem from the methods we used.

One possibility is that decision-making flexibility causes, rather than is caused by, variation in the independent variables. This interpretation does not appear tenable. Competitive threat and slack are the product of numerous forces in the environmental and organizational context; it is hard to see how the process undertaken in making one decision could substantially affect them. Along similar lines, problem uncertainty is logically prior to decision process flexibility. While, as noted above, the problem interpretation process may influence the perception of uncertainty, it would already be established when the decision-making process begins.

Another possibility is that some unmeasured variable is influencing both flexibility and the independent variables simultaneously. While we tried to be comprehensive in identifying potential influences on flexibility, this certainly remains a possibility, as it is in all non-experimental designs. It is essential to note, however, that such a variable would have to be related not just to flexibility itself, but also to one or more of the independent variables, in order to be responsible for our findings.

A third possibility worth considering is that the constructs are not related in the population at all, and that the relationships we found are a function of response bias due to the use of common methods. This is not a potential problem for competitive threat or heterogeneity, which were measured archivally. For the relationships involving slack and uncertainty, the potential problem of response bias is reduced by the techniques we described earlier and by using multiple informants for each decision. That is, the response tendencies of individual informants play a much smaller role in influencing the relationships among aggregated variables than they would if only single informants were used. Thus it is unlikely that response bias accounts for our findings.

A fourth explanation is that the error inherent in the measures created spurious results. While measurement error is a cause for concern, there are two issues that reduce our concern in this study. First, two of the measures came from archival data and are less susceptible than interview data to measurement error. Additionally two of the scales in the study exceeded Nunnally's (1978) suggestion of an alpha of .70, so current convention says that they are sufficiently internally consistent. Our concern lies with the two scales where we were not able to reach Nunnally's suggested standard. Because these scales were the item combinations that produced the best psychometric results, we chose to follow Nunnally's advice on the matter. He suggests that '[i]n the early stages of research on predictor tests or hypothesized measures of a construct, one saves time and energy by working with instruments of only modest reliability' (p. 245). As this project is the first we have identified that looks at the issues we examine (i.e. the 'early stages of research'), we chose to accept the two scales with only modest reliability to see if the phenomena of interest were related in the ways we predict. Now that we have evidence that some of the underlying relationships that we predict exist actually do, future research can concentrate on removing measurement error from our scales.

Future Research

This study represents first steps on a number of fronts: the conceptualization of flexibility, the development of theory linking the strategic decision-making context to the flexibility of its process, and the identification of specific empirical relationships. While all of these steps will require refinement, they provide some structure and direction to an important and under-researched area.

While information processing and ideological forces have shown promise as sources of constraint for strategic decision making, there are certainly additional perspectives and factors that deserve consideration. One important source of constraint that we did not address is the reward systems of top managers, which may substantially limit or expand the strategic initiatives managers are willing to consider (March and Shapira, 1982). A second source of constraint that deserves

more consideration is the presence of fixed assets or capacities (e.g. Hannan and Freeman, 1989). While these may appear more as barriers to implementation of change, they may be so well-learned as to remove certain options from managerial consideration at a very early stage of the decision process (e.g. Donaldson and Lorsch, 1983).

Another important goal for future research will be to demonstrate empirically the relationship between the flexibility of the strategic decision process and actual strategic change, so as to validate our focus on flexibility. While the link between flexible processes and innovative outcomes has been clearly demonstrated under laboratory conditions (e.g. Maier, 1970; Schweiger et al., 1989), it should also be documented under real-world conditions, a nontrivial research challenge.

The relative importance of strategic decision making and implementation as barriers to adaptation is also an important question worth pursuing. Are firms primarily limited in their adaptation because managers cannot conceive an adaptive course of action, or because such programmes get bogged down in implementation? While we have focused here on formulation, some proportion of innovative ideas certainly die a slow and painful death through failed implementation. This of course relates to the question of the link between flexibility and actual strategic change.

Two final agenda items for future research deal with the nexus of forces stimulating and constraining managerial adaptiveness. First, research should try to sort out the importance of the *strength* of ideological factors from their *content*. Meyer (1982a), for example, has pointed out that some organizations, while having strong ideologies, are led by those ideologies to behave in a way that we would describe as flexible. Secondly, the relationship between politics and flexibility needs to be considered. This relationship is not obvious, as political forces and techniques may be brought to bear on either the side of change or the side of stability. Such studies as Pettigrew (1985) and Wilson et al. (1986) indicate that political dynamics are often interwoven with ideological constraints on change.

CONCLUSION

It is a fundamental tenet of strategic management and organization theory that organizations must change with their environments. Events in recent years have shown us that this is not just theory; many firms around the world have paid a severe price for intransigence in the face of change. In this paper, we provided a conceptualization of strategic decision-making flexibility, and identified several factors that render it more or less likely to be found in specific situations. With this study, we join Nutt (1993a) in extending the theoretical understanding of flexibility in strategic decision making. Nutt clarified the role of decision styles in flexible decision making; in this study we examined the role of context as antecedent to flexibility. On a practical note, it seems clear that organizations that intend to survive and flourish into the next century must be blessed with managers who are capable of overcoming their informational and ideological barriers, and practising flexibility in their strategic choices.

APPENDIX

Construct Measures

Openness

1. How often did the group rely on new sources of information in making the decision?
(1 = not at all, 4 = to some extent, 7 = completely)
2. How often were novel or original ideas presented during the discussion?
(1 = never, 4 = occasionally, 7 = very often)
3. To what extent were these novel or unusual ideas seriously considered by the group?
(1 = not at all seriously, 4 = moderately seriously, 7 = very seriously)
4. To what degree were people able to contribute to the decision in ways that did not strictly match their job description or level of authority?
(1 = not at all, 4 = to some extent, 7 = a great deal)

Recursiveness

1. To what extent did the group reconsider any choices made *during* the process?
(1 = never, 4 = occasionally, 7 = very often)
2. How often did *individuals* in the group change their minds during the process?
(1 = never, 4 = occasionally, 7 = very often)

Competitive threat

<i>Component</i>	<i>Calculation</i>	<i>Data source</i>
Value of shipments munificence (VSM)	Regression slope of the value of shipments over 1973–82 divided by the mean of value of shipments	US Bureau of Census, 1982 Census of Manufacturers
Number of employees munificence (NEM)	Same procedure as above using the total number of employees	Same as above
Number of firms in the eight-firm concentration ratio (NF)	Total number of different firms appearing in the top eight market share holders in the data sets from 1976, 1979 and 1983	Trinet Corp., Large Business File Tape
Average market share change (MSC)	Each firm appearing in both 1976 and 1983 top eight was analysed. The absolute value of each change in market share in the interim was calculated. The average of the absolute values was used	
Competitive threat (CT)	$CT = Z \left\{ \frac{\sqrt{NF \times MSC}}{10 (.05 + MUN)} \right\}$	[MUN = VSM + NEM]

Slack

1. How difficult would it currently be to get approval for a medium-sized capital project that is worth doing?
(1 = not at all difficult, 4 = moderately difficult, 7 = very difficult)
2. Businesses often go through cycles in the availability of money. Sometimes it is very tight, and other times very loose. How would you describe your firm's current situation?
(1 = very tight, 4 = moderately tight, 7 = very loose)

Uncertainty

1. How difficult was it to predict the outcomes of the various courses of action you considered in making this decision?
(1 = not at all difficult, 4 = moderately difficult, 7 = very difficult)
2. How complex were the issues involved in this decision?
(1 = not at all complex, 4 = moderately complex, 7 = very complex)
3. At the time the decision was finally made, how would you describe your need for additional information?
(1 = had all relevant information, 7 = needed a great deal more information)

NOTE

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