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TOP MANAGEMENT TEAM DEMOGRAPHY AND CORPORATE STRATEGIC CHANGE

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This study examined the relationship between the demography of top management teams and corporate strategic change, measured as absolute change in diversification level, within a sample of *Fortune* 500 companies. Controlling for prior firm performance, organizational size, top team size, and industry structure, we found that the firms most likely to undergo changes in corporate strategy had top management teams characterized by lower average age, shorter organizational tenure, higher team tenure, higher educational level, higher educational specialization heterogeneity, and higher academic training in the sciences than other teams. The results suggest that top managers' cognitive perspectives, as reflected in a team's demographic characteristics, are linked to the team's propensity to change corporate strategy.

The ability of an organization to anticipate and respond to opportunities or pressures for change, both internal and external, is one of the most important ways in which its competitiveness and viability are ensured. The nature and effectiveness of organizational responses vary in part with how top management triggers and interprets strategic issues (Dutton & Duncan, 1987; Kiesler & Sproull, 1982). Management's role in defining the "developments and events which have the potential to influence the organization's current or future strategy" (Dutton & Duncan, 1987: 280) provides a major link between a firm and its external environment.

This inquiry examined the link between top management teams and corporate strategic change, defined as absolute change in diversification level. By focusing on top management teams, we followed the tenets of the strategic choice perspective (e.g., Andrews, 1971; Child, 1972) rather than the more deterministic assumptions of population ecology (Aldrich, 1979; Aldrich & Pfeffer, 1966; Hannan & Freeman, 1977) or "life cycle" models (Greiner, 1972; Quinn & Cameron, 1983). A firm's top management team—the "dominant coalition" of individuals responsible for setting firm direction (Cyert & March, 1963)—identifies environmental opportunities and problems, interprets relevant information, considers organizational capabil-

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ities and constraints, and formulates and implements strategic change (Mintzberg, 1979). Thus, an examination of what influences how executives assess and direct firm strategy is an important area of investigation.

Our interest in the role of top management teams, as opposed to that of individual leaders, is consistent with recent emphasis in the strategy field. In large, complex organizations, managerial responsibilities are unlikely to be the exclusive domain of just one individual (Drucker, 1974). Hambrick and Mason (1984), with their "upper echelon" perspective, proposed examining the relationship between top management teams and the organizational outcomes of strategic choices and performance levels. Similarly, Gupta (1988) suggested that a stronger relationship with strategy will be found if top management teams, rather than CEOs, are analyzed. Recent studies have found a link between top management teams and such organization-level issues as strategic innovation and performance (Bantel & Jackson, 1989; Murray, 1989; Norburn & Birley, 1988; O'Reilly & Flatt, 1989).

In examining the management-strategic change link, this study viewed top teams as decision-making groups. Decisions related to changing strategy result from the interactions of group members; the type and variety of cognitive perspectives represented on a team shape those interactions. Thus, our specific focus was the link between the type and variety of top team members' cognitive perspectives, as measured using a demographic approach, and strategic change.

THE LINK BETWEEN TOP MANAGEMENT TEAM DEMOGRAPHY AND CORPORATE STRATEGIC CHANGE

Corporate Strategic Change

The formulation of strategy entails aligning a firm's strengths and weaknesses with the problems and opportunities in its environment (Andrews, 1971). As the strategic decision-making process is by its very nature ambiguous, complex, and unstructured, the perceptions and interpretations of a top management team's members critically influence strategic decisions (Dutton & Duncan, 1987). A team's decision to initiate changes in strategy will be based on members' perceptions of opportunities and constraints (Tushman & Romanelli, 1985).

Tushman and Romanelli (1985) pointed out that the internal coordination requirements associated with a firm's strategy increase structural elaboration, which creates inertia that promotes maintaining the status quo, even if such clear dysfunctional consequences as performance downturns are present. Such inertia will decrease the probability of a team's perceiving the need for fundamental change (Normann, 1977). Thus, a top management team must be proactive in its role of overcoming inertia if strategic change is to be initiated.

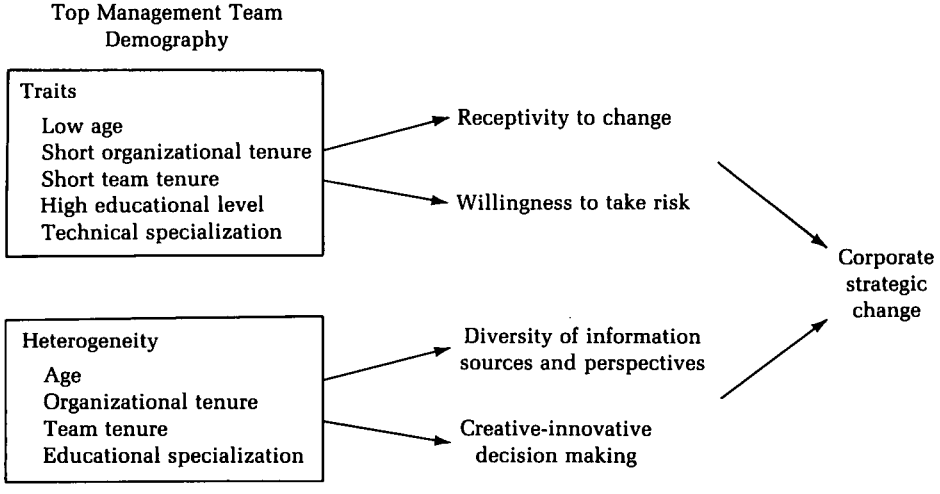
The characteristics of a team expected to be proactive in initiating strategic change include receptivity to change, willingness to take risk, diversity in information sources and perspectives, and creativity and innovativeness

in decision making. Receptivity to change suggests an openness to pursuing different business approaches, essential to strategic change. Willingness to take risk is important because changing firm strategy involves risk: established ways of conducting business are abandoned in favor of making commitments to strategic directions for which the payoffs are not guaranteed. Novelty, and therefore change, result from a creative, innovative decision-making style. Finally, diversity in information sources and perspectives suggests differentiation in an organization's belief structure that in turn leads to a perception of the feasibility of change and a momentum toward change (Dutton & Duncan, 1987).

As depicted in Figure 1, a team's demographic composition is a key indicator of these four tendencies. Specifically, certain demographic traits suggest receptivity to change and willingness to take risks, while demographic heterogeneity indicates diversity of information sources and perspectives and creativity and innovativeness in decision making.

The focus of this research was changes in corporate rather than business-level strategy. This distinction is an important one in strategy research. Strategy at the business level constitutes decisions regarding the methods of competition within a specific industry. By contrast, corporate strategy pertains to decisions on the mix and emphases of business within a portfolio. Corporate strategy includes the evaluation of the appropriate courses of action with regard to potential divestments, downsizings, and restructurings of existing businesses, as well as to acquisitions, mergers, and the internal development of new business units. Therefore, absolute change in the level of corporate diversification, the measure used in this study, is an accurate reflection of strategic change.

FIGURE 1
Top Management Team Demography and Corporate Strategic Change



The Link Between Demography and Cognitive Perspectives

As a top team engages in the strategic decision-making process, each manager's perceptions and interpretations will reflect his or her own "cognitive base." Previous research has defined a cognitive base as assumptions about future events, knowledge of alternatives, and the consequences attached to alternatives (Hambrick & Mason, 1984; March & Simon, 1958). Drawing on Hambrick and Snow (1977), Hambrick and Mason (1984) proposed a model of how a manager's cognitive base influences the perceptual process underlying decision making. First, it limits the manager's field of vision, or the areas in the environment to which attention is directed. Second, selective perception occurs because the manager only pays attention to some of the stimuli in his or her field of vision. And third, the information that is processed is filtered through the lens of the cognitive base.

In its role of setting the strategic direction of a firm, a top management team functions as a decision-making group. We thus examined the type and variety of cognitive bases represented by top team members in the strategic decision-making process. According to the Hambrick and Mason (1984) model, a study of the cognitive bases of team members will suggest the nature of a team's information gathering and processing and the number and variety of solutions generated.

Because an individual's cognitive base evolves from experiences, including training and background (Cyert & March, 1963), demographic characteristics are indicators of its qualities (Hambrick & Mason, 1984). Previous studies have used demography as a predictor of beliefs and values (Kahalas & Groves, 1979; Walsh, 1988) and viewpoints (Dearborn & Simon, 1958). The demographic approach builds on research that has found a link between demographic characteristics and specific beliefs, values, and abilities. For example, age has been found to be negatively related to the ability to integrate new information (Taylor, 1975) and to make risky decisions (Carlson & Karlsson, 1970; Vroom & Pahl, 1971).

Demography theory, since first applied to general populations, has generated considerable interest because of its theoretical importance in the study of organizations (Stinchcombe, McDill, & Walker, 1968). Pfeffer described the importance of the demographic approach as follows: "Demography is an important, causal variable that affects a number of intervening variables and processes and, through them, a number of organizational outcomes" (1983: 350). He argued that demography might explain more variance in the dependent variable than would the presumed intervening constructs, which are often such underlying mental processes as attitudes toward risk. This superiority might be due in part to the fact that some characteristics of interest do not have analogous psychological measures (Hambrick & Mason, 1984). For example, a manager's team tenure suggests interaction patterns with colleagues that might be difficult to tap with a psychological measure. Further advantages of demography are objectivity,

parsimony, comprehensibility, logical coherence, predictive power, and testability (Hambrick & Mason, 1984; Pfeffer, 1981).

In understanding the influence of team demography on strategic decision outcomes, it is important to differentiate between trait and diversity effects. This concern follows research on group problem solving that has suggested that both the characteristics, or traits, and the variety, or diversity, of cognitive resources are central to understanding group performance (Hoffman, 1959; Hoffman & Maier, 1961; Triandis, Hall, & Ewen, 1965).

Demographic trait effects. With regard to trait effects, the extent to which a member has a certain demographic characteristic predicts his or her perspective and interpretations. For example, a variety of research studies have shown that certain demographic variables can be linked to an individual's receptivity to change. Several studies have found a link between long tenure and high commitment to the status quo (Alutto & Hrebiniak, 1975; Staw & Ross, 1980; Stevens, Beyer, & Trice, 1978). As our interest was the strategic decision making of teams, we used the average level of a given demographic trait in a team to represent the group's overall perspective. As Figure 1 indicates, certain demographic traits suggest a team's receptivity to change and willingness to take risks. This link will be elaborated in the hypotheses section.

Demographic diversity effects. Diversity effects, which refer to the relative homogeneity or heterogeneity of a team on a characteristic, suggest the breadth of perspective available in a decision-making process. As shown in Figure 1 and described below, team demographic heterogeneity suggests diversity in information sources and perspectives and creativity and innovativeness in decision making.

Research has suggested that a team's demographic *homogeneity* will be linked to its propensity to maintain the strategic status quo. Homogeneity on demographic traits leads to perceptions of similarity with and attraction to others (Byrne, 1961; Kanter, 1977; Pfeffer, 1981). Shared cohort membership, which implies that two or more people experience an event like birth or organizational entry within the same time interval (Ryder, 1965), indicates similar exposure to social, environmental, and organizational events. A shared language develops among individuals with similar experiences, backgrounds, beliefs, and values (Allen & Cohen, 1969; Rhodes, 1983), enhancing communication frequency and integration (O'Reilly, Caldwell, & Barnett, 1989; Wagner, Pfeffer, & O'Reilly, 1984; Zenger & Lawrence, 1989).

Solidarity, sponsorship, and mutual choice are likely to occur among similar individuals (Pfeffer, 1983), leading to congruence in beliefs and perceptions of a firm and how it operates (Tushman & Romanelli, 1985; Wagner et al., 1984) and to high consensus (Dutton & Duncan, 1987) and continuity (Reed, 1978) in decision making. Such congruence can be particularly functional when high interdependence characterizes a firm's diversification posture, demanding integration among top team members. Michel and Hambrick (1992) found a positive association between team homogeneity and

performance for vertically integrated and related-diversified firms; no such relationship existed for firms with unrelated diversification.

Homogeneous groups can also be expected to exhibit conformity and lack of openness to information. Social psychological research on decision-making groups has shown that members' perceptions of similarity with others, particularly on values, beliefs, and attitudes, increases group identification and cohesion (Byrne & Wong, 1962; Lott & Lott, 1965; Rokeach, 1960; Zander, 1977). Cohesiveness is in turn associated with high conformity (Back, 1951; Janis, 1972; Kiesler & Kiesler, 1969; Lott & Lott, 1961, 1965; Zander, 1977), high commitment to prior courses of action (Janis, 1972), lack of openness to information, and interference with a group's ability to fully use information (Whitney & Smith, 1983).

In contrast, demographic *heterogeneity* represents diversity in a team's cognitive bases. According to Hambrick and Mason's (1984) model, a heterogeneous team will gather information from a variety of sources and have diverse interpretations and perspectives. Dutton and Duncan (1987) posited that differentiation in an organization's belief structure, defined as high complexity with low consensus, enhances the search for information, the perception that change is feasible, and the momentum for change. Other theorists have also suggested that high member diversity and variety enhance the ability of an organization to adapt (Katz, 1982; Weick, 1969).

Group heterogeneity has also been shown to be associated with high levels of creativity and innovation (Bantel & Jackson, 1989; Katz, 1982; Murray, 1989; Wanous & Youtz, 1986). The presumed benefit of a diverse group is that its members' different points of view lead to diversity, novelty, and comprehensiveness in the set of recommended solutions. The members of such a team will be able and willing to challenge each others' viewpoints (Hoffman & Maier, 1961). Researchers have suggested that a need to reconcile diverse solutions and viewpoints stimulates effective group discussion and, in turn, high-quality decisions (Ghiselli & Lodahl, 1958; Hoffman, 1959; Hoffman & Maier, 1961; Sorenson, 1968).

Organizational theorists have also pointed out, however, that diversity within a group on the demographic variables of age and organizational tenure has its costs. Group members who are not in the same cohorts, for example, find it more difficult to communicate than do same-cohort members (McCain, O'Reilly, & Pfeffer, 1983), making conflict and power struggles more likely (Pfeffer, 1983). At high levels of diversity, communication will become increasingly strained and conflict laden. A potential outcome would be the inability of a group to make decisions or take action.

These findings suggest that the benefits of group diversity in demographic characteristics taper off as heterogeneity increases. In fact, very high levels of heterogeneity may actually have negative organizational consequences. Thus, we expected that increases in demographic heterogeneity within a group would have the strongest association with strategic change at moderate levels of heterogeneity.

HYPOTHESES

Five demographic variables were chosen for study: age, organizational tenure, team (executive) tenure, educational level, and educational specialization. Previous research has shown that these variables are indicators of attitudes about change and risk taking and are thus relevant to the trait hypotheses we will state. In addition, the selected variables suggest a certain type of decision-making perspective, relevant to the heterogeneity hypotheses.

Age

An individual's age is expected to influence strategic decision-making perspectives and choices. Hitt and Tyler (1991), for example, found that executives' ages had an influence on the strategic evaluation of acquisition candidates. Research has suggested that flexibility decreases and rigidity and resistance to change increase as people age. To older executives, security, both financial and career, may become very important. They might thus avoid risky decisions (Carlson & Karlsson, 1970; Vroom & Pahl, 1971), which could include major changes in the strategic direction of a firm. Younger managers, on the other hand, tend to be more risk oriented; low executive age has been associated with both corporate growth (Child, 1974; Hart & Mellons, 1970) and volatility of sales and earnings.

Older managers also tend to have less confidence in their decisions and are willing to change their views if they become aware of a negative consequence (Taylor, 1975). As a result, such managers may lack the conviction necessary to provide the leadership for strategic change.

> *Hypothesis 1a: Average age of a top management team will be negatively related to change in corporate strategy.*

As discussed earlier, research investigating the role of cohorts in firms has focused for the most part on the variables of age and organizational tenure (e.g., McCain et al., 1983; Wagner et al., 1984). Age is an important demographic variable in that it helps to predict an individual's non–work-related experiences (Ryder, 1965); people of a similar age have such experiences in common, which leads to shared attitudes and beliefs (Rhodes, 1983). Diversity of age is expected to increase the variety of perspectives on strategic issues facing a firm, thus stimulating the consideration of change. The benefits of increased age diversity will be greater at moderate levels and will taper off the more heterogeneous in age a top management team becomes.

> *Hypothesis 1b: Age heterogeneity within a top management team will be positively related to change in corporate strategy, but the association will decrease the more heterogeneous the team.*

Organizational Tenure

Higher commitment to the status quo (Alutto & Hrebiniak, 1975; Staw & Ross, 1980; Stevens et al., 1978) and to the values of a firm (Schmidt & Posner, 1983) are likely to be associated with long organizational tenure. Miller (1991) found that firms with long-tenured CEOs were less likely to have appropriate strategies and structures that matched their environmental requirements. Social cohesion is also expected to result in a team with high organizational tenure (Michel & Hambrick, 1992), leading to a reluctance to challenge the status quo (Janis, 1972). In addition, long tenure increases understanding of organizational policies and procedures (Kanter, 1977) and perhaps reluctance to change such structures.

Although we might thus expect a positive relationship between low organizational tenure and strategic change, research has suggested that this association is not straightforward. In their study of the effects of group demographics on communication frequency, Zenger and Lawrence (1989) found that organizational tenure was not a significant predictor of within-group communication frequency, yet it was significant in determining outside-group communication frequency. They postulated that small groups in which work-related knowledge and skills develop rapidly assimilate new entrants quickly. Assuming that assimilation into the routines and perspectives of a top management team is rapid, we posited that only teams with low average organizational tenure are likely to bring about changes in corporate strategy.

> *Hypothesis 2a: Low average organizational tenure of a top management team will be positively related to change in corporate strategy.*

Organizational tenure, by defining an individual's cohort membership, indicates experiences, perspectives, and values. Experiences inside an organization produce a common vocabulary and similar interpretations of events (Allen & Cohen, 1969; Lawrence & Lorsch, 1967), which facilitate communication among individuals (March & Simon, 1958). Thus, a team's heterogeneity in organizational tenure should lead to diverse opinions and stimulate consideration of changes in strategy. Increases in diversity are most likely to have the greatest effect at low levels.

> *Hypothesis 2b: Organizational tenure heterogeneity within a top management team will be positively related to change in corporate strategy, but the association will decrease the more heterogeneous the team.*

Top Management Team Tenure

Time of entry into a group is an important determinant of a person's communication patterns within it (Allen & Cohen, 1969). In his study of R&D project groups, Katz (1982) found that groups that had been together a long time tended to develop standardized ways of communicating and homoge-

neity in perspective. Long average group tenure results in decreasing levels of overall communication because group members feel they can anticipate other members' viewpoints and increased specialization occurs (Katz, 1982). In addition, team longevity can lead to increasing isolation from outside sources of information (Pelz & Andrews, 1966) as members become less receptive toward communications that threaten their patterns of behavior (Staw, 1977). We thus expected that long-tenured groups will become increasingly resistant to changes in strategic direction.

Hypothesis 3a: Average tenure of a top management team will be negatively related to change in corporate strategy.

Heterogeneity of team tenure indicates that the various members of a top management team have been promoted at different times, suggesting that new and different perspectives on the strategic vision for the firm have been added. Team tenure homogeneity, by contrast, suggests shared socialization and group experiences that reinforce the cohort phenomenon. Thus, we expected heterogeneity of top management team tenure to provide a variety of information sources and outlooks.

Hypothesis 3b: Tenure heterogeneity within a top management team will be positively related to change in corporate strategy, but the association will decrease the more heterogeneous the team.

Education

Educational level. Level of education reflects an individual's cognitive ability and skills. High levels are associated with high capacity for information processing and ability to discriminate among a variety of stimuli (Schroder, Driver, & Streufert, 1967). Educated individuals are likely to engage in boundary spanning, tolerate ambiguity, and show an ability for "integrative complexity" (Dollinger, 1984: 354). Further, high levels of education have consistently been associated with receptivity to innovation (Becker, 1970; Kimberly & Evanisko, 1981; Rogers & Shoemaker, 1971). Bantel and Jackson (1989) found that top management teams with high levels of education headed innovative banks. We thus expected individuals with high levels of education to be aware of and receptive to the need for change in corporate strategy.

Hypothesis 4: Average educational level of a top management team will be positively related to change in corporate strategy.

Educational specialization. Selection of a curriculum of study reflects an individual's cognitive style and personality (Holland, 1973), and the curriculum pursued shapes perspectives and outlooks. Hitt and Tyler (1991), for example, found that the type of academic degrees executives had influenced their strategic decision making, specifically their evaluation of acquisition candidates. Certain academic fields are more oriented toward change

than others. For example, science and engineering are concerned with progress, invention, and improvement. We explored the possibility that those disciplines might be more strongly associated with strategic change than the arts, law, and business.

> *Hypothesis 5a: Academic specialization in science and engineering within a top management team will be positively related to change in corporate strategy.*

Heterogeneity of educational curriculum within a team is likely to broaden perspectives on strategic decision making.

> *Hypothesis 5b: Educational specialization heterogeneity within a top management team will be positively related to change in corporate strategy.*

Control Variables

Three variables—prior organizational performance, organizational size, and top management team size—were included as controls because of their potential influence on strategic change. In addition, we included three industry structure variables that might account for changes in firms' corporate diversification strategies.

Prior organizational performance. Tushman and Romanelli (1985) pointed out that low organizational performance results when a firm's strategy fails to achieve an appropriate alignment with its environment. Thus, poor performance is often the impetus for changes in strategy (Hambrick & Schechter, 1983; Tushman & Romanelli, 1985), particularly as top managers often feel more vulnerable to unfriendly takeovers, internal upheavals, and losing their jobs when performance is poor (James & Soref, 1981). Evidence suggests that changes in strategy can bring about desired performance improvements. Schendel, Patten, and Riggs (1975) examined firms that suffered performance declines followed by turnarounds. For firms that experienced declines brought about by such strategic issues as product obsolescence, strategic change was associated with the turnarounds. We thus expected a relationship between poor organizational performance and corporate strategic change.

Organizational size. Increases in organizational size add complexity with its attendant increases in structural elaboration and formalized systems for planning, control, and resource allocation (Quinn & Cameron, 1983). As a result, increases in organizational size can create progressively stronger resistance to fundamental change (Tushman & Romanelli, 1985). Largeness should thus be associated with a low likelihood of major changes in corporate strategy.

Top management team size. Group size is likely to influence measures of demographic heterogeneity, since large groups have more potential for dissimilarity. In a small group, the addition of one person can increase team heterogeneity substantially (Bantel & Jackson, 1989). As the number of members on a top management team increases, structural elaboration is expected

(Meyer, 1972), including differentiation in perspective (Dearborn & Simon, 1958), specialization of skills, and diversity of opinion (Bales & Borgatta, 1955). Such breadth of team perspective should stimulate proactive strategic actions. Eisenhardt and Schoonhoven (1990), for example, found that large teams facilitate growth for new ventures. We thus expected firms with large top management teams to exhibit high corporate strategic change.

However, as team size increases, group cohesion and communication intensity become strained (Shaw, 1976). Thus, at low-to-moderate levels of largeness, a positive association with corporate strategic change is expected; the association will taper off as a team becomes very large.

Industry structure. Contributors to the strategy literature have noted that characteristics of industry structure may provide incentives for firms to pursue changes in their diversification postures (Hoskisson & Hitt, 1990; Reed & Luffman, 1986). Similarly, economists have noted that industry structure variables may determine a firm's diversification strategy (e.g., Lecraw, 1984). A review of the literature suggested three industry structure characteristics that should be examined: growth, profitability, and concentration.

Changes in diversification strategy may be defensive moves by management to mitigate undesirable characteristics in a firm's dominant industrial environment. In response to poor growth and profit opportunities in their core businesses, firms are likely to pursue opportunities elsewhere (Ansoff, 1965; Bass & Wittink, 1978; Berry, 1975; Gort, 1962; Rumelt, 1974). Firms can satisfy their profit and growth goals without changing their diversification strategies when operating in industries characterized by high growth with above-average profitability and below-average risk (Ansoff, 1965; Lecraw, 1984).

In addition, the economic concentration of an industry may influence the likelihood of strategic change. Montgomery (1979) found that firms in highly concentrated industries were likely to experience higher market shares and the associated higher returns than firms in other industries. As a result, we expected firms in highly concentrated industries to exhibit less strategic change than firms in less concentrated industries.

Low industry growth, profitability, and concentration were thus expected to be associated with high levels of corporate strategic change.

METHODS

Sample

A random sample of 100 firms was selected from the 500 largest manufacturing firms for the year 1980 as listed in *Fortune*. We chose 1980 because of the availability of TRINET line-of-business data and because the subsequent years were an active period for corporate acquisitions and divestitures as indicated by a review of the *Journal of Mergers & Acquisitions* for the years 1981–83. In addition, TRINET line-of-business data were available for 1980 and 1983. TRINET, a data base made available by Economic Information Systems (EIS) and derived from the EIS establishment/company

TABLE 1
Firms and Their Primary Lines of Business

Company	Primary Line of Business
A. E. Staley Manufacturing Co.	Corn syrups
A. O. Smith Corp.	Auto and truck frames
Akzona Corp.	Man-made fibers
Allied Corp.	Chemicals
Allis-Chalmers Corp.	Farm machinery
Amax Inc.	Base metals
American Can Co.	Metal cans
American Cyanamid Co.	Medical drugs
Amstar Corp.	Sweeteners
Arcata Corp.	Printing
Armco Inc.	Carbon steel
Avon Products Inc.	Cosmetics
Barnes Group Inc.	Springs
Bausch & Lomb	Contact lenses
Bell & Howell Co.	Specialized business equipment
Burlington Industries Inc.	Fabrics
Cameron Iron Works Inc.	Iron and steel forgings
Carpenter Technology Corp.	Stainless steel
Caterpillar Tractor Co.	Construction machinery
Certainteed Corp.	Roofing materials
Cooper Industries Inc.	Hand tools
Copperweld Corp.	Steel tubing
Crown Central Petroleum Corp.	Petroleum refining
Data General Corp.	Computers
Deere & Co.	Farm machinery
Dexter Corp.	Industrial coatings
Diamond International Corp.	Packaging
Dorchester Gas Corp.	Natural gas
EG&G Inc.	Engineering and scientific instruments
Eagle-Picher Industries Inc.	Transportation equipment components
Emerson Electric Co.	Electric motors
Ethyl Corp.	Industrial inorganic chemicals
Ex-Cell-O Corp.	Machine tools
Fieldcrest Mills Inc.	Textile products
Figgie International Inc.	General industrial machinery
Frederick & Herrud Inc.	Prepared meat products
G. D. Searle & Co.	Pharmaceuticals
GAF Corp.	Photography equipment
General Instrument Corp.	Electronic components
General Motors Corp.	Motor vehicles
Geo A. Hormel & Co.	Meat processing
Georgia-Pacific Corp.	Plywood
Great Northern Nekoosa Corp.	Paper
Gulf Resources & Chemical Corp.	Lead, zinc
Harris Corp.	Printing equipment
Hewlett-Packard Co.	Test and measurement instruments
IC Industries Inc.	Railroads
Insilco Corp.	Silverware
Intel Corp.	Semiconductors

TABLE 1 (continued)

Company	Primary Line of Business
International Harvester Co.	Agricultural equipment
International Minerals & Chemicals	Fertilizers
International Multifoods Corp.	Flour
Johnson Controls Inc.	Automatic controls
Joseph E. Seagram & Sons	Liquors and wines
L. B. Foster Inc.	Iron and steel forgings
Lone Star Industries Inc.	Cement and concrete
MAPCO Inc.	Petroleum pipelines
Mead Corp.	Forest products
Mitchell Energy & Development Corp.	Natural gas
Monsanto Co.	Synthetic fibers
Oak Industries Inc.	Telecommunication switches
PACCAR Inc.	Heavy-duty trucks
Palm Beach Inc.	Men's apparel
Phillips Petroleum Co.	Petroleum
Pitney Bowes Inc.	Office machines
Quaker Oats Co.	Cereals
Revere Copper & Brass Inc.	Fabricated copper and brass
Scott Fetzer	Vacuum cleaners
Scovill Inc.	Door bells
Signode Industries Inc.	Steel and plastic strappings
Southwest Forest Industries	Lumber
Spring Mills Inc.	Woven fabrics
Sun Co.	Petroleum
Tecumseh Products Inc.	Refrigerator compressors
Tyson Foods Inc.	Poultry products
Varian Associates Inc.	Microwave and power tubes
Vulcan Materials Co.	Crushed aggregate
Warnaco Inc.	Women's apparel
Warner Communications Inc.	Motion pictures
West Point-Pepperell Inc.	Cotton fabrics
Westinghouse Electric Corp.	Motors, controls, breakers
Westvaco Corp.	Paper products
Whittaker Corp.	Metal pipe
Williamette Industries Inc.	Paper products
Witco Chemical Corp.	Defoamers
Wyman-Gordon Co.	Nonferrous and iron forgings
Xerox Corp.	Copiers

files, provides information on numbers of employees, revenues, and the four-digit Standard Industrial Classification (SIC) codes for all plants employing 40 or more persons in the United States. We aggregated those data for each firm to arrive at line-of-business data, which indicate the percentages of a firm's total sales represented by each of its four-digit SIC codes and allows identification of changes in corporate strategy.

The sample was reduced to 87 firms because TRINET data were unavailable for 13 of the firms. Table 1 identifies the final sample of firms and their primary lines of business, defined as the four-digit SIC code with the

largest percentage of revenues. A sample of firms selected from the *Fortune* 500 represents companies already quite diversified in their strategic postures and operating in a variety of industries (Rumelt, 1982), as evidenced by the variety of lines of business represented. By selecting a multiindustry sample, we controlled for industry-specific effects.

Definition and Measurement of the Variables

Demography measures. For each firm, only data for managers on the top management team were collected. We defined top management team members as including the very highest level of management—the chairman, chief executive officer, president, and chief operating officer—as well as the next-highest tier. The exact titles in the second executive level vary from executive vice president to vice president, depending on the organization. The arbitrary use of a position title, such as vice president, to define top management team membership can lead to the inclusion of anywhere from two to five levels of management. By defining the top management team as the two highest executive levels, regardless of the titles used, we achieved greater consistency across the sample of firms than have other studies in the measurement of the top management team.

Demographic characteristics were collected for members of the 1980 top management team of each firm as listed in the *Dun & Bradstreet Reference Book of Corporate Managements, 1980*. We calculated age, organizational tenure, and top management team tenure from biographical data. Educational level was measured in terms of the number of years of schooling, and the specialization represented by the highest obtained university degree determined the educational specialization measure. In categorizing managers by their fields of educational specialty, we used information provided by Dun & Bradstreet and *Who's Who in Finance and Industry* (Marquis Who's Who, Inc., 1981). Individuals were categorized into five educational specializations: arts, sciences, engineering, business and economics, and law. Individuals with B.S. or M.S. degrees were classified as science specialists; B.S. and M.S. degrees with a listed specialty, such as business, were not coded as science degrees. Individuals with Ph.D. degrees in the sciences were classified as science specialists.

The demographic trait measures for interval scaled data were calculated by aggregating values for a team's members and taking the mean. For the measure of organizational tenure, we created a dummy variable to capture low tenures, consistent with Hypothesis 2a. The cutoff point for low organizational tenure was the mean tenure for the sample minus one standard deviation. This resulted in 11.5 (19.98 − 8.48) years as a cutoff. We then divided the sample into firms with teams with mean organizational tenures of (1) less than 11.5 years and (2) more than or equal to 11.5 years. We classified 11 firms as having top management teams with low average organizational tenures.

For educational specialization, we categorized each team on the basis of

its members' mode specialization and then developed a dummy variable to capture top management teams dominated by individuals with educational backgrounds in science and engineering.

Heterogeneity of the top management team on the interval scaled data was measured using the coefficient of variation, defined as the standard deviation divided by the mean. Allison's (1978) review of inequality measures indicates that the coefficient of variation, because it is a scale invariant measure, is preferred to the standard deviation or variance for interval-level variables. Scale invariant measures are desirable because they are sensitive to relative rather than absolute differences. When multiplied by a constant, a scale invariant measure remains unchanged; when added to a constant, it declines. These properties are desirable for ranking one distribution as more unequal than another (Allison, 1978).[1]

The logarithm of the heterogeneity measure was used to capture the anticipated decreasing rate of the effect of dissimilarity in age, organizational tenure, and top management team tenure on changes in corporate strategy. For the categorical variable, educational specialization, we applied Blau's (1977) index of heterogeneity.[2]

Strategic change measure. Strategic change was measured by the absolute percentage change in diversification strategy over the period 1980–83. A firm's diversification posture captures the moves its management has made to establish business positions in different industries (Porter, 1987). The concept of corporate diversification captures the variety and relative distribution of a firm's lines of business (Rumelt, 1974). Management can choose to alter a firm's diversification strategy by adding new business activities, dropping or divesting existing business activities, or pursuing corporate growth through expansion in its existing lines of business. A firm's growth pattern and the composition of its business portfolio will reflect decisions on the amount of resources allocated to specific areas.

Corporate diversification strategy was measured with Jacquemin and Berry's (1979) entropy measure of diversification, which captures both the extent of diversity across a firm's activities and the related versus unrelated elements of diversity (Palepu, 1985). It is calculated as follows:

$$\sum_{i=1}^{N} P_i \ln(1/P_i)$$

where P_i is the percentage of a firm's total sales in the ith segment and N is the number of the firm's businesses.

[1] Although the coefficient of variation is the preferred measure of heterogeneity, the results of regression analyses did not differ substantially when the standard deviation was used.

[2] Blau's index of heterogeneity is calculated as $1 - \Sigma (P_i)^2$, when P_i is the proportion of a group's individuals in the ith category.

TABLE 2
Examples of Values for the Entropy Measure of Diversification

Firms	1980	1983	Amount of Change	Percentage of Change
High diversification				
Westinghouse Electric Corporation	3.38	3.39	.02	0.5
Moderate diversification				
Armco Inc.	1.61	2.27	.66	41.1
Low diversification				
Joseph E. Seagram & Sons	1.05	1.05	.00	0.0

For each firm, line-of-business data at the four-, three-, and two-digit SIC code levels were used to obtain the entropy measure of diversification for 1980 and 1983. We measured changes in diversification strategy by taking the absolute percentage change in a firm's entropy measure from 1980 to 1983.[3] The period chosen was long enough to allow us to capture shifts in corporate diversification posture but brief enough to accurately reflect the actions of the top management team in charge of a company in 1980.

Table 2 shows some examples of the entropy measure within the sample. The measure's value could range from 0 for single business firms to 4 for highly diversified firms. A highly diversified firm like the Westinghouse Electric Corporation had sales in 80 four-digit SIC lines of business, but Joseph E. Seagram & Sons, with low diversification, participated in only 7 four-digit SIC lines. Changes in the entropy measure reflect strategic changes in the composition of a business portfolio.

Prior organizational performance. We measured firm performance as the average return on assets for the three-year period from 1978 to 1980 using data from Standard & Poor's COMPUSTAT. Performance during this time period was assumed to have provided the stimulus for changes in corporate diversification strategy during 1980–83.[4]

Organizational size. Organizational size was measured by taking the logarithm of each firm's 1980 revenues. This measure is the established way to account for differences in firm size when examining organizational outcomes (Montgomery, 1979).

Top management team size. The size of each firm's top management team was measured using the logarithm of the number of individuals in the

[3] Findings on the relationship between top management team demography and changes in diversification strategy were consistent when diversification was calculated using the entropy measure of diversification at the two-, three-, and four-digit SIC levels. We thus only report findings on the four-digit level.

[4] Average firm performance, rather than performance relative to the industry, was used. A relative performance measure allows for intraindustry comparisons. However, for highly diversified firms with substantial operating revenues from a number of industries, this type of comparison is meaningless. Comparison of a firm's performance to that of a random sample of similarly diversified firms is the most appropriate measure.

top two tiers of the firm's management. We used the logarithmic transformation to capture the anticipated decreasing effect of increases in top management team size on the dependent measure.

Industry structure. Industry structure characteristics were ascertained for the four-digit SIC industry representing each firm's dominant line of business. We measured industry growth, profitability, and concentration using data in the U.S. commerce department's *U.S. Industrial Outlook*, the 1982 *U.S. Census of Manufacturers*, and the Federal Trade Commission's line-of-business data base.

RESULTS

Table 3 presents the means, standard deviations, and correlations among the variables. The size of each firm's top management team ranged from 2 to 8 individuals, with a mean of 4.3. The ages of the top management teams' members varied from 42 to 69 years, and their organizational tenures varied from 5 to 38 years. Regarding educational level, 2 percent of managers had a high school degree, 10 percent had some college, 55 percent held baccalaureate degrees, 22 percent held master's degrees, and 9 percent held doctorates, and 2 percent were missing this data item.

The matrix in Table 3 indicates that there are significant correlations between the trait and heterogeneity variables for organizational tenure (.59) and age (.36). We therefore followed procedures as outlined by Belsely, Kuh, and Welsch (1980) to test for the effects of multicollinearity in the regression analysis. We calculated condition indexes and examined whether a high condition index contributes substantially to the variance of two or more variables. In our analysis, none of the components associated with a high condition index contributed substantially. Additionally, the correlation matrix of the regression coefficients showed no significant correlations between them. Thus, the degree of multicollinearity was not sufficient to warrant concern over the estimates of the regression coefficients.

An exploratory analysis of the influence of educational specialization on changes in diversification strategy was conducted in which two dummy variables were created for the fields of science and engineering. Only science was significantly related to the dependent measure. We entered this dummy variable into the regression equation.[5]

The hypotheses were tested by regressing strategic change, measured by absolute change in the entropy measure of corporate diversification, on the

[5] The findings for the science specialization led to further analysis to see if this variable's significance could be due instead to an industry effect. We hypothesized that firms with top management teams with predominantly scientific backgrounds might be more frequent in industries generating excess resource capability and thus characterized by high diversification. This relationship was examined by comparing educational specialization with several industry characteristics including marketing, advertising, and R&D expenditures and asset intensity. No statistically significant differences existed across the five specializations on those characteristics.

TABLE 3
Descriptive Statistics and Correlation Matrix[a]

Variables	Means	s.d.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. Change in strategy	0.19	0.55															
2. Prior organizational performance	0.10	0.07	.14														
3. Organizational size	7.20	0.95	−.02	−.01													
4. Top management team size	4.30	0.95	.09	−.15	.33**												
5. Industry growth	0.68	2.02	−.03	.04	−.19	−.23*											
6. Industry profitability	0.13	0.07	−.16	−.20	.01	.14	−.05										
7. Industry concentration	0.44	0.21	−.01	−.29**	.23*	.30**	−.08	.14									
8. Mean team age	55.55	4.56	−.20	.01	.19	.01	.01	.09	.01								
9. Mean team organizational tenure	19.98	8.48	−.10	.03	.20	−.11	.02	.15	.04	.50***							

TABLE 3 (continued)

Variables	Means	s.d.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
10. Mean team executive tenure	9.25	4.33	.04	.03	−.24*	−.42***	.01	−.03	−.29**	.26**	.46***						
11. Mean team educational level	16.50	1.13	.28**	−.16	.04	.17	−.03	−.06	.12	−.14	−.26**	−.26**					
12. Team age heterogeneity	0.11	0.07	−.04	−.10	−.13	.06	.04	.12	.19	−.36**	−.26**	−.13	.21				
13. Team organizational tenure heterogeneity	0.49	0.29	−.13	−.10	.03	.27**	.08	.08	.09	−.19	−.59***	−.42***	.10	.44***			
14. Team executive tenure heterogeneity	0.67	0.37	−.21	−.15	.01	.34**	−.07	.07	.18	−.05	−.10	−.29**	.10	.29**	.38***		
15. Educational specialization heterogeneity	0.61	0.25	−.12	.00	.11	.37***	−.03	.01	.10	.15	.17	.09	−.38***	−.13	−.05	.10	
16. Science specialization			.16	−.12	.17	.01	−.10	−.12	.14	−.02	−.02	−.12	.10	−.09	−.06	−.02	−.14

[a] n = 87.
* $p < .05$
** $p < .01$
*** $p < .001$

TABLE 4
Results of Regression Analyses[a]

Variables	Model 1: Control Variables	Model 2: Trait Variables	Model 3: Heterogeneity Variables	Model 4: Full Model	Model 5: Adjusted Full Model
Prior organizational performance	.13	.23*	.12	.24*	.23*
Organizational size	−.07	−.01	−.05	−.02	
Top management team size	.14	.22†	.13	.05	
Industry growth	−.02	.04	−.02	.01	
Industry profitability	−.15	−.07	−.16	−.04	
Industry concentration	.02	.07	.00	.05	
Mean team age		−.16		−.21†	−.18*
Mean team organizational tenure		−.29**		−.25*	−.27*
Mean team executive tenure		.37**		.27*	.27**
Mean team educational level		.27**		.46***	.45***
Science specialization		.14		.18†	.18*
Team age heterogeneity			.14	−.10	
Team organizational tenure heterogeneity			−.11	.07	
Team executive tenure heterogeneity			−.10	−.09	
Educational specialization heterogeneity			.14	.38**	.40***
R^2	.06	.29	.09	.39	.38
Adjusted R^2	.00	.19	.00	.26	.32
F	0.80	2.84**	0.72	3.08***	6.91***

[a] Values shown are the standardized regression coefficients. $n = 87$.
† $p < .10$
* $p < .05$
** $p < .01$
*** $p < .001$

control variables and the demographic measures. Table 4 shows results. We tested separate regression equations for five models: (1) control variables only, (2) control and trait variables, (3) control and heterogeneity variables, (4) the full model, and (5) the full model with only significant variables. This approach allows comparison of the relative effects on explained variance of each of the three sets of variables.

In model 1, regressing strategic change on the control variables (prior organizational performance, organizational size, top management team size, industry growth, profitability, and concentration) indicated that the control variables have no significant effect on strategic change.

Regressing strategic change on the control and trait variables in model 2 supported our hypotheses that firms with top management teams character-

ized by more educated members with relatively short organizational tenures will exhibit greater strategic change. Top management team tenure was significant in the direction opposite our prediction: high tenures were related to the dependent measure. The regression analysis indicates that with organizational size, performance, team size, and industry characteristics controlled, demographic traits have a significant effect on the extent of strategic change within a firm. The control and trait sets of variables explained .29 of the variance (adjusted $R^2 = .19$).

Model 3, in which strategic change is regressed on the control and heterogeneity variables, indicates that age, organizational tenure, top management team tenure, and educational specialization heterogeneity have no significant effect on strategic change.[6] The analysis of the heterogeneity measures does not support the hypotheses that team heterogeneity in age, organizational tenure, and top management team tenure are positively related to changes in corporate strategy.

Model 4, including the control, trait, and heterogeneity variables, provides support for the hypotheses that low age, short organizational tenure, high top team tenure, high educational level, science specialization, and educational specialization heterogeneity are significantly associated with strategic change. Further, firms with high prior performance are also more likely to undergo strategic change. The full model explains .39 of the variance in the dependent measure (adjusted $R^2 = .26$). Model 5 is the adjusted full model including only the significant variables.

The signs of the coefficients and the statistical significance levels are consistent across the models for all but two variables. Model 4 provides support for a positive and significant relationship between prior organizational performance and strategic change, a result opposite to the direction predicted. In addition, a regression analysis of the full model indicates that educational curriculum heterogeneity has a significant and positive effect on strategic change; this variable's correlation with mean education level ($-.38$) might help account for the differences across models. The degree of multicollinearity between the trait and heterogeneity variables was not, however, sufficient to warrant concern over the validity of the regression estimate results.

DISCUSSION

The results of this study show a relationship between six of the nine demographic variables studied and changes in corporate strategy. The firms

[6] We conducted an additional analysis using standard deviation rather than the coefficient of variation to measure heterogeneity. The overall results did not differ; the regression coefficients were slightly larger in the additional analysis because the absolute values for the measure of standard deviation were smaller.

most likely to undergo strategic change had top management teams characterized by relative youth, relatively short organizational tenure, high team tenure, high educational level, academic training in the sciences, and heterogeneity in educational specialization.

This research makes two important contributions to strategic theory. First, it supports the strategic choice view that top management teams have an important influence on the direction of firms through their strategic decisions (Child, 1972). Although previous research has examined links between top team characteristics and strategy type (e.g., Gupta, 1984), our focus on the phenomenon of strategic change was new. Strategic change is an important construct; one of the most basic tenets in the strategy field is that a firm's viability is ensured to the extent that an ongoing alignment between the firm and its environment can be maintained (Andrews, 1971). This adaptation occurs through appropriate and timely changes in the firm's strategy; the responsibility for making such changes ultimately belongs to the firm's top managers (Mintzberg, 1979).

Second, this research provides encouragement for those interested in pursuing the upper echelons perspective of Hambrick and Mason (1984). We found that the demographic characteristics of top management teams have a significant relationship with a strategy-related organizational outcome. Demographic characteristics are an important way to measure individuals' cognitive bases; cognitive bases in turn combine to create certain team abilities and tendencies, resulting in patterns in decision outcomes. Research by Bantel and Jackson (1989) and Murray (1989) has also found support for the link between top team demographic characteristics and strategy- or performance-related outcomes.

The Influence of Demographic Traits

Particularly strong support emerged in this study for the importance of trait effects, or the level of certain demographic characteristics. Firms undergoing strategic change are more often managed by top management teams characterized by lower average age, shorter organizational tenure, higher team tenure, higher educational level, educational specialization heterogeneity, and academic training in the sciences. Case examples can highlight the relationship of several of these characteristics to strategic change. The American Can Company and the Allied Corporation both experienced significant changes in diversification strategy and were managed by top management teams that were relatively young (53 and 50, respectively) with relatively short organizational tenures (6 and 10 years) and above-average levels of education (16 and 17.1 years). Firms that did not undergo significant strategic change were more likely to be managed by older top management teams with longer organizational tenures and lower levels of education. Examples of such firms include the Westinghouse Electric Corporation and the Phillips Petroleum Company. Both firms underwent minimal stra-

tegic change and were managed by teams with respective mean ages of 61 and 59, organizational tenures of 38 and 28 years, and mean educational levels of 16 and 15.6 years.

The findings on organizational tenure are of particular interest. A relationship emerged here between organizational tenure and strategic change. We defined short organizational tenure by taking the mean tenure and subtracting one standard deviation, obtaining 11.5 years, but we expect that this threshold number of years of organizational tenure may vary with the sample studied. The findings suggest that in large, diversified firms, individuals on a management team have been fully assimilated in about 11 years, after which they take on the cognitive perspective of the other members of the team. This finding is consistent with Zenger and Lawrence's (1989) finding that the effect of short tenure on communication within a group diminishes rapidly as tenure increases. Further, these findings are somewhat supported by the work of Katz (1982), who found that beyond a certain level of mean organizational tenure, the performance of a group begins to deteriorate.

A surprising finding was that high, rather than low, top management team tenure is associated with changes in strategy. An additional analysis examining mean top management tenure and strategic change indicated that firms with very short team tenure (less than 5 years, calculated as the mean minus one standard deviation) had the least amount of strategic change. Firms with top management team tenures of more than 13 years (mean plus one standard deviation), however, did not have significantly higher levels of strategic change than the remaining firms in the sample. One possible explanation may be that the greater levels of social integration and more effective patterns of communication characteristic of longer-tenured groups enhance a group's ability to carry out changes in corporate strategy. Over time, top management team members may become adept at getting or sharing input, facilitating productive debates and discussions, gaining or giving commitment to a direction, and moving a group efficiently and rapidly to decision implementation. Beyond some average level of team tenure, however, further increases neither help nor hinder team dynamics. Firms with managers with short top management team tenure, by comparison, have not had enough time to develop the smooth group dynamics that can facilitate strategic change. Similarly, Eisenhardt and Schoonhoven (1990) and Roure and Maidique (1986) found that the sharing of working experience among top team members facilitated growth and success for new ventures.

The combination of short organizational tenure and long top management team tenure leading to changes in strategy may also be the result of another factor: the role of outsiders. We conducted an additional analysis examining differences in top management team and organizational tenure. For firms with teams with relatively short organizational tenures (<11.5 years, $\bar{x} = 7.8$), the mean top management team tenure was 5.7 years. Firms with longer organizational tenures (the remainder of the sample, with a mean of 22 years) had a mean top management team tenure of 10 years.

Therefore, managers on teams with short organizational tenures spent an average 72 percent of their organizational tenures on the top team. Team members in the rest of the sample spent on average less than half (48 percent) of their organizational tenures as members of the top management team. These results indicate that firms with teams with relatively short organizational tenures have brought in outsiders at very high managerial levels. A further analysis was conducted to learn whether executives hired from outside a company pursued increased diversification. The change in diversification strategy was significantly different for the two groups of long and short organizational tenure. The low-tenure group had an average increase in diversification of 46 percent and the long-tenured group had an average increase of 4 percent. It appears that outside executives have a managerial perspective on the firm that facilitated strategic change. Previous work on executive succession supports the role of outsiders as change agents. Helmich and Brown (1972) showed that the appointment of outsiders to a top management team brought in new perspectives and was likely to lead to organizational change.

The Influence of Demographic Diversity

Very little support for the heterogeneity argument emerged. Heterogeneity with respect to educational specialization was related to strategic change, consistent with the theory that diversity in cognitive perspective facilitates adaptation. But heterogeneity on age, organizational tenure, and team tenure were not significantly associated with strategic change.

The lack of major effects for these variables may be attributable to two aspects of this research: our level of analysis and limitation in the range of demographic variables evaluated. With regard to level, it is possible that cognitive and demographic diversity benefit complex decision making (Hoffman & Maier, 1961) less at the top management team level than at lower levels. Prior empirical studies linking group heterogeneity to higher levels of communication and creativity have focused exclusively on lower organizational levels (Katz, 1982; Pelz & Andrew, 1966; Rogers & Shoemaker, 1971; Staw, 1977; Zenger & Lawrence, 1989). In comparison, at the top management level, O'Reilly and Flatt (1989) found a negative relationship between organizational tenure heterogeneity and innovation, and Bantel and Jackson (1989) found no significant relationship between heterogeneity of age or tenure and organizational innovation.

One potential explanation is the difference in interaction frequency for groups at various levels. Interaction frequency among top team members may be low, given extensive line responsibility within the organization for each member; this would be particularly true for *Fortune* 500 firms in which top team managers autonomously run operating units. Interaction dynamics within such teams may play a less significant role in decision outcomes than they play in functional groups at lower organizational levels, such as re-

search groups, whose members need to have ongoing day-to-day interaction to achieve their work goals. We might thus conclude that findings on group decision making at lower levels do not generalize to the top team level.

A second issue is the limited range of demographic variables examined in this study. Group diversity on age and on organizational and team tenure may not adequately capture the underlying constructs of creativity-innovativeness and diversity of information. The heterogeneity argument might have found stronger support with the addition of demographic variables more specifically related to cognitive ability, training, and experience; the one significant heterogeneity measure in this study, educational specialization, is representative.

Another characteristic that might be particularly relevant to strategic change is managers' experience in different industries, particularly with regard to strategy at the corporate level. Managers with varied industrial experience will think more broadly about the diversification possibilities a firm might pursue. Future research to ascertain the additional heterogeneity dimensions most pertinent to strategic decision making at the top level might need to rely on more in-depth analysis, such as case studies and experimental research.

The Role of Control Variables

Organizational size was not found to be related to the dependent variable, which may be a result of the nature of the sample. By definition, a *Fortune* 500 sample represents the largest manufacturing enterprises in the United States, firms with sales in excess of $500 million. As such, these firms are above the threshold size at which inertia and the attendant resistance to change may develop. Size is therefore no longer a differentiating factor in the behavior of these firms.

Firm performance during 1978–80 was found to be positively related to diversification change during 1980–83, contrary to the hypothesis that poor performance would serve as an impetus for strategic change. One explanation for the findings might be the relationship between firm performance and resource availability. A firm's unused or excess productive services, which can be applied to new as well as existing lines of business, create the opportunity to pursue growth into new domains (Nelson & Winter, 1982; Penrose, 1959; Teece, 1982) and thus alter corporate strategy. Alternatively, lack of resources might create a tendency to maintain the status quo. The possibility that the best-performing firms were headed by aggressive, opportunity-seeking managers is another potential explanation.

The lack of significance of top management team size might be at least somewhat attributable to the general lack of significance for the heterogeneity variables. Larger teams are inherently more heterogeneous (see Table 3). As the heterogeneity effects proved less useful in explaining diversification change than the trait effects, the lack of findings for team size is consistent.

Industry structure characteristics were not found to have a significant effect on strategic change. The characteristics of a firm's core industry were not linked to the extent of strategic change the firm pursued. The firms we examined were already quite diverse in strategic posture. As a result, economic characteristics inherent in their core businesses and industries may not be critical for understanding the motivations for further changes in their corporate strategies.

Taking Hambrick and Mason's (1984) upper echelons perspective, previous studies have found evidence of a relationship between top management team demography and such organizational outcomes as performance and innovation. This is the first study linking multiple top management team demographic characteristics to the phenomenon of strategic change. Future researchers should be encouraged by our findings to focus on strategy and strategic change as important outcome variables in relation to top management teams.

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