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THE MEDIATING INFLUENCE OF TOP
MANAGEMENT STYLES ON THE RELATIONSHIP
BETWEEN EXTERNAL ENVIRONMENT AND
ORGANIZATIONAL STRUCTURE : TESTS
OF SOME HYPOTHESES

by

Pradip N Khandwalla

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Pradip N. Khandwala

Indian Institute of Management, Ahmedabad

ABSTRACT

Three styles of top management, labelled entrepreneurial, professional, and conservative, were empirically derived from cluster analysis of policies and practices data from a sample of companies. Eleven hypotheses were developed of the relationships between external environmental change and changes in certain dimensions of organizational structure, and the mediating effects of the three empirically derived styles on these relationships. A large number of predictions were supported. Implications of the findings were discussed.

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INTRODUCTION

A number of organizational researchers have postulated or sought relationships between aspects of the organization's external environment and elements of its structure (Dill, 1958; Burns and Stalker, 1961; Williamson, 1963; Thompson 1967; Lawrence and Lorsch, 1967; Duncan, 1971; Khandwalla, 1972; Galbraith, 1973; Negandhi and Reimann, 1973; Franko, 1974; Kimberley, 1975; Pennings, 1975; Leifer and Huber, 1977; Shortell, 1977). The tendency of contingency organization theorists has been to postulate relationships on the basis of the assumed functional necessity of certain structural arrangements to meeting specific contingencies, constraints, exigencies, and opportunities furnished by the organization's external environment (Child, 1972). However, as some writers have pointed out, strategic organizational choices and the values of the ruling coalition that underlie these choices, may significantly mediate the influence of external environmental variables on organizational structure (Child, 1972; Uytterhoevan, Ackerman, and Rosenblum, 1973; Glueck, 1976; Khandwalla, 1977). As Child (1972, p.16) has pointed out "..... when incorporating strategic choice in a theory of organization, one is recognizing the operation of an essentially political process in which constraints and opportunities are functions of the power exercised by decision-makers in the light of ideological values". Thus, the organization's structural response to, say, high environmental uncertainty or turbulence is likely to be affected by the ideology of what Cyert and March (1963) have called the dominant coalition ruling the organization. To take an example, Thompson has identified the response to a dynamic environment as greater monitoring of the environment, greater planning, and the setting up of localized units (decentralization) (Thompson, 1967, pp. 70-72). If the ideology in question is one of heavy reliance on sophisticated management techniques of control, information seeking, and problem solving, the structural

response may be a highly sophisticated control and information system. If instead, the ideology is one of entrepreneurship and aversion to technocratic management, the structural response may be the elevation of individuals with a keen intuition about future developments, and greater reliance on non-formal channels of information, rather than the installation of a highly sophisticated control and information system.

Empirical and theoretical efforts directed at exploring the mediating effects of management ideologies and styles are conspicuous by their absence. In this paper it is proposed to demonstrate the mediating effects of three empirically derived styles of what may be called the top managements of companies, on the relationship between five elements of the external environment and three aspects of organizational structure. The three styles of top management are the entrepreneurial style, the conservative style, and the professional style. These three were identified through a cluster analysis of data on the top management's orientation with respect to risk taking, participative decision making, technocratic decision making, coercion, and organic administrative relations. The five elements of the external environment are hostility; turbulence, heterogeneity, restrictiveness, and technological sophistication. The three features of organizational structure are sophistication of the organization's intelligence system, delegation of decision making authority by the chief executive, and sophistication of the management control system. Structure may be viewed as a set of durable mechanisms formally employed by the organization to accomplish certain organizational functions, the chief of which are reduction of environmental uncertainty, differentiation for coping effectively with sub-tasks, and integration and coordination of the organization's activities to reach organizational goals (Khandwalla, 1973). Intelligence system, then, is a principal mechanism to reduce external environmental uncertainty in order to facilitate the formulation of organizational growth and survival strategy and the planning of its operations. Delegation by the chief executive of the authority to make certain classes of decision to his subordinates is a principal mechanism to facilitate organizational differentiation through greater specialization in decision making. A formal system of

management controls is an important mechanism for reducing administrative uncertainties and for ensuring integration of the organization's diverse operations with its plan of action. The dimensions of the external environment, the principal constituents of the three empirically derived top management styles, and the three structural variables are operationally defined in Appendix I. Several hypotheses of relationships between features of the environment and aspects of organizational structure, and the mediating influence of the three styles of top management, are developed in a later section. These are tested on the basis of data from 103 Canadian companies.

Styles of Top Management

The style of the organization's ruling coalition or top management is the predisposition on its part to operate the organization in certain specific ways, such as organically or mechanistically, coercively or noncoercively, analytically or intuitively, participatively or nonparticipatively, and entrepreneurially (high risk taking) or conservatively. As a number of studies have cumulatively indicated, the main ingredients of a management style may be the propensity to take risks (Schumpeter, 1947; Mintzberg, 1973; Ross, 1975), the degree of commitment to scientific analysis and technocracy (Braybrooke and Lindblom, 1963), the degree of flexibility in administrative relations (Burns and Stalker, 1961), the degree to which compliance is sought through coercive means (Etzioni, 1964) and the degree to which decision making is participative (Likert, 1961). The style of an organization's top management is the degree to which the management is willing to take risks in growth related decisions, the degree to which it is technocratic and relies on expert power, the degree to which it is organic, the degree to which it is coercive, and the degree to which it believes in decisions being taken participatively or jointly, rather than by individual decision makers.

The style of management relates to the ideological orientations of one or more persons in leadership positions in an organization with respect to the full range of organizational activities. It is not, however, synonymous with

leadership. The latter relates to the characteristics of a high influencer in a group situation and the quality of his relations with the led (Filley, House, and Kerr, 1976, ch. 11 and 12). It is also to be differentiated from another closely related concept, that of organizational climate, which usually represents the perceptions of the organizational rank-and-file about such aspects of the organizational culture as decision making practices, management's concern for people, the way intraorganizational conflicts are resolved, the presence of factors which encourage hard work, and communication flow in the organization. (Franklin, 1975). In addition it is different from organizational structure, which consists of formal mechanisms for attaining organizational goals. As an example, a management committee is a part of organizational structure; whether the decision making process within it is genuinely participative or actually coercive behind a participative facade is a reflection of management style. Finally, there is no presumption that all managers in an organization practice an identical style. Clearly, there may be several managerial cultures in a sizeable, complex organization (Lawrence and Lorsch, 1967). The paper deals with the mediating effects of one of these cultures, the one existing at the highest levels of the organization, on the structural adaptation to the external environment.

METHOD AND MEASUREMENT

Three Empirically Derived Styles of Top Management

While the principal components of management styles were deduced from literature search, the principal styles of management studied in this paper were derived from questionnaire data on corporate policies, orientations, and management practices supplied by senior executives of a sample of Canadian companies. The data were secured through ratings on 7 point anchored scales. The questionnaire was completed anonymously by one to six executives from each company. Multiple responses from the same company were averaged. The questionnaire was pre-tested with two pilot samples. Follow-up interviews with the executives of about 15 companies revealed very substantial agreement between the data furnished in the questionnaire and information supplied in interviews. While the data are subjective in character, they represent the perceptions of the respondents not about their own operating modes or their own ideological preferences, but about the company's top management's policies and operating preferences.

Data were gathered during 1973 and 1974 from 103 Canadian companies of which about 55% were manufacturing companies and about 40% service and trading companies. The rest could not be easily categorised into one or the other (eg. property development companies). All were public companies or their subsidiaries, and about a score were foreign, mostly American, subsidiaries operating in Canada. A large variety of industries were represented in the sample, such as chemicals, metals, machinery, structural materials, foodstuffs and beverages, textiles, merchandising, printing, communications, data processing, and banking and trust. The average size was \$133 millions in annual sales. About 25% had sales of \$10m. or less, about 50% between \$10m. and \$100m., and the remaining had sales exceeding \$100m., with two companies exceeding a billion dollars in sales. The average age was 49 years since being founded, with a standard deviation of 45 years (a couple of companies were over 250 years old). The average long term profitability of the sample was 15% return before tax on net worth. The standard deviation was 12%. The long term average annual growth rate in sales was 14%, with a standard deviation of 14%. Thus, in terms of size, industry affiliation, operations technology, age, profitability, and growth rate the sample incorporated very substantial variations and probably yielded a wide range of management policies and practices.

As indicated in Appendix I, the data on operating management practices and policies were aggregated into the dimensions of risk taking, technocracy, participation, organicity, and coercion. Risk taking measured the degree to which the top management was entrepreneurially oriented, emphasized innovations and new products and preferred high risk high return investments, external financing of investments, and vigorous competition with rivals. The reliability of the measure was adequate and its predictive validity excellent. Technocracy measured the degree to which the top management was committed to formal long range planning, decisions based on formal research, formal long term forecasts of markets and technology, operations research, formal market research, long term capital budgeting, formalization of corporate strategy, formal management training, and great say in decision making to technocrats. The reliability of the measure as well as its construct and predictive validities were quite

adequate. Participation measured the extent to which the top management was committed to participative, consensual decision making, not only at top levels but also at middle management levels, management by objectives, human relations training, organization development, participatory organization change, etc. The reliability as well as construct and predictive validities were quite adequate. Organicity measured the degree of top management adherence to open channels of communication, freedom to managers to practice operating styles of their choice, influence of the situational expert in decision making, free organizational adaptation to changing circumstances, and emphasis on getting things done rather than on formal job descriptions or procedures. Both reliability and construct validity were adequate. Coercion measured the degree of top management adherence to "might is right" as a way of resolving internal differences of opinion, recourse to warnings and threats to personnel, non-statement of rationales for organizational changes, procuring of the services of outside experts to investigate organizational problems, and arbitration procedures. The measure had modest reliability but substantial predictive validity.

Since the potential number of styles was very large (3^5 or 243 if high, medium, and low values of each style constituent were taken into account), the scores of risk taking, technocracy, participation, organicity, and coercion were subjected to hierarchical cluster analysis (Ward, 1963) to identify a parsimonious set of styles. The cluster analysis yielded three major styles of management labelled the entrepreneurial, the professional, and the conservative. The entrepreneurial style was practiced by 21 companies, and it was characterized by a high commitment to risk taking, a moderate commitment to organicity and coercion and a very low commitment to participation and technocracy. The professional style was practiced by 38 companies, and it was characterized by a strong commitment to technocracy and participation, and a moderately low commitment to organicity. Its commitment to risk taking and coercion was just about the average for the sample as a whole. The conservative style practiced by 44 companies, displayed a very weak commitment to risk taking, a somewhat weak commitment to technocracy and participation, and about average commitment to organicity and coercion.

Table 1 shows the means of the three styles for each of risk taking, technocracy, participation, organicity, and coercion. The data shown are in standardized units. The results of pair-wise comparisons of the means for each style constituent are also shown in the table. Out of 15 such comparisons, the means differed significantly in 11 instances. It is, therefore, reasonable to infer that these three styles differ substantially from one another along a number of crucial dimensions, and are likely to provide a reasonable test of the hypothesis of the style of management mediating the relationship between environment and organizational structure.

As measured, the three styles had good predictive validity. Entrepreneurial managements may be expected to show, on the average, the highest rate of corporate growth and also the highest riskiness. The average growth rate of the entrepreneurially managed companies was not only the highest for the three styles, it was twice the average growth rate of the conservatively managed companies and about 40% higher than the average growth rate of the professionally managed companies. Similarly, the entrepreneurial managements averaged the highest range of profitability over a 5 year period (a measure of risk), nearly twice the average for the professionally managed companies and nearly 50% higher than the average for the conservative companies. The professionally and conservatively managed organizations displayed comparable profitability, but the former showed both greater profit stability and higher sales growth rate.

Measures of Environment and Organizational Structure

The five environmental variables of turbulence, hostility, heterogeneity, restrictiveness, and technological sophistication have been well studied in the literature. Dill (1958), Emery and Trist (1960), Burns and Stalker (1961), Bonini (1963), Bennis (1966), Thompson (1967), Duncan (1971), Khandwalla (1972), Jurkovich (1974), Shortell (1977), and others have examined the organizational consequences of stable versus what has variously been described as disturbed, dynamic, unstable, shifting, fluctuating, uncertain, or turbulent environment. At the core of these labels seem to lie two concepts, one, of frequency of change, and second, of unpredictability. A turbulent environment is, therefore,

TABLE 1
 MEANS OF THREE STYLES ON STYLE DIMENSIONS
 N=103 Canadian companies

	N	1 Risk taking	2 Technocracy	3 Partici- pation	4 Organi- city	5 Coercion	
<u>Cluster 1</u>							
A.	Entrepreneurial Style	21	.96	-1.00	-.73	.44	.42
	Mean statistically significantly different from	B1,C1	B2,C2	B3	B4	C5	
<u>Cluster 2</u>							
B.	Professional Style	38	.21	.88	.63	-.42	-.02
	Mean statistically significantly different from	A1,C1	A2,C2	A3,C3	A4,C4		
<u>Cluster 3</u>							
C.	Conservative Style	44	-.64	-.28	-.32	.15	-.19
	Mean statistically significantly different from	A1,B1	A2,B2	B3	B4	A5	

Note: Data are in standardized units. Significance level is $p=.05$ (2 tails)

one that is not only changing rapidly, but often changing in unexpected or unpredictable ways. As operationally defined (see Appendix I), turbulence measures the degree of perceived change, unpredictability, periodic fluctuation, and buoyancy (in terms of emergence of new markets or growth in existing markets). The measure had acceptable reliability and predictive validity. (see Appendix I).

Hostility has been studied extensively by economists in one of its forms, namely competition. A hostile environment is one in which there is an adversary relationship between the organization and significant constituents of its environment, such as its rivals, the government, or its clients and suppliers. The organizational consequences of a benign or munificent or non-hostile or non-competitive environment versus a hostile or competitive environment have been studied by Williamson (1963), Crotty (1968), Khandwalla (1972), Pfeffer and Leblebici (1973), Pennings (1975), Shortell (1977), etc. As operationalised in this study, hostility measures the degree of perceived environmental riskiness, hostility, and dominance; the measure had acceptable reliability and predictive validity (see Appendix I).

A number of researchers have analysed the organizational consequences of a homogeneous versus a heterogeneous or diverse or differentiated environment (Chandler, 1963; Thompson, 1967; Lawrence and Lorsch, 1967; Khandwalla, 1972; Shortell, 1977). As operationally measured in this study, heterogeneity is the degree of perceived diversity in terms of markets, types of customer, required marketing strategies, etc. This measure had acceptable reliability and construct validity (Appendix I).

Environmental restrictiveness has not been extensively studied by organization theorists but it has been studied extensively by economists (see Scherer, 1970, chapters 20-22 for a summary). This feature of environment is of considerable importance due to the growing regulation of the economy by the government. As operationally measured, restrictiveness is the degree to which there are perceived legal, economic, or political constraints and governmental regulations. The measure has reasonable reliability and discriminant validity (Appendix I).

Technological sophistication of the environment has, again, been studied more extensively by economists than by organization researchers. They have studied the economic behaviour of high versus low research and development activity industries (for a summary of these studies see Scherer, 1970, ch.15). Writers on organizational change and development (eg. Bennis, 1966) have noted the increasing technological sophistication of the environment and its implications for human resource management. Some others have noted that where technological sophistication is associated with customised outputs, the matrix structure is a common organizational response (Galbraith, 1970). As operationalised in this study, technological sophistication is the degree of perceived research and development activity in the industry and perceived technological complexity of the environment. The measure appears to have reasonable reliability and discriminant validity (Appendix I).

The scores on turbulence, hostility, heterogeneity, restrictiveness, and technological sophistication were very modestly intercorrelated, the average intercorrelation being .11, with no correlation exceeding .33. In order to obtain clear differences between high and low conditions of these perceived environmental variables, they were standardised and trichotomised. The high condition was scores exceeding .43 (corresponding to the top third of a normally distributed variable) while the low condition meant scores below -.43 (corresponding to the bottom third of a normally distributed variable). This procedure minimised the risk of artificially labeling scores as high or low despite their closeness that frequently results from the usual procedure of using the mean or the median as the dividing point (McKelvey, 1975, p.521). It also increased the probability that what was categorised as low was in fact lower than what was categorised as high, a point of considerable concern given the subjective, ordinal nature of the data.

As has been noted earlier, sophistication of the organization's intelligence system (intelligence sophistication), delegation of decision making authority by the chief executive (decentralisation), and sophistication of the management control system (control sophistication) are formal mechanisms utilised by organizations to reduce task uncertainty, to differentiate the organizational activities through greater specialization in decision making, and to keep the

diverse activities of the organization attuned to management objectives (integration). These structural mechanisms are intimately linked with the role of management, especially of top management, of assessing the opportunities, threats, constraints, and contingencies in the environment and of devising appropriate goals, strategies and structures based on this assessment. If the style of management has a mediating influence on structural adaptation to environment, it is strongly likely to be evidenced with respect to these three structural variables.

The three structural variables have been operationalised as shown in Appendix I. All three have considerable reliability and substantial construct validity. Intelligence sophistication measures the degree to which computerisation of operations, research and development, formal long term forecasting of company's markets and technology, formal market research, and systematic long term capital budgeting involving search for and evaluation of long term investments and their financing is done by the company. Decentralization measures the degree to which the company's chief executive has delegated authority to subordinates in the making of long term finance, new product, marketing strategy, senior personnel, investment selection, pricing, acquisitions, and personnel bargaining decisions. Control sophistication is the degree to which the organization employs the controls of statistical quality control, standard costing, discounted cash flow analysis of prospective investments, mathematically based inventory control, internal audit of operations, systematic evaluation of senior personnel, and establishment of profit and cost centers.

HYPOTHESES

At the core of several hypotheses stated below are some assumptions. The first assumption is that different styles have different comparative strengths and weaknesses. The strength of the entrepreneurial management may lie in making speedy, bold, intuitively right decisions, rather than in efficiency in executing decisions. The strength of the conservative management may lie in capitalizing on the experience of innovating and pioneering organizations, rather than in speed or boldness of decision making or in innovating. The

strength of the professional management may lie in clearer long range vision and a systematic, scientific approach to problems, rather than in intuitively right judgments or in speed in decision making. Structures will tend to be developed that compensate for the style's strengths in favorable situations. To put it another way, it is assumed that managements will employ structures that tend to maximise the viability of their mode of operating the organization. As an example, entrepreneurial managements may be quite averse to setting up a sophisticated intelligence system for their organizations in a relatively non-complex environment. But in a complex environment, they may wish to supplement their judgment about market conditions and prospects with some formally gathered information about the environment to keep risks of miscalculation within acceptable limits.

The second assumption is that styles having a strong commitment to technocracy, scientific decision making, and power sharing and participative decision making will, across the range of environmental situations, tend to show greater inflexibility in the use of such value congruent structural mechanisms as sophisticated intelligence gathering and control and decentralization in decision making, than styles with relatively weaker commitment to technocracy, scientific decision making, and power sharing and participative decision making. In other words, ideological considerations will tend to dampen the potential variation in structural mechanisms in response to environmental variations. Where these ideological commitments are weak the variation in structural mechanisms contingent upon environmental variations will tend to become more fully manifested than where they are strong.

The third assumption is that a change in relatively stable, benign, homogeneous, unconstraining, or technologically uncomplicated environments towards greater turbulence, hostility, heterogeneity, restrictiveness, and technological sophistication, respectively, increases information acquisition, information processing, and problem solving load on the organization's principal decision makers (top management). Given the bounded rationality of decision makers, information acquisition, processing, and problem solving activity / weaknesses in unfavourable environmental situations and actualise the style's

will need to be structured (March and Simon, 1958, ch.6). Structural proliferation, that is, proliferation of roles and stable action programs to acquire and process information and make decisions, will increase coordinative or integrative complexity, giving rise to further development of structures to deal with coordinative complexity.

Eleven hypotheses are stated below, along with their rationales and empirical support. All the data appearing in Tables 2 through 8 are in standardized units. Results significant at the 5% level (single tail) are marked by an asterisk.

The following hypotheses were formulated:

When organizations transit from an environment requiring relatively little processing of complex environmental information by the top echelons of the organization to one requiring much greater acquisition and processing of complex environmental information by the top echelons of the organization, that is, from a relatively homogeneous, stable, benign, unrestrictive, or technologically uncomplicated environment to one that is heterogeneous, turbulent, hostile, restrictive, or technologically sophisticated, there will be a substantial increase in the sophistication of the organization's intelligence system.

When organizations transit from a task environment without problem solving or information overload on top management to one with such an overload, more formal intelligence gathering and processing by staff units becomes likely for delivering information to the top decision makers (March and Simon, 1958; Khandwala, 1972; Galbraith, 1973). This tendency will tend to be manifested across all the three management styles though the extent of change in intelligence sophistication is likely to vary as between the three styles.

TABLE 2

CHANGE IN INTELLIGENCE SOPHISTICATION, CONTROL SOPHISTICATION, AND DECENTRALIZATION
CONTINGENT UPON GREATER ENVIRONMENTAL COMPLEXITY

<u>Environmental change</u>	<u>Predicted change in Intelli- gence Sophisti- cation</u>	<u>Difference in Average Intelligence Sophisti- cation</u>	<u>Predicted change in Control Sophisti- cation</u>	<u>Difference in Average Control Sophisti- cation</u>	<u>Difference in Average Decentra- lization</u>
From low to high heterogeneity	+	.63*	+	.63*	.51*
From low to high technological sophistication	+	.78*	+	.67*	.15
From low to high restrictiveness	+	.78*	+	.47*	.38*
From low to high turbulence	+	.30	+	.25	.43*
From low to high hostility	+	.23	+	.36	.33
From low to high overall complexity	+	1.08*	+	1.15*	.83*

* Significant at the 5% level (one tail)

Table 2 (Col.2) shows differences in the means of intelligence sophistication for each of the transitions from low to high environmental heterogeneity, technological complexity, restrictiveness, turbulence, and hostility. It also shows the mean change in intelligence sophistication for transition to what may be called a complex environment (high on at least one of heterogeneity, technological complexity, restrictiveness, turbulence, and hostility, and not low on any of these) from what may be called a simple environment (low on at least one of heterogeneity, technological complexity, etc. and not high on any of them). Those companies that scored in the top third of the distribution of an environmental variable were considered high on that variable and those that scored in the bottom third were considered low on that variable.

The data indicate that H_1 is supported at the desired level of significance for all variations in environments except greater turbulence and hostility. In the case of these two, the changes are in the expected direction but do not reach the desired level of significance.

When organizations transit from an environment requiring little management effort to coordinate and integrate the organization's activities (such as a relatively homogeneous, stable, benign, unrestrictive, or technologically unsophisticated environment) to one that requires much special management effort to coordinate and integrate the organization's activities (such as a relatively heterogeneous, turbulent, hostile, restrictive, or technologically unsophisticated environment), there will tend to be a substantial increase in the sophistication of the management control system.

Greater environmental complexity is likely to lead to greater organizational differentiation due to greater task specialization, the development of organizational sub-cultures, the use of variegated technologies, operating processes and so on. Special control and integrative efforts are likely to become necessary to cope with this differentiation (Lawrence and Lorsch, 1967). A sophisticated control system is an integrative device that provides necessary control and coordination with relatively little supervisory effort by top management (Drucker, 1964; Khandwalla, 1973). Greater control sophistication will tend to be manifested across all the three styles although there may be substantial inter-style variation in the extent of increase in control sophistication.

Table 2 (Col.4) presents the data pertinent to H2. The hypothesis is significantly supported in 4 out of 6 cases. The hypothesis is not supported in the case of greater turbulence and hostility, but the difference is in the predicted direction. The data in Table 2 suggest that the informational and integrative complexity imposed by greater turbulence or hostility may differ somewhat from these complexities imposed by greater diversity, constraints, or technological complexity. One crucial difference may be the quickness with which organizations need to respond to the environment. This is likely to be greater in a turbulent or hostile environment than in a restrictive, diverse or technologically complex environment. Sophisticated information and control systems are not necessarily speedy - formal long term forecasting, market research, internal audit, cost variance analysis, and so on yield comprehensive and reliable information, but the information they yield tends to be somewhat dated by the time it reaches key decision makers. This may be one reason why sophistication of intelligence and control system did not significantly increase in response to greater environmental turbulence or hostility. The response, however, to greater overall complexity of the task environment is unmistakably in the direction of greater intelligence and control sophistication.

When organizations transit from an environment requiring relatively little processing of complex information by the top echelons of the organization to one requiring much greater processing of complex information by the top echelons of the organization, there will tend to be a substantial decentralization of authority by the top echelons of the organization but this will partially or fully be offset by a tendency towards centralization if simultaneously the organization transits from an environment requiring little management effort to coordinate and integrate the organization's activities to one that requires much special management effort to coordinate the organization's activities.

A response to problem solving and information overload due to environmental change is likely to be greater specialization and division of labor in problem solving and decision making, that is to say, greater decentralization. But if such environmental change, by concomitantly increasing organizational differentiation, requires greater integrative efforts, then there will be a tendency in the opposite direction, towards centralization. The extent of decentralization following environmental change will therefore be the net

result of the force supporting it and the force opposing it. This dampening of decentralization will tend to be manifested across all the three styles although there may be substantial inter-style variations in the extent of this dampening.

Table 2 provides the pertinent data. The data indicate that while decentralization does tend to increase as hypothesized, and significantly so in the case of increase in environmental heterogeneity, restrictiveness, turbulence, and environmental (overall) complexity, the increases are generally smaller than those for intelligence and control sophistication. The data indicate that the contrary tendencies relating to decentralization hypothesized in H3 are likely to be most marked in the case of change in complexity stemming from variation in technological complexity and hostility. Contrary tendencies are particularly likely in greater environment hostility because of the shorter response time it is likely to impose on organizations. In technologically complex environments, the magnitude of risks involved in investment decisions may inhibit decentralization. However, where informational complexity goes up simultaneously in a number of dimensions (overall complexity), the increase in decentralization is unmistakable, and is likely to be bolstered by a concomitantly increased systemic intelligence and control sophistication (Child, 1970).

For each environmental situation, professionally managed organizations will tend to have

- a) a more sophisticated intelligence system
- b) greater decentralization of authority at the top echelons of the organization
- c) a more sophisticated management control system than entrepreneurially or conservatively managed organizations

The above hypothesis follows from the assumption of a strong commitment of professional managements to technocracy and scientific decision making (see Table 1). In environments requiring little processing of complex information by top echelons and little special coordinative effort, this commitment implies much greater use of sophisticated intelligence and control mechanisms in professionally managed organizations compared to organizations whose managements are not especially committed to technocracy, such as

organizations with entrepreneurial or conservative managements. While the disparity in the deployment of sophisticated intelligence and control mechanisms as between professional managements and other managements may decline in environments requiring much processing of complex information by top echelons and much special integrative effort, it is unlikely to disappear. The strong commitment of professional managements to power sharing and participative decision making is likely to account for the greater decentralization of decision making authority in professionally managed organizations vis-a-vis conservatively and entrepreneurially managed organizations across the entire range of environments.

TABLE 3

DIFFERENCES IN MEANS OF STRUCTURAL VARIABLES ACROSS DIFFERENT ENVIRONMENTAL CONDITIONS FOR PROFESSIONAL VIS-A-VIS ENTREPRENEURIAL AND CONSERVATIVE MANagements

<u>Environmental Condition</u>	<u>Difference in Mean Intelligence Sophistication</u>		<u>Difference in Mean Control Sophistication</u>		<u>Difference in Mean Decentralization</u>	
	P-E	P-C	P-E	P-C	P-E	P-C
Low heterogeneity	.98*	.74*	.74	.24	.22	.45
High heterogeneity	.58	1.43*	.72*	.70*	-.02	.47
Low tech. sophistication	1.19*	1.05*	.90*	.59*	.59	.34
High tech. sophistication	.58	1.32*	.20	.67	.28	.86*
Low restrictiveness	1.20*	1.31*	1.71*	1.13*	1.30*	.83*
High restrictiveness	1.46*	.85*	.74*	.48	.35	.59
Low turbulence	1.20*	.99*	1.01*	.35	.67	.56
High turbulence	.59	1.21*	.75	1.04*	.39	.10
Low hostility	1.45*	.96*	1.61*	.89*	.54	.67*
High hostility	1.14*	1.39*	.90*	.67*	.42	.24
Low overall complexity	1.22*	.76*	.88	.91	1.55*	.88
High overall complexity	.83*	.80*	.46	.38	.61	.16

* Significant at the 5% level (one tail)

P = professional management; C = conservative management; E = entrepreneurial management.

Table 3 presents the differences in the means of professionally and entrepreneurially managed and professionally and conservatively managed organizations, respectively, for each of twelve environmental conditions. For every environmental situation, professionally managed organizations outscore the entrepreneurially and conservatively managed organizations on intelligence as well as control sophistication. With one exception (high environmental heterogeneity), professionally managed organizations outscore both other types of management on decentralization too. The differences in the means of professionally managed companies and entrepreneurially or conservatively managed companies reach significance levels in a large number of cases, particularly with regards to intelligence and control sophistication. The hypothesis is well-supported. It is noteworthy that when the professional managements are compared with the entrepreneurial managements there is a strong tendency for the differences in structural means to decline with change from "low" environmental condition to "high" condition. When, however, the comparison is between professionally and conservatively managed organizations, differences in intelligence sophistication tend to widen and differences in decentralization tend to shrink with change from "low" to "high" environmental condition. For the change from low to high overall complexity, the differences (P-E as well as P-C) for the three structural variables decline substantially with the exception of P-C for intelligence sophistication where there is a small increase. The data suggest that faced with increase in variegated environmental complexity, entrepreneurial managements adopt complex structural uncertainty reduction, differentiation, and integration mechanisms at a faster rate than professional managements, and conservative managements turn to differentiation and integration mechanisms at a faster rate than professional managements.

Across all environmental situations which require the processing of especially complex environmental information by the top echelons of the organization (as in highly heterogeneous, turbulent, hostile, restrictive or technologically sophisticated environments), entrepreneurially managed organizations will tend to have a more sophisticated intelligence system than conservatively managed organizations.

Conservative managements, wedded to a policy of cautiously exploiting the opportunities unearthed by pioneering organizations, are less likely to need sophisticated intelligence gathering mechanisms than entrepreneurial managements.

committed to risky decisions and rapid organizational growth. This is especially likely to be true in relatively complex environments with considerable problem solving and informational overload on the top management. In such environments entrepreneurial managements are likely to want more keenly to test their intuitions and market assessments against the findings of analysts and professionals

TABLE 4

DIFFERENCES IN INTELLIGENCE SOPHISTICATION OF ENTREPRENEURIAL AND CONSERVATIVE ORGANIZATIONS IN INFORMATIONALLY COMPLEX ENVIRONMENTS

	<u>Difference in Intelligence Sophistication Means</u>
	E-C
High heterogeneity	.85*
High tech. complexity	.74*
High restrictiveness	-.61
High turbulence	.62
High hostility	.25
High complexity	.06

* Significant at the 5% level (1 tail)

E = Entrepreneurially managed organizations

C = Conservatively managed organizations

Table 4 presents the relevant data. The hypothesis has mixed support: five of the six signs of differences in means are in the predicted direction, one in the contrary direction. However, only two of the differences are statistically significant. It is noteworthy that the difference for overall complex environment (high on at least one of heterogeneity, technological complexity, etc. and not low on any one of these) is quite small suggesting that even conservative managements respond to informational and problem solving overload in a comparable way to entrepreneurial managements when information and problem solving complexity takes multiple forms.

H6 Across all environmental situations which do not require special management efforts to coordinate and integrate the organization's activities (as in relatively homogeneous, stable, benign, unrestrictive, or technologically unsophisticated environments), conservatively managed organizations will tend to have a more sophisticated management control system than entrepreneurially managed organizations.

Rationale: In environments not requiring special integrative and coordinative efforts by management, bot conservatively and entrepreneurially managed organizations will tend to employ relatively unsophisticated, untechnocratic control systems. However, of the two, entrepreneurial managements have lesser commitment to technocracy (Table 1). Also, they tend to take up product lines that confer temporary monopoly power (due to the novelty of the product or service being offered). Thus, in relatively simple environments requiring little organizational differentiation, they are likely to be less concerned with efficiency and control over operations through control sophistication, than conservative managements. The latter are likely to be more concerned with efficiency and well-coordinated operations in such environments because their comparative strength is likely to reside in efficiently exploiting opportunities opened up by other organizations. Hence for ideological as well as pragmatic reasons, conservative managements will tend to employ comparatively more sophisticated control systems than entrepreneurial managements in relatively noncomplex environments.

TABLE 5
DIFFERENCES IN CONTROL SOPHISTICATION FOR CONSERVATIVE AND ENTREPRENEURIAL
MANAGEMENTS IN SIMPLE ENVIRONMENTS

	<u>Difference in Control Sophistication Means:</u>
	C-E
Homogeneous environment	.50
Technologically unsophisticated environment	.31
Unrestrictive environment	.58
Stable environment	.64*
Benign environment	.72
Overall simple environment	-.03

* Significant at the 5% level (1 tail)
C = Conservatively managed organizations

: Table 5 presents the relevant data. Except for one small negative difference, all the other differences are sizeable and in the predicted direction. Only one, however, is statistically significant. It is noteworthy that the difference between the means of control sophistication in an overall simple environment is quite small. Since only 2 entrepreneurial managements and 6 conservative managements operated in a simple (overall) environment, no strong inferences can be drawn.

When organizations transit from an environment requiring relatively little processing of complex information by the top echelons of the organization to one requiring much greater processing of complex information by the top echelons of the organization (that is, from a relatively homogeneous to heterogeneous, stable to turbulent, benign to hostile, unrestrictive to restrictive, or technologically unsophisticated to sophisticated, environment), the increase in the sophistication of the intelligence system will be more marked in the case of entrepreneurial managements than in the case of professionally or conservatively managed organizations.

Since professionally managed organizations, out of ideological considerations, are likely to have a fairly sophisticated intelligence system even in task environments without a significant problem solving or informational overload on decision makers, the increase in intelligence sophistication contingent upon transition to an environment with much problem solving or informational overload is likely to be modest. Information or problem solving overload on conservatively managed organizations, even when operating in a more informationally complex environment, is likely to be mitigated by their policy of cautious exploitation of opportunities and learning from the experience of other organizations. Therefore, the increase in their intelligence sophistication also is likely to be modest. In the case of entrepreneurially managed organizations, their intelligence sophistication in informationally non-complex environments is likely to be quite low because of their lack of commitment to technocracy (see Table 1). As they transit to informationally complex environments, their need for reliable market information to plan dramatic, risky moves is likely to escalate, and with it the sophistication of their intelligence mechanisms. Hence, entrepreneurial managements, despite their lack of commitment to technocracy, are likely to increase sharply their intelligence sophistication

when they move into informationally complex environments to protect their mode of operating.

TABLE 6

CHANGE IN INTELLIGENCE AND CONTROL SOPHISTICATION AND DECENTRALIZATION FOR THREE TYPES OF MANagements CONTINGENT UPON GREATER ENVIRONMENTAL COMPLEXITY

Type of Environmental Change	<u>Change in Mean Intelligence Sophistication</u>			<u>Change in Mean Control Sophistication</u>			<u>Change in Mean Decentralization</u>		
	E	C	P	E	C	P	E	C	P
	*		*			*	*		
From low to high heterogeneity	1.19*	.10	.79*	.76	.28	.74*	.71*	.45	.47
From low to high technological sophistication	1.14*	.25	.53*	1.11*	.33	.41	.50	-.33	.19
From low to high restrictiveness	-.04	.68*	.22	.63	.31	-.34	.78	.07	.17
From low to high turbulence	.77	-.06	.16	.70	-.25	.44	.46	.64*	.18
From low to high hostility	.62	-.12	.31	.80*	.31	.09	.24	.55	.12
From low to high overall complexity	1.38*	.86*	.99*	1.25*	1.36*	.83	1.38*	1.16	.44

* Significant at the 5% level (one tail)

E = entrepreneurial managements; C = conservative managements

P = professional managements

Table 6 (first 3 columns) presents data on the average change in intelligence sophistication for three styles of management contingent upon change from an informationally noncomplex environment (homogeneous, technologically unsophisticated, unrestrictive, etc.) to an informationally complex environment (heterogeneous, technologically sophisticated, restrictive, etc.). With the exception of greater restrictiveness, entrepreneurial managements show the largest changes for each of the environmental changes, thus providing a substantial support to the hypothesis. While greater overall complexity seems to cause sizeable increases in intelligence sophistication for all three styles, there appear to be interesting inter-style differences as to the dimension of environmental change that may trigger substantially higher intelligence sophistication. For entrepreneurial as well as

professional managements, greater heterogeneity and technological sophistication seem particularly to promote greater intelligence sophistication; for conservative managements the stimulant seems to be provided by greater restrictiveness.

When organizations transit from an environment requiring relatively little management effort to coordinate and integrate the organization's activities (such as a relatively homogeneous, stable, benign, unrestrictive, or technologically uncomplicated environment) to one that requires much special management effort to coordinate and integrate the organization's activities (such as a relatively heterogeneous, turbulent, hostile, restrictive or technologically sophisticated environment), the increase in the sophistication of the management control system will tend to be larger for entrepreneurially managed organizations than for professionally or conservatively managed organizations.

: The rationale for this hypothesis is similar to that for the previous hypothesis. Regardless of the environment a conservative management operates in, its organizational adaptation to environmental contingencies is likely to be relatively slow and cautious, and so transitions from relatively simple to relatively complex environments are likely to require relatively few special coordinative efforts by management and therefore at best modest increases in control sophistication are likely. A transition to an environment requiring special coordinative effort is likely to elicit only a modest increase in the control sophistication of professionally managed organizations because, due to commitment to technocracy and modern management techniques, the base itself is likely to be quite sophisticated. In the case of entrepreneurial managements, control sophistication in a relatively simple environment is likely to be quite low because of a tendency to centralized decision making and very low commitment to technocracy. But as task complexity increases, they are likely to need substantially more control sophistication to be able to continue to pursue rapid growth and devote attention to strategic issues rather than to mundane operating matters. In other words, they are likely to feel keenly the need for structures that permit what is known as management by exception (Drucker, 1964). Hence the increase in control sophistication is likely to be largest for entrepreneurially managed organizations consequent upon an increase in task complexity.

: Table 6 (columns 4, 5, and 6) presents the pertinent data. In all environmental changes except greater overall complexity, the increase in control sophistication, as predicted, is largest for entrepreneurial managements. In the case of greater overall complexity, however, the increase is largest for conservative managements. While greater restrictiveness seems not to lead to any increase in the intelligence sophistication of entrepreneurially managed organizations it does seem to lead to greater control sophistication for these managements. For the latter, greater technological sophistication is the primary stimulant of greater control sophistication followed by greater environmental hostility. The interesting point about conservative managements seems to be that while no one type of environmental change significantly increases control sophistication, a number of such changes taking place simultaneously (greater overall complexity) may strongly promote greater control sophistication. As with intelligence sophistication, greater heterogeneity seems to be the primary promoter of control sophistication for professional managements. The data suggest that while greater overall environmental complexity may lead to increase in control sophistication for all three styles, there may be quite significant differences in organizational responses to individual environmental changes and these differences in responses may be due to differences in the character of environmental change as well as differences in management orientations.

When organizations transit from an environment that requires relatively little processing of complex environmental information by the top echelons of the organization as well as relatively little special coordination and integration effort by the top echelons to one that requires both considerable processing of complex environmental information by the top echelons as well as much more coordination and integration effort by the top echelons, the least change in decentralization of decision making authority will tend to be found in those organizations with a significant commitment to power sharing (such as professionally managed organizations) and to cautious adaptation to environment (such as conservatively managed organizations), and most change in those organizations whose managements have a significant commitment to risky decision making but not to power sharing (such as entrepreneurially managed organizations).

A transition to an environment with greater informational and task complexity is likely to initiate a tendency towards both decentralization and centralization of top echelon decision making (Hypothesis 3), so that in any case the tendency will be for no more than a modest change in the level of decentralization. However, the increase in it consequent upon environmental change towards greater complexity is likely to be even smaller in those organizations where the base was already high due to ideological considerations (as in professionally managed organizations) and in those organizations where the impact of the change in environment is dampened by a strategy of slow and cautious organizational adaptation (as in conservatively managed organizations). In the case of entrepreneurially managed organizations, however, the level of decentralization is likely to be low in non-complex environments because of lack of commitment to power sharing. For such organizations information and problem solving overload in a relatively complex environment is likely to be exacerbated because of the penchant for big, bold, risky decisions and the goal of rapid organizational growth, hence impelling a strong move towards decentralization of relatively mundane operating decisions. At the same time, the contrary tendency towards greater top management supervision of internal operations may be relatively weak for two reasons: the tendency of entrepreneurial managements to secure monopolistic market segments by offering relatively novel products or services, and the relatively rapid development of a sophisticated control system. Hence, as organizations transit to more complex environments, those with entrepreneurial managements are likely to show larger increases in decentralization as compared to professionally or conservatively managed organizations.

Table 6 (columns 7,8 and 9) presents the relevant data. Entrepreneurial managements exhibit the largest increases in decentralization in 4 out of six cases. Professional managements exhibit the smallest changes in decentralization in four environment change conditions and in the other two environmental change conditions, their decentralization change is exceeded by such change in entrepreneurially managed organizations. While decentralization change is higher for entrepreneurial companies in four out of 6 cases vis-a-vis conservative companies, it is lower in the case of greater environmental turbulence and hostility.

The hypothesis, therefore, has mixed support. The data indicate that greater restrictiveness and heterogeneity may be the primary promoters of greater

decentralization in decision making for entrepreneurial managements, greater turbulence and hostility may play this role for conservative managements, and greater heterogeneity for professional managements, while greater overall complexity may play this role for all three types of management, but particularly entrepreneurial and conservative managements.

If one can think of a simultaneous structural change towards decentralization, intelligence sophistication, and control sophistication as indicative of change towards greater overall structural complexity, then greater heterogeneity or technological sophistication may cause greater overall structural complexity in entrepreneurially and professionally managed organizations but not in conservatively managed organizations. In the case of all three styles, simultaneous changes in a number of environmental dimensions resulting in an environment with variegated complexity (greater overall complexity) seems to lead to greater overall structural complexity.

The imposition of a short response time on the organization through greater environmental turbulence or hostility will have the effect of increasing control sophistication if the task environment is otherwise non-complex and of increasing intelligence sophistication as well as control sophistication if the task environment is otherwise complex.

3. The necessity of responding rapidly to environmental contingencies due to a more hostile or turbulent environment is likely to translate into greater management need for control of the organization's internal operations. This is likely to result in greater control sophistication. Whether shorter response time also results in greater intelligence sophistication is likely to depend upon whether informational complexity of the environment is high or low. Some increase in intelligence sophistication is likely regardless of informational complexity. However, when informational complexity is low, in terms of the diversity of the environment, its technological complexity, and its restrictiveness, increase in turbulence or hostility may be handled with existing information gathering and processing mechanisms of the organization, for the crucial elements of the environment are fairly similar to one another, technically easy to understand, and their being ignored do not carry serious legal or other

consequences. When informational complexity is high, increase in turbulence or hostility may create such an informational and problem solving overload on top management that greater recourse to formal and sophisticated mechanisms of information gathering and processing may become necessary, that is to say, intelligence sophistication may need to be stepped up substantially.

TABLE 7

CHANGE IN INTELLIGENCE AND CONTROL SOPHISTICATION CONTINGENT UPON SHORTER RESPONSE TIME IN SIMPLE AND COMPLEX ENVIRONMENTS

<u>Type of Environmental Change</u>	<u>Change in Mean Intelligence Sophistication</u>	<u>Change in Mean Control Sophistication</u>
From a non-complex environment with long response time to non-complex environment with short response time	.14	.91*
From a complex environment with long response time to a complex environment with short response time	.60*	.42

* Significant at the 5% level (one tail)

: Table 7 presents ^{the} pertinent data. It is assumed that a highly turbulent or hostile environment imposes a short response time on the organization. A non-complex environment with a long response time is an environment low on at least one of heterogeneity, restrictiveness, and technological sophistication and not high on any of these, as well as low on at least one of turbulence and hostility and not high on either ("high" is top third of environmental distribution, "low" is bottom third of distribution). A non-complex environment with a short response time is non-complex in the above sense but high on at least one of turbulence or hostility and not low on either. A complex environment with a long response time is an environment high on at least one of heterogeneity, restrictiveness, and technological sophistication and not low on any of these, and is low on at least one of turbulence or hostility and not high on either. A complex environment with a short response time is complex in the sense of the preceding environment but high on at least one of turbulence or hostility and not low on either.

The data show that control sophistication tends to shoot up when a short response time (greater turbulence and/or hostility) is imposed on an otherwise simple environment, but there is no appreciable effect on intelligence sophistication. Thus, half of the hypothesis is supported. The data indicate that when short response time is imposed on an otherwise complex environment both control sophistication and intelligence sophistication go up, but the increase in intelligence sophistication alone is significant. Thus, this half of the hypothesis also has support, but not as strong a support as the first half of the hypothesis.

When environmental change imposes shorter response time through greater environmental turbulence or hostility, the increase in intelligence and control sophistication will be larger for entrepreneurially managed than for conservatively or professionally managed organizations regardless of the complexity of the environment.

Hypothesis 10 postulates that when the environment imposes a shorter response time, control sophistication tends to increase regardless of environmental complexity, and intelligence sophistication tends to increase provided the environment is complex in terms of diversity, restrictiveness, and/or technological complexity. As between the three styles, the effects of shorter response time will tend to be dampened if the management is cautious (conservative management) or committed to technocracy and scientific decision making (professional management), and exacerbated if the management is committed to risky decisions and rapid growth (entrepreneurial management). Thus, regardless of environmental complexity, the predictions of hypothesis 10 will tend to hold true especially strongly for entrepreneurial managements and less strongly for conservative and professional managements.

Table 8 presents the relevant data. The different environments have the same meanings as in Table 7. The data support the hypothesis with respect to complex environments but controvert the hypothesis with regards to simple environments, although overall, when complexity is ignored, they support the hypothesis. A shorter response time seems to have a notable effect in increasing control sophistication of professional and conservative managements operating in

TABLE 8

CHANGE IN INTELLIGENCE AND CONTROL SOPHISTICATION CONTINGENT UPON SHORTER RESPONSE TIME IN SIMPLE AND COMPLEX ENVIRONMENTS FOR THREE MANAGEMENT STYLES

<u>Type of Environmental Change</u>	<u>Change in Mean Intelligence Sophistication</u>			<u>Change in Mean Control Sophistication</u>		
	E	C	P	E	C	P
From a simple environment with a long response time to a simple environment with a short response time	.06	.12	.41	.65	.97*	1.17*
From a complex environment with a long response time to a complex environment with a short response time	.90	.46	.37	1.05*	.24	.34
From a long response time environment to a short response time environment	.84	.16	.45	1.01*	.40	.63*

* Significant at the 5% level (one tail)

E = entrepreneurially managed organizations

C = conservatively managed organizations

P = professionally managed organizations

relatively simple, stable, benign environments. A shorter response time also seems to galvanise entrepreneurial managements operating in complex but stable and benign environments into greater control as well as intelligence sophistication. When complexity is ignored, a shorter response time seems to trigger greater control, and to a lesser extent intelligence sophistication, in both entrepreneurial and professional managements.

SUMMARY AND DISCUSSION

Based on prior work on management orientations, five aspects, namely risk taking, technocracy, participation, organicity, and coercion were identified as the major building blocks of management styles. These were operationally defined as shown in Appendix I. Considering that they were being measured for the first time, they turned out to have acceptable reliability and validity. Though the potential number of management styles was very large, three major ones were extracted through the hierarchical cluster analysis of the data on these orientations. The data were secured from the senior executives of 103 Canadian companies through a questionnaire. The three styles were labelled entrepreneurial, conservative, and professional.

Eleven hypotheses were developed that stated relationships between environmental complexity and aspects of organizational structure, and the mediating effects of the three styles on these relationships. The facets of external environment studied were heterogeneity, restrictiveness, technological sophistication, turbulence, and hostility. Considering the initial nature of their operationalisation, all five had acceptable reliability and validity. Overall complexity, a sixth measure was derived from these five. Sophistication of the organization's intelligence system, decentralization of decision making authority by the chief executive, and sophistication of the management control system were the aspects of organizational structure that were studied. All three had adequate reliability and construct validity. These three were assumed to be major representatives of uncertainty reduction, differentiation, and integration structural mechanisms.

The eleven hypotheses rested on three broad assumptions. One was that ideological commitments to technocracy and power sharing dampen structural variations attendant upon environmental change. A second assumption was that managements try to retain their way of managing the organization by making

structural changes that compensate for the style's deficiencies in a given environmental situation. The third assumption was that certain kinds of environmental change - for example, from stability to turbulence, or munificence to hostility, or lack of constraints to restrictiveness, etc. - imply greater information acquisition, processing, and problem solving load on the top management, and that this increase in load has important structural implications.

The first three hypotheses related intelligence sophistication, control sophistication, and decentralization with environmental complexity. The fourth stated the primacy of professionally managed organizations with respect to the three measures of structure under all environmental situations. The fifth hypothesized greater intelligence sophistication of entrepreneurially managed organizations vis-a-vis conservatively managed organizations in conditions of environmental complexity while the sixth hypothesized greater control sophistication of conservative organizations vis-a-vis entrepreneurial organizations in noncomplex environments. The seventh, eighth, and ninth hypothesized that attendant upon greater environmental complexity there would be a faster rate of change in intelligence and control sophistication and in decentralization in entrepreneurial organizations than in conservative and professionally managed organizations. Hypothesis 10 stated that the imposition of a short response time (through greater environmental turbulence or hostility) would have a different impact on intelligence sophistication as compared to control sophistication depending upon the complexity of the environment. Hypothesis 11 stated that regardless of the complexity of the environment, entrepreneurial organizations would increase intelligence and control sophistication the most in the face of shorter response time. The eleven hypotheses taken as a group were fairly well-supported. Tables 2 through 8 exhibit 178 findings. Only 10 were negative findings, none of which reached significance levels. Seventy-seven of the non-negative findings reached significance levels.

There are several implications of the findings:

1. The support for the system of hypotheses implies empirical support for the assumptions upon which the hypotheses rest. Thus, the support in Tables 2 and 7 for hypotheses 1,2,3 and 10 tends to support the assumption that certain kinds of environmental change tend to increase information processing and problem solving overload on the organization's principal decision makers, and

tends to re-affirm the position of several organization theorists that this overload has major implications for organizational structure (March and Simon, 1958; Cyert and March, 1963; Thompson, 1967; Galbraith, 1973). The data in Table 6 support the assumption that faced with greater environmental complexity, styles showing the greatest commitment to power sharing and technocracy will tend to exhibit the least variation in certain structural mechanisms that are ideologically congruent with these commitments while styles that show the least commitment will tend to exhibit the greatest variation in these structural mechanisms. The data in Tables 4, 6, and 8 tend to substantiate the assumption that structural change is not merely an adaptation to task change but also a mechanism for protecting the management's ideology and style of operating the organization, that is, it is initiated to compensate for the style's deficiencies in an altered environmental state. The foregoing indirect support for the assumptions may increase confidence that they are valid building blocks for larger forays in theory construction. For example, the assumption about ideological commitments dampening variation in value congruent structural mechanisms may lead one to expect variation in routinisation contingent upon task environmental variation in organizations with mechanistic managements to be smaller than in those with organic managements; smaller variation in number of committees in participatively-led organizations than in nonparticipative organizations; smaller variation in personalized character of recruitment, promotion etc. of personnel in coercively-led organizations than in non-coercively-led organizations; etc.

2. The findings support contingency organization theory but also expose its present limitations. They vindicate the arguments of those writers that have decried the naive, mechanistic flavor of much contemporary organization theory concerning the relationship between task environment and organizational structure. The findings indicate that the structural outcome of task environmental change varies significantly depending upon the ideological orientation of the human agency (management) that mediates structural change, and therefore, the working assumption in organization theory construction should not be unimodal structural responses to specific environmental conditions, but rather, multimodal structural responses. Given the likelihood of multimodal responses, the search should be on for processes and constraints that determine the variation in structural responses to each task environmental contingency. One of these is the ideology and style

of top management. There may, however, be many more, such as strategy, internal power structure, the historical experience of the organization and its past commitments, the attitudes and values of the rank-and-file, and so forth. Some detailed theoretical and empirical work that integrates these factors with environmental and ideological variables is an urgent need.

3. Contingency organization theorists have tended to build their theories on the foundation of functional necessity. In this venture they have tended to ignore organizational processes, particularly decision making and decision implementation processes. The decision making perspective would regard structural change as a matter of choice, and therefore, subject to the vagaries of decision making processes, rather than as the inevitable outcome of functional necessity. The intervention of management style, a decision making process variable, in structural change, is merely the beginning of a more systemic view of structural change. The need is for dynamic models of structural change that spell out the step-by-step modifications in organizational variates culminating in stable structural changes. It is possible that while these models regard task environmental changes as important triggers of systemic change, a change taking place at any given moment is likely to be shaped by the entirety of current organizational reality, including ideological preferences, strategy commitments, power distribution, personalities, precedents, and current organizational structure, indeed, whatever that at the moment of decision making is regarded by the decision makers as the organizational givens. It is possible that what contemporary organization theorists currently regard as contextual variables - size, technology, ownership, properties of the external environment - that allegedly sufficiently explain variations in structure - may be in for a rude reassessment.

The paper has pointed to some far-reaching changes in organizational theorising and search. The limitations of the empirical effort reported in the paper should, however, be borne in mind while assessing the findings as well as their implications. Apart from the usual disabilities associated with cross-sectional, survey-type, self-report data, one bothersome problem is the possibility of respondent biases increasing the congruence between certain classes of variables. Since the measures of style, environment, and structure were all derived from the same set of respondents, there is a possibility that there would be artifactual covariation, say between management professionalism and structural sophistication and management anti-professionalism and structural

nonsophistication. . At first glance Table 3 is supportive of this inference. However, a good deal of the data reported in this paper tends to weaken this inference. For example, the congruence hypothesis does not explain the distinct tendency for the structural sophistication superiority of the professional style over the other two styles to decline in relatively complex environments; nor the entrepreneurially managed organizations displaying much greater structural sophistication in complex environments as compared to simpler environments; nor, comparable structural adaptations to changes in five weakly intercorrelated environmental variables.

Another controversial issue concerns the use of perceived, subjective measures of environment rather than objective measures of environment (Tosi, Aldag and Storey, 1973; Downey, Hellriegel, and Slocum Jr., 1975). For some of the environmental variables, "objective" measures could have been found, such as R and D industry expenditures as a measure of technological sophistication, industry size fluctuations (after netting out trend factors) as a measure of turbulence, and industrial structure (number of competitors, market concentration, etc.) as a measure of hostility. These measures would have had dubious validity because published industry data come in highly aggregated forms, that is, represent the aggregation of data about a number of more finely defined industries, and may seriously distort the level of the R and D activity or market concentration or size variability of the company's particular business or industry. There is also the question whether it is the "objective" environment or the perceived environment that triggers organizational action (Miles, Snow, and Pfeffer, 1974; Leifer and Huber, 1977). The decision was to use measures of perceived environment. As Appendix I shows, considering the first time operationalisations of these variables they have acceptable reliability and validity. Using the top third and bottom third of the distribution scores may have substantially raised their discriminant validity, although the cost was sacrifice of some of the data.

The data presented in this paper do not have any strong normative implications for organizational design. They do not indicate whether the structural changes associated with environmental changes or as mediated by management styles are "optimal" or even desirable, since these changes were not related to measures of organizational performance. This lacuna may be partially bridged in another paper under preparation.

APPENDIX I
OPERATIONAL DEFINITIONS OF VARIABLES, THEIR RELIABILITY AND VALIDITY

<u>VARIABLE</u>	<u>OPERATIONAL DEFINITION</u>	<u>RELIA- BILITY</u>	<u>VALIDITY</u>
<u>Environmental variables</u>			
1. Environmental turbulence	Four scales were aggregated. High values represented an external environment that was perceived as highly dynamic and changing rapidly in technological and cultural dimensions, very unpredictable, expansionary with new markets emerging, and periodically fluctuating. Low values represented a stable, predictable, static, and unfluctuating environment	.58	Significantly correlated with perceived competitive pressure as well as with perceived rate of innovation in industry. The <u>range</u> of profitability of the company over a 5-year period averaged 44% higher for the companies in the top third of the distribution of turbulence as compared to the average for the companies in the bottom third of the distribution of turbulence.
2. Environmental hostility	Three scales were aggregated. High values represented an external environment that was perceived as highly risky, very hostile, and very dominant. Low values represented an environment perceived as safe, rich in opportunities, and easily manipulatable by the organization.	.56	Significantly correlated negatively with average long term profitability of the company.
3. Environmental heterogeneity	Three scales were aggregated. High values represented an environment perceived to be very diverse in terms of nature of markets, types of customers, customer requirements, required marketing strategies to cater to markets. Low values represented an environment perceived to be homogeneous in terms of nature of markets, customer requirements, required marketing strategies to cater to markets.	.59	Strongly correlated with reported diversification of company's products. Significantly correlated with the size of the company.

* The measure of reliability was based on average intercorrelation between the constituents of a variable - see Nunnally, 1967, p.193. In his opinion, reliabilities of .50 are adequate in early stages of research and for basic research it may be wasteful to seek reliabilities exceeding .80 (ibid, p.226).

<u>VARIABLE</u>	<u>OPERATIONAL DEFINITION</u>	<u>RELIA- BILITY</u>	<u>VALIDITY</u>
4. Environmental restrictiveness	Two scales were aggregated. High values represented an environment perceived to be very constraining in terms of legal, social, economic or political constraints and a business whose growth was greatly constrained by government regulations. Low values indicated an environment with few perceived constraints or government regulations.	.67	Twelve banking, trust, and utility companies rated their environment as highly restrictive; none rated their environment as low in restrictiveness. Eleven printing, publishing and merchandising companies rated their environment as low in restrictiveness; only 1 rated it high in restrictiveness.
5. Technological sophistication of environment	Two scales were aggregated. High values represented an environment perceived to be very sophisticated and complex technologically with a strong R and D orientation. Low values indicated a technologically unsophisticated environment and little R and D activity in the industry	.56	Fourteen chemical, data processing, electrical equipment, metal manufacturing, telephone, and telecommunications companies rated their environment as high in technological sophistication, only 3 as low in technological sophistication. Thirty foodstuffs, merchandising, property development, banking, trust, publishing and transportation companies perceived their environment as low in technological sophistication; only 6 rated their environment as high in technological sophistication.
<u>Style Variables</u>			
6. Risk taking	Six scales were aggregated. High values represented a top management orientation perceived to be very entrepreneurial and growth oriented, strongly emphasising technological product leadership, with a strong preference for high risk, high return investments, external financing of investments, a very aggressive competitive stance towards rivals. Low values indicated cautious, pragmatic, incrementalist decision making, a strong preference for marketing true-and-tried products, low risk modest return investments, reliance on retained earnings to finance investments, and a cooperative stance towards rival companies.	.53	Significantly correlated with long term growth rate of the company and with the riskiness of the company (its range of profitability over a 5 year period)

Duncan, R.B.
1973

"Multiple decision-making structures in adapting to environmental uncertainty: the impact on organizational effectiveness".
Human Relations, 24: 274-291.

<u>VARIABLE</u>	<u>OPERATIONAL DEFINITION</u>	<u>RELIA- BILITY</u>	<u>VALIDITY</u>
7. Technocracy	Eight scales were aggregated. High values indicated management commitment to systematic long range planning, formal research before making decisions, great importance of long term market and technology forecasts, operations research applications, market research, long term capital budgeting and strategy planning, influence of technocrats in decision making, and formal management training. Low values indicated low priority to formal planning, forecasting, market research, budgeting, operations research, management training, etc. and reliance during decision making on experienced rather than specialised personnel.	.80	Consistent with the findings of Thune and House (1970), Herold, Thune and House (1972), technocracy was significantly correlated with an index of perceived performance relative to rivals.
8. Participation	Ten scales were aggregated. High scores indicated a management committed to strategic decision making by groups or committees on the basis of full discussion and consensus, very great importance accorded to participative decision making at middle and senior management levels, to management by objectives, human relations training to improve collaboration between personnel, organizational development, humane, democratic organizational change, etc. Low values indicated a management committed to individualistic rather than group decision making, little importance given to participative management, MBO, human relations training, OD, etc.	.85	Correlated significantly with index of perceived performance relative to rivals in industry. Consistent with the findings of Likert (1961), Pennings (1975).
9. Organicity	Seven scales were aggregated. Low scores indicated a management committed to structured channels of communication and restricted information flows, to a uniform management style through out the organization, to authority wielded by formally designated managers, to true and tried management principles, to tight formal control of operations, to insistence on all personnel following formally laid down	.68	Significantly correlated with reported rate of innovation in company's industry, consistent with the findings of Burns and Stalker, (1961).

<u>VARIABLE</u>	<u>OPERATIONAL DEFINITION</u>	<u>RELIABILITY</u>	<u>VALIDITY</u>
	procedures and job descriptions. High scores indicated a management committed to open channels of communication and free flow of information, freedom to managers in the matter of operating styles, influence in decision making to the expert in the problem situation, free adaptation to changing circumstances, emphasis on getting things done rather than on formally laid down job descriptions or procedures.		
10 Coercion	Five scales were aggregated. High scores indicated a management characterised by "might is right" method of resolving internal differences, frequent recourse to warnings and threats to personnel, failure to explain to personnel the rationale behind organizational changes, procuring of the services of outside experts to investigate organizational problems, institution of arbitration procedures. Low scores indicated a management aversive to "might is right", threats and warnings, arbitrary organizational changes, getting outside experts to investigate problems, and arbitration procedures.	.52	Significantly correlated negatively with each of index of perceived performance relative to rivals, with perceived quality of collaboration between managers, and with perceived morale of staff. Consistent with the findings of Likert, 1961.
	<u>Structural Variables</u>		
11 <u>Sophistication of intelligence system</u>	Seven scales were aggregated. High scores indicated considerable electronic data processing of organization's operations, research and development, long term forecasting of markets and technology, systematic search for and evaluation of profitable investments, long term planning of investments and financing them, and formal market research. Low scores indicated that the foregoing were done only marginally or not at all.	.80	Correlated significantly with size, consistent with the findings of Khandella (1970) on a sample of U.S. medium sized manufacturing firms.

<u>VARIABLE</u>	<u>OPERATIONAL DEFINITION</u>	<u>RELIABILITY</u>	<u>VALIDITY</u>
12 Delegation of authority by chief executive	Eight scales were aggregated. High scores indicated considerable delegation of authority by the chief executive with respect to raising of long term finance, development of new products, marketing strategy, the hiring and firing of senior personnel, selection of new investments, pricing, acquisitions, and bargaining with personnel about wages etc. Low scores indicated little delegation of authority with respect to the above areas of decision making, and consequently, much centralization of decision making authority.	.81	Correlated significantly with firm size, consistent with the findings of Pugh, Hickson et al (1969), Child and Mansfield (1972), and Khandwalla (1974).
13 Sophistication of control system	Eight scales were aggregated. High scores indicated the widespread use of sophisticated quality control, cost control through standard costing, discounted cash flow analysis for evaluating investments, mathematically based inventory control, internal auditing, systematic evaluation of senior personnel, establishment of profit centers and cost centers. Low scores indicated marginal use of the above management controls.	.84	Correlated with firm size, finding consistent with that of Khandwalla (1974) on a sample of US manufacturing firms.

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