

AN EMPIRICAL EXAMINATION OF
INFORMATION SYSTEMS SATISFACTORINESS,
ORGANIZATIONAL LIFE CYCLE, AND
SOME ORGANIZATIONAL VARIABLES

By

© David Chi Wai Chin, B.Comm.(Hons.)

A Thesis

Submitted in Partial Fulfillment
Of the Requirements for the Degree

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DAVID CHI WAI CHIN

A thesis submitted to the Faculty of Graduate Studies of
the University of Manitoba in partial fulfillment of the requirements
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David Chi Wai Chin

ABSTRACT

Since the early work of Haire (1957), there has been a phenomenal growth in the literature related to organizational life cycle (OLC). It has been used as a vehicle in studying a number of organizational processes such as effectiveness, politics and strategy. However, no attempt has been made to synthesize the literature with respect to organizational life cycle. Accordingly, in this thesis we have attempted to relate a number of organizational variables such as strategy and environment with organizational life cycle, and have presented several propositions which could be tested empirically.

From this set of propositions, some hypotheses were developed to investigate the relationship between organizational life cycle and organizational strategy dimensions given by: (i) Miller and Friesen (1983a), and (ii) Gupta and Govindarajan (1984). In this study, using responses from 105 chief executive officers and 181 senior managers who are users of computer information systems, we have attempted to validate the three-stage OLC model (inception, growth and maturity) given by Smith, Mitchell and Summer (1985). It has been shown that organizational strategies differ significantly from stage one to stage three.

A new concept of information systems (IS) satisfactoriness given by Goodhue (1988) has been applied to determine its relationships with: (i) organizational environment, and (ii) organizational life cycle; using individual task characteristics as moderating variables. In

both cases, the results indicate that the interaction terms between: (i) the variables of task characteristics and variables of environment, and (ii) variables of task characteristics and organizational life cycle; have significant impact on IS satisfactoriness. Further, it has been shown that the impact of OLC on IS satisfactoriness is a nonmonotonic function.

Finally, several managerial implications and directions for future research are provided.

In memory of my Father,

Dr. Walter K. T. Chin (1933-1975),

who taught me what responsibility is.

His image will always be with me.

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CHAPTER I

OVERVIEW AND MOTIVATION

In the past two decades, the theoretical and empirical literature in organizational science has given considerable attention to the interdependence between organization and its environment. Contingency formulations of organizational phenomena have appeared both in organizational theory and management information systems (MIS) literature. Organizational variables such as structure, strategy and environment are of particular interests. In the MIS literature, considerable research has been done in the areas of task characteristics and information systems satisfaction.

One way to examine the dynamics of contingency variables is by using an organizational life cycle perspective. The organizational life cycle models assume that organizations evolve in such a way that the organizational development processes can be segmented into identifiable stages or periods of time.

1.1 THESIS OBJECTIVE

The objective of this thesis is to examine empirically the relationships among organizational life cycle, organizational structure, strategy, environment, task characteristics and management information systems satisfactoriness, using a questionnaire approach. The data are gathered from 105 chief executive officers (CEO), and 181

senior business executives who are users of computer information.

1.2 ORGANIZATION OF THIS THESIS

Chapter II reviews the pertinent literature with respect to the areas in organizational life cycle, environment, strategy, information systems satisfactoriness and task characteristics. Several propositions are developed. In Chapter III, the hypotheses that are to be tested in this thesis study are outlined in detail. Chapter IV discusses the development of the two questionnaires used for this study. In this study, three databases are used: (i) Organizational Variables Database; (ii) End User Database; and (iii) Matched Pairs Database. Chapter V describes the data analyses of the raw data to form these databases. In Chapter VI, the results from the empirical analyses and hypotheses testing are examined in detail. Chapter VII provides a summary of the research results, their implications and further research directions.

CHAPTER II

LITERATURE REVIEW

This chapter reviews the literature in the areas of organizational life cycle, environment, strategy, information satisfactoriness and task characteristics. From the literature review, some propositions are developed. Due to the scope of the areas to be covered, not all of these propositions are tested. The propositions to be examined are rephrased in a more specific form as hypotheses, which are discussed in Chapter III.

2.1 ORGANIZATIONAL LIFE CYCLE

Models of Organizational life cycle assume that there are regularities in organizational development. These regularities occur in such a way that the organizations' development processes lend themselves to segmentation into stages or periods of time (Smith, Mitchell and Summer, 1985). The value of the organizational life cycle concept lies in its predictable nature. Since organizations exhibit a unique set of characteristics in each developmental stage, having the ability to recognize an organization's particular stage of development would help in the formulation of its strategies, identification of risk and opportunities, and management of organizational change (Thain, 1969). For companies who are targets of takeovers, candidates for bankruptcies, and companies who aim at attaining superior corporate performance,

the need to understand this evolutionary process is eminent (Ouchi, 1981; Peters and Waterman, 1982).

Since the early work of Haire (1959) in organizational analysis, the concept of modeling life cycle stages has been linked with various organizational processes. This includes the following: identifying the general pattern of technological change that would seem to be evident over the life cycle of many complex products and their production processes (Abernathy, 1976); studying organizational cultures in the role of entrepreneurs during the creation of new organizations (Pettigrew, 1977; Pettigrew, 1979); analyzing newly developed venture organizations (Galbraith, 1982); and maintaining organizational effectiveness (Scanlan, 1980). The concept has also been applied in different settings. For example, in a publishing company (Hall, 1976), in a university (Levine, 1978a,b; Cyert, 1978; Cameron Whetten and Kim, 1987; Cameron and Whetten, 1981) and in a hospital federation (D'Aunno and Zuckerman, 1987).

The earlier literature on organizational life cycles was largely theoretical rather than empirical, and authors differed about the number of stages of the life cycle. Quinn and Cameron (1983) presented a review of nine models of organization life cycles (Downs, 1967; Lippitt and Schmidt, 1967; Scott, 1971; Greiner, 1972; Torbert, 1974; Lyden, 1975; Katz and Kahn, 1978; Adizes, 1979; Kimberly, 1979). Some authors identified three stages in the life cycle (Downs, 1967; Lippitt and Schmidt, 1967; Scott, 1971; Katz and Kahn,

1978). Others identified four stages (Lyden, 1975). Still others attempted to segment the organizational development process into more stages (Greiner, 1972: five stages; Torbert, 1974: nine stages and Adizes, 1979: ten stages). Different authors emphasized a unique set of characteristics found in each stage of their life cycle models. However, what is important is that, regardless of the numbers, these stages are: (i) sequential in nature; (ii) occur as a hierarchical progression that is not easily reversed; and (iii) involve a broad range of organizational activities and structures (Quinn and Cameron, 1983; Lavoie and Culbert, 1978).

In general, organizational life cycle models assume that an organization goes through inception to growth, maturity and decline or redevelopment. During inception and early growth, the organization is a single product company (Scott, 1971); and is characterized by a "one man show" (Adizes, 1979; Thain, 1969; Scott, 1971), with the founder bearing the responsibility of managing all aspects of the company, including day-to-day operations. The organization has just come into existence and established its niche in the market place, usually through technological advances, innovation or entrepreneurship (Lyden, 1975; Greiner, 1972; Lorange and Nelson, 1987). The prime concern at this stage is to secure its financial resources in order to ensure its survival (Adizes, 1979; Kimberly, 1979). The way to achieve long term stability is through the use of long working hours (Greiner, 1972), informal communication and structure (Greiner, 1972;

Torbert, 1974), centralization and personal leadership (Scott, 1971).

During the growth stage, rapid expansion takes place. The organization is now capable of producing more than one product (Scott, 1971). The need for planning is elevated as a result of the increased size and complexity of running the operation (Downs, 1967). More emphasis is placed upon establishing rules and procedures and maintaining stability of the organizational structure (Katz and Kahn, 1978). At this point, it is imperative for the founder to be able to delegate responsibilities in order for the company to survive (Thain, 1969). In this stage, the organization is distinguished by a more formalized structure (Katz and Kahn, 1978), focus on task performance (Torbert, 1974), functional specialization and departmentalization (Scott, 1971).

As the organization matures, the rules and procedures created have led to a rigid structure which inhibits the organization's adaptability to changes in the market environment (Lippitt and Schmidt, 1967). Kimberly (1980b) pointed out that the process of institutionalization, whereby norms, values and structures become incorporated within the framework of existing patterns of norms, values and structures, enhances stability in the early stage of the organizational development process. However, this very same process of formalization reduces innovativeness and flexibility, and the ability to adapt to turbulent environments in the future. This subsequently leads to

downfall (Peters and Waterman, 1982). Some possible strategies for improving flexibility are: using matrix structures, real time information systems (Greiner, 1972), developing multiple product lines, and practicing decentralization and diversification (Scott, 1971). Another problem is that organizations tend to develop activity programs that replicate earlier successes, but the very existence of such programs creates enormous inertia. As Yasai-Ardekani (1986) has concluded:

"... activity programs direct attention to areas assumed important by their creators; programs reduce perceptual sensitivity and consequently loosen the links between organizations and their environments."

The organization now enters the decline stage because rapid growth and expansion, which was a result of initial successes, led to self-deception, inflexibility, shortsightedness and cultural rigidity (Lorange and Nelson, 1987). As the organization matures and enters this decline phase, the organizational climate is characterized by unrealistic optimism, poor communication, commitment to past strategy, conformity, group think, over-conservatism and mistrust (Nystrom and Starbuck, 1984; Pfeffer, 1981; Lorange and Nelson, 1987; Adizes, 1979). This is further exacerbated by increased rivalry among political coalitions, power conflicts and scapegoating (Pfeffer, 1981; Adizes, 1979). Some aspects of decline are centralization, short term planning, lack of innovation, scapegoating, resistance to change, turnover, low morale, loss of organizational slack, fragmented pluralism, loss of credibility, non-prioritized cuts and

conflicts (Cameron, Whetten and Kim, 1987; Cameron, 1983). The organization's rigid structure, resistance to change and political climate make it impossible to perceive important environmental changes. Moreover, the organizational structure, decision making process and information management procedures no longer fit the organization's needs.

After an organization goes through decline, it will either die or enter a phase of revival and redevelopment. If an organization is able to take drastic actions to rectify the situation, it may survive. In many cases, however, the drastic shift of an organization's direction is not possible unless top managers are removed. This is often necessary before new ideas becomes possible (Nystrom and Starbuck, 1984). If organizational change cannot take place, the persistence of present practices usually leads to further decline. Then, bankruptcy and corporate failure are inevitable.

2.1.1 Linkages to other fields

Many organizational life cycle researchers linked the stages of corporate development to organizational structure. That is, an organization grows from a simple, informal structure in its inception and early growth; then expands into a more formal, rigid structure in the latter stages of growth and maturity. Finally, diversification is needed for the company to regain flexibility and avoid consequences of decline. Tuason (1973) proposed the relationship between corporate strategy and organizational life cycle. He pointed

out that the concept of an organizational life cycle includes dimension other than organization structure alone. He stated that:

"... umbilical cord linkages between the company (and its market-product commitment) should go beyond into crucial sectors of a company's environment."

Tuason (1973) further posited that the organizational climate, personal values of key executives and managers, power and achievement motives may all be related to the stages of corporate development. Since then, many researchers have attempted to analyze various organizational concepts in relation to organizational life cycles.

Researchers found that the criteria of effectiveness (Quinn and Cameron, 1983; Quinn and Rohrbaugh, 1983), perception of effectiveness (Cameron and Whetten, 1981) and management priorities (Smith, Mitchell and Summer, 1985) change according to the stage of organizational development. An entrepreneur suited for one stage may not be suited for another (Smith and Miner, 1983). As an organization grows, transition of power distribution and intrinsic forces takes place (Mintzberg, 1984). Politics are involved in strategic changes but are manifested differently at each stage of the life cycle (Gray and Ariss, 1985).

Many researchers have attempted to link one or two concepts to the notion of the organizational life cycle. However, since structure is related to a life cycle (Scott, 1971; Tuason, 1973), strategy is related to structure (Chandler, 1962; Hofer and Schendel, 1978); and environment

is related to strategy (Thompson, 1967; Burns and Stalker, 1961; Miller and Friesen, 1983a); power is also related to strategy (Gray and Ariss, 1985); may be it is worthwhile to examine all these organizational concepts within the context of organizational development.

The more recent empirical literature shows that many organizational variables are interrelated. For example, in an empirical study of 103 firms, Khandwalla (1977) found that a conservative top management style is effective for smaller firms in benign environments, while an entrepreneurial style is effective for smaller firms in hostile environments. From an empirical study of 97 firms, Miller and Toulouse (1986a, 1986b) found that the relationship between CEO personality and organizational characteristics are by far the strongest in small firms and also somewhat significant in dynamic environments. In another study, Miller, Kets De Vries and Toulouse (1982) found a direct and significant relationship between the locus of control of top executives and the nature of corporate strategy. Covin and Slevin (1989) concluded that performance among small firms in hostile environment is positively related to an organic structure, an entrepreneurial strategic posture, and a competitive profile characterized by a long term orientation, high product prices and a concern for predicting industry trends. Miller (1983) found that entrepreneurship is also integrally related to environment, structure, strategy and the leader's personality. Kimberly and Rottman (1987) identified that strategic decision making

is the key link between organizational environment, structure and effectiveness. Miller and Friesen (1984) found that there appears to be a cohesiveness or complementarity among the situation, strategy, structure and decision making style variables for each phase of the organizational life cycle. The authors concluded that the precise reasons for this cohesiveness is unknown, but they seem to relate to the goals, ideologies, political systems and technical tasks of organizations.

We continue to examine the literature by reviewing organizational life cycle and its relationships between other areas in management.

Organizational life cycle and effectiveness

There are substantial difficulties in developing general theories of organizational effectiveness (Lewin and Minton, 1986; Goodman, Atkin and Schoorman, 1983), because researchers cannot agree on the important questions: (i) what constitutes a useful and valid set of effectiveness measures (Steers, 1975); (ii) what kinds of models should be adopted universally; and (iii) what level of analysis is appropriate for measuring the construct (Cameron and Whetten, 1981). Cameron (1986a) summarized that the four main problems facing researchers are: (i) inadequacy in identifying indicators of effectiveness; (ii) over-reliance on single indicators of effectiveness and ignoring the relationships among multiple indicators; (iii) under-specified models and ignoring time

frame of the criterion variable; and (iv) over-generalization to dissimilar organizations or subunits.

Steers (1975) reviewed seventeen multivariate studies on organizational effectiveness and attempted to identify the variables in the domain of effectiveness and to determine how they are related. He summarized that the "adaptability/flexibility" criterion was most widely used by researchers in measuring effectiveness. Campbell (1977) examined the literature and identified a comprehensive list of thirty criteria. Quinn and Rohrbaugh (1983) suggested that organizational effectiveness is a multidimensional concept, and they reduced Campbell's (1977) criteria of effectiveness into seventeen variables using multidimensional techniques and constructed an effectiveness model based on a competing values approach. A paradoxical approach in analyzing effectiveness has also been confirmed by Cameron (1986b).

According to Quinn and Rohrbaugh (1983), individual perceptions of organizational effectiveness are based on three underlying dimensions: (i) an internal focus versus an external focus (e.g. micro well being of the people in the organization versus the external, macro well being of the organization); (ii) a concern for stability versus a concern for flexibility (e.g. adaptation versus predictability); and (iii) an emphasis on ends versus an emphasis on means (e.g. emphasis on final outcomes and productivity versus emphasis on planning and goal setting). Thus, Quinn and Rohrbaughs' (1983) model captures the essence of: (i) a human

relations model which emphasizes flexibility and internal focus, with cohesion and morale as means, and human resource development as ends; (ii) an open system model, which focuses on flexibility and external focus, with flexibility and readiness as means; and growth, resource acquisition and external support as ends; (iii) a rational goal model, which stresses control and external focus, with planning and goal setting as means; and productivity and efficiency as ends; (iv) a internal process model, which places emphasis on control and an internal focus, with the role of information management and communication as means; and stability and control as ends.

Building on Quinn and Rohrbaughs' (1983) model, Quinn and Cameron (1983) tested the criteria of effectiveness along the stages of organizational development using a longitudinal analysis and classified the organizational life cycle into four stages: (i) creativity and entrepreneurship stage, whereby innovation, marshalling of resources for survival and concentration on input activities are important; (ii) collectivity stage, where emphasis is placed upon communication and cohesion, which is associated with an internal process, becomes top priority; (iii) formalization and control stage, which focuses on stability, control and production efficiency; (iv) structure elaboration and adaptation stage, where domain expansion and flexibility become a growing concern. Since organizations go through different stages in the life cycle, the different emphases and

concerns in different stages suggest that a different criteria of effectiveness may exist.

Based on this assumption, in the entrepreneurial stage, characterized by innovation, creativity and the marshalling of resources, the open systems model would be emphasized. In the collectivity stage, personalized leadership, high member commitment, morale and cohesion become increasingly important to an organization; therefore, the human relations model becomes increasingly important. As the organization continues to grow, more emphasis would be placed on rules and procedures in order to obtain a higher production efficiency. Thus, control, stability, efficiency and results are of prime concern. This matches the increasing importance of the internal process model and the rational goal model. In the elaboration of structure, the organization has become too rigid. Therefore emphasis must be placed upon flexibility in order to react to the changing environment, such as through decentralization and diversification strategies. Thus, the open systems model is emphasized.

Using Quinn and Rohrbaughs' (1983) model, Quinn and Cameron (1983) conducted a longitudinal analysis on the New York State Department of Mental Hygiene. The results show that the changes in the dominant criteria of organizational effectiveness follow a predictable pattern. The criteria of open systems model are important in the early stages but then decreased. Then, the criteria for the rational goal model and internal process model increase in importance over time and

subsequently become the most important criteria in later stages of the life cycle. This life cycle-effectiveness model is useful since it allow managers and researchers to anticipate changes and predict what criteria of success are likely to take precedence and in what sequence.

Based on the four growth stages classified by Quinn and Cameron (1983), Cameron and Whetten (1981) examined the perception of organizational effectiveness as an organization passes through different stages of the life cycle. An organization simulation was conducted on graduate and upper division undergraduate students in two universities, using "The Organization Game" developed by Miles and Randolph (1979). In a simulated situation of the organizational life cycle, the participants were asked to complete a questionnaire that assessed their perception of different aspects of organizational effectiveness across four levels of analysis, and to rank the relative importance they attached to the criteria of individual effectiveness, departmental or operating-unit effectiveness, divisional effectiveness and organizational effectiveness. The results do not show significant differences between the students of the two universities. With respect to the level of analysis, the results show that: (i) Individual effectiveness is important in the early stage but is less important as the organization moves toward formalization, and is least important in the late stages of the life cycle; (ii) Organizational effectiveness is relatively unimportant initially, but its rating increases

steadily throughout the organization's development and subsequently becomes the most important level of analysis for effectiveness; (iii) Ratings of departmental and divisional effectiveness are highly important in the growth stage, but decline slightly as the organization matures.

When considering the ratings of the importance in input, internal processes, and output of effectiveness for the four levels of analysis, there has been consistent emphasis on internal processes from creation to formalization. Output effectiveness increase in importance as the organization developed, while input effectiveness decrease in importance. Output and input effectiveness are significantly affected by the organization's stage of development, regardless of the participant's position in the simulated organization. In short, the perception of organizational effectiveness may be contingent upon the stage of organizational development, since in each stage different issues are being emphasized. The results also imply that the appropriateness of any particular model of effectiveness may be contingent upon the environment, the constituency under investigation and the life-cycle stage.

Building on Cameron and Whetten (1981), Quinn and Cameron (1983) and Quinn and Rohrbaugh (1983), Smith, Mitchell and Summer (1985) examined the different priorities among top level managers with respect to different stages of the organizational life cycle. The way that managers use information; how they pay attention to, weigh and use certain information when solving problems show what they desire and

thus provide indicators or criteria of effectiveness. Smith, Mitchell and Summer (1985) noted that individuals hold technical efficiency as a priority when they: (i) are concerned with efficiency; (ii) seek short term, quantifiable criteria for evaluating decisions; (iii) seek high levels of accomplishment; and (iv) hold maximization of organizational efficiency as a personal value. Organization coordination priority is defined as a concern for the long term integration of total organizations. Individuals hold this as a priority when they are concerned with building an organization synergy, cooperation and coordination, or integration of their total organizations. Political support priority is a concern on the part of top level managers for maintaining individual power and support of subordinates. Individuals hold this as a priority when they are concerned with being fair and equitable to subordinates, are interested in their subordinates' suggestions and attitudes, and hope to obtain and maintain subordinates' support. Integrating previous studies, Smith, Mitchell and Summer (1985) developed a three stage life cycle model. They tested the management priorities, namely the technical efficiency priority, organizational coordination priority and political support priority with respect to different stages of the life cycle, using a field study by testing thirty-eight top level managers, and an organizational simulation with participation from 128 students. The results from both studies showed that: (i) priorities differ in different stages; (ii) the importance of the organizational

coordination priority decrease in later stages; and (iii) managers' concern with political support changes as organizations progress through different stages. Due to the fact that a three stage model was used in the field study and a four stage model was developed from the results of the simulation, the outcome of the two studies did not provide convergent results. However, the results have successfully verified the existence of different priorities across different stages of development and its description of these priorities, and that the relative importance of the priorities do exist in different stages of the life cycle.

Venkatraman and Ramanujam (1986) summarized the relations between organizational effectiveness, financial and operational performance and finance performance. Financial performance is the narrowest conception of business performance, and simple outcome-based financial indicators are used to measure the degree of economic goals being fulfilled in a company. Financial and operational performance is the enlarged domain which is reflected in strategy research. Organizational effectiveness is the broadest domain of the three, which is used in the conceptual literature in strategic management and organization theory. Various studies have also shown that since many environmental characteristics are industry specific, it is essential to analyze firms according to the characteristics of their respective industrial structure in order to provide meaningful explanations for the patterns of relationships observed (Hrebiniak and Snow, 1980;

Yasai-Ardekani, 1986). Since the level of analysis, rating of importance, perception and criteria of effectiveness change with respect to the life cycle, the domain of financial performance may also change since the domain of financial performance is a subset of the domain of organizational effectiveness. Therefore the following hypothesis can be formulated:

Proposition 1: Within the same industry, other things being equal, a company's financial performance should correspond to the financial performance of other companies within the same developmental stage of the organizational life cycle.

Also, since the structure of an organization will affect the strategy to be implemented (Bourgeois and Astley, 1979; Burgelman, 1983; Fahey, 1981), and the domain of strategy is a sub-domain of effectiveness (Venkatraman and Ramanujam, 1986), which is related to the stages of organizational development:

Proposition 2: There should be a match between structure and organizational effectiveness with respect to the developmental stage of organizational life cycle.

Numerous studies have shown that there is a relationship among organizational effectiveness, the chief executive officer's personality and organizational structure. (Miller and Toulouse, 1986a, b; Kets De Vries and Miller, 1984; Miller, Kets De Vries and Toulouse, 1982). Therefore:

Proposition 3: Organizational effectiveness is affected by a match between: (i) entrepreneurship and organizational structure, and (ii) organizational life cycle and organizational structure.

Organizational life cycle and entrepreneurship

Smith and Miner (1983) attempted to cross validate Smith's (1967) study, using the Miner Sentence Completion Scale (MSCS - Form H), with interview-based measures similar to those used in the Aston research (Pugh and Hickson, 1976). Data were collected from 37 entrepreneurs. The results were compared with 117 first line supervisors and 97 middle managers.

The Miner Sentence Completion Scale measures management motivation. Tests of the basic assumption that managerial motivation as measured by the MSCS - Form H is positively related to managerial success as indicated by performance ratings, peer ratings, promotion rates and managerial level in large bureaucratic organization, have consistently produced positive results (Miner, 1965; 1977; 1978; Smith and Miner, 1983).

The results show that the average level of managerial motivation in entrepreneurs is lower, compared to managers in large bureaucratic corporations. Entrepreneurs with an opportunistic orientation are associated with a more adaptive (growth-oriented) environment in the firm.

Since an organizational life cycle involves a transition from the initial entrepreneurial phase to a more bureaucratic type of managerial system, the entrepreneur who created an organization may be very different from the one that can manage the organization effectively at some subsequent stage of growth (Smith and Miner, 1983). Smith (1967) identified two

types of entrepreneurs. The craftsman entrepreneur is characterized by narrowness in education and training, low social awareness and involvement, a feeling of incompetence in dealing with the social environment, and a limited time orientation. On the other hand, the opportunistic entrepreneur exhibits breadth in education and training, has high social awareness and involvement, is confident in dealing with the social environment, and is aware of, and oriented to, the future (Smith and Miner, 1983). Smith (1967) concluded that the more opportunistic the entrepreneur, the more adaptive the firm, the greater the likelihood that the entrepreneur will bring the company on through the initial phases of the life cycle to aggrandizement (Smith and Miner, 1983). This is logical since many founders of organizations are not able to cope with the institutionalization process of bureaucracies, and are not prepared to delegate responsibilities to subordinates. Therefore, they leave shortly after they recognize their companies have grown to the point where rules and procedures have become dominant.

Using a four stage life cycle of birth, growth, maturity and decline:

Proposition 4: There tend to be more chief executive officers that resemble the characteristics of an opportunistic entrepreneur than craftsman entrepreneur in the maturity and decline stages of organizational development.

Proposition 5: There tend to be more chief executive officers that resemble the characteristics of a craftsman entrepreneur than an opportunistic entrepreneur in the stages of birth and growth.

The entrepreneur or chief executive officer has great influence on an organization's day to day operation. This influence is especially prevalent in a small firm (Miller and Toulouse, 1986a; Miller and Toulouse, 1986b). Miller and Toulouse (1986a, 1986b) found that the tenure of a chief executive officer correlates negatively with a firm's performance index. Chief executive officers who have been managers for many years have simply become out of touch with the environment. Therefore:

Proposition 6: In a small firm setting, the tenure of a CEO whose firm is in the decline stage tends to be longer than one whose firm is undergoing growth and maturity stage of the life cycle.

Similarly, using Miller and Friesen (1983b)'s definition of successful and unsuccessful phases of the life cycle:

Proposition 7: In a small firm setting and in the same developmental stage, the average tenure of a chief executive officer is shorter in the firm who is completing a successful phase of the life cycle, as compared to one who is undergoing an unsuccessful phase.

Organizational life cycle and culture

Recently, the concept of organizational culture has been the focus of attention, since organizational culture is believed to have contributed to superior corporate performance (Peters and Waterman, 1982), increased productivity (Ouchi, 1981; Ouchi and Price, 1981), improved employee morale and quality of work life (Barney, 1986) and substantially high return on investment (Dennison, 1984). A common hypothesis is that if the organization's culture enhances performance, the

culture must be "strong" and possesses distinctive "traits": particular values, beliefs, and shared behavior patterns (Saffold, 1988), which distinguish the organization from other less productive or less profitable organizations. Many researchers have noted that a company that has a "strong culture" is synonymous to having an effective organization with excellent management (Barney, 1986; Deal and Kennedy, 1982; Ouchi, 1981; Peters and Waterman, 1982; Trice and Beyer, 1984). Hence, this view of "strong culture hypothesis" (Dennison, 1984; Saffold; 1988) is of prime concern to the researchers and practitioners who are trying to understand the making of a successful organization.

The definition of culture, however, varies. For example, Smircich (1983) provided five competing definitions of culture and their corresponding themes for research. Saffold (1988) summarized that cultures are highly particular to specific notions (Moore, 1985), industries (Barley, 1983) and individual organizations (Smircich and Morgan, 1982). For the purpose of this study, we adopt Pettigrew's (1979) definition of organizational culture as the system of publicly and collectively accepted meanings operating for a given group at a given time. As summarized by Smircich (1983), these meanings may include myths (Boje, Fedor and Rowland, 1982), rituals (Deal and Kennedy, 1982), stories (Mitroff and Kilmann, 1976), legends (Wilkins and Martin, 1980) and specialized language (Andrews and Hirsch, 1983). For a review of the contingency

view of cultures and their relations to organizational analysis, refer to Smircich (1983).

Trice and Beyer (1984) presented a typology of rites and ceremonies to study organizational culture. Barney (1986) asserted that for a firm to have culture that leads to sustained financial performance, the culture must be valuable, rare and imperfectly imitable by other firms. Saffold (1988) criticized that the weaknesses of the present research using trait strength framework are assumptions of unitary culture, ambiguity of strength as a measure of culture, over-dependence upon composite culture profiles and use of inadequate methodologies. Jacques (1952), Harrison (1972) and Pettigrew (1979) are some of the earlier researchers that applied the concept culture in the study of organizational development. While many researchers asserted that all cultures change in a similar fashion (Wilkins and Dyer, 1988), Schein (1985) suggested that the process for change may differ according to the stages of corporate development. Culture actually evolves over time (Barney, 1986; Selznick, 1957; Zucker, 1977).

Since culture is believed to improve performance and effectiveness, and effectiveness and performance are related to organizational development, it is therefore speculated that culture is also related to organizational life cycle. According to Mitroff and Kilmann (1984), what often ails an organization is an immense culture lag or culture gap. One way of measuring the culture gap is by using the Kilmann-Saxton Culture-Gap Survey (1983). The survey measures the desired

norm and the actual norm, and the contrast between the two is defined as the culture-gap. Based on the above arguments, within a particular industry (Saffold, 1988):

Proposition 8: Since culture evolves according to time and stages of organizational development, in general, the actual norm in an organization varies according to the organization's life cycle stage.

An organization that is in the decline stage usually exhibits dysfunctional attributes which may affect its productivity, effectiveness and financial performance. Therefore:

Proposition 9: In general, a wider culture gap may be exhibited in organizations that are in the decline stage of the life cycle, as compared to ones in the growth and maturity stage.

Since management and labor, top management and lower employees may have different subcultures, this may lead to either enhanced productivity or decreased productivity. So, instead of using a unitary approach to culture, it may be necessary to analyze culture according to the respective levels of management (Saffold, 1988; Pettigrew, 1985). Since a strong culture will enhance corporate performance (Saffold, 1988), and an immense culture gap may be dysfunctional to an organization's performance (Mitroff and Kilmann, 1984):

Proposition 10: In an organization that exhibits a strong culture, the desired norms of top management must be closer to the desired norms of lower management, as compared to an organization that does not exhibit strong culture.

Proposition 11: In an organization that exhibits strong culture, the culture gap in both top management and lower management must be smaller, compared to an organization that does not exhibit strong culture.

Proposition 12: The culture-gap in top management and/or lower management is wider in the decline stage of the organizational life cycle, as compared to the growth stage and maturity stage.

Miller and Friesen (1983b) classified the concept of successful and unsuccessful phases of the corporate life cycle. A "successful phase" is a stage in the life cycle where an organization performs well. Similarly, in an "unsuccessful phase" an organization performs poorly. Using this definition of successful and unsuccessful phases of the organizational life cycle, we develop the following propositions:

Proposition 13: In an organization that is undergoing a successful phase, the desired norms of top management must be closer to the desired norms of lower management, as compared to an organization that is undergoing an unsuccessful phase.

Proposition 14: In an organization that is undergoing a successful phase, the culture gap in both top management and lower management must be smaller, as compared to an organization that is undergoing an unsuccessful phase.

Organizational life cycle and structure

The life cycle literature suggests that during inception, the organization uses a simple structure. As the organization expands and grows, a functional, more rigid structure is used. Finally, a diversified, more organic structure is needed for the organization to prolong its longevity and avoid the consequences of decline. Many researchers argue that the most effective firms coping with turbulent environments utilize an organic structure, while adopting a more placid, mechanistic structure in stable environments (Burns and Stalker, 1961; Lawrence and Lorsch, 1967; Thompson, 1967; Woodward, 1965).

On the other hand, some other researchers have suggested the opposite. That is, managers will try to use a more mechanistic structure to cope with a turbulent environment in order to gain a sense of control, while "loosening up" or using a more organic structure when the firm is facing a stable environment (Hall and Mansfield, 1971; Selye, 1956; Bourgeois, McAllister and Mitchell, 1978). Using the life cycle theory, both schools of thought seem to be logical and produce non-conflicting arguments. The firm's ability to understand the conditions of the environment is a result of the ability to perceive the environmental threats and changes (Yasai-Ardekani, 1986). In the growth stage of the organization, since the firm has maintained viability, the "perceived environmental uncertainty" decreases. Thus, a mechanistic structure seems to prevail in the management structure. However, the mechanistic structure has a negative influence on the organization's ability to perceive environmental uncertainty. The result of using a mechanistic structure creates inflexibility, enough to repress the firm's ability to perceive environmental uncertainty (Yasai-Ardekani, 1986; Huber, O'Connell and Cummings, 1975). Thus, due to the inability to react to environmental changes, the organization enters the mature and decline stage.

Proposition 15: The initial success and growth of an organization leads to reduced perceived uncertainty, which encourages a mechanistic structure. The mechanistic structure has a reciprocal effect of reducing the perceived uncertainty further, which leads the organization to the roads of maturity and decline.

According to Yasai-Ardekani (1986, p.12):

"Structuring of activities- specialization, formalization, and centralization- affects environmental scanning and information processing. Information sources accessed, interpretation, transmission, and managers' perceptions probably differ substantially across organizations with different levels of structuring."

The two schools of thought on either using a mechanistic or organic structure to fit a stable or unstable environment can be explained by the life cycle concept. Generally, top management tends to believe in the existing strategy, since "whatever has worked before should continue to work." As a result of this, and because it is quite difficult to challenge top management's practice, new strategies are made as small departures from existing strategies (Fredrickson, 1986). As the organization continues to grow and mature, a predetermined set of ideology and mind set prevails in the organizational culture and this generates inertia and tendency for a company to become more mechanistic or more organic (Yasai-Ardekani, 1986; Mitroff and Kilmann, 1976). Generally, whenever there is a drastic change in the structure of management, the sudden shake up in the ongoing practice will tend to improve performance. If an organization is not too mechanistic or organic in nature, a shift toward the opposite direction of the organic-mechanistic spectrum may be healthy, since employees may see the change as a resolution of the existing constraints and problems. For a firm that is already in an extreme form of mechanistic structure, adapting to a mechanistic structure to cope with uncertainty would only lead

to more problems. This would lead to more resentment and inflexibility. On the other hand, when an organization is already at an extreme form of mechanistic structure, it is highly unlikely for the organization to change in the opposite direction of the organic-mechanistic spectrum due to the prevailing inertia. The same analogy applies to an organization that is already in an extreme form of organic structure. It follows that:

Proposition 16: As long as the organization is not at the extreme of the organic-mechanistic spectrum, a shift towards either direction in light of environmental changes will be beneficial to performance.

Mintzberg (1973) analyzed strategy making according to three modes: the entrepreneurial mode, the adaptive mode and the planning mode. In the entrepreneurial mode, strategy making is dominated by a proactive search for new opportunities with a high tolerance for risk. The organization is characterized by high growth, a highly centralized structure, and power dominated by the chief executive. In the adaptive mode, strategy making is characterized by a reactive approach where actions are taken in small incremental steps and concentrate on solving existing problems. The overall organizational goal is unclear, since strategy is a product of bargaining among political coalitions. In the planning mode, the focus is on integration of decisions and strategies with an emphasis on systematic evaluation and cost-benefit analyses of alternatives. According to Mintzberg, assuming a

three or four stage life cycle model, the entrepreneurial mode will dominate the youth stage, and the adaptive mode will signal the final stage of maturity. In the initial stage of inception and growth, the organization will operate in an entrepreneurial and adaptive mode. While the founder of an organization is willing to take bold steps and assume considerable risk, much consideration is being focused on the operationalization of the business. Thus, the founder has his or her long term mission, but he or she has to lay rules and procedures for the foundation of company growth as well. As the organization passes through the maturity stage, the process of institutionalization and the setting of rules and procedures are completed. Therefore, guidelines and procedures, followed by feasibility analyses, viability analyses and cost-benefit analyses become dominant practices. Hence, in this stage, the planning mode is eminent. In the decline stage, while participants in an organization may know what new directions should be taken, the existing bureaucracies have contributed to so much inflexibility that drastic change is often too difficult. Hence, the strategic decisions are outcomes of power struggles and decisions based on conformance. Therefore, the planning mode and adaptive mode are dominant. Thus, we propose that:

Proposition 17: Using a three stage life cycle model, in the initial stage of inception and growth, the entrepreneurial and adaptive mode is dominant. In the stage of maturity, the planning mode is dominant. In the final stage of decline, the planning and adaptive mode prevails.

Organizational life cycle and strategic orientation

One thing that plagues an organization's success is the assumption of continuous growth. Levine (1978b) stated that since the Roosevelt Administration, the widespread acceptance of Keynesian economics showed the broad assumptions of abundance, continuous and unlimited growth. Boulding (1975) pointed out that decades of continuous growth in population, per capita real productivity of overall society and gross national products have shaped the ways people think and institutions practice. It is assumed that survival is a result of the ability to adapt to rapid growth (Whetten, 1980). Scott (1976) summarized that under the influence of systems theory and humanistic psychology, a healthy organization is assumed to be one that exhibits growth and adaptability. In a similar fashion, Ford (1980) summarized that growth is a surrogate for effectiveness.

Lorange and Nelson (1987) observed that the initial success of many companies has been a result of technical innovation in a growth niche. While the initial success generates rapid growth and expansion for the company, it also leads to self-deception and cultural rigidity. Over time, management becomes insensitive to the upturns and downturns in businesses. Management chooses to believe that in the long run the upturns will counterbalance the downturns. This myopia has led to an inability to foresee maturity. The change from an innovation-oriented practice to tightened administration results in cultural rigidity. This in turn leads to a lack of

sense of urgency in employees, and the criteria for decisions are based on the perceived desires and politics of the organization hierarchy (Nystrom and Starbuck, 1984).

Harrigan and Porter (1983) explored the possible "end game" strategies in industry-wide decline. Hofer (1980) discussed a framework for deciding which type of turnaround strategies should be used in a particular situation to save a deteriorating businesses. Mitroff and Kilmann (1984) provided examples of product tampering and industrial sabotage and suggested ways that organizations can cope with the corporate tragedies. Zammuto (1983) developed a typology for decline based on the continuity of environmental change, change in niche size and change in niche shape. However, in the mature and decline stages of the organizational life cycle, the companies are generally too inflexible to perceive important environmental changes. Instead of making strategic exits, some companies may still remain in business even when they know that the business they are in has already turned sour (Harrigan, 1985). Managers generally view declining growth as an indication of failure, and they always wish to change and realign their organizations for continued growth (Smith, Mitchell and Summer, 1985; Scott, 1976). Hence, it is conjectured that, in the maturity stage of the organizational life cycle, the strategic orientation of the companies would remain to be one that is suited for a growth environment. This adherence to growth will generate the momentum for further decline, because rather than looking into harvest, divest and

end game strategies, companies continue to pursue a growth strategy. In fact, many companies often resist change even when their environments threaten them with extinction (Miller and Friesen, 1980b). This leads to the following proposition:

Proposition 18: In the mature and decline stages of the organizational life cycle, companies are generally too inflexible to foresee shifts in environmental changes. Therefore, the strategic orientation is one that is based on growth rather than decline.

2.2 ENVIRONMENT AND STRATEGY

Environments may provide opportunities and at the same time pose problems for managers. Organizations draw their scarce and valued resources from the environment. Concomitantly, they must cope with unstable and unpredictable external events (Daft, Sormunen and Parks, 1988). Perhaps as much as 90% of the variance in organizational performance is due to an environmental context rather than an administrative action or internal organization (Salancik and Pfeffer, 1978). Considerable effort has been dedicated to the notion of environmental uncertainty to make a valid predictor of organizational characteristics. Weick (1969) posited that organizational members form an image of the environment (i.e. the enactment process) and it is that image to which they respond, rather than to the objective environment. The conceptual work of Downey et al. (1975) and Galbraith (1973) suggested that the structuring actions taken by an organization in response to its environment are more consistent with its perception of the environment than with

more objective indicators of the environment (Leifer and Huber, 1978). Environmental scanning is the means by which managers perceive external events and trends (Hambrick, 1982; Culnan, 1983). The frequency of scanning indicates the amount of information obtained about the environment (Hambrick, 1982). Managers could receive information along a continuum from irregular to continuous gathering (Fahey and King, 1977). They may process data irregularly or continuously depending upon the nature of the environment (Daft, Sormunen and Parks, 1988). Child (1972) argued that there are three properties of environment which affect organizations, namely dynamism (also referred to as environmental uncertainty), hostility and heterogeneity.

2.2.1 Dynamism

Dynamism (often called uncertainty) is characterized by the rate of change and innovation in the industry as well as the uncertainty or unpredictability of the actions of competitors and customers (Lawrence and Lorsch, 1967; Thompson, 1967; Burns and Stalker, 1961). Thompson (1967, p.159) posited:

"... [environmental] uncertainty appears as the fundamental problem for complex organizations, and coping with uncertainty is the essence of the administrative process."

Perceived environmental uncertainty makes managerial planning and control difficult (Burns and Stalker, 1961; Lawrence and Lorsch, 1967; Weick, 1969; Duncan, 1972). If there is uncertainty about price, for example, planning of

production and capacity will be jeopardized (Khandwalla, 1972). Control activities are also likely to be influenced by uncertainty. For example, sub-units which face unpredictable change may find that static budgets are ineffective control devices because initial standards rapidly become out of date (Chenhall and Morris, 1986). Several ways of reducing uncertainty have been suggested. These include: participative and consultative decision making (Leavitt, 1975), vertical integration or forward contracts (Cyert and March, 1963; Thompson, 1967) and uncertainty absorption devices (March and Simon, 1958). Sales forecasting, research and development, search for investment opportunities are some of the examples of uncertainty absorption devices. Integrating the works of Burns and Stalker (1961), Woodward (1965), Hall (1962), and Lawrence and Lorsch (1967), Galbraith (1973) suggested that the implementation of the above devices to reduce perceived uncertainty implies a greater need for an organization to process information because managers must identify opportunities, detect and interpret problem areas (Hambrick, 1982; Culnan, 1983; Tushman, 1977 and Jemison, 1984). The processing of information will be sought through the use of information systems (Khandwalla, 1972).

2.2.2 Hostility

Hostile environments are characterized by precarious industry settings, intense competition, the relative lack of exploitable opportunities, and a harsh, overwhelming business

climate. Non-hostile or benign environments, on the other hand, provide a safe setting for business operations due to their overall level of munificence and richness in investment and marketing opportunities (Khandwalla, 1976/77; 1977; Miller and Friesen, 1983a). If hostility represents a threat to an organization's primary goals, then the organization's response is likely to involve greater integration and coordination of its activities so that it can effectively meet the threat to its objectives.

2.2.3 Heterogeneity

A heterogeneous environment implies that an organization is faced with numerous relatively homogeneous segments that are distinctive from each other in their market place (at the input end or the output end). These segments also require distinctive modes of handling. According to Khandwalla (1972, p.304):

"... the concept of environmental heterogeneity has little significance unless each segment needs to be managed in a way at least somewhat differentiated from the way in which the other segments are managed."

The organizational response to perceived heterogeneity could be organizational differentiation (Lawrence and Lorsch, 1967, Thompson, 1967). Increased level of perceived heterogeneity (which is important to organizational performance) will lead to an increased need for information processing (Daft, Sormunen and Parks, 1988).

2.2.4 Relationship to Organizational Life Cycle

Miller and Friesen (1983a) examined changes in strategy making and changes in environment and found that successful and unsuccessful firms react differently in their strategy making processes to cope with the dynamic and hostile environments. There is a high correlation between the changes of the strategy making process in successful firms as compared to the ones in unsuccessful firms. A company in the growth stage of the organizational life cycle is likely to possess signs of potential success; and a company in the mature stage of the life cycle will probably have the necessary infrastructure of a successful firm. These symptoms of success imply the ability to perceive and react to the changing environmental conditions by implementing effective strategies. On the other hand, in a declining company, the inflexibility, rigidity and political environment make it very difficult for the company to perceive major environmental changes. Therefore:

Proposition 19: In comparison with companies in the growth and maturity stage of the organizational life cycle, a company that is in the decline stage will react differently in its strategy making process to cope with the dynamic and hostile environment.

2.3 INFORMATION SYSTEMS SATISFACTORINESS

2.3.1 Attitudes and Beliefs

As the cost of information systems has become increasingly visible, researchers have made efforts to measure their success. Various constructs related to success have been

suggested, such as user attitudes, use, performance and value. The attitude construct has received considerably more attention in the literature because (Goodhue, 1988, p.4):

"user attitudes can be measured after the fact - they do not require the large up-front organizational commitment associated with unobtrusive measures of use. Attitude measures are also seen as more generalizable and more general purpose than context specific measures of performance or value."

User attitudes have been used in a number of studies (please refer to Goodhue, 1988, p.6 for a detailed review). For example, in determining an appropriate charge system (Nolan, 1977; Olson and Ives, 1982); allocation of time to various phases of the system development process (McKeen, 1983) and in user involvement (Swanson, 1974; Olson, 1981), Goodhue (1988, p.4) suggested that:

"... the results of these studies have been decidedly mixed. Some have found statistically significant links; others have not. It is difficult to extract from these results any generally accepted finding or an underlying model upon which future research can be built. One possibility is that these contradictory results are due in part to the lack of a strong theoretical basis."

One example of the lack of a theoretical basis includes a situation where researchers have not clearly distinguished between attitudes and beliefs in measuring information systems success (Bailey and Pearson, 1983; Ives, Olson and Baroudi, 1983). Goodhue (1988, p.12) posited that:

For some theoretical contexts, attitudes may be the appropriate construct to measure: in others, beliefs may be more useful. For example, if we hypothesize that success of a system is affected by positive or negative feelings about changes in the work place, then we certainly need to measure attitudes. If we hypothesize that features and functionality of a system are key to acceptance, we might wish to

measure beliefs about the existence of those appropriate, or vice versa, or which aspects of two constructs, is likely to introduce additional bias or random error into measurements."

2.3.2 The Theory of Information Systems Satisfactoriness

The theory of IS satisfactoriness was developed by Goodhue (1988). This theory distinguishes between feelings of satisfaction (whether an individual's personal needs are met by using a system) and objective beliefs of satisfactoriness (whether an individual believes the system is assisting him or her in performing his or her job). Drawing from the works of Schwab and Cummings (1973), Weiss, Dawis, England and Lofquist (1967) and Gibson, Weiss, Dawis and Lofquist (1970) in job satisfaction, individual satisfactoriness and performance, Goodhue (1988) suggested that in information systems the individual user rates the satisfactoriness of the system, as the supervisor rates the satisfactoriness of the individual. The theory of work adjustment suggests that satisfactoriness is a belief held by a supervisor about the objective fit between a subordinate and his or her job. It is measured by a questionnaire given to the supervisor in which questions are of the form "compared to others in your experience, how does this person rate" on various aspects of the job (Gibson, Weiss, Dawis, Lofquist, 1970). IS satisfactoriness focuses on the correspondence between task requirements and system functionality as the mechanism by which systems create value. It also focuses on individuals and the way systems assist them in doing their jobs, and thus

encourages us to be more careful in matching our unit of measure with our unit of analysis (Goodhue, 1988).

2.3.3 Relationship to Organizational Life Cycle

As an organization progresses through different stages of the life cycle, it evolves from an informal environment to an increasingly formal and rigid structure (Greiner, 1972; Scott, 1971). As the organization reaches the maturity and decline phases, it is at the risk of more uncertain and hostile environment. At this point, the increase in environmental uncertainty would require an increase in information processing (Hambrick, 1982; Culnan, 1983; Tushman, 1977; Galbraith, 1973) which will improve the organization's ability to adapt to the changes. The organization has a tendency to make decisions that reinforce previous actions (Yasai-Ardekani, 1986). The climate in the maturity stage is one where managers are most concerned with individual power and support (Smith, Mitchell and Summer, 1985). Also, at this point the strategy making process is dominated by the power struggle between those who want to maintain the status quo and those who want new strategic orientation (Gray and Ariss, 1985; Mintzberg, 1984) (Also, refer to section 2.1). Thus, the decision for investment in information systems will be a political one rather than need-based or function-based. Therefore, users of information systems will be less satisfied as compared to those in the inception and growth stages of the life cycle. Hence:

Proposition 20: Compared to the users of computer information systems from companies that are in the stages of inception and growth, users of computer information systems from companies that are in the maturity and decline stages will be less satisfied, since investment decisions in information systems are a result of power struggle and political bargaining.

2.4 TASK CHARACTERISTICS

Perrow (1967) suggested two task characteristics which were pertinent to the transformation of inputs into organizational outputs. These task characteristics are: (i) task variety, and (ii) task analyzability.

Task variety is the frequency of the unexpected and novel events that occur in the conversion process (Van de Ven and Delbecq, 1974). Low task variety implies that the managers experience considerably low uncertainty about the occurrence of future activities. On the other hand, high variety implies that managers typically cannot predict problems or activities in advance.

Task analyzability is concerned with the way individuals respond to problems that arise. When the conversion process is analyzable, managers typically follow an objective, computational procedure to resolve problems. On the other hand, when the nature of the conversion process is less understood (i.e. low analyzability) problem solving resists direct analysis. One muddles through problems using trial and error and intuition in place of analysis. These are more uncertain situations because of the difficulty of analyzing alternative courses of action, costs and benefits (Daft and

MacIntosh, 1981). This dimension of task characteristics is similar to Thompson's (1967) cause-effect relationships. Daft and MacIntosh (1981) found a correlation between attitudes towards task variety and task analyzability at (-0.64), raising the possibility that the respondents may not think of these two as separate dimensions.

Thompson (1967) added the importance of the type of interdependence between tasks. Task interdependence refers to the exchange of output that takes place between segments within a sub-unit. Thompson (1967) separated situations of no exchanges between segments (pooled) from interdependent situations which involve either sequential or reciprocal exchanges. Interdependence is an important element of context in the design of information systems because of the increased problems of coordinating interdependent situations as compared to pooled ones (Watson, 1975).

Culnan (1983) studied the relationship between the use of specific types of information sources and task complexity and source accessibility. She found that accessibility was more important than task complexity in explaining use.

Fry and Slocum (1984) proposed three dimensional constructs of task characteristics, namely variety (number of exceptions), difficulty (analyzability), and interdependence (complexity). These constructs are the combination of Perrow's (1967) dimensions of task characteristics.

In an extensive study, Goodhue (1988) did not find any justification for including both task variety and task

analyzability as separate dimensions of task characteristics. Accordingly, in this study, these dimensions were collapsed into one dimension called "ad hoc tasks". In this thesis, we consider two task characteristics, namely, ad hoc tasks and task complexity.

CHAPTER III

HYPOTHESES DEVELOPMENT

Based on the literature review provided in Chapter II, in this chapter we have developed several hypotheses which will be tested in this study. They are arranged by areas of examination and are discussed in detail. The results of the hypotheses testing are presented in Chapter VI.

3.1 ORGANIZATIONAL LIFE CYCLE AND STRATEGIC ORIENTATION

It is proposed that as a company enters the maturity and decline phases of the organizational life cycle, the inability to perceive environmental changes and the belief that "whatever works before should continue to work" leads to an adherence to a growth strategy (refer to proposition 18). This continued adherence generates an inertia towards an increasingly intense strategic orientation towards growth and at the same time, it creates a momentum for further decline.

Hofer and Schendel (1978) studied six kinds of strategies: (i) share increasing strategies; (ii) growth strategies; (iii) profit strategies; (iv) market concentration and asset reduction strategies; (v) turnaround strategies; and (vi) liquidation or divestiture strategies. MacMillan (1982) classified strategies into eight categories: (i) aggressive build; (ii) gradual build; (iii) selective build; (iv) aggressive maintain; (v) selective maintain; (vi) competitive harasser; (vii) prove viability; and

(viii) divest. Gupta and Govindarajan (1984) summarized that these strategies more or less reflect a transition from a "pure build" strategy at one end to a "pure harvest" or "divest" strategy at the other. Following Gupta and Govindarajan (1984), the implications of "divest" strategy is not considered because we are only concerned with existing companies.

Hence, we attempt to relate the strategic orientation of a company to the "pure build" and "pure harvest" strategic continuum in an organizational life cycle context. Using the concept of "pure build" and "pure harvest" strategic continuum, and a 3-stage life cycle model, the following hypotheses are formulated:

- H₁: The strategic orientation of an organization changes as it goes through the different stages of the organizational life cycle.
- H₂: An organization that is in stage two of the life cycle will have a more intense strategic orientation towards growth, as compared with an organization that is in stage one of the organizational life cycle.
- H₃: An organization that is in stage three of the life cycle will have a more intense strategic orientation towards growth, as compared with an organization that is in stage two of the organizational life cycle.
- H₄: An organization that is in stage three of the life cycle will have a more intense strategic orientation towards growth, as compared with an organization that is in stage one of the organizational life cycle.

3.2 ORGANIZATIONAL LIFE CYCLE, ENVIRONMENT AND STRATEGY

Miller and Friesen (1983a) conducted a study to examine the relationships between the changes in dynamism, hostility and heterogeneity (environment), and the changes in the amount

of analysis and innovation (strategy) in companies. These relationships were compared between successful and unsuccessful firms, using samples from Canadian and American firms. Firms that had a growth rate in sales of less than 8 percent (the average rate of inflation for this period) and an average decrease in return on equity were classified as low performers. Firms that exhibited real growth in sales and return on equity were classified as high performers.

Yasai-Ardekani (1986) suggested that contingency variables such as environment should be measured according to industry structural characteristics such as concentration, entry barriers, growth of demand and import penetration to represent objective environments. In a similar argument, organizational life cycle models suggest that companies in the same developmental stage have similar characteristics such as sales growth, structure, communication and formality (Smith, Mitchell and Summer, 1985). Moreover, a company that is in the growth stage of the organizational life cycle is likely to possess signs of potential success; a company in the mature stage of the organizational life cycle may have the infrastructure of a successful firm; and a company in the decline stage of the life cycle may possess symptoms of decline (proposition 19). Hence, it is logical to examine the relationship between strategic and environmental changes within the context of organizational development.

In another study, Miller and Friesen (1983b) conducted an empirical analysis and classified firms into going through

successful or unsuccessful phases of the organizational life cycle. A "successful phase" is simply a period of the life cycle in which a given firm performs well. Poor performance characterizes "unsuccessful phases" (Miller and Friesen, 1983b). As reported by Miller and Friesen (1983b), the need to study numerous organizations over long periods of time required the use of a rather unorthodox database. Using case analyses, published records and company histories as data, independent raters constructed multivariate profiles of firms as they developed over time. The companies were then rated according to various dimensions such as environment, structure and strategy making, and were classified into various stages of the organizational life cycle. After normalizing the annual growth rates in profit and sales for the companies, the two scales were averaged and converted to form a 7-point success score. The samples were then split into successful and unsuccessful firms. Companies which had a success score of 5 or more were considered successful firms, while all other companies were considered unsuccessful. As reported by Miller and Friesen (1980a, 1980b), the use of complicated heuristics to classify firms always involves a certain degree of arbitrariness and subjectivity, and in most cases this necessitated the use of a second or third database.

In this thesis, a cross-sectional study using a 3-stage organizational life cycle model is adopted (Smith, Mitchell and Summer, 1985) in the examination of changes in environmental challenges and strategy making. While we are

well aware that a cross-sectional study does not provide causal findings, the adoption of Smith, Mitchell and Summer's (1985) life cycle model will provide a more objective way of classifying companies into various stages. The details of the description, validation and examination of Smith, Mitchell and Summer's (1985) model are provided in Sections 5.1 and 6.1.

Companies generally react to the environmental challenges with an increase in analysis and innovation. Using a three stage organizational cycle model of inception, growth and decline, Miller and Friesen's (1983a) definition of environment and strategy and the arguments made by Miller and Friesen (1983a) and Covin and Slevin (1989), the hypotheses can be expressed as follows:

H₅: It is expected that there should be a significant positive association between changes in environmental challenges and changes in strategy making for companies in: a) stage 1; b) stage 2; and c) stage 3 of the organizational life cycle.

The companies in the inception stage are characterized by informal structure and communication. Since the companies are still young, they may not have the resources and capability to conduct analysis and innovation. Therefore:

H₆: Relative to companies in the inception stage of the life cycle, companies in the growth stage will show more positive correlations between changes in environmental dynamism, hostility and heterogeneity, and changes in analysis and in innovation.

In the mature stage of the life cycle, the organization generally becomes more inflexible due to the formalization of rules and procedures. Weick (1969) suggested that

organizational members respond to the "enacted" environment rather than the "objective" environment. The enacted environment is a subjective image of the environment. As organizations go through the maturity phase, decisions are based on perceived desires and politics of the organization hierarchy (Nystrom and Starbuck, 1984). Insensitivity towards the environment prevails which leads to rigidity (Lorange and Nelson, 1987). As a result of this, the perceived environmental uncertainty will be less threatening and therefore, less attention is given to innovation. Also, since activity programs are constantly created to reinforce previous decisions (Yasai-Ardekani, 1986), there is less time spent on analysis. Therefore:

H₇: Relative to companies in the growth stage of the life cycle, companies in the mature stage will show less positive correlation between increases in environmental dynamism, hostility and heterogeneity, and increases in analysis and innovation.

3.3 IS SATISFACTORINESS, TASK CHARACTERISTICS AND ENVIRONMENT

All organizations process information in order to interpret the external environment, coordinate activities and handle problems that arise (Arrow, 1974; Williamson, 1975). As the environment becomes more heterogeneous, dynamic, hostile and uncertain, the requirements for information about the environment also increase (Tushman and Nadler, 1978).

Miller and Friesen (1983a) showed that when there is an increase in environmental dynamism, companies tend to do more analysis and pursue higher levels of innovative activities.

These relationships were found to be more pronounced in successful companies. Mintzberg (1979, p.269) argued that:

"Hostility affects structure through the intermediate variables of the predictability of work, in that hostile environments are unpredictable ones. But the greater interest is its relationship with the intermediate variable of speed of response, since very hostile environments generally demand fast reactions by the organization."

Covin and Slevin (1989) and Miller (1983) advocated that environmental hostility requires innovation and analysis because only through such efforts can firms effectively cope with the adverse forces prevalent in such environments. The results are consistent with those obtained by Hall (1980). Khandwalla's (1977) study strongly suggests that environmental scanning efforts aimed at forecasting the industry environment are particularly critical to firms facing hostile environments. However, actively attempting to predict industry trends may be of lesser importance to firms in more benign environments.

The proliferation of differences among the markets (heterogeneity) of the organization makes the environment more complex. Intuitive modes of strategy making will prove to be inadequate as more dimensions must be taken into consideration in order to interpret the challenges and opportunities facing the organization (Steiner, 1969). On the other hand, increased diversity of market domains provides an incentive to adopt market segmentation strategies, which takes advantage of product and service or technological innovation (Miller and Friesen, 1982a; 1983a). Also, Miller and Friesen (1983a)

suggested that under heterogeneous environment, the successful organizations tend to rely more on analysis and innovation. The dimension of analysis involves methodically and systematically taking more facts into account in decision making, ensuring the complementarity and synergy of different decisions, planning for future contingencies, and developing levels of industry expertise at high levels of the organization. Innovation includes the introduction of new products and service technologies, the search for novel solutions to marketing and production problems, the attempt to lead rather than follow competitors and risk taking. Miller and Friesen (1983b) posited that increased levels of analysis and innovation will impose greater need for information processing in an organization.

Ginzberg (1980) proposed that "procedural" information systems - routinized systems that limit the discretion of the users - tend to be dysfunctional in unstable environments, in subunits employing non-routine technologies, in organic and decentralized organization.

Several empirical studies have shown that higher levels of task variety lead to a greater need for information processing (Hackman, 1968; Hage and Aiken, 1969; Hackman and Vidmar, 1970; Tushman, 1978, 1979). When the tasks are of high variety nature, the managers experience unfamiliar, unexpected and novel situations. Consequently, a wide scope of information has to be shared. Also, more people tend to be involved, implying the need for greater volume of information

processing (Ference, 1970; Sandowsky, 1972; Connolly, 1975, 1977). Moreover, in these kind of situations, preplanning tends to be extremely difficult. This leads to a greater need for managers to acquire information on an ongoing basis .On the other hand, when managers are confronted with fewer unexpected situations or problems, they experience fewer surprises and unexpected problems. In this situation, the managers can preplan in order to handle expected tasks and do not need to process large amount of information (Galbraith, 1973). Consequently, the information processing can be limited to small set of predictable applications.

Martin and Power (1980) conducted a study to determine executive information needs. They suggested that a significant proportion of the information needed by executives is subjective and qualitative, and therefore is difficult to provide through formal information systems. Limitation of computer information systems has also been stated by Robey and Taggart (1982). They contended that computers can effectively model analytical left brain functions. However, the right brain activities, such as intuition, may not be successfully modeled.

From in depth interviews with executives, Alavi (1982) concluded that decision support systems must be capable of handling complexity, reducing uncertainty and resolving conflict. Sprague (1980) suggested that because many top level decisions are made in groups, decision support systems (DSS) must support interdependent decisions, not simply the

decisions of a single executive at a computer terminal. He further argued that when the demands on DSS are high, it is questionable whether DSS can be expected to assist many of the decisions made by managers. A similar concern was expressed by Harris and Hartman (1985). Mintzberg (1973) observed that senior managers tend to rely largely on intuitive and implicit theories, and most of them are not likely to do much systematic planning prior to launching any change effort (Tichy, 1983, p. 38). The database for making decisions about the organizational change are not likely to be formally recorded anywhere.

Chenhall and Morris (1986) argued that task interdependence or complexity leads to a heightened perception of managers, regarding the usefulness of management information systems in providing information which is timely, has broad scope, has various forms of aggregation and has the ability to provide integrated information. Tushman (1978, 1979) studied research and development projects in a single organization and found that in high performing projects, complexity is positively associated with increased technical communication within the project.

Using Tushman and Nadlers' (1978) arguments, Tichy (1983) suggested that an organization is technically effective to the degree that the uncertainty it faces matches its capacity to process information and to eliminate the uncertainty. He further noted that too much information capacity is as dysfunctional as too little, because the management of

information processing capacity is costly and expensive. Tichy proposed that one way to achieve the above match is to change task characteristics of information users and producers. O'Reilly (1982) found no relationship between task complexity, uncertainty and information use for subjects employed within the same task in a single organization, underlining the importance of information use across tasks. Goodhue (1988, p.133) posited that task characteristics act as moderating variables in relationships between data environment and IS satisfactoriness.

From the above discussion, it can be implied that IS satisfactoriness may be more negatively related with the environment challenges, given the presence of high levels of difficulty in task characteristics. Goodhue (1988, p.102) suggested that the construct of IS satisfactoriness has three components: (i) accessibility; (ii) quality; and (iii) systems reliability. This can be formally expressed in the following hypotheses:

- H_{8A}: Dynamic environments are more negatively related to data accessibility under conditions where there are more adhoc tasks than less adhoc tasks.
- H_{8B}: Hostile environments are more negatively related to data accessibility under conditions where there are more adhoc tasks than less adhoc tasks.
- H_{8C}: Heterogeneous environments are more negatively related to data accessibility under conditions where there are more adhoc tasks than less adhoc tasks.
- H_{9A}: Dynamic environments are more negatively related to data quality under conditions where there are more adhoc tasks than less adhoc tasks.
- H_{9B}: Hostile environments are more negatively related to data quality under conditions where there are more adhoc tasks than less adhoc tasks.

- H_{9C}: Heterogeneous environments are more negatively related to data quality under conditions where there are more adhoc tasks than less adhoc tasks.
- H_{10A}: Dynamic environments are more negatively related to system reliability under conditions where there are more adhoc tasks than less adhoc tasks.
- H_{10B}: Hostile environments are more negatively related to system reliability under conditions where there are more adhoc tasks than less adhoc tasks.
- H_{10C}: Heterogeneous environments are more negatively related to system reliability under conditions where there are more adhoc tasks than less adhoc tasks.
- H_{11A}: Dynamic environments are more negatively related to data accessibility under conditions where there is more task complexity than less task complexity.
- H_{11B}: Hostile environments are more negatively related to data accessibility under conditions where there is more task complexity than less task complexity.
- H_{11C}: Heterogeneous environments are more negatively related to data accessibility under conditions where there is more task complexity than less task complexity.
- H_{12A}: Dynamic environments are more negatively related to data quality under conditions where there is more task complexity than less task complexity.
- H_{12B}: Hostile environments are more negatively related to data quality under conditions where there is more task complexity than less task complexity.
- H_{12C}: Heterogeneous environments are more negatively related to data quality under conditions where there is more task complexity than less task complexity.
- H_{13A}: Dynamic environments are more negatively related to system reliability under conditions where there is more task complexity than less task complexity.
- H_{13B}: Hostile environments are more negatively related to system reliability under conditions where there is more task complexity than less task complexity.
- H_{13C}: Heterogeneous environments are more negatively related to system reliability under conditions where there is more task complexity than less task complexity.

3.4 ORGANIZATIONAL LIFE CYCLE, TASK CHARACTERISTICS AND IS SATISFACTORINESS

In this section, we attempt to establish a link between organizational life cycle, task characteristics and IS satisfactoriness.

As organizations progress from inception and growth to maturity stages, they have a tendency to become more and more formalized in order to maintain the stability of structure and efficiency (Scott, 1971; Kimberly, 1976). Fredrickson (1986) suggested that organizational structure helps management to control the decision making environment and facilitate the processing of information.

Bower (1970, p. 287) posited that:

"... when management chooses a particular organizational form, it is providing not only a framework for current operations but also the channels along which strategic information will flow."

Similarly, other authors, including Gordon and Narayanan (1985), Chenhall and Morris (1986) and Leifer (1988), have argued that organizational structure affects the information processing requirements and information processing capacity of an organization. Carter (1971) suggested that formalization affects an organization's strategic process as participants gather and process information that is passed up the hierarchy. Generally, as a company becomes more formalized, the strategic process will be motivated by reactive (for example, problem solving or crisis) as opposed to proactive (for example, searching for opportunities) behaviors. In these situations, decision stimulus could be ignored if the formal

system is not able to monitor them (Cyert and March, 1963). This suggests that a formalized structure has the inherent ability to discourage the pursuit of opportunities (Lenz and Lyles, 1983). Cyert and March (1963) further suggested that a formalized structure would lead to the implementation of formalized rules and search procedures, and it is highly likely that information that has been previously utilized and solutions that were successful in the past would be used again.

Kimberly (1980b) suggested that the process of formalization reduces an organization's ability to adapt to the turbulent environment which subsequently leads to decline and cultural rigidity in organizations (Lorange and Nelson, 1987). In the mature and decline phases of organization, the political environment of organizations will become more intense (Pfeffer, 1981), which may lead to a further decline in innovation and increasing resistance to change. This is further elaborated in Proposition 15 of Chapter II.

Daft and Weick (1984, p.288) posited that:

"New, young organizations typically begin their existence as test makers. They try new things and actively seek information about their limited environment. Gradually over time, the organization interpretation system begins to accept the environment rather than search or testing its boundaries. New organizations are disbelievers, are unindoctrinated, and have less history to rely on. They are most likely to dive in and develop a niche that established organizations have failed to see. But as organizations grow and time passes, the environment may be perceived as less threatening, so search will decrease."

This implies that as organizations progress through the life cycle, the perceived environmental uncertainty is reduced, which leads to a decrease in the need to process information. This may result in an increase in IS satisfactoriness. On the other hand, in Sections 2.4 and 3.3, it has been argued that, as the task characteristics of individual becomes more difficult (increase in adhoc tasks and task complexity), the need to process information increases. Therefore, we propose that there is a fit between the individual task characteristics and the stages of the organizational life cycle (OLC). This will in turn be related to IS satisfactoriness. The hypotheses are expressed in the following:

- H_{14A}: Under the conditions of less adhoc tasks, the organizational development process (OLC) will positively influence users' satisfactoriness with data accessibility; under conditions of more adhoc tasks, the organizational development process will negatively influence users' satisfactoriness with data accessibility.
- H_{14B}: Under the conditions of less adhoc tasks, the organizational development process (OLC) will positively influence users' satisfactoriness with data quality; under conditions of more adhoc tasks, the organizational development process will negatively influence users' satisfactoriness with data quality.
- H_{14C}: Under the conditions of less adhoc tasks, the organizational development process (OLC) will positively influence users' satisfactoriness with systems reliability; under conditions of more adhoc tasks, the organizational development process will negatively influence users' satisfactoriness with systems reliability.

- H_{15A}: Under the conditions of less tasks complexity, the organizational development process (OLC) will positively influence users' satisfactoriness with data accessibility; under conditions of more tasks complexity, the organizational development process will negatively influence users' satisfactoriness with data accessibility.
- H_{15B}: Under the conditions of less tasks complexity, the organizational development process (OLC) will positively influence users' satisfactoriness with data quality; under conditions of more tasks complexity, the organizational development process will negatively influence users' satisfactoriness with data quality.
- H_{15C}: Under the conditions of less tasks complexity, the organizational development process (OLC) will positively influence users' satisfactoriness with systems reliability; under conditions of more tasks complexity, the organizational development process will negatively influence users' satisfactoriness with systems reliability.

CHAPTER IV

RESEARCH DESIGN

This chapter discusses the components of the two questionnaires used in this study. The research design, validity issues, data collection and makeup of the responding organizations are reported.

This study tests the hypotheses mentioned in Chapter III, using a cross-sectional questionnaire survey of 105 chief executive officers and 181 senior managers in profit-oriented companies across Canada. The senior managers who completed the questionnaires are users of information systems (IS). These include: (i) "indirect" end users who use computers through other people (for example, an airline passenger requesting a seat through his travel agent); (ii) "intermediate" end users who specify business information requirements for reports they ultimately receive and use for business purposes; and (iii) "direct" end users who actually use terminals (Goodhue, 1988, p.26; CODASYL, 1979). From here onwards, we use the term "end user" to refer to the senior managers.

Two sets of questionnaires were developed, one for the chief executive officers (CEO) and another for senior business managers. The senior managers who completed the questionnaires were users of computer information.

4.1 QUESTIONNAIRE DEVELOPMENT

The chief executive officers were asked to complete the CEO questionnaire. The purpose of this questionnaire is: (i) to identify the stage of organizational development a firm is in (Smith, Mitchell and Summer, 1985); (ii) to examine a firm's intended strategy in the "pure build" versus "pure harvest" continuum (Gupta and Govindarajan, 1984); and (iii) to examine changes in environmental challenges and changes in strategy making pertaining to a firm (Miller and Friesen, 1983a).

The end users were asked to complete the End User questionnaire. The purpose of this questionnaire is to measure information systems (IS) satisfactoriness and task characteristics (Goodhue, 1988). The following sections describe the components of the two questionnaires. Section 4.1.1 to Section 4.1.3 discuss the components of the CEO questionnaire. Section 4.1.4 discusses the components of the End User questionnaire.

4.1.1 Organizational Life Cycle Model

Smith, Mitchell and Summer (1985) analyzed top management priorities in different stages of the organizational life cycle, by conducting a questionnaire survey on chief executive officers and senior managers, and performing an organizational simulation study on undergraduate business students. In the questionnaire survey, twenty-seven chief executive officers and senior managers from different companies responded to ten

questions that were used to assess the particular life cycle stage that ones organization was in. The questions are designed in five point, Likert-type scales which assess the following dimensions: (i) formal structure definition, defined or undefined; (ii) extent of adherence to formal structure; (iii) type of structure, centralized or decentralized; (iv) formality of communication system; (v) formality and objectivity of reward system; (vi) adherence to reward system; (vii) use of formal operating budgets; (viii) time horizon of budgets and plans; (ix) the make-up of top-level staff, generalists or strategist and planners; (x) method of top-level decision making, entrepreneurial or professional (Smith, Mitchell and Summer, 1985). We adopted these questions (which were supplied by the authors) to analyze the life cycle stage which the organization is in. The authors obtained data on the firms' ages, sizes and rates of growth from interviews and secondary data and this formed five indicators. We obtained the same information with respect to the firm's age, size, and rates of growth using five questions, which form five indicators. These five indicators, plus information from the ten scaled questions form fifteen indicators of the life-cycle stages.

Smith, Mitchell and Summer (1985) used principle component analysis to reduce the fifteen indicators to five factor scores. Using these factor scores, the organizations were classified into three stage-of-life-cycle groups by a variety of clustering techniques. For the purpose of this

thesis, we will adopt the same techniques to replicate a three-stage life cycle model. The details of the analyses conducted and results are provided in Section 5.1.

The ten indicators adopted from Smith, Mitchell and Summer (1985) are represented by the items given in Appendix A. These include 003, 004, 005, 006, 007, 008, 009, 010, 011, 0121, 0122, 0123. The items representing the firm's age, size and rate of growth include 0011, 0012, 0013, 0014, 0021, 0022, 0023, 0024, 013, 014 and 015.

4.1.2 Measuring Strategic Orientation

Gupta and Govindarajan (1984) examined the relationships among marketing/sales experience, willingness to take risk, tolerance for ambiguity and effectiveness in business units. Based on Abell and Hammond(1979); Larreche and Srinivasan (1982); Hofer and Schendel (1978); MacMillan (1982), Gupta and Govindarajan (1984) found that different strategies reflect a transition from a "pure build" strategy at one end to a "pure harvest" or "divest strategy" at the other end in a continuous spectrum. The following question was developed to measure "build", "hold", "harvest", "divest" and "other" strategies:

Given below are descriptions of several alternative strategies. Depending upon the context, each of these descriptions may represent the strategy for all or only a fraction or none of a business unit's products. Please indicate below what percentage of your business unit's current total sales is accounted for by products represented by each of these descriptions. Your answers should total 100%.

- | | |
|---|--------------|
| * Increase sales and market share, be willing to accept low returns on investment in the short-to-medium term, if necessary | _____ % |
| * Maintain market share and obtain reasonable return on investment | _____ % |
| * Maximize profitability and cash flow in the short-to-medium term, be willing to sacrifice market share if necessary | _____ % |
| * Prepare for liquidation | _____ % |
| * None of the above (please specify) | _____ % |
| TOTAL | 100 % |

Respondents were asked to indicate what percentage of their business units' current total sales is accounted for by each of the "build", "hold", "harvest", "divest" and "other" strategies. None of the respondents in this study indicated a percentage of their business units' current total sales is accounted for by "other" strategy. A weighted average index was developed by attaching a value of +1 to a build strategy, 0 to a hold strategy, -1 to a harvest strategy and -2 to a divest strategy. This weighted average index was used to measure the business unit's intended strategy in a pure build/harvest continuum.

In our CEO questionnaire, the same question was adopted to measure the intended strategy of the organization in a pure build/harvest continuum. In this question, the phrase "business unit" was changed to "company". The items representing build, hold, harvest, divest and other include AKG1, AKG2, AKG3, AKG4 and AKG5 respectively (Appendix A).

4.1.3 Environment and Strategy

Miller and Friesen (1983a) conducted an empirical study and examined the relationships between environmental dynamism, hostility and heterogeneity, and analysis and innovation which characterize strategy making activity, with respect to organizational performance. Environmental dynamism is characterized by the rate of change and innovation in the industry as well as the uncertainty or unpredictability of the actions of competitors and customers (Miller and Friesen,

1983a; Lawrence and Lorsch, 1967; Burns and Stalker, 1961). Environmental hostility represents the degree of threat to the firm posed by the multifacetedness, vigour and intensity of the competition and the downswings and upswings of the firm's principal industry (Miller and Friesen, 1978, 1983a; Khandwalla, 1973). Environmental heterogeneity encompasses variations among the firm's markets that require diversity in production and marketing orientations (Miller and Friesen, 1983a; Chandler, 1962; Khandwalla, 1972; Porter, 1979).

Two broad dimensions of strategy making are examined. The first dimension of strategy making is "analysis", which is reflected by methodically and systematically taking more factors into account in decision making (analysis and multiplexity), ensuring the complementarity and synergy of different decisions (integration), planning for future contingencies (futuraity), and developing levels of industry expertise at high levels of the organization (Miller and Friesen, 1980a, 1983a; Steiner, 1969; Mintzberg, 1973; Ansoff, 1965; Glueck, 1980). The second type of strategy making is innovation which includes introductions of new products and production-service technologies, the search for novel solutions to marketing and production problems, the attempt to lead rather than to follow competitors (proactiveness), and risk-taking (Miller and Friesen, 1983a; Collins and Moore, 1970; Mintzberg, 1973; Toulouse, 1980).

According to Miller and Friesen (1982a, 1983a), since strategy making is a process, its impact can best be studied

over time by using methods of longitudinal analysis. Therefore, questions were developed to measure the extent to which changes in environmental challenges are associated with changes in strategy making in order to achieve a high level of performance (Miller and Friesen, 1983a).

For the purposes of this thesis, we adopted the questions in Appendix 1 of Miller and Friesen (1983a) to measure changes in environment and changes in strategy. The items used to measure dynamism (3 items), hostility (3 items), heterogeneity (1 item), analysis (5 items) and innovation (5 items) are represented by DCOM, DCUST, DINDINO, HINDCYC, HCOMINT, HMULCOM, HET, AFUTUR, AINTEG, AANAL, AINDEXP, AMULT, AINEWP, ITECH, IRISK, IPRO and INOVEL. Please refer to Appendix A for the corresponding questions.

4.1.4 Information Systems Satisfactoriness and Task Characteristics

The questions used to measure information satisfactoriness and task characteristics form the End User Questionnaire. The end users were asked to complete the End User questionnaire. As mentioned in Section 2.3, information satisfaction is best measured by information satisfactoriness. Please refer to Appendix B for item identification.

4.2 PILOT TESTING AND THREATS TO VALIDITY

The organizational life cycle model used for this study is adopted from Smith, Mitchell and Summer (1985). Since the sample size used by the authors is only 27, it is felt that

the organizational life cycle model should be validated for the purpose of this study. The validation and testing of this model is presented in Section 6.1. To assess construct validity, the life cycle indicators adopted from the model were factor analyzed, using principle component analysis and varimax rotation. The results of the factor analysis are reported in Section 5.1.

The question used to measure a company's strategic orientation is adopted from Gupta and Govindarajan (1984). This question was validated by the authors using preliminary interviews and zero-order correlation coefficients.

The items used for measuring changes in strategy making and environmental changes are adopted from Miller and Friesen (1983a). The treatment of validity issues for these items are reported in Miller and Friesen (1980a; 1983a).

The items used for measuring information systems satisfactoriness and task characteristics are adopted from Goodhue (1988). These items have been validated by Goodhue, using multi-trait, multi-method approach and confirmatory factor analysis, based on a sample size of 350 end users from 10 companies. For a detailed discussion on the treatment of validity issues, please refer to Goodhue (1988, p.55 - p.64). The twelve dimensions of satisfactoriness were factor analyzed to ensure the measurement of constructs are the same for Goodhue's (1988) study, using principle component analysis and varimax rotation.

To ensure content validity for both the CEO and End User questionnaires, the final draft of both questionnaires were examined by two professors in MIS, two professors in organizational behavior, one professor in actuarial science, one professor in marketing research, a chief executive officer in a Canadian Business 500 company and two graduate students.

4.3 DATA COLLECTION

The companies were randomly selected across Canada from the Dun and Bradstreet Canadian Key Business Directory. Prior to the mailing of the questionnaires, the Chief Executive Officer of a large corporation (CEO) (who also chaired the board of advisors of a business school) wrote a personalized letter to the CEOs of responding organizations, requesting support and participation for this study.

Two sets of questionnaires were mailed to the CEOs of the companies; one for the CEO (CEO questionnaire) and three for senior managers who are also end users of computer information systems (End User questionnaire). The CEOs were requested to send the end user questionnaires to three senior managers (end users) for participation in this study. A cover letter was enclosed with each of the four questionnaires. The cover letter guaranteed the respondents that none of their responses would be disclosed to anybody and that only summary data from the total responses would be published. A preaddressed envelope was also enclosed with each questionnaire to enable the respondents to mail back the questionnaires directly,

without the risk of perusal by secretarial staff. Although it might have been preferable to mail the CEO questionnaire and the end user questionnaires independently to the CEO and end users of an organization, identifying an end user, however, was perceived to be difficult. Secondly, if the questionnaires (the CEO questionnaire and the three End User questionnaire) were mailed independently, the probability of the CEO and one or more end users from the same organization to respond would have been extremely low. The need for having the CEO and one or more end users in the same organization to respond is important for the development of the Matched Pairs Database, which is described Section 5.3 in detail.

A total of 500 CEO and 1500 End User questionnaires were mailed during the first week of May, 1988. A letter of reminder was sent after six weeks from the date of mailing to companies who had not responded. Another set of questionnaires (one CEO questionnaire and three End User questionnaires) was enclosed with the letter of reminder. The response collection period occurred between the second week of May, 1988 to the third week of September, 1988. A deadline was set in the last week of September, although no companies responded after the third week of September.

A total of 111 CEO and 190 End User questionnaires were received. Of which, 6 CEO and 9 End User questionnaires were not usable. The remaining 105 CEO and 181 End User questionnaires represent a response rate of 21% by company or 14.30% by the total number of questionnaires sent. The sales breakdown and industry breakdown are as follows:

Table 4.3.1 DEMOGRAPHICS OF RESPONDING ORGANIZATIONS

INDUSTRY	PERCENTAGE RESPONSE
Agriculture and Forestry	4.9
Automotive Products	2.9
Chemical and Petroleum	2.9
Construction	3.9
Banking and Finance	13.6
Healthcare	2.9
Insurance	3.9
Manufacturing and Processing	21.4
Mining	1.9
Retail	3.9
Services (Non IS-related)	3.9
Services (IS-related)	1.9
Transportation	5.8
Wholesale	7.8
Others	<u>18.4</u>
	100.0%

SALES	PERCENTAGE RESPONSE
Under \$20M*	9.8
\$20M - \$99M	50.0
\$100M - \$299M	13.7
\$300M - \$399M	3.9
\$400M - \$499M	5.9
\$500M - \$599M	2.9
\$600M - \$699M	3.9
\$700M - \$799M	1.0
\$800M - \$899M	0.0
\$900M - \$1B ⁺	2.0
Over \$1B	<u>6.9</u>
	100.0%

* millions

+ billions

The information from the 105 CEO questionnaires forms the raw data for the Organizational Variables Database (Section 5.1). The information from the 181 end users forms the raw data for the End User Database. From the usable samples, only 77 CEOs and 166 end users form matched pairs. A matched pair is formed when a CEO and one or more end users

from the same company responded to the study. The information from the matched pairs forms the raw data for the Matched Pairs Database. The details for the construction of these three databases are discussed in detail in the following chapter.

CHAPTER V

DATA ANALYSIS AND RELIABILITY TESTING

The analysis of empirical data has been performed using the SPSS-X statistical package, version 3.0. The information obtained from the CEO questionnaires forms the raw data for the Organizational Variables Database. From the raw data, factor analysis and cluster analysis are performed on 15 indicators (17 items) to determine the life cycle stages the companies are in, following the techniques used by Smith, Mitchell and Summer (1985). Similarly, the information obtained from the End User questionnaire forms the raw data for the End User Database. From the end user questionnaire, factor analysis is performed on the items used for measuring satisfactoriness to obtain three factor scores: (i) accessibility; (ii) quality; and (iii) systems reliability. This replicates the results reported by Goodhue (1988).

The reliability of a measure refers to the extent to which the measurement process is free from random errors (Kinnear and Taylor, 1983, p.297). In this study, reliability is estimated by the calculation of Cronbach's alpha. Nunnally (1967, p.226) suggested that reliability with alpha ranges between .60 and .80 are probably appropriate for basic research, but in some cases .50 will also suffice.

5.1 PHASE I: ORGANIZATIONAL VARIABLES DATABASE

Following Smith, Mitchell and Summer (1985), a factor analysis is conducted on the fifteen indicators for life cycle stages (17 items), using principle components analysis. This results in 5 factor scores with eigenvalues greater than 1. These factor scores explain 57.1% of variance.

Table 5.1.1 FACTOR ANALYSIS - LIFE CYCLE INDICATORS⁺

ITEM	FACTOR 1	FACTOR 2	FACTOR 3	FACTOR 4	FACTOR 5
O08	.80*				
O03	.70*				
O07	.68*				
O05	.61*				
O09	.59*				
O06	.42*	.41			.32
O121		-.78*			
O122		.72*			
O11		.61*			
INDEMP			.86*		
INDSALES			.85*		
O04			-.40*		.36
O14				.84*	
O15				.80*	
O10		.34		.40*	.33
O123					.73*
YEARS					-.60*
Eigenvalue	3.01	1.90	1.69	1.66	1.45
% of variance	17.7	11.2	9.9	9.8	8.5
Cumulative percentage	17.7	28.9	38.8	48.6	57.1

⁺ Factor loadings that are less than .30 are not reported.

* Loading is significant on the corresponding factor score.

Cronbach's alpha for Factor 1 is .73. Cronbach's alpha is not calculated for Factor 2, Factor 3, Factor 4 and Factor 5 since these factor scores consist of one or more ordinal variables. From the above five factor scores, we use a clustering technique to divide the companies into three stages of the organizational life cycle, by Ward's method. In Ward's method, the distance between two clusters is the sum of squares between the two clusters summed over all variables. At each stage, the within-cluster sum of squares is minimized over all partitions (the complete set of disjoint or separate clusters) obtainable by combining two clusters from the previous stage (Hair et al., 1987, p.304). After the cluster analysis, a total of 74 companies remain in one of the three clusters. The following table summarizes the characteristics of the three groups of companies:

Table 5.1.2 DESCRIPTION OF SAMPLE AND CLUSTER BY MEAN SCORES

<u>Measured Characteristic</u>	<u>Stage 1</u> N=18	<u>Stage 2</u> N=24	<u>Stage 3</u> N=32
Growth rate in dollar sales	16.45%	34.61%	25.14% *
Growth rate in number of employees	4.21%	8.29%	9.80% *
Structure definition 1 = No structure 3 = Partial structure 5 = Very formal	4.000	3.677	4.344
Type of structure 1 = Decentralized 5 = Centralized	3.444	3.042	2.094
Extent of formal vs. informal communication 1 = Informal, 5 = Formal	3.500	2.417	2.875
Extent of use of objective or subjective rewards 1 = Subjective, 5 = Objective	4.000	2.583	3.875
Extent to which reward system is adhered to 1 = Never, 5 = Always	4.444	3.333	4.156 *
Extent to which structure is adhered to 1 = Never, 5 = Always	4.000	3.667	4.156 *
Extent to which budgets are used 1 = Never, 5 = Always	4.056	3.500	4.406
Time horizon of budgets and plans 1 = 1/4 year, 3 = 1 year 5 = 5 years	4.000	3.750	4.250
Type of decision making 1 = Professional 5 = Entrepreneurial	4.000	3.280	3.406 *
Breakdown of top level staff			
Generalists	31.8%	47.4%	29.3%
Specialists	50.1%	43.0%	59.2%
Strategists	27.3%	19.3%	19.8%
Organization's age in years	30.4	38.667	58.517
Organization's size in annual sales dollars (millions)	3.16	3.50	3.42
Organization's size in number of employees	4240	1911	4447

* upward and/or downward tendencies between stages are the same as reported by Smith, Mitchell and Summer (1985).

The table presented above follows the one that was reported by Smith, Mitchell and Summer (1985, Table 2). In Smith, Mitchell and Summer (1985), while measuring pairwise similarity using different clustering methods showed that the results from each clustering techniques were similar, the total sample size of only 27 makes it difficult to obtain any generalizations with statistical significance. The use of mean scores on the 15 life cycle indicators can only provide us with some idea about the behavior of various organizational variables in different stages, but does not provide us with any level of confidence. Therefore, it is necessary to test and validate Smith, Mitchell and Summer (1985)'s life cycle model. The results are reported in detail in Section 6.1.

From the raw data, a field is created at the end of each record. A dummy variable (LIFE) is used to denote the life cycle stage the responding company is in. Missing values are assigned to companies that are not included in part of the three clusters.

The Cronbach's alpha for the variables used to examine changes in environmental dynamism, hostility, analysis and innovation are as follows. Since the variable heterogeneity consists of one item, Cronbach's alpha is not calculated. The reliability measurements for these variables are as follows:

TABLE 5.1.3 CRONBACH'S ALPHA: DYNAMISM, HOSTILITY, HETEROGENEITY, ANALYSIS AND INNOVATION

Dimension	# Indicators	Cronbach's α
Dynamism	3	.61
Hostility	3	.62
Analysis	5	.71
Innovation	5	.76

Hence, this forms the Organizational Variables Database.

5.2 PHASE II: END USER DATABASE

Following Goodhue (1988, p.99), a factor analysis is conducted on the 12 dimensions of IS satisfactoriness. The results conform to Goodhue's. Thus, for satisfactoriness measures, we name the factors according to Goodhue's (1988) definition, namely data accessibility, quality and system reliability. The results of the factor analysis provide 3 factor scores with eigenvalues greater than 1. These factor scores explain 65.9% of the variance.

Table 5.2.1: FACTOR ANALYSIS ON 12 DIMENSIONS OF IS SATISFACTORINESS

Dimension	Factor 1 (Accessibility)	Factor 2 (Quality)	Factor 3 (Systems Reliability)
Level of Detail	.52	.61*	-.24
Accuracy	.20	.84*	.03
Compatibility	.27	.54*	-.02
Locatability	.81*	.27	-.04
Accessibility	.83*	.27	-.05
Meaning	.78*	.17	.09
Assistance	.80*	.26	.19
Ease of Use	.79*	.13	-.01
Systems Reliability	.22	.31	.67*
Currency	-.11	.78*	.19
Presentation	.72*	.29	-.07
Confusion	.81*	-.11	.13
Eigenvalue	5.35	1.47	1.07
% of variance	44.6%	12.3%	8.9%
Cumulative %	44.6%	56.9%	65.9%

* loading is significant on the corresponding factor score

The reliability measures for the 12 dimensions of IS satisfactoriness are as follows:

Table 5.2.2: RELIABILITIES FOR 12 DIMENSIONS OF SATISFACTORINESS

Dimension	# Indicators	Cronbach's α
Level of Detail	3	.84
Accuracy	3	.70
Compatibility	3	.60
Locatability	3	.78
Accessibility	3	.86
Meaning	2	.66
Assistance	3	.86
Ease of Use	3	.74
Systems Reliability	3	.73
Currency	2	.80
Presentation	2	.82
Confusion	2	.79

For task characteristics, we have considered two task characteristics: adhoc tasks and task complexity (Goodhue, p.104). The reliability measures of adhoc tasks (3 items) and task complexity (2 items) are .62 and .60 respectively.

Hence, three constructs with respect to information systems satisfactoriness (accessibility, quality and systems reliability) and two constructs pertaining to task characteristics (adhoc tasks and task complexity) are used. The constructs adhoc tasks, task complexity, accessibility, quality and systems reliability are denoted by the variables (ADHOC), (COMPLEX), (ACCESS), (Quality) and (SYSREL) in the SPSS-X program. Hence, the End User Database is complete.

5.3 PHASE III: MATCHED PAIRS DATABASE: MERGING THE ORGANIZATIONAL VARIABLES AND END USER DATABASES

Recall from Section 4.3 that 77 CEO and 166 End User questionnaires formed matched pairs. A matched pair is formed when the CEO and one or more end users from the same company responds to the study by completing and returning the questionnaires. A major concern brought to our attention was whether the analysis is more appropriately performed at the individual level or at the group level.

We could have performed the analysis using average IS satisfactoriness and average task characteristics (i.e. average of the responses from a given company). However, in doing so we would have negated the very purpose of our study, because task characteristics of individuals differ, and the theory of IS satisfactoriness argues in favor of measuring IS satisfactoriness on an individual basis (Goodhue, 1988, p.115). Moreover, studies of information processing suggests that individuals differ in the complexities of their cognitive structures (Schroder et al., 1967). Cognitive complex individuals attend to broader ranges of information (Streufert et al., 1964), are more able to predict others' strategies (Streufert and Driver, 1966), and appear to have more accurate perceptions and a greater tolerance for ambiguity (Streufert et al., 1968) as compared to others. These individuals search for more information and spend more time in processing information.

There are previous studies which utilize the individual as a unit for this type of analysis. Many studies assign group

values to all individuals in a group prior to conducting an individual analysis (Goodhue, 1988, p.116). For example, Harrison and Rubinfield (1978) studied housing prices and the demand for clean air using data from 502 census tracts in the Boston area. In addition to "individual" census tract data such as median value of owner-occupied homes, they used many "group" variables such as the tax rate, crime rate and pupil-teacher ratio for all tracts in a given town (Goodhue, 1988, p.116). Also, Goodhue assigned group data environment variables to 275 individuals in the study of IS satisfactoriness, task characteristics and data environment.

Thus, we duplicate records from the Organizational Variable Database to match the 166 end users with the relevant information with respect to organizational variables. Hence, the Matched Pairs database is formed. This contains the information on individual IS satisfactoriness, task characteristics, organizational variables information and the life cycle stage the corresponding companies are in.

In our study, we only obtain organizational information from the chief executive officers of each company, rather than requesting a number of individuals for the information. The rationale is that the CEO is likely to be able to provide us with more accurate information, from a totality point of view. We avoided requesting organizational information from lower level managers, since they have their own perception of what the problem is, and they are not likely to be an adequate

source of information regarding uncertainties faced by the total firm (Downey and Slocum, 1975; Tichy, 1983, p.40).

The cluster analysis is performed on the responses from all the responding chief executive officers (total sample size of 105, including non-matched pairs). Only 74 out of a total 105 chief executive officers were classified into one of the three clusters (others were rejected because of missing values). From these 74 companies, only 55 belong to the matched pairs. Thus, we have only 122 individuals in the Matched Pairs Database which contains the life cycle stage information.

CHAPTER VI

EMPIRICAL RESULTS AND DISCUSSION

In this chapter, the results of the empirical analyses are presented. Section 6.1 presents the findings with respect to the effectiveness of the organizational life cycle model we adopted from Smith, Mitchell and Summer (1985). The rest of the chapter is devoted to empirical findings and testing of the hypotheses.

6.1 VALIDATING SMITH, MITCHELL AND SUMMER'S (1985) LIFE CYCLE MODEL

Recall from Section 5.1 that based on a sample size of 27, Smith, Mitchell and Summer (1985) provided the mean scores on the 15 life cycle indicators. With such a small sample size and without any information on the level of significance, it is very difficult to ensure the validity of this technique in developing a life cycle model.

The basic assumption of Smith, Mitchell and Summer's (1985) life cycle model is that the life cycle stage a company is in is based on: (i) type of formal structure, defined or undefined; (ii) extent of adherence to formal structure; (iii) type of structure, centralized or decentralized; (iv) formality and objectivity of reward system; (v) adherence to reward system; (vi) use of formal operating budgets; (vii) time horizon of budgets and plans; (viii) the make-up of top-level staff, generalists or strategist and planners; (ix) method of top-level decision making, entrepreneurial or professional. Based on these assumptions

15 indicators were developed. Therefore, the life cycle stage of a company is dependent upon these indicators or characteristics. To determine whether this model is effective, the key question to be asked is "Do these indicators really separate the companies into life cycle stages?" To answer this question, we use the Organizational Variables Database to conduct the following analyses:

6.1.1 Testing Whether the 15 Life Cycle Indicators Really Separate the Companies into Life Cycle Stages

Life cycle stage (dependent variable) is a categorical variable. The 15 indicators (17 items) are metric variables. In order to analyze whether the life cycle indicators are effective in separating the companies into stages, multiple discriminant analysis is the appropriate technique (Hair et al., p.75). The results of the multiple discriminant analysis are presented in the following:

After 11 steps, the results show that the variables which discriminate the life cycle stages are INDEMP, 003, 004, 005, 006, 008, 009, 011, 0122, 014 and 015:

Table 6.1.1 F STATISTICS AND SIGNIFICANCE BETWEEN PAIRS OF GROUPS AFTER STEP 11

Group	1	2
Group		
2	6.8801 0.0000	
3	9.6608 0.0000	9.3698 0.0000

Note: Each F Statistic has 11 and 36 degrees of freedom.

TABLE 6.1.2 VARIABLES IN THE ANALYSIS AFTER STEP 11

VARIABLE	TOLERANCE	F TO REMOVE	WILKS' LAMBDA
INDEMP	0.8220452	2.2992	0.08861
003	0.6620033	1.8916	0.08683
004	0.8436226	8.9121	0.11748
005	0.5961731	13.3560	0.13688
006	0.9665566	6.1336	0.10535
008	0.7168304	2.0824	0.08767
009	0.7749405	1.4029	0.08470
011	0.5941454	8.4839	0.11561
0122	0.8082684	2.4248	0.08916
014	0.5798815	3.1030	0.09212
015	0.5648407	2.9575	0.09149

TABLE 6.1.3 SUMMARY TABLE

ACTION		VARS IN	WILKS' LAMBDA	SIG
STEP	ENTERED REMOVED			
1	006	1	.54549	.0000
2	004	2	.31868	.0000
3	005	3	.21949	.0000
4	011	4	.16674	.0000
5	009	5	.14525	.0000
6	0122	6	.13004	.0000
7	INDEMP	7	.11741	.0000
8	008	8	.10562	.0000
9	003	9	.09808	.0000
10	014	10	.09149	.0000
11	015	11	.07858	.0000

Table 6.1.4

STANDARDIZED CANONICAL DISCRIMINANT
FUNCTION COEFFICIENTS

	FUNCTION 1	FUNCTION 2
INDEMP	-0.37338	-0.21841
003	-0.41969	0.12382
004	0.57271	-0.46174
005	0.95494	-0.19032
006	0.25270	0.56298
008	-0.05351	0.45870
009	0.05472	0.36665
011	0.82590	0.18466
0122	-0.32906	0.30971
014	-0.57889	-0.00591
015	0.52477	-0.24751

Table 6.1.5 CANONICAL DISCRIMINANT FUNCTIONS EVALUATED AT GROUP MEANS (GROUP CENTROIDS)

Group	Function 1	Function 2
1	-1.10424	1.60272
2	-0.84412	-1.62131
3	2.99289	0.16298

Table 6.1.6 CLASSIFICATION RESULTS

<u>ACTUAL GROUP</u>	<u>NO. OF CASES</u>	<u>PREDICTED GROUP MEMBERSHIP</u>		
		<u>1</u>	<u>2</u>	<u>3</u>
GROUP 1	28	24 85.7%	3 10.7%	1 3.6%
GROUP 2	23	2 8.7%	21 91.3%	0 0.0%
GROUP 3	17	1 5.9%	1 5.9%	15 88.2%
UNGROUPED CASES	11	4 36.4%	3 27.3%	4 36.4%

PERCENT OF "GROUPED" CASES CORRECTLY CLASSIFIED: 88.24%

The above results show that 11 out of the 17 items have played a significant role in separating the life cycle stage a company is in. The 11 items are able to classify a company's life cycle stage 88.24% of the time. Table 6.1.3 shows that Function 1 is more effective in discriminating between firms that are in stage 1 and firms that are in stage 2. Function 2 is more effective in discriminating between firms that are in stage 1 and firms that are in stage 2.

6.1.2 Testing Whether the Means of the Life Cycle Indicators Are Different Across the Life Cycle Stages

It has been demonstrated that 11 out of the 17 items for life cycle indicators are responsible for separating the companies into life cycle stages. Therefore, it is expected that the means for most or all of these 11 items will be different across the three life cycle stages. In this section, MANOVA is used to examine whether the means of the life cycle indicators are different across the life cycle stages. The results are as follows:

Table 6.1.7 Testing the Differences of Means of the Life Cycle Indicators Across Life Cycle Stages

EFFECT .. LIFE

Multivariate Tests of Significance (S = 2, M = 7, N = 14)

Test Name	Value	Approx. F	Hypoth. DF	Error DF	Sig. of F
Pillais	1.50698	5.57392	34.00	62.00	.000
Hotellings	6.35109	5.41711	34.00	58.00	.000
Wilks	.05904	5.41711	34.00	58.00	.000
Roys	.79509	5.49825	34.00	60.00	.000

Note .. F statistic for WILK'S Lambda is exact.

Table 6.1.7 (Continue)

EFFECT .. LIFE (Cont.)

Univariate F-tests with (2, 46) D.F.

Variable	Hypoth. SS	Error SS	Hypoth. MS	Error MS	F	Sig. of F
INDSALES	2119.33	34803.63	1059.67	756.60	1.40	.257
INDEMP	1754.51	17029.51	877.26	370.21	2.36	.105
003	6.14	21.78	3.07	.47	6.48	.003 **
004	15.33	18.67	7.67	.41	18.89	.000 **
005	12.05	24.76	6.03	.54	11.19	.000 **
006	19.18	23.02	9.59	.50	19.16	.000 **
007	15.22	33.27	7.61	.72	10.52	.000 **
008	3.88	14.03	1.94	.31	6.37	.004 **
009	10.96	22.94	5.48	.50	10.99	.000 **
010	1.43	26.57	.71	.57	1.23	.301
011	6.13	20.07	3.06	.44	7.02	.002 **
0121	3250.43	16390.39	1625.21	356.31	4.56	.016 *
0122	2499.16	17592.23	1249.58	382.44	3.27	.047 *
0123	832.05	6609.34	416.03	143.68	2.90	.065 +
YEARS	9998.65	141709.27	4999.32	3080.64	1.62	.208
014	7.05	411.15	3.53	8.94	.39	.676
015	210161965.00	4016448573.81	105080982.50	87314099.43	1.20	.309

Note: +,*,** The symbols indicate the level of significance at the 0.10, 0.05 or 0.01 level respectively.

The variables in Table 6.1.7 are all the items which denote the life cycle indicators. From the results of the MANOVA, collectively, the life cycle indicators show a difference in the means between the 3 stages of the life cycle model. The highlighted variables are the 11 items that discriminate the companies into different life cycle stages (Section 6.1.1). Using Table 6.1.7 and focusing on individual life cycle indicators (assuming univariate relationships), all but 2 of the 11 items show a difference in the means across the life cycle stages. The two items are 014 and 015, which represent the sales and number of years of existence of the companies. This is possible since the sales of companies may vary greatly according to industries. Also, in this study a three-stage model is adopted. While it is clear that the

number of years that a firm has been in existence contributes to the developmental stage it is in, we cannot assume all companies go through a three stage life cycle. For example, Miller and Friesen (1983b) reported a five-stage model with birth, growth, maturity, revival and decline phases. Only one item (O123) which does not separate the companies into stages shows a difference in the means across stages. The item O123 is the percentage of strategists in the breakdown of top level staff.

6.2 ORGANIZATIONAL LIFE CYCLE AND STRATEGIC ORIENTATION

Hypothesis 1 suggested that the strategic orientation of a company changes as the company moves from one stage of the organizational life cycle to another. From the Organizational Variables Database, a dummy variable is created. This dummy variable (AKG) is assigned a weighted strategy index, following the method used by Gupta and Govindarajan (1984). In Gupta and Govindarajan (1984), none of the samples entered in the item "none of the above". In this study, we do not include the samples that have entered a value other than zero in the item "none of the above", in order to maintain the weighted average strategy which measures the "pure build" and "pure harvest" strategic continuum. The results of the ANOVA are as follows:

Table 6.2.1 ANOVA - STRATEGIC ORIENTATION

Source of Variation	Sum of Squares	DF	MEAN Square	F	Sig of F
Main Effects	.753	2	.376	2.754	.074
LIFE	.753	2	.376	2.754	.074
Explained	.753	2	.376	2.754	.074
Residual	6.422	47	.137		
Total	7.175	49	.146		

The results show that the strategic orientation of a company changes as the organization passes through different stages of the life cycle, with a level of significance of .074. Thus, H_1 is supported. Further investigation is needed to examine whether the differences in the weighted strategy index is significant between the 3 stages of the life cycle model. The Scheffe Test is chosen for multiple comparison procedure, because of its conservativeness and the constraint of unequal sample size (Roscoe, 1975, p.311). The results are as follows:

Table 6.2.2 MULTIPLE COMPARISONS OF THE WEIGHTED STRATEGY INDEX USING THE SCHEFFE TEST

Variable AKG
By Variable LIFE

MULTIPLE RANGE TEST

SCHEFFE PROCEDURE
RANGES FOR THE 0.100 LEVEL

3.11 3.11

THE RANGES ABOVE ARE TABLE RANGES.
THE VALUE ACTUALLY COMPARED WITH $\text{MEAN}(J) - \text{MEAN}(I)$ IS ..
 $0.2614 * \text{RANGE} * \text{DSQRT}(1/N(I) + 1/N(J))$

(*) DENOTES PAIRS OF GROUPS SIGNIFICANTLY DIFFERENT AT THE 0.100 LEVEL

		G	G	G
		R	R	R
		P	P	P
MEAN	GROUP	1	2	3
-.0413	GRP 1			
.0962	GRP 2			
.2514	GRP 3		*	

In stages 1, 2 and 3 of the organizational life cycle, the values of the weighted strategy index are -0.0413, 0.962 and 0.2514 respectively. From the results of the Scheffe Test, it is demonstrated that there is a significant difference in the weight strategy index between stage 1 and stage 3 companies. Therefore, Hypothesis 4 is supported. This is the only significant difference found in multiple comparisons of the three groups. Therefore, Hypotheses 2 and 3 are not supported. This shows that, as a company passes from stage 1 to stage three of the organizational life cycle, the orientation towards a growth strategy becomes increasingly intense. This may explain the fact that between stage 1 and 2, the weighted strategy index is not significantly different, but between stage 1 and 3 the strategy shows a difference at the 0.10 level of significance.

6.3 ORGANIZATIONAL LIFE CYCLE, ENVIRONMENT AND STRATEGY

Following Miller and Friesen (1983a), product-moment correlations are used to examine the correlations between changes in environmental challenges and changes in strategy making. The results are as follows:

TABLE 6.3.1 PRODUCT MOMENT CORRELATIONS - CHANGES IN ENVIRONMENTAL CHALLENGES VERSUS CHANGES IN STRATEGY MAKING (LIFE CYCLE STAGE=1)

Changes in strategy making	STAGE 1 (N=32)						
	ENVIRONMENTAL CHANGE						
	DYNAMISM		HOSTILITY		HETEROGENEITY		
	Prediction of competition (DCOM)	Prediction of customers (DCUST)	Industry innovation (DINDINO)	Industry cycles (HINDCYC)	Competition intensity (HCOMINT)	Multiplexity competition (HMULCOM)	Needed diversity (HET)
Analysis:							
Futurity (AFUTUR)	-0.24+	0.00	0.09	-0.30+	-0.11	0.05	-0.03
Integration (AINTG)	-0.13	0.16	0.13	-0.18	0.26+	0.28+	0.24+
Analysis (AANAL)	0.03	0.10	0.38*	-0.04	0.43**	0.40*	0.40*
Industry Expertise (AINDEXP)	0.16	0.34*	0.28+	0.03	0.45**	0.38*	-0.21
Multiplexity (AMULT)	0.10	0.28+	0.28+	0.09	0.35*	0.38*	0.32*
Innovation:							
New products (INEWP)	0.19	0.04	0.06	-0.08	0.20	-0.04	0.00
Technology (ITECH)	0.15	0.29+	0.21	0.00	0.21	0.26+	0.05
Risk Taking (IRISK)	0.15	-0.11	0.17	-0.18	0.31*	0.09	-0.14
Proactiveness (IPRO)	0.27+	0.06	0.22	-0.12	-0.10	-0.16	0.34*
Novel solution (INOVEL)	-0.02	0.46**	0.07	-0.02	-0.13	-0.24+	0.09

Note: +,*,** The symbols indicate that the coefficient is significant at the 0.10, 0.05, or 0.01 level respectively in the predicted direction.

TABLE 6.3.2 PRODUCT MOMENT CORRELATIONS - CHANGES IN ENVIRONMENTAL CHALLENGES VERSUS CHANGES IN STRATEGY MAKING (LIFE CYCLE STAGE=2)

STAGE 2 (N=24)							
Changes in strategy making	ENVIRONMENTAL CHANGE						
	DYNAMISM		HOSTILITY			HETEROGENEITY	
	Prediction of competition (DCOM)	Prediction of customers (DCUST)	Industry innovation (DINDINO)	Industry cycles (HINDCYC)	Competition intensity (HCOMINT)	Multiplexity competition (HMULCOM)	Needed diversity (HET)
Analysis:							
Futurity (AFUTUR)	-0.06	0.12	0.36*	0.05	0.30+	0.21	0.42*
Integration (AINTG)	0.24	0.04	0.47**	0.25	0.06	0.32+	0.33+
Analysis (AANAL)	0.10	-0.07	-0.08	0.19	-0.35*	0.00	0.10
Industry Expertise (AINDEXP)	0.10	0.02	0.42*	0.27*	0.19	0.14*	0.37*
Multiplexity (AMULT)	0.00	0.18	0.47**	0.16	0.24	0.58**	0.50**
Innovation:							
New products (INEWP)	0.40*	-0.11	0.41	0.20	0.16	0.32+	0.24
Technology (ITECH)	0.51**	-0.14	0.37*	0.59**	-0.10	0.44*	0.29+
Risk Taking (IRISK)	0.28+	-0.33+	0.17	0.33+	-0.04	0.32+	0.27
Proactiveness (IPRO)	0.14	0.07	0.53**	0.21	0.21	0.63**	0.39*
Novel solution (INOVEL)	-0.12	0.15	0.15	0.17	0.00	0.34+	0.24

Note: +,*,** The symbols indicate that the coefficient is significant at the 0.10, 0.05, or 0.01 level respectively in the predicted direction.

TABLE 6.3.3 PRODUCT MOMENT CORRELATIONS - CHANGES IN ENVIRONMENTAL CHALLENGES VERSUS CHANGES IN STRATEGY MAKING (LIFE CYCLE STAGE=3)

STAGE 3 (N=18)							
Changes in strategy making	ENVIRONMENTAL CHANGE						
	DYNAMISM		HOSTILITY		HETEROGENEITY		
	Prediction of competition (DCOM)	Prediction of customers (DCUST)	Industry innovation (DINDCYC)	Industry cycles (HINDCYC)	Competition intensity (HCOMINT)	Multiplexity competition (HMULCOM)	Needed diversity (HET)
Analysis:							
Futurity (AFUTUR)	-0.31	0.04	0.55*	-0.05	-0.25	0.09	-0.02
Integration (AINTG)	-0.38+	0.03	0.50*	-0.09	-0.22	0.43*	0.27
Analysis (AANAL)	0.09	0.19	0.38+	0.43*	0.45*	0.02	0.66**
Industry Expertise (AINDEXP)	-0.03	0.18	0.30	0.19	-0.37+	0.26	0.27
Multiplexity (AMULT)	0.00	0.27	0.41+	-0.14	-0.41+	0.06	0.16
Innovation:							
New products (INEWP)	-0.02	0.12	0.19	0.02	-0.24	0.20	0.14
Technology (ITECH)	-0.63**	-0.17	0.43*	-0.11	-0.11	0.30	0.15
Risk Taking (IRISK)	-0.30	-0.07	0.48*	0.35+	-0.09	0.52*	0.52*
Proactiveness (IPRO)	-0.19	-0.06	0.39+	0.36+	-0.12	0.19	0.23
Novel solution (INOVEL)	-0.10	-0.15	0.13	-0.12	0.09	-0.26	0.26

Note: +,*,** The symbols indicate that the coefficient is significant at the 0.10, 0.05, or 0.01 level respectively in the predicted direction.

The Organizational Variables Database is used for the analyses performed in this section. From Hypothesis 5 (see Chapter 3), it has been conjectured that there should be a positive correlation between changes in strategy making and changes in environmental challenges in stage 1, 2 and 3 of the organizational life cycle.

From Tables 6.3.1, in stage 1 of the organizational life cycle model, 22 relationships among environmental and strategy making variables are significant at or beyond the 0.10 level in the predicted direction, and only three relationships are significant in an opposite direction. Following Miller and Friesen's (1983a) analyses, the probability of having 22 or more out of 25 successes when success and failure are equally probable under the null hypothesis (H_0 ;) allows us to reject H_0 with a p value of 0.0001. Similarly, in stage 2 of the organizational life cycle model (see Table 6.3.2), 27 relationships are significant in the predicted direction, and only 2 relationships are significant in an opposite direction. Therefore, the probability of having 27 or more out of 29 successes when success and failure are equally probable under the null hypothesis allows us to reject H_0 with a p-value of 0.0000 (actual value is 8.121×10^{-7}). In stage 3, 19 relationships are significant in the predicted direction, and only 4 relationships are significant in an opposite direction. Using the same argument, we reject H_0 with $p = 0.0096$. Thus, Hypothesis 5A, 5B and 5C are supported. Therefore, in general, there is a positive correlation between the changes in

environmental challenges and the changes in strategy making in all stages of our life cycle model (Average significant correlation coefficients of stage 1, 2 and 3 companies are 0.264, 0.35 and 0.26 respectively).

The next question of interest is: "Do companies do more analysis and innovation between the stages of the life cycle?" We attempt to answer this question by testing Hypotheses 6 and 7. Following Miller and Friesen (1983a), the ratio of predicted to total correlation coefficients is examined between different stages of the life cycle, using the Fisher exact test. For stage 1 and 2 companies, the ratios of predicted to total significant correlation coefficients is 22/25 (.88) and 27/29 (.93) respectively. The Fisher exact test returns a p value of 0.23. Hence, we fail to reject the null hypothesis and therefore Hypothesis 6 is not supported. Therefore, compared to companies in stage 1, companies in stage 2 of the life cycle do not do more analysis and innovation in reaction to environmental challenges.

Between stage 2 and 3 companies, the ratio of predicted to total correlation significant coefficients is 27/29 (.93) and 15/19 (.79) respectively. The Fisher exact test returns a p-value of .0641. Hence, we reject the null hypothesis and Hypothesis 7 is supported with 0.10 level of significance. Therefore, compared to stage 2 companies, companies in stage 3 do less analysis and innovation in reaction to environmental changes.

6.4 IS SATISFACTORINESS, TASK CHARACTERISTICS AND ENVIRONMENT

Hypotheses 8 to 13 suggest that the relationship between the independent variable organizational environment and IS satisfactoriness is contingent upon the level of difficulty of task characteristics. Many researchers such as Argote (1982), Schoonhoven (1981), Southwood (1978), Darrow and Kahl (1982), Gupta and Govindarajan (1984) and Sharma, Durand and Gur-Arie (1981) have suggested that the moderated regression analysis is an appropriate technique for testing contingency relationships, since it allows interaction terms, which are implied in all contingency relationships, to be directly examined.

Several other analytical techniques such as analysis of variance of dummy variable regression could have been employed to test the hypotheses. The moderated regression technique is selected due to two reasons (Covin and Slevin, 1989): (i) it provides the most straightforward and the most general method for testing contingency hypotheses in which an interaction is implied (Arnold, 1982, p.170); and (ii) it is regarded as a conservative method for identifying the interaction effects, because the interaction terms are tested for significance after other independent variables are entered into the regression equation. The interaction effects are found to be significant if and only if they explain a significantly greater portion of the variance in the dependent variable than the portion that is already explained by the other independent variables.

Following the arguments of Sharma et al. (1981), the most appropriate method for testing moderated regression analysis is to run the three regression equations given below:

$$Y = C_1 + a_1X_1 \quad (1)$$

$$Y = C_1 + a_1X_1 + a_2X_2 \quad (2)$$

$$Y = C_1 + a_1X_1 + a_2X_2 + a_3X_1X_2 \quad (3)$$

where Y is the dependent variable (IS satisfactoriness), X_1 is the theoretically defined independent variable (environmental uncertainty), and X_2 is theoretically defined moderator variable (task characteristics), and X_1X_2 is the interaction term. If a_3 is not significantly different from zero, it implies that X_2 does not have any contingency effect on the relationship between X_1 and Y. It may be noted that whenever a_3 is significantly different from zero, the coefficient of determination (R^2) for equation (3) will be significantly greater than that for equation (2). If a_2 in equation (2) is also significantly different from zero, the task characteristic is also related to IS satisfactoriness and would be considered a quasi-moderator of the relationship between environment and IS satisfactoriness. If a_3 is significantly different from zero but a_2 , in equation (2), is not, task characteristic is unrelated to IS satisfactoriness and would be considered a pure moderator of the relationship between environment and IS satisfactoriness. If the unstandardized regression coefficient a_3 is positive and significant, one would conclude that the positive impact of X_1 on Y is indeed stronger for higher as compared to lower

values of X_2 . A negative and significant a_3 would imply the opposite.

All the analyses in this section are performed at the level of three second order factors of IS satisfactoriness, namely data accessibility, quality and system reliability. To test the above hypotheses (H_8 to H_{13}), three regression models (given in equations 1 to 3) were run for each hypothesis. In equation 3, the interaction term was entered first, followed by the environment variable and task characteristics variable. This sequence of entering variables was suggested by Darrow and Kahl (1982). Table 6.4.1 to Table 6.4.6 provide the results of the regression models. Each table reports moderated regressions analyses of the three dimensions of environment, a dimension of task characteristics and a dimension of IS satisfactoriness as a dependent variable.

In Table 6.4.1, all interaction terms are significantly related to data accessibility. This suggests that the impact of three environment dimensions (dynamism, hostility and heterogeneity) have a significant influence with adhoc tasks on data accessibility at the $p < 0.05$ level. This provides unequivocal support for Hypothesis 8A - 8C. Also, it can be seen from this table that, in the case of dynamism and adhoc tasks, the adhoc tasks is also significantly related to data accessibility, suggesting it to be a quasi-moderating variable. Table 6.4.2 also shows support for Hypotheses 9A - 9C. Again, in the case of dynamism and adhoc tasks, the adhoc tasks variable is an independent predictor of quality.

TABLE 6.4.1 MODERATED REGRESSION ANALYSIS OF ENVIRONMENT, ADHOC TASKS AND THEIR INTERACTION WITH ACCESS (IS SATISFACTORINESS) AS THE DEPENDENT VARIABLE

ACCESS/ADHOC

Variables Included	Cumulative R-squared	Unstandardized Regression Coefficients ^a	F-ratio for Individual Variables	df
Dynamism	0.0082	-0.104055	1.273	1,154
Dynamism	0.10574	-0.115696	1.840	1,154
Adhoc		-0.348848	27.09 ***	1,154
Dynamism	0.17048	0.436034	1.414	1,154
Adhoc		-0.198422	13.304 ***	1,154
Dynamism X Adhoc		-0.112414	5.392 *	1,154
Hostility	0.00243	-0.121861	1.659	1,154
Hostility	0.11366	-0.038432	1.535	1,154
Adhoc		-0.289569	26.29 ***	1,154
Hostility	0.161	-0.507	1.423	1,154
Adhoc		-0.71	3.34 +	1,154
Hostility X Adhoc		-0.79128	3.917 *	1,154
Heterogeneity	0.01451	-0.12032	2.238	1,154
Heterogeneity	0.011879	-0.068154	1.293	1,154
Adhoc		-0.286154	19.187 ***	1,154
Heterogeneity(Het)	0.11882	-0.088549	0.070	1,154
Adhoc		-0.308164	2.731	1,154
Het X Adhoc		-0.30396	5.755 ***	1,154

Note:

^a Unstandardized regression coefficients are reported because, unlike standardized regression coefficients, they are not affected by changes in the points of origin of the two main variables (Adhoc and Environment variable under consideration). See Southwood (1978) for details.

- + p ≤ 0.10
- * p ≤ 0.05
- ** p ≤ 0.01
- *** p ≤ 0.001

TABLE 6.4.2 MODERATED REGRESSION ANALYSIS OF ENVIRONMENT, ADHOC TASKS AND THEIR INTERACTION WITH QUALITY (IS SATISFACTORINESS) AS THE DEPENDENT VARIABLE

QUALITY/ADHOC

Variables Included	Cumulative R-squared	Unstandardized Regression Coefficients ^a	F-ratio for Individual Variables	df
Dynamism	0.0063	-0.085624	0.981	1,154
Dynamism	0.11537	-0.097226	1.514	1,154
Adhoc		-0.347677	31.362***	1,154
Dynamism	0.18901	0.430940	1.61	1,154
Adhoc		-0.176218	7.28**	1,154
Dynamism X Adhoc		-0.107613	12.56**	1,154
Hostility	0.00001	-0.0038	0.002	1,154
Host	0.10728	0.0095	0.014	1,154
Adhoc		-0.3459	30.73***	1,154
Host	0.1673	0.0258	0.004	1,154
Adhoc		-0.331	0.832	1,154
Host X Adhoc		-0.3241	4.002*	1,154
Heterogeneity	0.0048	0.0205	0.073	1,154
Heterogeneity	0.01213	0.03187	0.295	1,154
Adhoc		-0.299316	21.924***	1,154
Heterogeneity(Het)	0.12245	0.028295	0.206	1,154
Adhoc		-0.113842	1.678	1,154
Het X Adhoc		-0.456564	8.128**	1,154

Note:

^a Unstandardized regression coefficients are reported because, unlike standardized regression coefficients, they are not affected by changes in the points of origin of the two main variables (Adhoc and Environment variable under consideration). See Southwood (1978) for details.

+ p ≤ 0.10
 * p ≤ 0.05
 ** p ≤ 0.01
 *** p ≤ 0.001

TABLE 6.4.3 MODERATED REGRESSION ANALYSIS OF ENVIRONMENT, ADHOC TASKS AND THEIR INTERACTION WITH SYSTEMS RELIABILITY (IS SATISFACTORINESS) AS THE DEPENDENT VARIABLE

SYSREL/ADHOC

Variables Included	Cumulative R-squared	Unstandardized Regression Coefficients ^a	F-ratio for Individual Variables	df
Dynamism	0.00315	0.073184	0.486	1,154
Dynamism	0.00401	0.07218	0.47	1,154
Adhoc		-0.030110	0.132	1,154
Dynamism	0.18	0.720628	2.53	1,154
Adhoc		0.613096	1.90	1,154
Dynamism X Adhoc		-0.13212	5.165*	1,154
Hostility	0.0106	0.13808	1.652	1,154
Host	0.01176	0.1394	1.673	1,154
Adhoc		-0.03472	0.177	1,154
Host	0.01358	-0.132	0.063	1,154
Adhoc		-0.2845	0.353	1,154
Host X Adhoc		0.054	0.284	1,154
Heterogeneity	0.00647	0.091	0.99	1,154
Heterogeneity	0.01333	0.109384	2.081	1,154
Adhoc		-0.031122	0.142	1,154
Heterogeneity(Het)	0.0134	0.066354	0.025	1,154
Adhoc		-0.077559	0.029	1,154
Het X Adhoc		0.008356	0.011	1,154

Note:

^a Unstandardized regression coefficients are reported because, unlike standardized regression coefficients, they are not affected by changes in the points of origin of the two main variables (Adhoc and Environment variable under consideration). See Southwood (1978) for details.

+ $p \leq 0.10$
 * $p \leq 0.05$
 ** $p \leq 0.01$
 *** $p \leq 0.001$

TABLE 6.4.4 MODERATED REGRESSION ANALYSIS OF ENVIRONMENT, TASK COMPLEXITY AND THEIR INTERACTION WITH ACCESS (IS SATISFACTORINESS) AS THE DEPENDENT VARIABLE

ACCESS/COMPLEX

Variables Included	Cumulative R-squared	Unstandardized Regression Coefficients ^a	F-ratio for Individual Variables	df
Dynamism	0.0082	-0.104055	1.273	1,154
Dynamism	0.0003	-0.017863	0.04	1,154
Complex		-0.003117	0.002	1,154
Dynamism	0.1879	-0.551972	1.3141	1,154
Complex		0.09834	1.302	1,154
Dynamism X Complex		-0.447266	4.271*	1,154
Hostility	0.00243	-0.121861	1.659	1,154
Hostility	0.01074	-0.121545	1.638	1,154
Complex		-0.008659	0.013	1,154
Hostility	0.12709	0.100975	2.72	1,154
Complex		-0.452915	3.415*	1,154
Hostility X Complex		-0.621036	3.984*	1,154
Heterogeneity	0.01451	-0.12032	2.238	1,154
Heterogeneity	0.00146	-0.090363	2.044	1,154
Complex		0.034766	0.277	1,154
Heterogeneity(Het)	0.3459	-0.103578	3.39	1,154
Complex		-0.550113	2.852	1,154
Het X Complex		-0.655261	4.38	1,154

Note:

^a Unstandardized regression coefficients are reported because, unlike standardized regression coefficients, they are not affected by changes in the points of origin of the two main variables (Adhoc and Environment variable under consideration). See Southwood (1978) for details.

- + p ≤ 0.10
- * p ≤ 0.05
- ** p ≤ 0.01
- *** p ≤ 0.001

TABLE 6.4.5 MODERATED REGRESSION ANALYSIS OF ENVIRONMENT, TASK COMPLEXITY AND THEIR INTERACTION WITH QUALITY (IS SATISFACTORINESS) AS THE DEPENDENT VARIABLE

QUALITY/COMPLEX

Variables Included	Cumulative R-squared	Unstandardized Regression Coefficients ^a	F-ratio for Individual Variables	df
Dynamism	0.0063	-0.085624	0.981	1,154
Dynamism	0.00319	0.014487	0.027	1,154
Complex		-0.052291	0.488	1,154
Dynamism	0.3708	-1.031241	5.018	1,154
Complex		-0.921886	5.789	1,154
Dynamism X Complex		-0.192538	5.35	1,154
Hostility	0.00001	-0.0038	0.002	1,154
Hostility	0.00728	-0.0011	0.106	1,154
Complex		-0.074815	1.212	1,154
Hostility	0.1789	-0.471384	2.368	1,154
Complex		0.088652	2.715	1,154
Hostility X Complex		-0.448175	4.1*	1,154
Heterogeneity	0.0048	0.0205	0.073	1,154
Heterogeneity	0.00051	0.008990	0.025	1,154
Complex		-0.017250	0.057	1,154
Heterogeneity(Het)	0.3842	-0.738899	5.823*	1,154
Complex		-0.792525	6.189*	1,154
Het X Complex		0.137296	6.23*	1,154

Note:

^a Unstandardized regression coefficients are reported because, unlike standardized regression coefficients, they are not affected by changes in the points of origin of the two main variables (Adhoc and Environment variable under consideration). See Southwood (1978) for details.

+ $p \leq 0.10$

* $p \leq 0.05$

** $p \leq 0.01$

*** $p \leq 0.001$

TABLE 6.4.6 MODERATED REGRESSION ANALYSIS OF ENVIRONMENT, TASK COMPLEXITY AND THEIR INTERACTION WITH SYSTEM RELIABILITY (IS SATISFACTORINESS) AS THE DEPENDENT VARIABLE

SYSREL/COMPLEX

Variables Included	Cumulative R-squared	Unstandardized Regression Coefficients ^a	F-ratio for Individual Variables	df
Dynamism	0.00315	0.073184	0.486	1,154
Dynamism	0.00207	0.084548	0.623	1,154
Complex		0.131332	2.075	1,154
Dynamism	0.00552	-0.361718	0.403	1,154
Complex		-0.239769	0.256	1,154
Dynamism X Complex		0.082166	0.637	1,154
Hostility	0.0106	0.13808	1.652	1,154
Hostility	0.03255	0.13232	1.54	1,154
Complex		0.15757	3.4	1,154
Hostility	0.13501	0.424141	0.399	1,154
Complex		-0.140377	0.186	1,154
Hostility X Complex		-0.442037	4.969*	1,154
Heterogeneity	0.00647	0.091	0.99	1,154
Heterogeneity	0.03718	0.102992	1.902	1,154
Complex		0.174147	3.083	1,154
Heterogeneity(Het)	0.04866	-0.399875	1.158	1,154
Complex		-0.346507	0.803	1,154
Het X Complex		0.092204	1.908	1,154

Note:

^a Unstandardized regression coefficients are reported because, unlike standardized regression coefficients, they are not affected by changes in the points of origin of the two main variables (Adhoc and Environment variable under consideration). See Southwood (1978) for details.

+ p ≤ 0.10

* p ≤ 0.05

** p ≤ 0.01

*** p ≤ 0.001

Table 6.4.3 supports Hypothesis 10A, but fails to support Hypothesis 10B and 10C, suggesting that heterogeneity and hostility do not have a significant relationship with systems reliability either independently or as an interaction term with adhoc tasks. Tables 6.4.4 to 6.4.6 show the results for hypotheses 11A - 13C. Table 6.4.4 indicates that Hypothesis 11A - 11C can be supported by the data. It also shows that task complexity is a significant independent predictor of data accessibility under hostile environments. Again, Table 6.4.5 supports Hypotheses 12A - 12C. It also shows that: (i) dynamism and complexity; and (ii) heterogeneity and complexity, are significantly and independently related (equations 3 for hypothesis 12A - 12C). The data provide support for hypothesis 13B, but not for hypotheses 13A and 13C (Table 6.4.6). From Table 6.4.1 to 6.4.6, it can be noticed that all the coefficients of significant variables are negative indicating that an increase in independent variables lead to a decrease in IS satisfactoriness.

Although we do not have conclusive evidence to explain the reasons for non-existence of these relationships, a tentative explanation could be provided from a study done by Miller and Friesen (1983a). This study suggests that an increase in heterogeneity generally requires a change in structure rather than an increase in the level of analysis. Perhaps the decentralization of operations or the divisionalization of structures becomes the sine qua non in

such settings (Chandler, 1962). Another explanation could be that there are other variables which have significantly more impact on system reliability than heterogeneity, task complexity and adhoc tasks. This observation reinforces our view that this study should only be considered as exploratory in nature and further investigations must be undertaken.

6.5 ORGANIZATIONAL LIFE CYCLE, TASK CHARACTERISTICS AND IS SATISFACTORINESS

Hypotheses 14 and 15 suggest that the relationship between the independent variable Organizational life cycle and IS Satisfactoriness is contingent upon the level of difficulty of task characteristics. The procedure used in analyzing data in this section is similar to the one described in Section 6.4. Tables 6.5.1 and 6.5.2 provide the results of the regression equations (1) - (3).

In order to test adequately Hypotheses 14A - 15C, it is necessary to calculate the partial derivatives of equation 3 with respect to variable LIFE (refer to Section 5.1). In brief, for a given hypothesis, if the ratio $-a_1/a_3$ falls within the range of values of the associated task characteristic observed in the sample, it can be concluded that the impact of LIFE on the variable of IS satisfactoriness under consideration is nonmonotonic (See Schoonhoven, 1981, for details). For Hypothesis 14A and 14B, the above ratio is 5.94 and 1.607 respectively. Similarly, for Hypothesis 15A and 15B, the ratio is 1.324 and 1.77 respectively. All the above four values fall within the range of the respective task characteristics observed in the sample (refer to Table 6.5.3 for the range of means). Therefore, organization life cycle has a nonmonotonic effect on IS satisfactoriness over the observed range of values of task characteristics variable. Specifically, organizational life cycle has a negative impact on data accessibility when the value of adhoc task is more than 5.94, and a positive impact on IS satisfactoriness

TABLE 6.5.1 MODERATED REGRESSION ANALYSIS OF ORGANIZATIONAL LIFE CYCLE, ADHOC TASKS AND THEIR INTERACTION WITH IS SATISFACTORINESS AS THE DEPENDENT VARIABLE

Variables Included	Cumulative R - squared	Unstandardized Regression Coefficients ^a	F-ratio for Individual Variables	df
ACCESS/ADHOC				
LIFE ^b	0.2866	0.194196	3.511+	1,119
LIFE	0.10615	0.190833	3.87*	1,119
Adhoc		-0.303547	17.828***	1,119
LIFE	0.191	-.1882	5.037**	1,119
Adhoc		0.05	0.084	1,119
LIFE X Adhoc		1.1178	6.954**	1,119
QUALITY/ADHOC				
LIFE	.00267	.059044	0.318	1,119
LIFE	0.11505	.055899	0.319	1,119
Adhoc		-0.284004	14.985***	1,119
LIFE	0.11699	0.27388	0.385	1,119
Adhoc		-0.200	1.248	1,119
LIFE X Adhoc		-0.44	5.257*	1,119
SYSREL/ADHOC				
LIFE	0.00037	0.026617	0.045	1,119
LIFE	0.00072	0.026407	0.044	1,119
Adhoc		-0.018972	0.041	1,119
LIFE	0.0027	-0.238	0.178	1,119
Adhoc		-0.1199	0.272	1,119
LIFE X Adhoc		0.054	0.232	1,119

Note:

^a Unstandardized regression coefficients are reported because, unlike standardized regression coefficients, they are not affected by changes in the points of origin of the two main variables (Adhoc and Environment variable under consideration). See Southwood (1978) for details.

^b LIFE is a dummy variable which represents the life cycle stage in which an organization is in.

+ p < 0.10

* p < 0.05

** p < 0.01

*** p < 0.001

TABLE 6.5.2 MODERATED REGRESSION ANALYSIS OF ORGANIZATIONAL LIFE CYCLE, TASKS COMPLEXITY AND THEIR INTERACTION WITH IS SATISFACTORINESS AS THE DEPENDENT VARIABLE

Variables Included	Cumulative R - squared	Unstandardized Regression Coefficients ^a	F-ratio for Individual Variables	df
ACCESS/COMPLEX				
LIFE ^b	.02866	.194196	3.511+	1,119
LIFE	0.03475	0.192	3.419+	1,119
Complexity		0.065	0.745	1,119
LIFE	0.1424	0.6585	1.776	1,119
Complexity		0.214	1.55	1,119
LIFE X Complexity		-0.872	3.933*	1,119
QUALITY/COMPLEX				
LIFE	0.00267	0.59044	0.318	1,119
LIFE	0.0029	0.0595	0.32	1,119
Complexity		-0.013	0.028	1,119
LIFE	0.11299	0.1097	0.048	1,119
Complexity		0.004	0.01	1,119
LIFE X Complexity		-0.1938	3.9*	1,119
SYSREL/COMPLEX				
LIFE	0.00037	0.026617	0.045	1,119
LIFE	0.041	0.019	0.025	1,119
Complexity		0.1998	4.941*	1,119
LIFE	0.04829	-0.5438	0.848	1,119
Complexity		0.02	0.009	1,119
LIFE X Complexity		0.152	0.952	1,119

Note:

^a Unstandardized regression coefficients are reported because, unlike standardized regression coefficients, they are not affected by changes in the points of origin of the two main variables (Adhoc and Environment variable under consideration). See Southwood (1978) for details.

^b LIFE is a dummy variable which represents the life cycle stage in which an organization is in.

+ p < 0.10

* p < 0.05

** p < 0.01

*** p < 0.001

TABLE 6.5.3 RANGE OF VARIABLES USED FOR MODERATED REGRESSION

Variable	Mean	Standard Deviation	Minimum	Maximum
Dynamism	4.69	.917	2.00	3.00
Hostility	4.68	.892	2.67	6.67
Heterogeneity	5.38	1.06	2.0	7.0
Accessibility	4.41	1.05	1.0	7.0
Quality	4.41	1.05	1.0	7.0
Systems Reliability	5.18	1.18	2.0	7.0
Adhoc Tasks	4.97	1.15	1.33	7.0
Task Complexity	5.40	1.12	1.5	7.0

(i.e. data accessibility), when adhoc task has a value of less than 5.94 (H_{14A}). Similarly, organizational life cycle has a negative impact on data quality when the value of adhoc task is more than 1.77, and a positive impact on IS satisfactoriness (data quality), when adhoc task has a value of less than 1.77 (H_{14B}).

Using the same arguments described above, organizational life cycle has a negative impact on data accessibility when the value of task complexity is more than 1.324, and a positive impact on IS satisfactoriness (data accessibility) when task complexity has a value of less than 1.324 (H_{15A}). Similarly, organizational life cycle has a negative impact on data quality when the value of task complexity is more than 1.77, and a positive impact on IS satisfactoriness (data quality) when task complexity bears a value of less than 1.77 (H_{15B}).

The results show that Hypotheses 14A, 14B, 15A and 15B are supported by the data. Once again, we cannot put forward any specific reasons for the rejection of these two hypotheses, except to suggest that there may be other variables which may have more impact on system reliability than organizational life cycle and task characteristics.

CHAPTER VII

SUMMARY, IMPLICATIONS AND DIRECTIONS FOR FURTHER RESEARCH

In this thesis, we have attempted to examine empirically the areas of information systems satisfactoriness, task characteristics, strategic orientation, environment and strategy, and their relationships with respect to organizational life cycle. Since this is a cross-sectional study, our results do not allow us to establish causal inferences. It would be helpful to conduct further analysis using longitudinal studies in order to obtain a better understanding in the areas we examined (Miller and Friesen, 1984).

While we have been successful in obtaining meaningful results from our areas of study, we have, as in many empirical studies, found more questions than answers. The summary of research results, their implications and directions for future research are discussed according to the following areas.

7.1 THE ORGANIZATIONAL LIFE CYCLE MODEL

In section 6.1, we have demonstrated that the various organizational dimensions of companies do vary between the different stages of the organizational life cycle. From the results of the discriminant function analysis, it has been demonstrated that in the life cycle model adopted from Smith, Mitchell and Summer (1985), 11 of the 17 items comprising life cycle indicators significantly discriminate sampled companies

into various life cycle stages. Using this model, the success rate for classifying the companies correctly is 88.24% of the time.

In this study, organizational growth, maturity, structure, decision style, and formalization are used as a basis for developing the proposed organizational life cycle model. It is conceivable that other organizational variables may also contribute to discriminating companies into the various life cycle stages. Some of these organizational variables may include culture, subculture, intraorganizational power and politics of an organization. Also, in Chapter II we have concluded that many organizational variables are linked to the organizational life cycle concept. Maybe the next logical step would be to develop a process model of organizational life cycle, which links the various relevant organizational variables together. Such a model would be useful in determining whether there is a match between a company's organizational dimensions (such as strategy, structure and culture) and external variables (such as environmental dynamism and hostility), within the context of organizational development.

7.2 ORGANIZATIONAL LIFE CYCLE AND STRATEGIC ORIENTATION

In Section 6.2, we have demonstrated that, assuming a "pure build" versus a "pure harvest" strategic continuum, companies continue to pursue a "pure build" orientation at a higher level, even when they have reached the maturity phase

of the organizational life cycle. Using the weighted strategic index developed by Gupta and Govindarajan (1984), our findings tend to be preliminary and exploratory, since the index was made available only by chief executive officers. Further analysis can be performed at the micro level, to explore what may constitute a growth versus harvest orientation. This may be accomplished by examining various dimensions such as culture, subculture, personality types, educational background, proactiveness, risk taking propensity and tolerance of stress of managers and employees at the subunit or departmental level. It is convinced that the above dimensions may have been playing an important role in affecting the strategy making process of a company, and its ability to perceive and react to the external environment. It may be useful to undertake another study to verify such relationships.

7.3 ORGANIZATIONAL LIFE CYCLE, ENVIRONMENT AND STRATEGY

In Section 6.3, it is shown that in general, companies do react to the external environment (i.e. dynamism, hostility and heterogeneity) with an increasing emphasis on strategic analysis and innovation, despite the stage an organization may be in. The results also suggest that in reaction to the external environment, companies that are in the maturity stage of their life cycle tend to pay less attention to strategic analysis and innovation process. This confirms the findings of the theoretical literature which suggests that companies

in the maturity and decline stages are generally more inflexible and ignorant of environmental changes.

In the analysis of contingency variables, many researchers have suggested the need for analyzing companies according to the industry they represent, since many similar industrial structural characteristics would provide some homogeneity within the same industry group. In this study, our sample size of 105 companies did not allow us to conduct such analyses (i.e. analyses based on the life cycle stages and their respective industry types). Hopefully, a larger sample size will shed more light on the dynamics of the various organizational variables under consideration.

7.4 IS SATISFACTORINESS, TASK CHARACTERISTICS AND ENVIRONMENT

This exploratory study sought to improve our understanding of the contingency relationships between perceived environment, task characteristics and IS satisfactoriness. The results of this study assist us in understanding how the above variables act independently and in combination. In general, the results indicate that the level of difficulty in task characteristics affects the strength of the relationship between environment and end user rated IS satisfactoriness.

The results indicate that the relationships between: (i) heterogeneity and system reliability; (ii) hostility and system reliability, are not contingent upon adhoc tasks. Similarly, the relationships between: (i) dynamism and system

reliability, and (ii) heterogeneity and system reliability are not moderated by tasks complexity. There are a number of managerial implications in this study. Huber (1984b, p.931) suggested that in the future:

" ... the increased adoption of knowledge-distributed technology, superimposed on the geometrically increasing knowledge base, will necessarily result in a knowledge environment that is dramatically more munificent (or burdening) than is today."

and

" ... the level of complexity and its absolute growth rate will be significantly greater than in the past." (p.932)

He further suggested that:

"the increasing knowledge will cause many technologies to be more effective. An important consequence of these heightened levels of effectiveness will be that individual events will be shorter in duration (Huber, 1984b)."

The greater turbulence will require organizations to make more frequent and faster decisions. These decisions will be more complex, requiring consideration of more variables and more complex relationships among these variables, leading to an increased demand for adhoc and cross-functional data.

Since the results indicate that environment and task characteristics have a negative impact on IS satisfactoriness, it will be extremely important that users' needs with respect to locating, assessing and interpreting data must be met. Appropriate mechanisms such as information centers and training programs must be established. Also, the process of systems development must pay special attention to

accessibility and quality of corporate data. Information systems planning linked with business planning may be one of the ways to ensure that future data and information needs are provided (King, 1982).

Traditional MIS provides rapid and inexpensive data. According to Daft and MacIntosh (1981) and Daft and Lengel (1986), such systems may be suitable when the tasks are analyzable and task characteristics primarily include task variety. However, for adhoc tasks (entailing unanalyzable tasks) requiring data to reduce equivocality, such systems may not be appropriate. New technologies such as group decision support systems should be implemented for providing data for unanalyzable tasks (Huber, 1984a). These systems allow face-to-face discussion and access to databases. They provide the user with the ability to think and work individually with extant databases, while exchanging ideas with others through verbal discussions (Huber, 1984a).

The implications of this study outlined above are significant. These implications, however, must be looked at in light of several other considerations.

While some of the results of moderated regression analysis were statistically significant and consistent with the hypotheses, none of the complete regression equations explained more than 18 percent of the variance in IS satisfactoriness. This may suggest that other organizational context variables may be equally or more important than

environment and task characteristics in predicting IS satisfactoriness.

Several authors including Gordon and Narayanan (1985), Chenhall and Morris (1986) and Leifer (1988) have argued that organizational structure affects information processing requirements and information processing capacity of an organization. Fredrickson (1986) suggested that organizational structure helps management to control the decision making environment and facilitate the processing of information. Bower (1970) posited that when management chooses a particular organizational form, it is providing not only a framework for current operations, but also the channels along which strategic information will flow.

It has been suggested in the emerging body of literature in strategic management that the existing strategy of an organization may be an important variable in the design of information systems (Gordon and Narayanan, 1985). A number of researchers have shown that the design of information systems have a significant impact on user satisfaction (Ives, Olsen and Baroudi, 1983). It is plausible that the design may have a similar impact on IS satisfactoriness.

Organizational slack can absorb a substantial amount of environmental variability (Cyert and March, 1963). Top managers may choose to consume slack by reducing their performance aspirations (Bourgeois, 1981) , and thus may be able to limit their analysis activity (Huber, 1982). This may in turn have an impact on their information satisfactoriness.

7.5 ORGANIZATIONAL LIFE CYCLE, TASK CHARACTERISTICS AND INFORMATION SYSTEMS SATISFACTORINESS

This study has provided strong support for the argument that the alignment between organizational life cycle and task characteristics is associated with IS satisfactoriness (data accessibility and data quality only). The data clearly suggest that as organizations progress through life cycle, the task characteristics play an extremely important role in determining IS satisfactoriness.

The most important application of this study, which must be substantiated with additional research, is that as organizations progress through the life cycle, there is a tendency of formalization of structure, which in some instances leads to reduction in organizations' ability to perceive challenges and changes in their environment, resulting in decreased need to process information. Also, individual task characteristics may affect the users' satisfactoriness with information systems.

In spite of declining information processing needs, the organization must provide support and training and other infrastructure for the users when the need for adhoc tasks and task complexities is high.

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APPENDIX A
CEO QUESTIONNAIRE AND COVER LETTER



THE UNIVERSITY OF MANITOBA

FACULTY OF MANAGEMENT
Department of Actuarial and Management Sciences

Winnipeg, Manitoba
Canada R3T 2N2

Date

Address

Dear Sir/Madam:

We are seeking your support as a participant in a study that attempts to establish the relationship between organizational life cycle and information requirements of users. The outcome of the study is likely to provide an understanding of how organizations should develop their management information systems departments.

The intensified pace of competition evident in the 1980's has accelerated the use of information systems as a competitive device. Increasing numbers of organizations are making large investments in the design and implementation of information systems. Therefore, this study attempts to explore the crucial factors in information systems which may lead to organizational success.

Most organizations go through a life cycle with identifiable stages of initiation, growth, maturity and decay. Since each stage of growth in an organization has its own unique set of characteristics, we believe that the information requirements in different stages will also be different. This research is designed to study the process of how and what type of information systems should be developed in each stage of the life cycle, and to explore the following issues: (i) how managers use data, (ii) how information systems play a part in organizations, and (iii) what role do information systems play in decision making.

The enclosed questionnaires have been approved by the ethics committee of the Faculty of Management. The data provided by the respondents will be handled with utmost care and in the strictest confidence. The questionnaires are fun to fill out and will take about fifteen minutes of the participant's time.

Please complete the questionnaire titled "The Role of Information and data in Management Decision Making", and ask any three users of computer(s) at senior management level in your company to complete the questionnaires titled "End User Data Information Requirements Questionnaire". The people who are completing the questionnaire titled 'End User Data and Information Requirements Questionnaire' need not have experience in using computer terminals or personal computers. In this context, users of computers include: i) "indirect" end users who use computers through other people, ii) "intermediate" end users who specify business information requirements for reports they ultimately receive and use for business purposes, and iii) "direct" end users who actually use terminals (or personal computers). If you have any query, please write or call me at
or contact my research assistant Mr. David Chin at

We will be glad to provide you with your company's relative position on the variables we are testing in a disguised format. Should you wish to receive a copy of the general results, please indicate this on the next page.

Thank you very much for your cooperation,

Yours truly,

Yash P. Gupta, Ph.D., P.E.
Professor and Head

YPG/dc

Enclosures (2)

A. GENERAL COMPANY BACKGROUND

1. What unit are you responsible for in your company? DEM1

☐ Entire Company☐ Division _____
Please specify2. Please indicate the year in which your organization was established 013 (YEARS)

3. Company (Division) Gross Revenues: 014

- | | |
|---|---|
| <input type="checkbox"/> under 20 million | <input type="checkbox"/> 500 million to 600 million |
| <input type="checkbox"/> 20 million to 100 million | <input type="checkbox"/> 600 million to 700 million |
| <input type="checkbox"/> 100 million to 200 million | <input type="checkbox"/> 700 million to 800 million |
| <input type="checkbox"/> 200 million to 300 million | <input type="checkbox"/> 800 million to 900 million |
| <input type="checkbox"/> 300 million to 400 million | <input type="checkbox"/> 900 million to 1 billion |
| <input type="checkbox"/> 400 million to 500 million | <input type="checkbox"/> over 1 billion |

4. Please indicate the rate of growth in sales dollars in the past five years, assuming 1984 as 100. (e.g. If there was a 20% increase in sales dollars from 1984 to 1985, then the value under 1985 is 120.) (INDSALES)

1984	1985	1986	1987	1988
100	<u>0011</u>	<u>0012</u>	<u>0013</u>	<u>0014</u>

5. Please provide an estimate of the total number of employees in your organization 015.

6. Please indicate the rate of growth in the total number of employees in the last five years, assuming 1984 as 100. (e.g. If there was a 20% decrease in the total number of employees from 1984 to 1985, then the value under 1985 is 80.) (INDEMP)

1984	1985	1986	1987	1988
100	<u>0021</u>	<u>0022</u>	<u>0023</u>	<u>0024</u>

7. Please indicate the category which best describes your business (or major business) (please check one): DEM2

- ☐ Agriculture, forestry, and fishing
- ☐ Automotive products
- ☐ Chemical, petroleum, and coal products
- ☐ Education
- ☐ Engineering or construction
- ☐ Finance and banking
- ☐ Hospital and health care
- ☐ Insurance
- ☐ Manufacturing or Processing
- ☐ Mining
- ☐ Public Administration
- ☐ Retail Trade
- ☐ Services (non-information systems related)
- ☐ Services (information systems related)
- ☐ Transportation, communications, electric, gas, and sanitary services
- ☐ Wholesale trade
- ☐ Others (please specify) _____

B. ABOUT YOUR ORGANIZATION

Please answer the following questions about your organization. The questions deal with your organization's type of structure, reward systems, budgets, methods of decision making, and background of management.

Organizational structure

1. To what extent is your organization's structure formally defined? (please check one) 003

- () No formal structure (reporting relationships and lines of authority are not formally defined).
- () Slight formal structure (reporting relationships are underlined by informally understood).
- () Partial formal structure (portions of the organization's lines of authority and communication are defined).
- () Formal structure (most of the reporting relationships and lines of authority are formally defined).
- () Very formal structure (all reporting relationships and lines of authority are formally defined).

2. To what extent do members of your organization adhere to the formal structure? (please circle) 008

never	seldom	sometimes	frequently	always
1	2	3	4	5

3. To what extent is your organization's structure centralized vs decentralized? 004

A structure is **centralized** when all decisions, authority and flow of communication is directed and referred up the hierarchy. Decisions are made at the top of the organization.

A structure is **decentralized** when decision authority and flows of communication are mostly balanced between upper and lower levels. Upper level management sets guidelines for decisions to be made at lower levels of the organization.

decentralized		combination		centralized
1	2	3	4	5

4. When information needs to be communicated within and across departments or divisions, to what extent do organizational members communicate by a formal communication system (e.g. memos) vs. informal, face to face communication system? 005

always informal	frequently informal	50 % formal	frequently formal	always formal
1	2	3	4	5

Administration of Rewards and Incentives

1. To what extent is the system of rewards and incentives in your organization administered by objective, specific, and systematic criteria vs. subjective and unsystematic? 006

always subjective 1	frequently subjective 2	50% subjective 50% objective 3	frequently objective 4	always objective & systematic 5
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2. To what extent is the formal system of rewards and incentives (specified in advance) formally adhered to by management? 007

never 1	seldom 2	sometimes 3	frequently 4	always 5
------------	-------------	----------------	-----------------	-------------

Budgets

1. To what extent does your organization adhere to the operating budgets? 009

never 1	seldom 2	sometimes 3	frequently 4	always 5
------------	-------------	----------------	-----------------	-------------

2. What is the typical time horizon of the short-term budgets (in months)? (please provide the closest answer) STBUD

3 months	6 months	9 months	12 months	18 months
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3. What is the typical time horizon of the long-term budgets (in years)? (please provide the closest answer) 010

1/4 year	1/2 year	1 year	3 years	5 years
----------	----------	--------	---------	---------

4. Is there a management information systems department in your company? IS1

() No () Yes

5. If there is no management information systems department in your company, who is responsible for management information systems functions in your company? (please provide concise comment) IS2

6. If there is a management information systems department in your company, what is the total budget of the information systems department in the past 5 years? (please provide the closest estimate as a percentage of total sales)

1984	1985	1986	1987	1988
<u>IS3</u> %	<u>IS4</u> %	<u>IS5</u> %	<u>IS6</u> %	<u>IS7</u> %

Method of Decision Making

1. To what extent is the method of decision making used by top management in your organization one of:

- a) **entrepreneurial** - where one individual makes decisions?
b) **professional** - where specialists make decisions based on expertise and analytical tools? 011

always professional 1	frequently professional 2	50% professional 50% entrepreneurial 3	frequently entrepreneurial 4	always entrepreneurial 5
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Changes in Internal Operating Practices Over the Past 5 Years

Analysis

How far ahead do top level managers look into the future to anticipate market conditions (competition, customer tastes, operations technology)	They have adopted a much shorter time perspective AFUTUR	1 2 3 4 5 6 7 No change	They now look much further in to the future
Concern by top executives for the meshing of new decisions with existing strategies (e.g. building new facilities so that they are compatible with old, introducing new products/services which can use existing marketing and production facilities, etc.):	Has decreased greatly AINTEG	1 2 3 4 5 6 7 No change	Has increased greatly
Time spent by top managers on analyzing key decisions (e.g. in-depth research of alternatives, etc.):	Has been substantially reduced AANAL	1 2 3 4 5 6 7 No change	Has increased substantially
The understanding of the market's characteristics (e.g. competitor tactics, customer needs) by the firm's senior management:	Has decreased very much AINDEXP	1 2 3 4 5 6 7 No change	Has increased a great deal
The range of factors which are considered in decision making (i.e. do managers find it necessary to consider many more different business aspects than before?):	No much change over past 5 years AMULT	1 2 3 4 5 6 7 No change	Much wider range of factors considered

Innovation

The rate, relative to competitors, of new product/service introduction by the firm:	Has decreased very much INEWP	1 2 3 4 5 6 7 No change	Has increased very much
---	----------------------------------	----------------------------	-------------------------

The rate of change in your methods of production or rendering of services:	Rate of change has declined much ITECH	1	2	3	4	5	6	7	Change has accelerated rapidly
					No change				
Risk taking by key executives of the firm in seizing and exploring 'chancy' growth opportunities:	Has decreased very much IRISK	1	2	3	4	5	6	7	Has increased very much
					No change				
In dealing with its competitors, the firm:	Resorts much more to a live and let live philosophy IPRO	1	2	3	4	5	6	7	Has become much more aggressive
					No change				
Seeking of unusual, novel solutions by senior executives to problems via the use of 'idea men', 'brainstorming', etc):	Has become less common INOVEL	1	2	3	4	5	6	7	Has become much more common
					No change				

Background of Top Management

Please distribute 100 points among the following three categories based on the proportional make-up of the top level management group in your organization.

- 0121 Jack of all trades - flexible, not using any dominant skill.
- 0122 Functional specialists - management is made up of accountants, finance experts, engineers, etc.
- 0123 Strategists, planners - management has generally gained expertise by serving top level management positions in other organizations.

100

Industrial Positioning

1. The following are the descriptions of several alternative strategies that might represent the strategy for all, a portion, or none of the product lines of the company (division). Please indicate below the percentage of your company's (division's) current total sales is accounted for by product lines which is represented by each of the strategies. Your answers should total 100%. None of these strategies is necessarily good or bad.

AKG1 % Increase sales and market share (10% or more annually) by willing to accept low returns on investment in the short-to-medium (1 to 3 years from now), if necessary.

AKG2 % Maintain market share and obtain reasonable return on investment (ROI).

AKG3 % Maximize profitability and cash flow in the short-to-medium term (1 to 3 years from now), by willing to sacrifice market share if necessary (10% or more annually).

AKG4 % Prepare for sale or liquidation in the next year.

AKG5 % None of the above. Please specify: _____

100

2. In your view, how would you classify your company (division) to be? (please check one) GRID

() **Star:** A company (division) which has high market share in a highly growing industry.

() **Cash cow:** A company (division) which has high market share in a maturing industry.

() **Dog:** A company (division) which has low market share in a maturing or declining industry.

() **Question mark:** A company (division) which has low market share in a growing industry.

3. How would you describe the industry in which your company (division) is operating: (please check one) INDSTG

() Slightly growing industry.

() Growing industry.

() Maturing industry.

() Declining industry.

Changes in the Company's (division's) External Environment Over the Past 5 Years.

Market activities of your key competitors: DCOM	Have become far more predictable	1	2	3	4	5	6	7	Have become far less predictable
					No change				
The tastes and preferences of your customers in your principal industry: DCUST	Have become far more stable and predictable	1	2	3	4	5	6	7	Have become much more harder to forecast
					No change				
Rate of innovation of new operating processes and new products or services in your principal industry: DINDINO	Rate has fallen dramatically	1	2	3	4	5	6	7	Rate has dramatically increased
					No change				
Your principal industry's downswings and upswings: HINDCYC	Have become far more predictable	1	2	3	4	5	6	7	Have become far less predictable
					No change				
Market activities of your key competitors: HCOMINT	Have become far more hostile	1	2	3	4	5	6	7	Have become far less hostile
					No change				
Market activities of your key competitors: HMULCOM	Now affect the firm in far fewer areas	1	2	3	4	5	6	7	Now affect the firm in many more areas (e.g. pricing, delivery, service, quality, etc.)
					No change				
Needed diversity in your production methods and marketing tactics to cater to your different customers: HET	Diversity has dramatically decreased	1	2	3	4	5	6	7	Diversity has dramatically increased
					No change				

APPENDIX B
END USER QUESTIONNAIRE AND COVER LETTER



THE UNIVERSITY OF MANITOBA

FACULTY OF MANAGEMENT
Department of Actuarial and Management Sciences

Winnipeg, Manitoba
Canada R3T 2N2

Dear Sir/Madam:

RE: END USER DATA AND INFORMATION REQUIREMENTS QUESTIONNAIRE

We are seeking your support as a participant in a study that attempts to establish the relationship between organizational life cycle and information requirements of users. The outcome of the study is likely to provide an understanding of how organizations should develop their management information systems departments.

The intensified pace of competition evident in the 1980's has accelerated the use of information systems as a competitive device. Increasing numbers of organizations are making large investments in the design and implementation of information systems. Therefore, this study attempts to explore the crucial factors in information systems which may lead to organizational success.

Most organizations go through a life cycle with identifiable stages of initiation, growth, maturity and decay. Since each stage of growth in an organization has its own unique set of characteristics, we believe that the information requirements in different stages will also be different. This research is designed to study the process of how and what type of information systems should be developed in each stage of the life cycle, and to explore the following issues: (i) how managers use data, (ii) how information systems play a part in organizations, and (iii) what role do information systems play in decision making.

The enclosed questionnaire has been approved by the ethics committee of the Faculty of Management. The data provided by the respondents will be handled with utmost care and in the strictest confidence. The questionnaire is fun to fill out and will take about fifteen minutes of your time.

Please complete the questionnaire titled "End User Data and Information Requirements Questionnaire". You need not have experience in using computer terminals or personal computers in order to fill out this questionnaire. In this context, users of computers include: i) "indirect" end users who use computers through other people, ii) "intermediate" end users who specify business information requirements for reports they ultimately receive and use for business purposes, and iii) "direct" end users who actually use terminals (or personal computers).

If you have any query, please write or call me at
or contact my research assistant Mr. David
Chin at

We will be glad to provide you with your company's relative
position on the variables we are testing in a disguised format.
Should you wish to receive a copy of the general results, please
indicate this on the next page.

Thank you very much for your cooperation,
Yours truly,

Yash P. Gupta, Ph.D., P.E.
Professor and Head

YPG/dc

Enclosures (2)

Please indicate the extent to which you agree or disagree with the following statements about your use of corporate or divisional data.

ID

	Strongly Disagree		Neither Agree nor Disagree		Strongly Agree		
On the reports or systems I deal with, the exact meaning of data elements is either obvious, or easy to find out. S27	1	2	3	4	5	6	7
Frequently my need for information arises on an irregular schedule and is not predictable in advance. T1	1	2	3	4	5	6	7
Data are safeguarded from unauthorized changes or use. S38	1	2	3	4	5	6	7
I am getting the training I need to be able to use corporate or divisional data effectively in my job. S51	1	2	3	4	5	6	7
Getting authorization to access data that would be useful in my job is time consuming and difficult. S53	1	2	3	4	5	6	7
It is easy to learn how to use the computer systems that give me access to data. S34	1	2	3	4	5	6	7
Frequently after I see what data are available or what the data say, I change my view of the problem and of what data are needed. T5	1	2	3	4	5	6	7
Quantitative information is important to me in doing my job. T24	1	2	3	4	5	6	7
It is easy to find out what data the corporation maintains on a given subject. S18	1	2	3	4	5	6	7
Overall I believe there are some important problems with the way corporate or divisional data are managed and made available that make it harder to do my job. S45	1	2	3	4	5	6	7
I frequently deal with ill-defined business problems. T6	1	2	3	4	5	6	7
When it's necessary to compare or aggregate data from two or more different sources, there may be unexpected or difficult inconsistencies. S13	1	2	3	4	5	6	7
There are accuracy problems in the data I use or need. S11	1	2	3	4	5	6	7
I frequently deal with ad hoc, non-routine business problems. T2	1	2	3	4	5	6	7

Please indicate the extent to which you agree or disagree with the following statements about your use of corporate or divisional data.

	Strongly Disagree		Neither Agree nor Disagree		Strongly Agree	
The computer systems that give me access to data are convenient and easy to use. S35	1	2	3	4	5	6 7
I can't get data current enough to meet my needs. S47	1	2	3	4	5	6 7
I am not getting as quick a turnaround as I need on requests for new reports or data. S25	1	2	3	4	5	6 7
The business problems I deal with frequently involve more than one organization group. T14	1	2	3	4	5	6 7
People in my group have participated in the design of some of the important information systems we use. X1	1	2	3	4	5	6 7
<hr/>						
There is not enough training on how to find, understand, access or use corporate or divisional data. S50	1	2	3	4	5	6 7
My company or organization has a strong commitment to developing and supporting information systems. X2	1	2	3	4	5	6 7
Frequently in the midst of using data to address some issue, I may decide to restate the problem and access slightly different data than I had at first planned. T8	1	2	3	4	5	6 7
Sometimes it is difficult or impossible to compare or aggregate data from two different sources because the data is defined differently. S15	1	2	3	4	5	6 7
It is more difficult to do my job effectively because some of the data I need is not available. S5	1	2	3	4	5	6 7
<hr/>						
The data maintained by the corporation or division and the way it is provided adequately meet my needs. S46	1	2	3	4	5	6 7
Frequently the business problems I work on involve answering questions that have never been asked in quite that form before. T7	1	2	3	4	5	6 7
There is a great deal of variety in the problems, issues, or questions for which I need data in my work. T3	1	2	3	4	5	6 7
Data that would be useful to me is unavailable because I don't have the right authorization. S52	1	2	3	4	5	6 7

Please indicate the extent to which you agree or disagree with the following statements about your use of corporate or divisional data.

	Strongly Disagree		Neither Agree nor Disagree			Strongly Agree	
There are times when supposedly equivalent data from two different sources is inconsistent. S14	1	2	3	4	5	6	7
The problems I deal with frequently involve more than one business function. T13	1	2	3	4	5	6	7
It is easy to get access to data that I need. S21	1	2	3	4	5	6	7
The data is up-to-date enough for my purposes. S49	1	2	3	4	5	6	7
In my work I frequently have to think about business problems and the associated data in new ways. T9	1	2	3	4	5	6	7
<hr/>							
The data maintained by the corporation or division is exactly what I need to carry out my tasks. S3	1	2	3	4	5	6	7
It is easy to get assistance when I am having trouble finding or using data. S32	1	2	3	4	5	6	7
There are so many different systems or files, each with slightly different data, that it is hard to understand which one to use in a given situation. S58	1	2	3	4	5	6	7
I can count on the system to be "up" and available when I need it. S42	1	2	3	4	5	6	7
Sensitive data is protected from those who should not have access to it. S39	1	2	3	4	5	6	7
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Frequently it is necessary to spend a fair amount of time thinking about how best to address a business problem before I begin an analysis. T4	1	2	3	4	5	6	7
I find the corporate data dictionary (dictionaries) useful. X3	1	2	3	4	5	6	7
When business requirements change it is easy to change the selection and format of data made available by our computer systems. S24	1	2	3	4	5	6	7
I am getting the help I need in accessing and understanding data. S30	1	2	3	4	5	6	7
Sufficiently detailed data are maintained by the corporation or division. S7	1	2	3	4	5	6	7

Please indicate the extent to which you agree or disagree with the following statements about your use of corporate or divisional data.

	Strongly Disagree		Neither Agree nor Disagree		Strongly Agree	
Our computer systems are too inflexible to be able to respond to my changing needs for the data. S23	1	2	3	4	5	6 7
The computer systems available to me are missing critical data that would be very useful to me in my job. S2	1	2	3	4	5	6 7
For business problems I deal with, the data collection is defined or designed by people outside my group. T15	1	2	3	4	5	6 7
It is easy to locate corporate or divisional data on a particular issue, even if I haven't used those data before. T17	1	2	3	4	5	6 7
The data are subject to frequent system problems and crashes. S41	1	2	3	4	5	6 7
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The exact definition of data fields relating to my tasks is easy to find out. S28	1	2	3	4	5	6 7
For many issues I deal with, I need good quantitative data. T25	1	2	3	4	5	6 7
The data that I need are displayed in a readable and understandable form. S54	1	2	3	4	5	6 7
The data are stored in so many different places and in so many forms that, it is hard to know how to use it effectively. S59	1	2	3	4	5	6 7
The data that I use or would like to use are accurate enough for my purposes. S10	1	2	3	4	5	6 7
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All in all, the corporate or divisional data are satisfactory in meeting my needs. S44	1	2	3	4	5	6 7
Data dictionaries or data directories are useful to me in locating or understanding the meaning of corporate or divisional data. X4	1	2	3	4	5	6 7
I need some data on the up-to-the minute status of operations or events but cannot get it. S48	1	2	3	4	5	6 7
My company or organization has a strong commitment to developing and supporting end user computing. X5	1	2	3	4	5	6 7
The data are presented in a readable and useful format. S55	1	2	3	4	5	6 7

Please indicate the extent to which you agree or disagree with the following statements about your use of corporate or divisional data.

	Strongly Disagree		Neither Agree nor Disagree			Strongly Agree	
I can get data quickly and easily when I need to. S20	1	2	3	4	5	6	7.
The company maintains data at an appropriate level of detail for my purposes. S8	1	2	3	4	5	6	7
My group has had significant input into the design of the systems we use. X6	1	2	3	4	5	6	7

Please rate the data environment in your organization by indicating how important it is in each of the following aspects to you.

Please assess how important in meeting your needs each aspect of the data environment is to you.

	Not at All Important				Very Important		
	1	2	3	4	5	6	7
The Right Data (maintaining the needed basic fields or elements of data). X7							
The Right Level of Detail (maintaining data at the right level or levels of detail). X8							
Accuracy (correctness of the data). X9							
Compatibility (ease with which data from different sources can be aggregated or compared without inconsistencies). X10							
Locatability (ease of determining what data is available and where). X11							
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Accessibility (ease of access to desired data). X12							
Flexibility (ease of changing the content or format of the data to meet changing business needs). X13							
Meaning (ease of determining what a data element on a report or file means, or what is included or excluded in calculating it). X14							
Assistance (ease of getting help on problems with the data). X15							
Ease of Use of Hardware and Software (ease of doing what I want to do using the system hardware and software for accessing and analyzing data). X16							
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Security (protection of data from intentional misuse). X17							
Systems Reliability (dependability of access and up-time of systems). X18							
Overall (degree to which the overall data environment meets my needs). X19							

Please rate the data environment in your organization by indicating how satisfactory is each of the following aspects to you.

Please indicate how satisfactory in meeting your needs you find the data environment.

	Very Unsatisfactory				Very Satisfactory		
The Right Data (maintaining the needed basic fields or elements of data). S1	1	2	3	4	5	6	7
The Right Level of Detail (maintaining data at the right level or levels of detail). S6	1	2	3	4	5	6	7
Accuracy (correctness of the data). S9	1	2	3	4	5	6	7
Compatibility (ease with which data from different sources can be aggregated or compared without inconsistencies). S12	1	2	3	4	5	6	7
Locatability (ease of determining what data is available and where). S16	1	2	3	4	5	6	7
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Accessibility (ease of access to desired data). S19	1	2	3	4	5	6	7
Flexibility (ease of changing the content or format of the data to meet changing business needs). S22	1	2	3	4	5	6	7
Meaning (ease of determining what a data element on a report or file means, or what is included or excluded in calculating it). S26	1	2	3	4	5	6	7
Assistance (ease of getting help on problems with the data). S29	1	2	3	4	5	6	7
Ease of Use of Hardware and Software (ease of doing what I want to do using the system hardware and software for accessing and analyzing data). S33	1	2	3	4	5	6	7
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Security (protection of data from intentional misuse). S37	1	2	3	4	5	6	7
Systems Reliability (dependability of access and up-time of systems). S40	1	2	3	4	5	6	7
Overall (degree to which the overall data environment meets my needs). S43	1	2	3	4	5	6	7