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Linking environmental scanning to marketing strategy: Factors influencing vertical communication of externally scanned information

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The University of Arizona, 1994
Linking Environmental Scanning To Marketing Strategy:
Factors Influencing Vertical Communication of Externally Scanned
Information

by

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This study develops a conceptual model for managerial control of environmental scanning behavior in their subordinate organizations. It is developed within a boundary-spanning framework where the boundary of the organization is part of the conceptualization of the environmental scanning process. Aggregate and individual effects specific to the organizational boundary layer are included in the conceptual model. Environmental scanning behavior is stimulated and focussed by managers like a "push-pull" pump. Subordinate perceptions of managerial communication are central to the "pump mechanism." Perceptions of strategically important themes for the organization supply the push to engage in environmental scanning. Perceptions of managerial receptivity to external information on strategic themes supply the pull. In concert these factors draw environmental information across the organizational boundary, then vertically in the organization, making environmental information available to senior management.
The marketing manager requires information from outside the organization to guide his/her organization. A number of popular inventories of information managers should gather are in the research and professional literature. Exactly what information is valuable to a specific organization's marketing strategy at any point in time depends largely on the specific circumstances of that firm. Marketing managers are advised to gather information on the competitors it faces, the types of customers served, the industry, new technology of all sorts, governmental regulations and much more. Gathering information is a prerequisite activity to strategy decisions in virtually every treatment of marketing, even if the high costs of comprehensive information are not discussed.

Marketing professionals are particularly attuned to this need as it falls to those in the marketing discipline to be primary agents of environmental adaptation for their organizations. Marketing managers are major participants in shaping and making a variety of organizational decisions that alter the firms activities, goals and use of resources. New product development and introduction is one example of such a strategic decision. Choosing strategic alliances or acquisition targets, distribution channels, new markets to be entered are more examples of strategic adaptations in which marketing professionals play a
fundamental role if not the lead role. All of these decisions require the sifting of substantial amounts of outside information for much smaller amounts of information vital to the specific decision.

The obvious problem is that environmental information which is actually valuable is very small compared to the ever increasing volume of non-valuable information. The problem facing organizations and their senior managers is: How to sift the important information needles from the ever larger haystacks? Is this seeking of valuable outside information a natural tendency of organization? If so, can it be stimulated and focussed by managers? What managerial behavior will stimulate environmental scanning behavior? Are there any drawbacks in attempting to focus outside information gathering, and what techniques can reduce such problems? These are the questions explored by the study reported below.

The study results are at the same time both expected and surprising. The expected results are that searching out and acquiring valuable outside information (environmental scanning) boosts organizational performance. The specific managerial behavior that stimulates and focusses this behavior has a ring of common sense. The surprising part is that the gathering behavior itself is subject to outside influences. Information may become distorted as it crosses the organizational boundary. In crossing the organizational boundary, outside information produces some negative side effects within the organization as well as
positive effects.

This last point has important implications for organizational research. Organizational boundaries are less arbitrary and ephemeral than many models of organizational behavior would admit. Organizational boundaries have a reality similar to cell membranes in Molecular and Cellular Biology. Outside information must come in contact with a favorable receptor at the boundary in order to enter the organization. Once within the organization, it may be transported along three available pathways to affect the organization. First, it can be communicated horizontally where the effect is generally negative. Horizontally communicated information may later be communicated vertically where it has a larger and positive effect on performance. Finally, environmental scanning may affect organizational performance directly and positively.

CONCEPTUAL FRAMEWORK FOR ENVIRONMENTAL SCANNING

The approach in this study is to build a conceptual model of environmental scanning behavior in organizations. This model draws on the idea that certain types of individuals in organizations are boundary-spanners. That is, their organizationally defined roles require contact and interaction with entities outside the formal boundaries of the firm. Sales and customer service personnel and their managers are boundary-spanners. So are many senior executives, middle managers and senior marketing staff.

The theoretical model (Figure 1) posits that communication behavior of
senior managers stimulates and focusses the environmental scanning behavior of their subordinate organization. Environmental scanning is defined by a small group of "strategic themes" established by senior managers' oral and written communication. The communication also needs clarity and a goal orientation. This perceived importance of a strategic theme leads to increased environmental scanning for outside information that relates to that theme. The subordinate's level of commitment to the strategic theme also increases the extent of environmental scanning. The link between perceived importance and environmental scanning is moderated by the interaction between external signals the scanner receives from outside the organization and their level of commitment. These outside signals can modify the dimensions along which environmental scanning is done.

When strategically valuable information is recognized in the firm's environment the scanner can choose to acquire the information and pass it along within the organization. The scanner may communicate among her/his peers (i.e. horizontally) or with management (i.e. vertically) within the organization. This study found that before information is communicated vertically, respondents first circulated their outside information horizontally. Organizational performance is
affected positively by the information that is communicated vertically, but negatively when it is being circulated horizontally. There is also a positive direct link between environmental scanning and organizational performance that is not mediated by peer or managerial communication. This indicates that organizations engage in environmental adaptation in ways that do not involve senior management.

METHOD

The methodology chosen for testing the conceptual model of environmental scanning was survey methodology and regression analysis. The behavior being examined is closely tied to the organizational setting and the presence of organizational strategy. An appropriate data gathering methodology when the natural setting is important is a survey of participants in the setting being studied.

The North American Pulp and Paper industry was chosen for the survey sample because of its wide variation in the size of firms, and because the survey participants could be identified by title and organizational position. The participants needed to have at least two levels of management over them and have job titles that were clearly marketing functions. The industry was also chosen for variation on the strategic theme chosen for the survey, new product development. A large percentage of firms do little to no new product development. A percentage of specialty paper manufacturers engage in a relatively high degree of new product development. A wide variation in
Technological sophistication was also a valuable characteristic of the sampled firms. Technological advances are a major dimension of environmental change and often of central concern to new product development efforts, either in the product itself or in the means of production or distribution.

Data Collection

The data collection methods used were those typical of self-administered surveys. Participants were selected from an industry directory. A total of 235 firms and SBU's of firms were in the sample. SBU's in multi-divisional firms were used if they had independent marketing staff listed in the industry directory for that business unit and otherwise fulfilled the requirements of the sample.

Participants were sent an initial letter requesting participation, a survey instrument and a postage paid return envelope. After 3 weeks non-responding participants were sent a reminder letter, and after 3 more weeks were sent a second reminder letter and an additional copy of the survey and another return envelope. A total of 105 responses were received and 89 usable surveys were coded for analysis.

Measurement

This theory of environmental scanning behavior is tested by adapting measurement scales from the organizational behavior and social psychology literature and developing new scales for some variables. Measurement scales in the survey instrument were constructed with 3-8 items for each of the main study
variables.

Analysis of Survey Data

To test that each variable proposed in the model was a distinct and measurable concept, a statistical test of scale reliability was conducted, called Cronbach’s Alpha. The reliability of all scales with 3 or more items was .7 or better, except commitment and external signals scales which had coefficient alphas of .66 and .64 respectively. The cognitive tuning scale had a coefficient alpha of .4 and was dropped from the analysis. All variables and appeared to be approximately normally distributed.

A questionnaire has a participant respond to a number of items that measure the variables used in a study. There needs to be some check that the participant is responding to the questions for each variable separately (discriminant validity), and not just responding to their perceptions of the study’s overall intent (halo effect or multicollinearity). Tests for these two conditions were performed.

The Pearson Product Moment correlation matrix was computed for the scale items used to measure each of the study variable. The correlations between questionnaire items on the same variable should be higher than those between questionnaire items belonging to different variables. In virtually all instances the inter-item correlations were higher than the inter-variable correlations indicating the study data had good discriminant validity, and that multicollinearity as not a
serious concern.

Regression analysis using the method of Ordinary Least Squares (OLS) was used to test the conceptual model in this study. Regressions conducted on the survey variables confirmed the conceptual model in most respects.

RESULTS

The results of the regression analysis confirm that organizations scan the environment based on a small number of strategic themes. These strategic themes, like the new product development theme in this study, are strongly influenced by oral and written communication from the firm's senior management. The perceived importance of these themes drives environmental scanning across the organization. Perceived strategic importance has three components in this study: i) Frequency of communication, ii) Clarity, and iii) Goal Orientation. To maintain a strategic theme as important senior management must reinforce its importance. Clarity means to communicate importance such that subordinates can successfully anticipate how managers want variations on a strategic theme handled. Goal orientation has two aspects confirmed in this study. First, managerial communication on a strategic theme should link to goals for the firm as a whole. Second, manager's communications on a strategic theme should link to goals for externalities of the organization (customers, suppliers, competitors, etc.).
An external goal orientation appears to have the stronger effect on extent of
environmental scanning than one centered on the firm itself.

Once a strategic theme is generally perceived as important to the organization and strategically valuable information is scanned by subordinates, that information can move vertically toward senior decision makers. The degree to which senior managers are perceived as receptive to new outside information is fundamental to drawing strategically valuable information upward through the managerial ranks. An important factor in developing perceptions of managerial receptivity is a reciprocal communication style. Reciprocal communication is where the senior manager exchanges valuable information when they communicate with subordinates.

Valuable outside information does not move directly toward senior management like on an elevator, but is first circulated across the organization. This horizontal communication precedes vertical communication of outside information.

The performance implications of this behavior are that horizontal circulation of outside information negatively influences organizational performance. The vertical communication of external information has a larger positive influence on organizational performance than horizontal communication has a negative one. Finally, there seems to be one other direct benefit from environmental scanning in subordinate organizations. There seems to be a direct positive effect on organizational performance from environmental scanning that
has no connection to managerial communication, but stems directly from the scanning activity itself.

The final aspect of this study was to examine whether strategically valuable information undergoes any selection or distortion effects as it encounters the organizational boundary. There were two types of effects included in the study. First, external signals were considered to be outside expert opinion on the strategic theme. Second, cognitive tuning is a long established psychological effect where new information is distorted by the recipient's intent to communicate that new information to someone else.

The measurement scale developed for cognitive tuning based on the laboratory experiments failed to demonstrate adequate reliability. However, the questionnaire items for external signals achieved reasonable reliability and were tested as a part of the environmental scanning model. External signals relative to a strategic theme have a direct effect on the extent of environmental scanning. External signals also interact with a subordinate's commitment to the firm's strategic themes, in which case the effect reduces the extent of environmental scanning.
CHAPTER 2

INTRODUCTION

Information gathering has long been considered a vital preliminary activity to formulating marketing strategy. Writings on market management routinely prescribe gathering a wide assortment of internal and external information to support analyses of customers, competition, and the industry (Aaker 1988; Kotler 1980; Porter 1981). Gathering this information has significant resource implications for the firm both in time and money. However, treatments in marketing focus primarily on the assimilation of information once it is within the organization and give little to no attention to specific external information scanning activities. External information gathering (or environmental scanning), has been examined in a descriptive sense in previous research (Agilar 1967; Fahey and King 1977; Lenz and Engledow 1986). This stream provides little managerially oriented insight joining external scanning to benefits for the firm’s strategy. The firms who implemented the widely suggested environmental scanning unit as a separate and specialized unit offer little direct evidence of successfully enhancing firm performance (Lenz and Engledow 1986). This paper provides a theoretical framework for environmental scanning and assimilation which allows marketing managers to stimulate and focus this activity for the information it contributes to marketing strategy and organizational performance.

In this framework, environmental scanning is positioned as a boundary-
spanning activity performed by individuals within the firm. These boundary-spanning individuals and their external information scanning activities provide the routes for external information to cross the firm's boundary and, under favorable conditions, into market management decision making (Lyonsky 1985; Eisenhart 1989). The conditions under which boundary-spanning activities can contribute to the formation of new marketing strategy is an important marketing topic and has begun receiving the attention of marketing researchers (Hutt, Reinhold & Ronchetto 1988).

The environmental scanning literature is in an embryonic state in marketing. None of the previous research has closely investigated what happens to information near the organization's boundary, nor what managerial behaviors might influence the quality and amount of environmental scanning done within the ranks of their subordinate organizations. Senior executives tend to allocate a significant portion of their time to boundary-spanning activities and may consider information gathered through these activities as highly important to strategy decisions (Watson 1990). The intent of this study is to i) develop a managerially oriented framework for environmental scanning, ii) to empirically validate the framework through consideration of a particular dimension of environmental scanning--technological information, and iii) suggest that new approaches to environmental scanning are available to management. The proposed framework provides insight by linking specific managerial behavior with specific dimensions
of environmental scanning and the vertical transmission of scanned information within the firm. The study also investigates information distortion and feedback effects that can alter scanning and assimilation behavior at the organization's boundary.

This paper is organized in three sections. In the first section, the conceptual framework is developed. It describes the factors fostering or hindering the extent of external scanning, including distortion and feedback effects that scanned information encounters at the organization's boundary. In the second section the proposed research methods are described, including sampling, measurement and statistical analysis with anticipated results. The third section is a discussion of this study's anticipated results and their implications within marketing and related fields.

CONCEPTUAL FRAMEWORK

The conceptual framework (Figure 1) illustrates the basic concepts and linkages proposed in this study. Several literatures and associated theories are drawn upon to support the principal hypotheses. These are the literature on organizations as interpretive systems (see Daft and Weick 1984), the embryonic scanning literature (see Kennedy 1984; Miller and Friesen 1983), contingency theory (Lawrence and Lorsch 1967; Galbraith 1977; Miles and Snow 1978), and organizational communications (Conrad 1985; Lewis 1987). These theories have
substantial empirical support and permit the linking of key aspects of managerial communication with scanning behavior of subordinates (junior managers) in organizational settings.

Communication from a functional area manager (i.e. marketing manager) can drive the perceptions of the functional area's strategy in subordinates (Bennis 1989; Pascarella and Frohman 1990). It is widely accepted that one of the fundamental tasks of management communication is to convey the strategy of the organization and its major subunits, often termed functional areas (see for example Drucker 1978 or Galbraith 1977). Subordinates, (i.e., junior managers) tend to interpret this information and organize the results as perceptions (Lewis 1987; Pascarella and Frohman 1989). The perceptions which drive environmental scanning are hypothesized to be composed of elements (Lewis 1975), which are here termed strategic themes and will be more carefully defined shortly. Based on these perceptions, subordinates engage in some level of external scanning of information sources of potentially relevant information (i.e., technological innovation or industry trends). When scanned information is linked to one or more strategic themes the linkage may be such that the subordinate chooses to communicate it (i.e., a "hit"). This communication may be directed horizontally, as among peers, or vertically toward senior management. The conceptual model is analogous to a push-pull mechanism--perceived importance provides the "push" for external scanning behavior, while managerial receptivity provides the "pull",
drawing the information upward in the organization where it can be input to strategy decisions. It is this vertical communication which is the central focus of the conceptual development in this paper. In the discussion below we elaborate the theoretical model and research hypotheses.

Management communications, perceived importance and information receptivity

It is well established in the management and communications literature that management communications can be a driving influence in the formation of subordinate's perceptions of the organization's purpose (see Bennis 1989 or Pascarella and Frohman 1989). One of the basic assumptions of organizational communications theory is receivers of management communication are active information processors (Lewis 1987). The result of their information processing is represented as perceptions, constructed to organize stimuli presented to them in the organization setting. Construction and change of perceptions are held to be cumulative, ongoing processes (Lewis 1987). These perceptions can be viewed as a characteristic of the organization (Daft and Weich 1984), or in this study, an organizational sub-unit. Much of the empirical work in organizational communications concerns itself with the structure and content of these
perceptions, linkages to organizational performance, and how managers affect the perceptual structure (Level 1972; Melcher and Beller 1967; Wilson, Goodall and Waagen 1986).

Strategic themes are (following Pascarella and Frohman 1989) the small number of core management topics which represent the essential purpose and methods for organizational tasks assigned to the functional area organization. The manager's communication of strategy is assumed to derive directly from the organizational purpose for the functional area, and the importance of a strategic theme is part of that communication.

In the case of a marketing functional area, the strategic themes of the area's strategy, organized as goal oriented statements, might be characterized as:

- Best possible account coverage for market segments X, Y, and Z.
- Use new technology to improve product quality.
- High responsiveness to special product requirements.
- Minimize forecast uncertainty.
- Develop promising new product ideas and additional product applications.

To the extent the functional area manager regularly and consistently communicates a goal oriented strategy for the strategic themes of his/her area of responsibility, the more likely it is management communication over time produces a structuring of the perceptions of subordinates to match the strategic
themes advanced by the functional manager. The greater the clarity of communication a manager has achieved the more junior managers can act on matters closely related to a strategic theme. This dimension of a strategic theme's importance is supported by studies in sales functional areas, where clarity of managerial communication was linked to salespersons' perceptions of performance goals and job performance (Futrell 1975).

Other studies provide support for both the extent of communication (or number of instances of a particular message) and the clarity of the message as having a positive relationship with acceptance of the message's assertions (Gollob, Rossman and Abelson 1973). Clarity is frequently used in organizational communications studies as being closely related to consistency. In this study clarity is used in the sense that consistent communication achieves clarity when the receivers find predictive value in a consistently communicated message. A subordinate "already knows how the manager will respond" to this variation of a particular theme.

Frequent and consistent communication of the strategy for a functional area is more effective when done in a goal-oriented style is a long accepted tenant of organizational theory (Galbraith 1977; Pascarelli and Frohman 1989; Bennis 1989). The goal orientation of that communication can influence the perceived importance of external information in contributing to that goal. Goal orientations for a functional area are usually described in one of three forms in the
organizational design and management literature.

First, the goals can be defined within the context of the functional area itself, i.e., "just do your job." Alternatively, the goal orientation can be described by linking performance of the functional area to overall performance measures of the firm or business unit, i.e., meeting the production schedule, expenses, or achieving product quality standards. Both of these orientations are internal to the firm, the functional area being a narrower and more limited one that the overall firm orientation.

A third way is to describe the goal orientation is in terms of external referents of the organization such as competitive position, customer needs or other goals tied to externalities of the firm. The more clearly linked a strategic theme is to external environmental trends and conditions the more important external information might be valued by an individual in contributing to achievements of the functional area. The goal statement that directly incorporates external referents provides the most direct linkage possible between a theme's other elements and an external trend or condition facing the firm. The earlier examples of goal oriented statements could be restated to explicitly reference external trends and conditions by stating them as:

- Superior account coverage for high potential customers in growing market segments X, Y, and Z.
- Use new technology to improve the quality a customer sees in every
stage of their experience with our firm's products and services.

- Understand customers and their environments so we can favorably respond to their special product or service requirements.
- Understand the market and competitive trends that influence customers' demand for our products and services so forecasts can minimize uncertainty.
- Identify, understand and develop new industry segments in which to apply our products, including new technologies and new products.

To the extent the functional area manager links the communication of the area's strategy to externally defined goal orientations, the more likely external information related to those strategic themes will be considered important by the individuals in that area. This goal orientation provides, for a scanner, a linkage between something important within the firm and something important outside the firm.

To summarize, our argument on strategic themes and perceived importance asserts that a functional area's strategy is composed of a small number of strategic themes. The perceived importance of a strategic theme has three dimensions for subordinates engaging in environmental scanning. First, the regular and consistent communication of the strategic theme as a part of the area's strategy. Second, the clarity of communication in that clarity allows subordinates to act on variations of the strategic theme. Third, the goal orientation of managerial
communication provides linkages between something important inside the firm and something important outside the firm.

The theoretical relationship of managerial communications and subordinate’s perceptions includes upward communication from subordinates to manager as well as downward communications already discussed. The style of a manager’s communication may indicate to receivers that their contributions or participation is desired (see Bennis 1989, or Wilson, Goodall and Waagen 1986) for discussion). There are studies in the communications literature suggesting which managerial communication style leads to increased vertical communication on topics considered important by subordinates. The style factors are the availability of the manager for receiving vertical communication, the reciprocal nature of information sharing by the manager (termed exposure in the literature), displaying a perceptiveness regarding the felt need of subordinates to communicate, and a willingness to initiate upward vertical communication exchanges (Falcione 1976; Robertson 1973; Wofford and Summers 1978). In this study’s approach, these style factors are termed cooperative communication style. The previous studies also indicate that the managers’ downward communication does not interact significantly with the receptivity style factors (Falcione 1976). If information on external trends and conditions is a motivational factor for subordinates as suggested by Bateman and Miller (1979), then the more consistently a functional area manager communicates management topics in a
cooperative manner, the more that subordinates develop the perception of managerial receptivity to additional (new) information related to these management topics (Robertson 1973), which includes the strategic themes discussed previously. There is empirical support for managerial receptivity to external information being part of a characteristic pattern of innovative small manufacturing firms (Kahn and Manopichetwattana 1989). This linkage between management communication style and perceived managerial receptivity is captured in H1 below.

**Perceived Managerial Receptivity**

**H1:** The more cooperative the style of internal management communications concerning strategic themes, the more subordinates perceive that management is receptive to additional information linked to those specific themes.

Linking perceived receptiveness & importance to environmental scanning

The dimensions of environmental scanning have previously been studied according to the source usage, importance and frequency of utilization (Kefalas and Schoderbek 1973). Sources of environmental information available to individuals have been characterized as internal sources like company libraries (containing externally published periodicals), or internal databases, gatekeepers, personal external sources like consultants, and personal subscriptions (Culnan 1983). Other studies of environmental scanning have included as information sources suppliers to the organization, government research agencies, university
laboratories and fields of applied scientific research (Cohen and Levinthal 1990). Some previous classification schemes for information sources are ambiguous. For example, a research journal published by an outside organization located in the company library being classified as a source internal to the firm. These distinctions could also be confounded with perceived importance or receptivity, like a technical library maintained at company expense.

The definition used in this study for extent of environmental scanning is the number of qualitatively different sources of outside information (personal or impersonal) external to the organization or internal, periodically scanned by one or more members of the organization. Individuals engaged in scanning activity may do so on a regular basis. Alternatively, environmental scanning may occur as part of regular or ad-hoc efforts like an semi-annual planning effort or in response to exogenous events, respectively. This definition encompasses the forms of environmental scanning used in previous studies (Fahey and King 1977).

It has been long established that information on external trends affecting the organization is of the highest or near highest importance to corporate employees (Bateman and Miller 1980). This is assumed to indicate a motivation for scanning behavior. Specific studies of external technical communication have supported that the scanner's level of uncertainty about the competitive environment of the firm is a motivator of external scanning behavior (Brown and Utterback 1985).
**Extent Of Environmental Scan**

**H2a:** The greater the perceived importance of a strategic theme, the greater the extent of environmental scanning.

When engaged in scanning activity, the scanner may vary the level of scanning activity (i.e., the amount of time spent scanning external information sources) and the choice of sources according to his/her perceptions of the kind of information being sought. The scanner's goal orientation is hypothesized to provide the basis for recognizing whether scanned information is related to an important goal of the organization. We argue that inherent in certain goal orientations is an information structure, of varying degrees of completeness, for external scanners to develop an interpretation of new external information relating it to strategic themes of the organization. Of the three goal orientations previously described, the least complete orientation for relating external information is the functional area orientation. A more complete orientation is the firm overall, and the most complete orientation is the external trends and conditions orientation, as this orientation is defined as containing conceptual linkages between an individual's functional area in the firm and the firm's external environment. In effect, the less structure the individual must create in linking external information to a strategically important theme, the more likely relevant external information will be linked to a strategic theme (of perceived importance). This linkage of perceived importance of strategic themes and the extent of
external scan is captured in Hypothesis 2b below.

**Goal Orientation Of Perceived Importance**

H2b: The extent of environmental scan for information on strategic themes (perceived as important) will be least for those strategic themes communicated with an internal functional area goal orientation, greater for internal firm overall goal orientation, and highest for an external trends and conditions orientation.

Previous research in organizational communication and social psychology has developed empirical support for linkages between an individual's level of commitment, information valence and receptivity to novel information and perspectives in two ways. First, receptivity to new information related to a specific topic is directly related to the receiver's level of commitment to decisions or action related to that topic (Brock and Albert 1970). The receptivity is to both new information related to familiar perspectives, and to new perspectives. Second, novel information that was supportive of the decisions or commitments of the receiver is generally preferred over new but unsupportive information. Committed receivers actually tended to avoid unsupportive new information. Conversely, there was no support for receiver preference for familiar information or familiar points of view. This direct effect of commitment on environmental scanning is captured in Hypothesis 2c below. The extent the scanners perceptions of the importance of a strategic theme drives their environmental scanning behavior should also be affected by the level of commitment a subordinate has to a strategic theme.
This linkage of perceived strategic importance, individual commitment to strategic themes and the extent of environmental scan is captured in Hypothesis 2c, and Hypothesis 2d below.

**H2c:** The greater the commitment of an individual to a particular strategic theme the greater the extent of environmental scanning.

**H2d:** The commitment of an individual engaging in external scanning on the strategic themes of an organization moderates the effect of the perceived importance of strategic themes on extent of external scanning.

**Role of external signals**

An apparently unexamined possibility in environmental scanning literature is the question of whether the information scanned has an effect on subsequent scanning behavior of the scanner by modifying the basic perceptions driving what s/he scans. This aspect of the proposal is especially intriguing from a theoretical standpoint. If information crossing the boundary can alter the behavior of individuals engaged in boundary spanning activities like scanning, or if the information itself should acquire some kind of bias or distortion at the firm’s boundary it could affect the way boundary spanning theory is developed in marketing and other disciplines. The empirical testing of theoretical constructs may need to test the properties of social boundaries present in the context of the study. Boundaries in social systems are often defined by the presence of systematic differences between one side and the other (Lawrence and Lorsch...
1967), the existence of systematic properties within the boundary is seldom considered. A notable exception is a study of emergent strategic change within an organization where critical activity shaping organizational change occurred within the boundary layer (Hutt, Reingen and Ronchetto 1988).

For example, in this conceptual model, the dimensions of scanning are driven by perceptions structured largely on communications internal to the organization. The possibility exists that scanners may scan outside information that causes them to modify the set of strategic themes for which they engage in environmental scanning. Additionally, they may alter the importance weighting(s) of strategic themes which guide their scanning activities. Either change could alter scanning behavior in three ways. First, the sources they include in their environmental scanning could change on a long-term basis. Second, the importance weightings given to current strategic themes could change. Third, outside signals could prompt the inclusion or deletion of themes in their perceptual system.

Previous experimental research in social psychology provides support for this effect. The literature terms it message discrepancy on attitude changes at the individual level. Discrepant messages (i.e., scanned information at odds with perceived important strategic themes) can produce a sustained change in the receiver's attitudes under the conditions of i) high receiver involvement (i.e., commitment), ii) high source credibility, and iii) high message clarity (Beatty and
In addition, the same process that is hypothesized to link managerial communications to perceptions of strategically important themes in individuals engaged in environmental scanning (Gollob and Rossman 1973) is also expected to operate with regard to external communication. These external signals seem more likely to change perceptions of strategically important themes as opposed to perceived managerial receptivity since the effect is hypothesized to be specific to the scanner, not the manager.

This hypothesis on external signals is supported by two studies in the environmental scanning area. One study points out that uncertainty, as used in many scanning studies, is really two constructs, rate of environmental change and unpredictability of change (Miles, Snow and Pfeffer 1974). Another of these earlier studies supports the existence of causal links between level of uncertainty, level of environmental scanning, and increased lateral communication in an organization (Utterback and Burack 1975). We argue here that a scanner's recognition of external information as a signal to change the weighting or structure of the strategic themes (perceived as important) constitutes recognition of environmental change. Therefore, we expect this to lead to a tendency to modify perceptions of important strategic themes to conform to the content of external signals.

Sources of external signals can be media reports, personal contacts who
have credibility or expertise in the same or related areas, sources in the industry such as suppliers, consultants, trade reports or primary technological information sources such as reports from researchers or technical laboratories specializing in the product class, industry or related technologies. The same sources that are scanned for external technology may also provide information which alters scanning behavior. The specific role of source expertise as a major influence in the effect of external signals is suggested by its well documented influence in a related marketing area—organizational buying (Kohli 1989). These two dimensions of external signals effect on environmental scanning is captured below.

**External Signals**

**H3a:** The more specific and credible external signals are to strategic themes, the more likely junior managers are to modify their perceptions of the importance (weighting) of strategic themes to match external signals.

A direct corollary to the above hypothesis follows from considering the extent external signals interact with the scanner’s personal commitment. If an individual, who is committed to a strategic theme, sees external signals they might affect important as s/he thought (H3a). It follows that the extent personal commitment motivates the scanner to continue environmental scanning is also reduced.

**H3b:** External signals on a strategic theme moderate the link between the scanner’s commitment to that strategic theme and the extent of environmental scan.
Communication of Scan Results

An individual engaged in external scanning has to perceive a relevant linkage between external information and something of importance to the firm before an intent to communicate the information (either horizontally or vertically) within the firm can be formed. Earlier studies of environmental scanning report increased scanning of external technical information is followed by increased lateral (horizontal) communication in the organization (Utterback and Burack 1970). This provides empirical support for the formation of intent to communicate scanned information.

A strategic theme with an external goal orientation provides an established structure incorporating something important within the firm with conceptual linkages to something important outside the firm. This goal orientation of strategic themes provides a more complete structure for relating new external information to what is important to the firm and senior management. The perceived importance of a strategic theme influences the extent of external scan, and that extent increases the likelihood of relating new external information to those themes and forming the intent to communicate that relevant new information. This linkage between extent of external scan and intent to communicate is captured in H5a below:

Communication Of Scan Results

H4a. The greater the extent of external scan, the more likely the scanner
is to form an intent to subsequently communicate relevant information within the firm.

Earlier studies in social psychology and organizational communications have investigated aspects of managerial communications behavior and the tendency of subordinates to communicate vertically. A previous study in a sales setting on the effectiveness of scanning customer accounts for new competitive product introduction concludes that vertical communication of scanning results depends upon the perception of managerial receptivity (Robertson 1973). There is also a well established tendency for subordinates to preferentially transmit information to superiors depending on the valence of the information with regard to the receiving superior. Positively valenced information was more readily transmitted to a superior, i.e., vertically (Rosen, Johnson, Johnson and Tesser 1973).

Three aspects of managerial behavior positively affect managerial credibility and can increase the vertical communication from subordinates. Demonstration of managerial perceptiveness of and receptivity to feedback from subordinates are two important dimensions of managerial behavior. A third is the degree of reciprocity in communications (i.e., exchanging ideas and other information in a reciprocal manner) with subordinates, facilitates the manager's credibility with subordinates and increases upward communication of ideas and other information from subordinate to manager (Falcione 1976). Managerial
credibility was the variable of interest in the study, but the linkage is supported between managerial perceptiveness of feedback (i.e., recognizing when subordinates have information they wish to share), receptiveness to feedback from subordinates and upward communications. These studies provide an empirical basis for linking information from environmental scanning with subsequent vertical communications.

H4b. The greater the perceived receptivity of the manager to additional information on (perceived) strategically important themes, the greater the upward (vertical) communication of relevant externally scanned information from subordinates.

Another stream of previous research examined the influence of an information scanner's intent on the structure of information the scanner subsequently transmits. The concept is called cognitive tuning in the literature. The original hypothesis was that the intent to transmit information at the time of reception influences the cognitive structure of the receiver and 'polarizes' the structure of the information they subsequently transmit (Zajonc 1960; Cohen 1961). Studies of the cognitive tuning effect support the hypothesis that the intent to transmit scanned information leads an individual to accentuate scanned information that supports the scanner's impressions (perceptions) of the intended receiver's attitudes and suppress or minimize dissonant or conflicting information (Mazis 1973). The implication of this experimental research is that strategically important information becomes biased at the organization boundary if the
scanner's intent is to transmit the information within the organization (i.e., make the information available to those making market management decisions)\(^1\). The degree of polarization was previously found not to be affected by expertise of the source or of the audience (Mazis 1973). However, these previous studies did not include an organizational communications setting, nor the manager-subordinate relationship. Information to be transmitted vertically within the organization may be subject to this distortion to a greater extent than information subsequently transmitted horizontally. In vertical communication the subordinate would be expected, at least in the short term, to be more concerned about acceptance of the message by a superior, compared to acceptance of the message by a co-worker.

**H5:** The greater the scanner's intent to vertically transmit externally scanned relevant information the greater the extent of (cognitive tuning) polarization bias in the information.

The confirmation of this hypothesis presents a dilemma to managers interested in fostering environmental scanning contributions to strategic issues like market strategy decisions. The implications and possible solutions are developed in the discussion section.

The effect of environmental scanning on organizational performance has received little empirical support (Kefalas and Schoderbek 1973). Senior

\(^1\) This polarization could also be accentuated if information is retransmitted within the organization as part of its vertical journey.
management, responsible for the firm's strategy, makes most of the major
decisions on adapting the organizational strategy to the demands and
opportunities afforded by the environment. Presumably the more strategically
valuable information they have available the better the organizational
performance. Therefore, it is hypothesized that vertical communication of
environmental information (on a strategic theme) has a positive relationship with
firm performance.

H6a: The greater the vertical communication of environmental
information the better the organizational performance.

Environmental information may also be communicated by a subordinate
among his/her peers. This would be information circulated horizontally within
the organization. Environmental information on a strategic theme, circulated
horizontally, could have a positive effect on organizational performance if it leads
to better strategic adaptation to the environment. The strategic adaptation would
have to be one within the authority of a junior manager, which may not be as
likely as it would at first appear. The alternative hypothesis is that horizontal
circulation of environmental information would make more salient any strategic
maladaptation with respect to a strategic theme. A strategic theme that is in a
maladaptive state could have a negative effect on organizational performance, as
the circulation of environmental information on that theme would make its
maladaptive state more widely known.
These two alternative hypotheses on the effect of horizontal communication of environmental information are captured below.

H6b: The greater the extent of horizontal communication of strategically valuable external information, the greater the organizational performance.

H6c: The greater the extent of horizontal communication of strategically valuable external information, the lower the organizational performance.

RESEARCH METHODS

This study is concerned with individual behavior related to functional area levels of organizations and the scanning and subsequent communication of relevant environmental information. For the empirical aspects of the paper, a specific strategic theme for external information was chosen—new product development, and the new technology so often involved in these efforts. Environmental scanning for technological information, as opposed to most other dimensions of environmental scanning, has been established as more intensive in the lower levels of the organization's hierarchy, and more concentrated in specific functional departments like R&D and Production (Kefalas and Schoderbek 1973).

Sample

An appropriate source of respondents would be a specific industry's middle level marketing professionals. Such individuals are in an organizational position to report their perceptions of strategy and the extent externally acquired information is communicated vertically or horizontally. There are several reasons for choosing
the pulp and paper industry for use in this study. The industry has two major segments. One that engages in minimal new product development, and another segment of specialty paper producers that does engage in new product development. The rate of technological change is moderate, present in both segments, but not extreme like semiconductors, computers or aerospace. Finally, the pulp and paper industry has an industry directory that identifies senior and junior management and senior staff by functional area and job title making it possible to select a sample of middle level marketing staff and junior managers. All respondents were selected from firms and SBU’s of large firms where at least two levels of management above the respondent were present at the respondent’s location.

Data Collection

The survey procedures used will be those widely accepted for self-administered questionnaires (Rossi, Wright and Anderson 1983). This sampling frame provides a basis for the study results being representative of the pulp and paper industry. Generalization beyond this industry will be possible only to the extent that it is considered representative of information gathering processes in other industries. On this point it is appropriate to recall a widely cited study of environment and organization set in the chemical industry (Lawrence and Lorsch 1967).

Members of the industry were contacted by mail with a request letter and
postage pre-paid return envelop and survey questionnaire. Two reminder letters to survey participants (at 3 and 5 weeks after initial survey mailed) achieved a reasonable level of completed surveys.

The survey was pretested using the marketing departments in cooperating local chemical firms, considered similar enough to pulp and paper firms for purposes of this survey. A key informant who was recently a senior executive in a large firm in the pulp and paper industry was also used to review the questionnaire prior to mailing.

Measurement

Several measures already exist in the literature for constructs proposed here. Organizational communications (House and Rizzo 1972), organizational commitment (Cook and Wall 1980), and extent of environmental scanning activity (Kefalas and Schoderbek 1973). These sources contain measures with 5 or more items (most use 5 point scales) for most constructs used in this study. These measures and other background material will be adapted where necessary for the specific context of this study (see Appendix B for sample measures).

Analysis

The data from the survey instrument was analyzed according the following steps. [1] Test the unidimensionality of the measures of the theoretical constructs (Gerbing and Anderson 1988). [2] Compute Cronbach alphas to determine the reliability of scale measures (See Table 1). [3] Conduct a test for multicollinearity
among measures of independent variables using the VIF (Variance Inflation Factor) (Neter, Wasserman, and Kutner 1985, 391-3). The constructs for perceived importance and perceived receptivity are the specific focus of this step. [4] Use regression techniques to estimate the conceptual model shown in Figure 1.

Table 2 below shows the construct intercorrelation and Cronbach Alpha's. The table shows that the scales developed for this study have acceptable levels of scale reliability (α > .70) in nearly every case. The one major exception is the scale for cognitive tuning which has a coefficient α = .40. The scales for commitment to strategic theme and external signals are slightly below .70 at .66 and .64, respectively. These values are only slightly below the generally accepted threshold of .70, and are believed to be adequate justification for retaining the scales in the rest of the analysis.

The intercorrelations between constructs are within a range of -.17 to .87. The construct correlations are examined for evidence the constructs have an adequate degree of construct discriminant validity. The concepts measured by the
scales must be distinct and separate. In only two cases are the high construct correlations near the Pearson Product Moments computed for the individual questionnaire items making up a measurement scale. The first is the correlation between a managerial cooperative communication style and the perceived importance of a strategic theme. The second is between managerial receptivity and cooperative communication style.

The scale for measuring cooperative communication style has two sub-scales. One subscale is four items for managers engaging in reciprocal communication, the second is three items for managerial availability to subordinates. The six correlations between the four cooperative communication items range from .61 to .74. Three correlations are greater that .70 and the other three are .61, .61 and .65. This provides some evidence of discriminant validity in addition to the conceptual definition of the constructs cooperative communication style and perceived importance being quite different. Examination of the wording in the scales in Appendix B demonstrates the scale elements between the two constructs are quite different. The scale for managerial receptivity is also quite different from cooperative communication style.

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Insert Table 2 about here

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Table 3 provides a summary of the regression analysis used to test each hypothesis. The table lists the specific hypothesis, the dependent variable with the adjusted $R^2$ for the regression model and the individual predictor (independent) variable(s).

Hypothesis 1 tests cooperative style of managerial communication as a predictor of perceived managerial receptivity. The hypothesis is supported with a positive coefficient and $p < .05$.

The hypotheses on the antecedents of the extent of environmental scanning were supported as follows. Hypothesis 2a linking perceived importance to extent of environmental scanning is supported with a positive coefficient and $p < .01$. Hypothesis 2b compares two elements of perceived importance, the goal orientation. The hypothesis is supported by comparing two regression models where the entire perceived importance scale is replaced with the sub-scale items for the overall firm, and separately with sub-scale items for external orientation. The overall firm orientation has a positive coefficient of .413 versus a positive coefficient for external orientation is .558, both a statistically significant at the $p < .1$ and $p < .05$ levels respectively.

Hypothesis 2c links the commitment of a junior manager (to the strategic themes of the organization) to the extent s/he will engage in environmental scanning for information related to that strategic theme. Commitment to Strategic Theme predicts Extent of Environmental Scan with a positive coefficient
and $p < .1$. In addition, Hypothesis 2d, which posits an interaction effect for commitment and perceived importance and is not supported by the sample data.

The conceptual model is based on a parallel between organizations and cellular biology support for boundary effects. Hypothesis 3a provides support for a boundary effect influencing the ability of an organization to recognize and absorb valuable environmental information across the organizational boundary. External signals predict the extent of environmental scanning. Hypothesis 3a is supported with a positive coefficient with $p < .05$. Hypothesis 3b posits that external signals interact with the level of commitment junior managers have to the strategic themes of the organization. This hypothesis is supported with a positive coefficient on an interaction term (Commitment $x$ External Signals) with $p < .1$.

The intent to communicate was included in the conceptual model to test a second form of boundary effect for environmental scanning, cognitive tuning. The link between extent of environmental scan and intent to communicate does not receive support. Extent of environmental scan does not predict the intent to communicate—either horizontally or vertically. However, additional analysis demonstrates that perceived importance is a significant predictor of intent to communicate horizontally (among peers), $p = .06$, as is commitment to the strategic theme, $p = .052$. These results are possibly spurious due to the construction of the scale involved. The questionnaire items for intent to communicate posit a hypothetical recognition of valuable information and ask the
respondent to weight the given alternatives according to his/her most likely course of action. These items do not directly reflect the respondent’s natural setting, even if they include a "similarity to recent situations" weighting factor. Hypothesis 5 receives no support from the analysis. There was not a sufficiently high scale reliability as indicated by a Cronbach's Alpha of .40, nor were there statistically significant results of a regression.

Hypothesis 4b receives support from the regression analysis both in terms of managerial receptivity being a significant predictor of vertical communication as stated in Hypothesis 4b, p < .05, but also in terms of the moderator role in the conceptual model in Figure 1. The regression shows that the established predictor for managerial receptivity, cooperative communication style is statistically significant in predicting vertical communication without receptivity in the regression equation. Cooperative communication loses statistical significance when managerial receptivity is added as a predictor of vertical communication. This confirms the variable as a moderator, as hypothesized in the conceptual model.

Finally, hypothesis 6a,b,c were tested using the 6 measures of organizational performance used by (Kohli & Jaworski, 1990). Hypothesis 6a is supported by the regression results. The coefficient is positive and significant with p < .001. Hypothesis 6c is supported over hypothesis 6b by the results for horizontal communication. The coefficient is positive and significant with p < .05.
There are some additional analysis results. Table 4 shows the results of a regression analysis that supports the role of horizontal communication as a mediator variable between the extent of environmental scan and vertical communication. This result supports a conclusion that subordinates in an organization will prefer to communicate new environmental information among peers before attempting to communicate the information vertically toward senior management.

Analysis of organizational performance revealed (see Table 3, H6a,b,c) there are three direct influences on organizational performance. Environmental scanning can have a direct, positive impact on organizational performance. When environmental information is first acquired at the boundary of the organization, there is a tendency for it to circulate horizontally. This horizontal communication apparently has a negative effect on organizational performance. After it circulates horizontally, it may be communicated vertically with a larger, positive coefficient.
Much like cell metabolism can have multiple pathways, valuable information has multiple pathways within the organization. Performance can be improved as a direct consequence of senior management engaging the "push-pull" pump mechanism combining importance of strategic themes with receptivity on those same themes. These results are consistent with the findings on communication patterns within research laboratories (Allen 1967; Allen and Cohen 1969). The earlier study demonstrated that information gathered by many people in the organization would flow toward "gatekeepers" in order to be communicated vertically within the organization. This study includes specific performance implications of this behavior pattern.

The empirically supported model for environmental scanning behavior is shown in Figure 2. Perceived importance and perceived receptivity provide the "push-pull" mechanism that managerial communication behavior can stimulate and focus. External signals are an important consideration for senior managers. The interaction between external signals and the individual organizational commitment indicates that managers who wish their subordinates to ignore the outside environment are engaging in self-defeating behavior. Subordinates respond to external signals by modifying the dimensions along which they engage in environmental scanning. Managers are better advised to understand this effect and the obligation for them to consider the relevance of the external signals directed at the strategic themes of their organizations.
DISCUSSION

The general phenomena under study is environmental scanning behavior in organizational settings. The specific aspect under study here is environmental scanning for new product related information. The conceptual framework is intended to be readily generalizable to other major dimensions of environmental scanning and organizational adaptation. The framework is also intended to be extensible to organizations outside the manufacturing sector.

This first study supports hypotheses on managerial controls for environmental scanning behavior. It includes important boundary effects that distort the kind of external information that can cross the organizational boundary. These findings indicate that relying on person-to-person communication channels to collect environmental information has a fundamental problem: It is expensive, collects distorted external information, and some side-effects have a negative impact on organizational performance.

It is possible that senior managers have already developed some inefficient strategies to cope with this bias. They only rely on the environmental information they can collect personally, first-hand, and at the source. A study of information scanning by CIO's (Chief Information Officers) showed that of the five sources of information reported as most influential to decision-making by these executives, 4 out of these 5 most influential sources were those which placed the executive in face-to-face proximity with primary developers of new external information.
technology. The fifth source was the executives' own staff (Watson 1990). The success of this tactic of coping with information bias at the organization boundary depends entirely on how much time the executive can allocate to personally scanning the environment, and whether that is sufficient to achieve the firm's strategic position. Organizations whose executives feel compelled to this method may be dangerously restricting their firm's capacity to monitor their environments. The study results indicate that, in a world where much important technology is developed externally, substantially more organizational resources must be allocated to environmental scanning or risk being at a serious strategic disadvantage (Darlin 1990).

Another important implication is that the 'push-pull pump' mechanism is not robust. External signals can cause subordinates to alter their scanning behavior. If senior management disregards these external signals then the extent of environmental scanning is reduced through the negative impact external signals can have on subordinates' commitment to strategic themes. Thus senior management's inattention to maintaining a good match between strategic themes and external signals results in reducing subordinates' commitment, extent of environmental scanning and the subsequent drop in organizational performance. There isn't a self-correcting or re-balancing aspect to this social mechanism. Environmental adaptation requires unflagging attention to maintaining the match between the selection of strategic themes (their clarity, goal orientation) and the
external signals the organization receives from the environment.
The previous chapters presented an overview of this research and the detailed conceptual model and results of an empirical test of the model in the Pulp and Paper industry. In this final chapter I present the implications of this study for further research and managerial applications.

This study has confirmed a view of environmental adaptation similar to cell biology. The boundary layers of organizations are conditioned in particular ways by certain managerial behavior. According to which strategic themes are chosen for the organization and how they are communicated, the organization's boundary-spanning personnel respond by seeking external information related to those specific themes. The strategic theme as the appropriate unit of analysis for strategic change is supported. The parallel with cellular biology is the boundary layer has "receptors", and information enters the organization only when it comes in contact with a suitably conditioned receptor site. The implications for senior management are to continuously select and communicate the important strategic themes. Senior management has to also recognize that conveying their receptivity to new strategically valuable information is an independent but necessary behavior. The combination of these behaviors stimulates the natural "push-pull" pump of the organization's natural environmental scanning behavior.

The benefits of stimulating the "push-pull" pump are substantial, both
directly and indirectly. The organization benefits are twofold. First, the strategically valuable information that follows the vertical communication pathway has a positive influence on organizational performance. Environmental information also influences organizational performance directly, without having to travel the vertical pathway to senior management. The third performance effect is a side-effect, strategically valuable information has to be communicated horizontally as a pre-requisite to vertical communication. This horizontal communication has a negative effect on organizational performance. According to the data obtained from this sample, this effect is smaller in magnitude than the positive effect of vertical communication. However, it is still a negative influence.

There are also side effects that can compromise managerial efforts to take advantage of this environmental scanning mechanism. External signals can modify the dimensions and extent of environmental scanning of subordinates. These modifications may or may not work to the advantage of the organization's strategy. In present day organizations this mechanism operates on person-to-person communication, via either face-to-face, written or telephone media. These are the existing media available to this organizational behavior.

The implications for further research on environmental scanning behavior will be discussed and then we consider some technologies that may enable an organization to engage in more environmental scanning more economically and effectively while minimizing the negative side effects. The discussion proceeds
from the premise that management information system technology is the primary discipline offering improvements to this vital activity.

Further research is needed into the basic conceptual model confirmed by this study. Multi-informant studies are an important step to understand how applicable the push-pull pump model is within organizations and across different functional areas. What are the microprocesses of recognition in environmental scanning? What role does intent play in recognition and acquisition of strategically valuable information? Cognitive tuning and other forms of information distortion at the organizational boundary need further attention if senior management is to focus environmental scanning most productively.

The detailed linkage between environmental scanning and organizational performance needs further examination. What does environmental scanning contribute to organizational performance that does not involve communication among peers nor to senior management? The obvious hypothesis is most organizations allow boundary spanners wider latitude for decision-making. Is this direct link between environmental scanning and organizational performance a testament to decentralized decision-making or something else?

One of the clear weaknesses in this study is the need to rely on self-report measures of organizational performance. It is very difficult to get informants to provide hard data on organizational performance in an unsolicited research study.
like this one. However, empirical validation of these results with actual performance data would provide stronger support for the study hypotheses.

We now discuss some information systems technologies which could provide greater economy to environmental scanning activities and perhaps minimize some of the side effects of the activity. Electronic mail technology is now commonplace in business and non-profit organizations. It provides a written media, accessible to everyone in the organization. EMAIL networks can collect and distribute information from/to many individuals, and the same computers can search the rapidly growing population of external electronic databases. Another useful technology is Group Systems (Johansen 1988). This technology integrates the activities of many individuals around a common set of strategic objectives. Finally, artificial intelligence (AI) is a technology that can, in limited domains, provide a simulated form of expertise, often in a more economical form than human experts. This combination of information processing technologies can provide senior management and their subordinates with information processing facilities to support the environmental scanning model developed in this study.

First, environmental scanning has to include both personal and impersonal sources of information. Electronic mail provides a means of collecting computer readable information from personal sources, inside or outside the scanners own organization. An environmental scanning support system will have to have its own ID on the organizations EMAIL system and interface to it. This provides a
means for collecting strategically valuable information from across the
organization at a central point for analysis and redistribution. Using EMAIL to
collect information that would ordinarily be circulated horizontally in the
organization, by word of mouth, helps reduce the negative side effect of horizontal
communication.

Impersonal sources that can be accessed via computer communications
links are growing rapidly as publishers move to electronic media. Most external
database services use some variation of keyword based search. The environmental
scanning support system would need to interface to a variety of external,
electronic databases. AI technology is evolving techniques for concept recognition
and association which may increase the ability of computer systems to support
environmental scanning at a more effective level than keyword search (see Frakes
and Baeza-Yates 1993)

Second, environmental scanning support would have to include group
collaboration facilities. Much of the need for environmental information is driven
by collaborative activities like new product development, re-design of production
facilities, new technology assessment, etc. Each executive subscriber/participant
in the organization's environmental support system will need their own intelligent
agent. This software agent would maintain a detailed profile of interests and
activities of its principal user by observing that user's information access behavior
and working calendar. The agents will need communication protocols to
communicate with other agents in the organization regarding common or conflicting interests or to examine the match between data gathered from external electronic sources and interest profiles managed by an individual agent.

Artificial intelligence techniques could provide the greatest productivity and economy of scale boost to an environmental scanning support system. Additional research can investigate whether there are a reasonable class of environmental scanning heuristics. Scanning heuristics with an underlying data model for measuring the strategic relevance of new information against a profile of strategic interests are the cornerstones needed to build intelligence into an environmental scanning support system. Economy of scale can derive from the system's ability to automatically scan, recognize, acquire and deliver strategically valuable outside information. When user's of the scanning system review the information reported to them the system can monitor their browsing behavior and update that user's interest profile, making the system a learning system.

This discussion has covered both the managerial implications of the model of environmental scanning and further research needed to make the behavior more effective and economical. Senior managers now have specific guidance in stimulating and focusing the scanning behavior of subordinates and this behavior has empirically supported organizational performance implications.
FIGURE 1: CONCEPTUAL FRAMEWORK FOR ENVIRONMENTAL SCANNING

Managerial Communication → Scanning Behavior → Organizational Outcomes

- Cooperative Communication Style (H1)
- Perceived Receptivity (H4b)
- Vertical Communication (H6a)

- Perceived Importance of a Strategic Theme (H2a, H2b)
- Frequency
- Clarity
- Goal Orientation (H3a)
- Extent of Environmental Scanning (H4a)
- Horizontal Communication (H5)

- External Signals on Theme
- Subordinate Commitment to Theme
- Intent To Communicate (H3b, H2c)

Causal linkages in conceptual model.
Figure 2: Final Conceptual Model of Environmental Scanning

Managerial Communications

Reciprocal Communication Style → Perceived Receptivity → Vertical Comm. → (+) Organizational Performance

Scanning Behavior

Perceived Importance of a Strategic Theme . Clarity . Goal Orientation → Extent of Environmental Scanning → Subordinate Commitment to Theme → External Signals

Organizational Outcomes

Horiz. Comm. → (-) . Clarity . Goal Orientation → (+)
TABLE 1A: Equations Used To Estimate Conceptual Framework

\[
\begin{align*}
\text{Extent}_\text{Environscan} &= b_{11} \text{Perceived Import} + b_{12} \text{Commit} + b_{13} \text{Extern Signals} \\
& \quad + b_{14} (\text{Commit} \times \text{External Signals}) + e_1 \\
\text{Perceived Receipt} &= b_{21} \text{Cooperative Style} + e_2 \\
\text{Horiz Comm} &= b_{31} \text{Extent}_\text{Environscan} + e_3 \\
\text{Vertical Comm} &= b_{41} \text{Perceived Receipt} + b_{42} \text{Horiz Comm} + e_4 \\
\text{Org Perform} &= b_{51} \text{Vertical Comm} + b_{52} \text{Extent}_\text{Environscan} + b_{53} \text{Horiz Comm} \\
& \quad + (\text{Commit} \times \text{External Signals}) + e_5 \\
\text{Intent Comm} &= b_{61} \text{Extent}_\text{Environscan} + e_6 \\
\end{align*}
\]

Where:
- \(b_m\) = regression coefficients
- \(e_i\) = error terms
<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commit</td>
<td>Subordinate's Commitment to Strategic Theme</td>
</tr>
<tr>
<td>Cooperative_Style</td>
<td>Cooperative Style of Senior Manager's Communication</td>
</tr>
<tr>
<td>Extent_Environ_Scan</td>
<td>Extent Of Environmental Scanning</td>
</tr>
<tr>
<td>External_Signals</td>
<td>External signals</td>
</tr>
<tr>
<td>Horiz_Scan</td>
<td>Horizontal Communication of New External Information</td>
</tr>
<tr>
<td>Intent_Comm</td>
<td>Intent to Communicate Scanned Information</td>
</tr>
<tr>
<td>Org_Perform</td>
<td>Organizational Performance (unit sales, overall, relative to competitors)</td>
</tr>
<tr>
<td>Perceived_Import</td>
<td>Perceived Importance of Strategic Themes</td>
</tr>
<tr>
<td>Perceived_Reciept</td>
<td>Perceived Receptiveness to New External Information</td>
</tr>
<tr>
<td>Vertical_Comm</td>
<td>Vertical Communication of Relevant External Information</td>
</tr>
<tr>
<td>Construct Variable</td>
<td>X1</td>
</tr>
<tr>
<td>-----------------------------</td>
<td>----</td>
</tr>
<tr>
<td>Perceived Importance</td>
<td>1.0</td>
</tr>
<tr>
<td>Cooperative Comm. Style</td>
<td>.87</td>
</tr>
<tr>
<td>Managerial Receptivity</td>
<td>.68</td>
</tr>
<tr>
<td>Commitment to Strategic</td>
<td>.57</td>
</tr>
<tr>
<td>Theme</td>
<td></td>
</tr>
<tr>
<td>External Signals</td>
<td>.13</td>
</tr>
<tr>
<td>Extent of Environmental</td>
<td>.42</td>
</tr>
<tr>
<td>Scan</td>
<td></td>
</tr>
<tr>
<td>Intent to Communicate</td>
<td>.02</td>
</tr>
<tr>
<td>(Vertical)</td>
<td></td>
</tr>
<tr>
<td>Horizontal Communication</td>
<td>.67</td>
</tr>
<tr>
<td>Vertical Communication</td>
<td>.54</td>
</tr>
<tr>
<td>Cognitive Tuning</td>
<td>-.07</td>
</tr>
<tr>
<td>Organizational Performance</td>
<td>.33</td>
</tr>
</tbody>
</table>
Hypothesis Tests

### Hypothesis

**H1:** The more cooperative the style of internal management communications concerning strategic themes, the more subordinates perceive that management is receptive to additional information linked to those specific themes.

<table>
<thead>
<tr>
<th>Predictor Variable(s)</th>
<th>Coeff.</th>
<th>$R^{2}_{\text{adj.}}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perceived Receptivity</td>
<td></td>
<td>.50</td>
</tr>
<tr>
<td>Cooperative Style</td>
<td>0.299**</td>
<td>(0.033)</td>
</tr>
</tbody>
</table>

**H2a:** The greater the perceived importance of a strategic theme, the greater the extent of environmental scanning.

<table>
<thead>
<tr>
<th>Extent Of Environmental Scan</th>
<th>Coeff.</th>
<th>$R^{2}_{\text{adj.}}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perceived Importance</td>
<td>0.19***</td>
<td>(0.056)</td>
</tr>
</tbody>
</table>

* $p < .1$  
** $p < .05$  
*** $p < .01$  
**** $p < .001$
TABLE 3 cont.
Hypothesis Tests

**Hypothesis**

H2b: The extent of environmental scan for information on strategic themes (perceived as important) will be least for those strategic themes communicated with an internal functional area goal orientation, greater for internal firm overall goal orientation, and highest for an external trends and conditions orientation.

<table>
<thead>
<tr>
<th>Predictor Variable(s)</th>
<th>Coeff.</th>
<th>R²adj.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dependent Variable</strong></td>
<td></td>
<td>.30</td>
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<tr>
<td>Extent of Environmental Scan</td>
<td></td>
<td></td>
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<tr>
<td>Goal Orientation -- Firm</td>
<td>0.413*</td>
<td></td>
</tr>
<tr>
<td>(Std. Err.)</td>
<td>(0.222)</td>
<td></td>
</tr>
<tr>
<td>Commitment to Strategic Theme</td>
<td>2.517**</td>
<td></td>
</tr>
<tr>
<td>(Std. Err.)</td>
<td>(1.046)</td>
<td></td>
</tr>
<tr>
<td>External Signals</td>
<td>2.545***</td>
<td></td>
</tr>
<tr>
<td>(Std. Err.)</td>
<td>(0.719)</td>
<td></td>
</tr>
<tr>
<td>(Commitment x External Signals)</td>
<td>-0.236*</td>
<td></td>
</tr>
<tr>
<td>(Std. Err.)</td>
<td>(0.106)</td>
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<tr>
<td>Extent of Environmental Scan</td>
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<td>.35</td>
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<tr>
<td>Goal Orientation -- External</td>
<td>0.558**</td>
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</tr>
<tr>
<td>(Std. Err.)</td>
<td>(0.186)</td>
<td></td>
</tr>
<tr>
<td>Commitment to Strategic Theme</td>
<td>2.376**</td>
<td></td>
</tr>
<tr>
<td>(Std. Err.)</td>
<td>(0.997)</td>
<td></td>
</tr>
<tr>
<td>External Signals</td>
<td>2.376***</td>
<td></td>
</tr>
<tr>
<td>(Std. Err.)</td>
<td>(.689)</td>
<td></td>
</tr>
<tr>
<td>(Commitment x External Signals)</td>
<td>-0.214**</td>
<td></td>
</tr>
<tr>
<td>(Std. Err.)</td>
<td>(0.102)</td>
<td></td>
</tr>
</tbody>
</table>

* p < .1
** p < .05
*** p < .01
**** p < .001
TABLE 3 cont.
Hypothesis Tests

Hypothesis
H2c: The greater the commitment of an individual to a particular strategic theme the greater the extent of environmental scanning.

<table>
<thead>
<tr>
<th>Predictor Variable(s)</th>
<th>Coeff. (Std. Err.)</th>
<th>R²adj.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dependent Variable</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Extent of Environmental Scan</td>
<td>.37</td>
<td></td>
</tr>
<tr>
<td>Perceived Importance</td>
<td>0.194*** (0.056)</td>
<td></td>
</tr>
<tr>
<td>Commitment to Strategic Theme</td>
<td>1.947* (1.012)</td>
<td></td>
</tr>
<tr>
<td>External Signals</td>
<td>2.16** (.688)</td>
<td></td>
</tr>
<tr>
<td>(Commitment x External Signals)</td>
<td>-0.178* (1.103)</td>
<td></td>
</tr>
</tbody>
</table>

* p < .1  ** p < .05  *** p < .01  **** p < .001
Hypothesis Tests

H2d: The commitment of an individual engaging in external scanning on the strategic themes of an organization moderates the effect of the perceived importance of strategic themes on extent of external scanning.

<table>
<thead>
<tr>
<th>Predictor Variable(s)</th>
<th>Coeff.</th>
<th>R²adj.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extent of Environmental Scan</td>
<td></td>
<td>.35</td>
</tr>
<tr>
<td>Perceived Importance</td>
<td>0.101</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.162)</td>
<td></td>
</tr>
<tr>
<td>Commitment to Strategic Theme</td>
<td>-0.376</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.819)</td>
<td></td>
</tr>
<tr>
<td>External Signals</td>
<td>1.081***</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.241)</td>
<td></td>
</tr>
<tr>
<td>(Perceived Importance x External Signals)</td>
<td>0.018</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.023)</td>
<td></td>
</tr>
</tbody>
</table>

* p < .1  ** p < .05  *** p < .01  **** p < .001
**TABLE 3 cont.**
Hypothesis Tests

H3a: The more specific and credible external signals are to strategic themes, the more likely junior managers are to modify their perceptions of the importance (weighting) of strategic themes to match external signals.

<table>
<thead>
<tr>
<th>Predictor Variable(s)</th>
<th>Coeff.</th>
<th>$R^2_{adj.}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dependent Variable</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Extent of Environmental Scan</td>
<td></td>
<td>.37</td>
</tr>
<tr>
<td>Perceived Importance</td>
<td>0.194***</td>
<td></td>
</tr>
<tr>
<td>(0.056)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Commitment to Strategic Theme</td>
<td>1.947*</td>
<td></td>
</tr>
<tr>
<td>(1.012)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>External Signals</td>
<td>2.16**</td>
<td></td>
</tr>
<tr>
<td>(.688)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Commitment x External Signals)</td>
<td>-0.178*</td>
<td></td>
</tr>
<tr>
<td>(1.103)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* $p < .1$  
** $p < .05$  
*** $p < .01$  
**** $p < .001$
TABLE 3 cont.
Hypothesis Tests

**Hypothesis**

**H3b:** External signals on a strategic theme moderate the link between the scanner's commitment to that strategic theme and the extent of environmental scan.

<table>
<thead>
<tr>
<th>Predictor Variable(s)</th>
<th>Coeff. (Std. Err.)</th>
<th>R²adj.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depend Variable</td>
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<td></td>
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<tr>
<td>Extent of Environmental Scan</td>
<td></td>
<td>.37</td>
</tr>
<tr>
<td>Perceived Importance</td>
<td>0.194*** (0.056)</td>
<td></td>
</tr>
<tr>
<td>Commitment to Strategic Theme</td>
<td>1.947* (1.012)</td>
<td></td>
</tr>
<tr>
<td>External Signals</td>
<td>2.16** (.688)</td>
<td></td>
</tr>
<tr>
<td>(Commitment x Ext. Signals)</td>
<td>-0.178* (1.103)</td>
<td></td>
</tr>
</tbody>
</table>

* p < .1
** p < .05
*** p < .01
**** p < .001
**TABLE 3 cont. Hypothesis Tests**

**Hypothesis**

**H4a.** The greater the extent of external scan, the more likely the scanner is to form an intent to subsequently communicate relevant information within the firm.

<table>
<thead>
<tr>
<th>Predictor Variable(s)</th>
<th>Coeff. (Std. Err.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dependent Variable</td>
<td>R^2adj.</td>
</tr>
<tr>
<td>Intent to Communicate Horizontally</td>
<td></td>
</tr>
<tr>
<td>Extent of Environmental Scan</td>
<td>-.408 (1.781)</td>
</tr>
<tr>
<td>Intent to Communicate Vertically</td>
<td>.53</td>
</tr>
<tr>
<td>Extent Of Environmental Scan</td>
<td>0.003 (0.048)</td>
</tr>
</tbody>
</table>

* p < .1  
** p < .05  
*** p < .01  
**** p < .001
TABLE 3 cont.
Hypothesis Tests

Hypothesis
H4b. The greater the perceived receptivity of the manager to additional information on (perceived) strategically important themes, the greater the upward (vertical) communication of relevant externally scanned information from subordinates.

<table>
<thead>
<tr>
<th>Dependent Variable</th>
<th>Predictor Variable(s)</th>
<th>Coeff.</th>
<th>R²adj.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vertical Communication</td>
<td></td>
<td></td>
<td>.39</td>
</tr>
<tr>
<td></td>
<td>Cooperative Style</td>
<td>0.188**</td>
<td>(0.056)</td>
</tr>
<tr>
<td></td>
<td>Horizontal Communication</td>
<td>0.342**</td>
<td>(0.110)</td>
</tr>
<tr>
<td></td>
<td>Extent of Environmental Scan</td>
<td>-0.028</td>
<td>(0.052)</td>
</tr>
<tr>
<td>Vertical Communication</td>
<td></td>
<td></td>
<td>.50</td>
</tr>
<tr>
<td></td>
<td>Managerial Receptivity</td>
<td>0.553***</td>
<td>(0.139)</td>
</tr>
<tr>
<td></td>
<td>Cooperative Style</td>
<td>0.045</td>
<td>(0.063)</td>
</tr>
<tr>
<td></td>
<td>Horizontal Communication</td>
<td>0.229**</td>
<td>(0.104)</td>
</tr>
<tr>
<td></td>
<td>Extent of Environmental Scan</td>
<td>0.0028</td>
<td>(0.048)</td>
</tr>
</tbody>
</table>

* p < .1  
** p < .05  
*** p < .01  
**** p < .001
### TABLE 3 cont.
**Hypothesis Tests**

H5: The greater the scanner’s intent to vertically transmit externally scanned relevant information the greater the extent of (cognitive tuning) polarization bias in the information.

<table>
<thead>
<tr>
<th>Predictor Variable(s)</th>
<th>Coeff. (Std. Err.)</th>
<th>R²adj.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dependent Variable</td>
<td></td>
<td>.05</td>
</tr>
<tr>
<td>Cognitive Tuning</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intent to Communicate Vertically</td>
<td>-0.031 (0.023)</td>
<td></td>
</tr>
<tr>
<td>Intent to Communicate Horizontally</td>
<td>-0.023 (0.032)</td>
<td></td>
</tr>
<tr>
<td>Vertical Communication</td>
<td>0.046 (0.105)</td>
<td></td>
</tr>
<tr>
<td>Horizontal Communication</td>
<td>0.052 (0.092)</td>
<td></td>
</tr>
</tbody>
</table>

* p < .1  
** p < .05  
*** p < .01  
**** p < .001
Hypothesis Tests

Hypothesis

H6a: The greater the vertical communication of environmental information the better the organizational performance.

H6b: The greater the extent of horizontal communication of strategically valuable external information, the better the organizational performance.

H6c: The greater the extent of horizontal communication of strategically valuable external information, the lower the organizational performance.

<table>
<thead>
<tr>
<th>Predictor Variable(s)</th>
<th>Coeff.</th>
<th>R²adj. (Std. Err.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dependent Variable</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Organizational Performance</td>
<td>.29</td>
<td></td>
</tr>
<tr>
<td>Vertical Communication</td>
<td>1.126****</td>
<td>0.236</td>
</tr>
<tr>
<td>Horizontal Communication</td>
<td>-0.828***</td>
<td>0.241</td>
</tr>
<tr>
<td>Extent of Environmental Scan</td>
<td>0.333***</td>
<td>0.115</td>
</tr>
</tbody>
</table>

* p < .1  
** p < .05  
*** p < .01  
**** p < .001
### TABLE 4
Additional Regression Analyses

<table>
<thead>
<tr>
<th>Predictor Variable(s)</th>
<th>Coeff.</th>
<th>R²adj.</th>
</tr>
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<tr>
<td></td>
<td>(Std. Err.)</td>
<td></td>
</tr>
<tr>
<td><strong>Dependent Variable</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Horizontal Communication</strong></td>
<td>0.05</td>
<td></td>
</tr>
<tr>
<td>Extent of Environmental Scan</td>
<td>0.124**</td>
<td>(0.056)</td>
</tr>
<tr>
<td><strong>Vertical Communication</strong></td>
<td>0.31</td>
<td></td>
</tr>
<tr>
<td>Extent of Environmental Scan</td>
<td>0.013</td>
<td>(0.054)</td>
</tr>
<tr>
<td>Horizontal Communication</td>
<td>0.536</td>
<td>(0.098)**</td>
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</tbody>
</table>

* * p < .1
** p < .05
*** p < .01
**** p < .001
<table>
<thead>
<tr>
<th>Independent Variable</th>
<th>1</th>
<th>3</th>
<th>6 Full Model</th>
<th>6 Reduced Model</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Perceived Importance</td>
<td></td>
<td></td>
<td>0.155 (.1689)</td>
<td>.194**** (0.056)</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>2. Cooperative Communication Style</td>
<td></td>
<td>.299**** (0.033) [H1]</td>
<td></td>
<td>0.045 (0.063)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Managerial Receptivity</td>
<td></td>
<td></td>
<td></td>
<td>.553*** (0.139) [H4b]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Commitment to Strategic Theme</td>
<td></td>
<td>-1.499 (1.017) [H2c]</td>
<td>1.948* (1.012) [H2c]</td>
<td></td>
<td></td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>5. External Signals</td>
<td></td>
<td>0.576 (0.475) [H3a]</td>
<td></td>
<td>2.160*** (0.688)</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>(Commitment x Perceived Importance)</td>
<td></td>
<td></td>
<td>0.0141 (0.0244) [H2d]</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>(Commitment x External Signals)</td>
<td></td>
<td>0.131 (0.0378) [H3b]</td>
<td>-0.178* (1.103) [H3b]</td>
<td></td>
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</tr>
<tr>
<td>Independent Variable</td>
<td>1</td>
<td>3</td>
<td>6 Full Model</td>
<td>6 Reduced Model</td>
<td>7</td>
<td>8</td>
<td>9</td>
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</tr>
<tr>
<td>----------------------</td>
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<td>----</td>
<td>----</td>
<td>----</td>
<td>----</td>
</tr>
<tr>
<td>6. Extent of Environmental Scan</td>
<td>.035 (.793) [H4a]</td>
<td>0.124** (.056)</td>
<td>0.0028 (0.048)</td>
<td>0.333*** (0.115)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Intent to Communicate (Vertical)</td>
<td></td>
<td></td>
<td></td>
<td>-0.031 (0.023)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Horizontal Communication</td>
<td>.229** (.104)</td>
<td>0.052 (0.092)</td>
<td>-0.828*** (0.241) [H6c]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. Vertical Communication</td>
<td></td>
<td>0.046 (0.105)</td>
<td>1.126**** (0.236) [H6a]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. Cognitive Tuning</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. Organizational Performance</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>N</strong></td>
<td>82</td>
<td>83</td>
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<td>74</td>
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<tr>
<td>R² adj.</td>
<td>.006</td>
<td>.50</td>
<td>.29</td>
<td>.37</td>
<td>.00</td>
<td>.05</td>
<td>.50</td>
<td>.05</td>
<td>.29</td>
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</tbody>
</table>

* p < .1  
** p < .05  
*** p < .01  
**** p < .001

1. Beta-coefficients are displayed in each table cell, standard errors are displayed in ()'s. The dependent variable for each regression is identified at the top of the column by a number matching the row number of the same variable in the leftmost column. The bottom line of each cell has the hypothesis being tested (H2b not represented). The degrees of freedom is in the bottom row with the value of adjusted $R^2$. 

77
for the regression.
## TABLE 6

### SUMMARY OF HYPOTHESES TESTS

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Direction</th>
<th>Supported</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1</td>
<td>Cooperative Communication Style ---&gt; Managerial Receptivity</td>
<td>Supported</td>
</tr>
<tr>
<td>H2a</td>
<td>Perceived Importance ---&gt; Extent of Environmental Scan</td>
<td>Supported</td>
</tr>
<tr>
<td>H2b</td>
<td>Firm Goal Orientation &lt; External Goal Orientation</td>
<td>Not Supported</td>
</tr>
<tr>
<td>H2c</td>
<td>Commitment to Theme ---&gt; Extent of Environmental Scan</td>
<td>Supported</td>
</tr>
<tr>
<td>H2d</td>
<td>Commitment interacts with Perceived Importance ---&gt; Extent of Environmental Scan</td>
<td>Not Supported</td>
</tr>
<tr>
<td>H3a</td>
<td>External Signals ---&gt; Perceived Importance</td>
<td>Not Supported</td>
</tr>
<tr>
<td>H3b</td>
<td>External Signals interact with Commitment to Theme ---&gt; Extent of Environmental Scan</td>
<td>Supported</td>
</tr>
<tr>
<td>H4a</td>
<td>Extent of Environmental Scan ---&gt; Intent to Communicate</td>
<td>Not Supported</td>
</tr>
<tr>
<td>H4b</td>
<td>Managerial Receptivity ---&gt; Vertical Communication</td>
<td>Supported</td>
</tr>
<tr>
<td>H5</td>
<td>Intent to Communicate ---&gt; Cognitive Tuning</td>
<td>Not Supported</td>
</tr>
<tr>
<td>H6a</td>
<td>Vertical Communication ---&gt; Organizational Performance</td>
<td>Supported</td>
</tr>
<tr>
<td>H6b</td>
<td>Horizontal Communication ---&gt; greater Organizational Performance</td>
<td>Not Supported</td>
</tr>
<tr>
<td>H6c</td>
<td>Horizontal Communication ---&gt; reduced Organizational Performance</td>
<td>Supported</td>
</tr>
</tbody>
</table>
APPENDIX A

Survey Questionnaire

SCANNING THE BUSINESS ENVIRONMENT: A MANAGERIAL SURVEY

Ron Dickinson
and
Bernard Jaworski

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Karl Eller Graduate School Of Management
University of Arizona
Tucson, AZ. 85721

(602) 621-7479

February 1993
SECTION I
In responding to the following questions, please focus on your strategic business unit (SBU) rather than the corporation as a whole. If a question is not applicable please leave it blank. The term senior management refers to levels of management above your immediate superior. The term work group refers to the group of co-workers whose work is directly linked to your assignment, most of your co-workers report to the same manager you do, but not necessarily all of them. New product refers to what your organization considers a new product, that is, more than minor improvements to current products.

Item Strongly Agree Strongly Disagree
1. Senior management takes the time to really understand how new product development works. 1 2 3 4 5
2. Senior management is always talking about new product development. 1 2 3 4 5
3. Senior management has let me understand how they think about new product development. 1 2 3 4 5
4. Senior management rarely mentions the importance of the schedule of new product development efforts. 1 2 3 4 5
5. Senior management makes sure new product development efforts have all the resources they need. 1 2 3 4 5
6. The written communication I get from senior management seldom refers to new product development. 1 2 3 4 5
7. Senior management rarely mentions the importance of our new product development projects. 1 2 3 4 5
8. I don't understand what senior management really wants in new product development. 1 2 3 4 5
9. Senior management asks about the effect any decision might have on new product development. 1 2 3 4 5
10. Overall, new product development gets a lot of attention from senior management. 1 2 3 4 5
11. Senior management's approach to new product development is very unclear. 1 2 3 4 5
12. Senior management clearly believes that new product development is important for the firm as a whole. 1 2 3 4 5
13. The communication from senior management on new product development is extensive. 1 2 3 4 5
14. Meetings with senior management seldom emphasize new product development. 1 2 3 4 5
### SECTION II

This section concerns managerial communication and organizational goals.

<table>
<thead>
<tr>
<th>Item</th>
<th>Strongly Agree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Senior management seldom elaborates their discussions related to new product development.</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>2. If each department just does their part correctly then new product development succeeds.</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>3. Senior management regularly emphasizes that the goals of new product development are to meet the needs of the marketplace.</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>4. Senior management is readily available if I need to see them.</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>5. Management conveys its new product goals in terms of benefits to the whole company.</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>6. I can anticipate how senior management will react to new information related to new product developments.</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>7. Senior management minimizes the amount of information about new product development in discussions.</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>8. Managers usually discuss the goals of new product development from the perspective of the whole company.</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>9. Senior managers won't start discussions with subordinates when they have information regarding new product development topics.</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>10. Senior management emphasizes new product development goals that put us among the best in our industry.</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>11. All I need to know from senior management about new product development goals is what my area is supposed to do.</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>12. Senior managers often initiate discussion if they see someone has valuable information on new product developments.</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>13. New product development can succeed only when the whole organization does its job well.</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>14. Getting through to senior management takes a great deal of effort.</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>15. Senior management states its new product development goals so they directly relate to our customers.</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>16. Senior management is very forthcoming with additional information where new product development is concerned.</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
</tbody>
</table>
17. Senior management states its new product development goals so the entire organization is involved.

18. Senior management says that new product developments must be the best in the industry for them to be worthwhile.

19. The only thing in new product development that matters to senior management is whether our area did its job.

20. Senior management frequently shares valuable information when discussing new product development.

21. Senior management's new product development goal is to be better than our best competitor.

22. Management defines new product development goals specifically for each department.

23. It is easy to reach senior management if you have to talk to them.

24. Senior managers can be very perceptive about who has important information on new product development topics.

SECTION III  This section concerns information from outside the organization.

1. There are regular meetings where I can ask if anyone has seen new information relevant to new product development.

2. A meeting with market consultants for this industry is unlikely to focus on new product development.

3. I often ask around in the firm for any new information related to new product development.

4. There is no one in the firm I can contact that is a good source of information on the opportunities for new product development.

5. The paper-oriented trade journals I have read often contain information relevant to this firm's new product development.

6. New product development is a frequent topic at professional gatherings I attend.

7. I regularly ask several of my colleagues in this firm if they have seen any fresh outside information relevant to new product developments.

8. Internal R & D project reports often contain outside information relevant to new product development.
| Item | | Strongly Agree | Strongly Disagree |
|------|------------------|------------------|
| 9. There are outside consultants whom I can contact regarding fresh information relevant to this firm's new product development. | | 1 | 2 | 3 | 4 | 5 |
| 10. A panel discussion by industry experts is likely to emphasize new product development. | | 1 | 2 | 3 | 4 | 5 |
| 11. I have no contacts outside the firm I can ask for new information they have related to this firm's product development. | | 1 | 2 | 3 | 4 | 5 |
| 12. Professional colleagues in other companies (i.e. suppliers or customers) are seldom interested in new product developments in their areas. | | 1 | 2 | 3 | 4 | 5 |
| 13. There are internal reports that often contain outside information relevant to new product development. | | 1 | 2 | 3 | 4 | 5 |
| 14. I frequently see general business publications emphasizing the importance of new product development in this industry. | | 1 | 2 | 3 | 4 | 5 |
| 15. There are several applied research journals that I check often for information relevant to this firm's new product development. | | 1 | 2 | 3 | 4 | 5 |
| 16. Our internal market research reports often contain outside information relevant to new product development. | | 1 | 2 | 3 | 4 | 5 |
| 17. I read several trade publications that often contain information relevant to this firm's new product development. | | 1 | 2 | 3 | 4 | 5 |
| 18. There are people outside the firm I ask for any fresh information relevant to new product developments they have seen. | | 1 | 2 | 3 | 4 | 5 |
| 19. I have regular contact with other people working in this industry to ask about any fresh information they have relevant to this firm's new product development. | | 1 | 2 | 3 | 4 | 5 |
| 20. Trade press articles in this industry seldom focus on new product developments. | | 1 | 2 | 3 | 4 | 5 |
| 21. There are outside industry databases that I can check for new information relevant to this firm's new product development. | | 1 | 2 | 3 | 4 | 5 |
| 22. Internal memoranda often reference outside information relevant to new product development. | | 1 | 2 | 3 | 4 | 5 |
SECTION IV In the questions below a hypothetical situation is presented. Please respond by weighting
the courses of action according to your FIRST likely course of action in a situation like this.

1. If I read a report that another firm in our business was able to produce a product or component
   for 5% less than this firm did, I'd most likely try to:
   (Allocate 20 points among the five alternatives below)
      - discuss it with a co-worker in my area who understood the product or component.  
      - discuss it with an acquaintance outside the firm who knew something about the competitor.
      - look for information on the technology and materials that went into that product or
        component.
      - try and figure out how they did it.
      - inform senior manager(s) in the area responsible for the product or component.

I can think of occasions in the past 6 months where something similar to this came up in my area.

Agree Strongly 1 2 3 4 5 Disagree Strongly

2. If another firm in the industry was trying out an interesting new product technology or process
   in the same sort of functional area as mine I'd most likely try to:
   (Allocate 20 points among the alternatives below)
      - discuss it with a co-worker in my area who understood the technology and materials.
      - discuss it with an acquaintance outside the firm, who knew something about that firm.
      - look for more information on the technology and materials.
      - try and figure out how they did it.
      - inform senior manager(s) in the area responsible for the product or component.

I can think of occasions in the past 6 months where something similar to this came up in my area.

Agree Strongly 1 2 3 4 5 Disagree Strongly

3. If an outside report from a well-known consultant or industry group showed some that some
   firms started using new production techniques or other technology to make additional product
   variations for special customers I'd most likely try to
   (Allocate 20 points among the alternatives below)
      - discuss it with a co-worker in my area who knew something about the product or the firms.
      - discuss it with an outside acquaintance who knew something about the firms or products.
      - look for information on the technology and materials that went into that product or
        component.
      - try and figure out how they did it.
      - inform senior manager(s) in the area responsible for the product or component.

I can think of occasions in the past 6 months where something similar to this came up in my area.

Agree Strongly 1 2 3 4 5 Disagree Strongly
SECTION V
This section deals with additional opinions and attitudes toward the organization.

<table>
<thead>
<tr>
<th>Item</th>
<th>Strongly Agree</th>
<th>Strongly Disagree</th>
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</thead>
<tbody>
<tr>
<td>1.</td>
<td>1</td>
<td>2 3 4 5</td>
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<tr>
<td>2.</td>
<td>1</td>
<td>2 3 4 5</td>
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<tr>
<td>3.</td>
<td>1</td>
<td>2 3 4 5</td>
</tr>
<tr>
<td>4.</td>
<td>1</td>
<td>2 3 4 5</td>
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<tr>
<td>5.</td>
<td>1</td>
<td>2 3 4 5</td>
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<tr>
<td>6.</td>
<td>1</td>
<td>2 3 4 5</td>
</tr>
<tr>
<td>7.</td>
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<td>2 3 4 5</td>
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<tr>
<td>8.</td>
<td>1</td>
<td>2 3 4 5</td>
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<tr>
<td>9.</td>
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<td>2 3 4 5</td>
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<tr>
<td>10.</td>
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<td>2 3 4 5</td>
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<tr>
<td>11.</td>
<td>1</td>
<td>2 3 4 5</td>
</tr>
<tr>
<td>12.</td>
<td>1</td>
<td>2 3 4 5</td>
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<tr>
<td>13.</td>
<td>1</td>
<td>2 3 4 5</td>
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<tr>
<td>14.</td>
<td>1</td>
<td>2 3 4 5</td>
</tr>
<tr>
<td>15.</td>
<td>1</td>
<td>2 3 4 5</td>
</tr>
</tbody>
</table>

1. Senior management acknowledges any new information on product development I send them.
2. A senior manager considers outside information on a new product technology more seriously if I have included mostly the benefits.
3. My work group receives a good deal of valuable external information from other groups.
4. A senior manager considers outside information on new product development more seriously if I soften any differences with that manager's attitudes.
5. I'm not willing to put myself out to help the new product development strategy succeed.
6. Senior management is NOT interested in new technology that could improve new product development.
7. My group never gets support and assistance from other groups regarding new product development.
8. A senior manager considers outside information on a new product technology more seriously if I include mostly what conflicts with the manager's attitudes.
9. I recognize outside information that would be useful to many of the other new product development groups when I see it.
10. Senior management would NOT listen to me regarding improvements in new product marketing procedures.
11. To know that my own efforts had made a contribution to the good of the organization's new product development strategy would please me.
12. When I have a problem, people in other work groups often circulate useful information to me on new product development.
13. Even if the firm were not doing too well financially, our new product development strategy would be a sound decision.
14. Senior management would listen to me regarding improvements in new product production from technological innovations.
15. There are reports to senior management in which I regularly forward fresh information on new product development.
<table>
<thead>
<tr>
<th>Item</th>
<th>Strongly Agree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>16. I would NOT recommend this area's new product development strategy to other organizations.</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>17. A senior manager considers outside information on new product development more seriously if I EXCLUDE anything agreeing with that manager's attitudes.</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>18. Subordinates have a receptive audience in senior managers when it comes to improving new product developments.</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>19. Sending outside information on new product development up the chain to senior management is something I never do.</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>20. A senior manager to considers outside information on new product technology more seriously if I can reduce any problems in using it.</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>21. I NEVER circulate outside information I've found to others doing new product related work.</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>22. A senior manager considers outside information on a new product technology more seriously if I have included mostly the benefits.</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>23. I receive a good deal of external information through other work groups on new product development.</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>24. In my work I like to feel I am making some effort, not just for myself but in support the organization's new product development strategy.</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>25. A senior manager considers outside information on new product technology more seriously if I can also reduce any problems in using it.</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>26. Valuable outside Information related to new product development is often accepted by senior management.</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
</tbody>
</table>

**SECTION VI** The following questions concern your business unit's size and performance.

<table>
<thead>
<tr>
<th>Item</th>
<th>Excellent</th>
<th>Poor</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Overall performance of the business unit last year.</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>2. Overall performance relative to major competitors last year.</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>3. Dollar sales of your business unit last year relative to last year.</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>4. Dollar sales of your business unit relative to best competitors</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>5. Net profit before taxes last year, for your business unit.</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>6. Return on shareholders' equity last year, for your business unit.</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>7. Number of departments in your business unit:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Number of levels in your business unit's organization chart:</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
APPENDIX B

Measurement Scales

Unless otherwise noted all scale values were computed by summing the scores on the individual questionnaire items below. These items were selected based on the overall scale reliability as reflected in Cronbach's Alpha.

Note: (R) - Item is reverse scored

Perceived Importance in Managerial Communication

Definition: The respondent’s perception that a strategic theme is important to the organization.

Managerial Communication -- Frequency

1. The written communication I get from senior management seldom refers to new product development. (R)

2. The communication from senior management on new product development is extensive.

3. Meetings with senior management seldom emphasize new product development. (R)

Managerial Communication -- Clarity

Definition: The extent to which senior management unambiguously conveys the substance and purpose of their views on a specific subject so that subordinates can deal with the situational variations on that theme.

1. Senior management has let me understand how they think about new product development. (R)

2. I don’t understand what senior management really wants in new product development. (R)

3. Senior management’s approach to new product development is very unclear. (R)

Managerial Communication -- Goal Orientation (Overall firm)

Definition: The boundary-orientation of the goals conveyed in managerial communication, does it convey the goal in terms of the overall firm (i.e. overall costs).

4. Management conveys its new product goals in terms of benefits to the whole company.

5. Managers usually discuss the goals of new product development from the perspective of the whole company.

6. Senior management states its new product development goals so the entire organization is involved.
Managerial Communication -- Goal Orientation (External)

Definition: The boundary-orientation of the goals conveyed in managerial communication, does it convey the goal in terms of external factors (market share, competitive position, etc.).

7. Senior management regularly emphasizes that the goals of new product development are to meet the needs of the marketplace.

8. Senior management emphasizes new product development goals that put us among the best in our industry.

9. Senior management states its new product development goals so they directly relate to our customers.

Perceived Managerial Receptivity

Definition: The extent managers are perceived as willing to receive communication from subordinates on work related topics, either verbally in meetings of one or more persons, written, or other means (i.e. telephone).

1. Senior management is NOT interested in new technology that could improve new product development. (R)

2. Senior management would NOT listen to me regarding improvements in new product marketing procedures. (R)

3. Subordinates have a receptive audience in senior managers when it comes to improving new product developments.

Cooperative Communication Style

Definition: The communication-oriented behavior a senior manager displays when receiving information from a subordinate--is the manager readily available to receive information (availability), does the manager disclose additional, useful information to the subordinate (reciprocity) while receiving useful information.

Cooperative Communication -- Reciprocal

1. Senior management seldom elaborates their discussions related to new product development. (R)

2. Senior management minimizes the amount of information about new product development in discussions. (R)

3. Senior management is very forthcoming with additional information where new product development is concerned.

4. Senior management frequently shares valuable information when discussing new product development.
Cooperative Communication -- Availability

5. Senior management is readily available if I need to see to them.

6. Getting through to senior management takes a great deal of effort. (R)

7. It is easy to reach senior management if you have to talk to them.

Extent of Environmental Scan

Definition: The information sources outside the organization regularly scanned by respondent for strategically valuable information. Sources are rated according to degree of specialization (Annual reviews etc. being more broadly integrated), Industry orientation (agriculture vs. plastics), and business or technical (price data and product specifications vs. research reports)

<table>
<thead>
<tr>
<th>Internal</th>
<th>External</th>
</tr>
</thead>
<tbody>
<tr>
<td>w Sales Reports</td>
<td>w Research Journals</td>
</tr>
<tr>
<td>w R &amp; D project reviews</td>
<td>w Market Research Reports</td>
</tr>
<tr>
<td>w Opportunity Analysis</td>
<td>w Patent Information</td>
</tr>
<tr>
<td>w Analysis</td>
<td>w Price Information</td>
</tr>
<tr>
<td>w</td>
<td>w Industry/Trade Press</td>
</tr>
<tr>
<td>w Co-workers</td>
<td>w Consulting Chemists</td>
</tr>
<tr>
<td>w Gatekeepers</td>
<td>w Advertising Agency</td>
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<td>w</td>
<td>w Trade Association</td>
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<td>w</td>
<td>w market analyst</td>
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<td>w</td>
<td>w lobbyist</td>
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</tbody>
</table>
Extent of Environmental Scan -- Personal & Internal Sources

These sources are those individuals within the firm (or SBU) who are regularly asked about new external information that they have encountered. This is different from horizontal communication in that the person supplying information is solicited (periodically) by the person who is seeking new information.

1. I often ask around in the firm for any new information related to new product development.

2. I regularly ask several of my colleagues in this firm if they have seen any fresh outside information relevant to new product developments.

Extent of Environmental Scan -- Personal & External Sources

These sources are individuals outside the firm who are contacted (periodically) for information on strategically important themes. Market researchers in outside research firms, brokerage house analysts, industry consultants and independent contractors, university researchers are examples of personal external sources that an individual in a firm might know.

4. There are people outside the firm I ask for any fresh information relevant to new product developments they have seen.

5. I have regular contact with other people working in this industry to ask about any fresh information they have relevant to this firm's new product development.

Extent of Environmental Scan -- Impersonal & Internal Sources

Definition: An organization has a wide variety of internal correspondence that might be scanned for information related to strategic themes. Memoranda, feasibility studies, opportunity analyses, test marketing or sales performance reports are all examples of impersonal internal sources that might be scanned for external information on strategic themes. This scale is implemented as two subscales. The first is to tap the outside information present in internal documents, the second is to tap new internal information that is relevant to new product development. The first sub-scale is what is of interest to this study, the second is used to check that the respondents can differentiate between the two.

6. There are internal reports that often contain outside information relevant to new product development.

7. Internal memoranda often reference outside information relevant to new product development.

Extent of Environmental Scan -- Impersonal & External

This is perhaps the category with the largest number of sources. All independent research journals, trade press and market research secondary sources fall in this category. In the case of the chemical industry there are hundreds of pure and applied research journals that are classified into this category.
8. There are several applied research journals that I check often for information relevant to this firm's new product development.

9. I read several trade publications that often contain information relevant to this firm's new product development.

External Signals

Definition: Individuals engaged in environmental scanning may scan outside information that causes them to modify, qualitatively, the importance (weighting) of strategic themes which guide their scanning activities. This could alter, on a long-term basis, the sources they include in their environmental scanning, the importance given to current strategic themes, even inclusion or deletion of themes from their perceptual system. Signals are distinguished from information scanned in that signals impact the processing schema under which the environmentally scanned information is processed and are not processed as theme specific content.

1. The paper-oriented trade journals I have read often contain information relevant to this firm's new product development.

2. A panel discussion by industry experts is likely to emphasize new product development.

3. Trade press articles in this industry seldom focus on new product developments. (R)

Commitment to Strategic Theme

Definition: The extent a subordinate has internalized a strategic theme as important.

1. To know that my own efforts had made a contribution to the good of the organization's new product development strategy would please me.

2. Even if the firm were not doing too well financially, our new product development strategy would be a sound decision.

3. In my work I like to feel I am making some effort, not just for myself but in support of the organization's new product development

Vertical Communication

Definition: The extent external information recognized as relevant to a strategic theme is communicated to senior management within the organization.

1. Senior management acknowledges any new information on product development I send them.

2. There are reports to senior management in which I regularly forward fresh information on new product development.

3. Sending outside information on new product development up the chain to senior management is
something I never do.

4. Valuable outside information related to new product development is often accepted by senior management.

**Horizontal Communication**

Definition: The extent external information recognized as relevant to a strategic theme is communicated to others at the same organizational level within the organization.

1. My work group receives a good deal of valuable external information from other groups.
2. My group never gets support and assistance from other groups regarding new product development.
3. When I have a problem, people in other work groups often circulate useful information to me on new product development.
4. I receive a good deal of external information through other work groups on new product development.

**Cognitive Tuning**

Definition: An individual engaged in environmental scanning tends to store and transmit information differently depending on cognitive intent at the time information is scanned. If the intent is to transmit information to another person, the information will be polarized by minimizing conflict and maximizing conformity with receivers' attitudes. If the intent is to record information then information is more completely recorded and recalled.

1. A senior manager considers outside information on a new product technology more seriously if I have included mostly the benefits.
2. A senior manager considers outside information on a new product technology more seriously if I include mostly what conflicts with the manager's attitudes.
3. A senior manager considers outside information on new product development more seriously if I EXCLUDE anything agreeing with that manager's attitudes.
4. A senior manager considers outside information on a new product technology more seriously if I have included mostly the benefits.
5. A senior manager considers outside information on new product technology more seriously if I can also reduce any problems in using it.

**Organizational Performance**

1. Overall performance of the business unit last year. Overall performance relative to major competitors last year.
2. Dollar sales of your business unit last year relative to last year.

3. Dollar sales of your business unit relative to best competitors

4. Net profit before taxes last year, for your business unit.

5. Return on shareholders' equity last year, for your business unit.

Intent To Communicate

Definition: Upon forming a linkage between external information encountered during scanning and a strategic theme, the individual may choose to communicate this information within the firm, either horizontally, as among peers, or vertically to more senior management.

The questions on this scale consist of paired items, one to present a hypothetical situation calling for a judgment of the individuals most likely actions (i.e. formation of intent, and direction of communication, vertical or horizontal) and the second to rate the similarity of the hypothetical situation to recent activity (representativeness). The five alternatives presented represent the following cognitive choices: i) get more information, increase scanning, ii) communicate information (vertically), iii) do nothing overt, just "think about it."

1. If I read a report that another firm in our business was able to produce a product or component for 5% less than this firm did, I'd most likely try to:

(Allocate 20 points among the five alternatives below)

______ - discuss it with a co-worker in my area who understood the product or component.
______ - discuss it with an acquaintance outside the firm who knew something about the competitor.
______ - look for information on the technology and materials that went into that product or component.
______ - try and figure out how they did it.
______ - inform senior manager(s) in the area responsible for the product or component.

20

I can think of occasions in the past 6 months where something similar to this came up in my area.

Agree Strongly 1 2 3 4 5 Disagree Strongly

2. If another firm in the industry was trying out an interesting new product technology or process in the same sort of functional area as mine I'd most likely try to:

(Allocate 20 points among the alternatives below)

______ - discuss it with a co-worker in my area who understood the technology and material.
______ - discuss it with an acquaintance outside the firm, who knew something about that firm.
______ - look for more information on the technology and materials.
______ - try and figure out how they did it.
______ - inform senior manager(s) in the area responsible for the product or component.

20
I can think of occasions in the past 6 months where something similar to this came up in my area.

Agree Strongly 1 2 3 4 5 Disagree Strongly

3. If an outside report from a well-known consultant or industry group showed some that some firms started using new production techniques or other technology to make additional product variations for special customers I'd most likely try to

(Allocate 20 points among the alternatives below)

- discuss it with a co-worker in my area who knew something about the product or the firms.
- discuss it with an outside acquaintance who knew something about the firms or products.
- look for information on the technology and materials that went into that product or component.
- try and figure out how they did it.
- inform senior manager(s) in the area responsible for the product or component.

I can think of occasions in the past 6 months where something similar to this came up in my area.

Agree Strongly 1 2 3 4 5 Disagree Strongly
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