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ENVIRONMENTAL SCANNING: A CONCEPTUAL FRAMEWORK FOR STUDYING THE INFORMATION SEEKING BEHAVIOR OF EXECUTIVES

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ABSTRACT

Today's business enterprises thrive in increasingly volatile environments that are characterized by rapid changes in the competition, technology, and economic and social conditions. Environmental scanning is the process of gaining external information about events and relationships in the organization's environment, the knowledge of which would assist management in planning future courses of action.

This paper proposes a conceptual framework for studying the information seeking behavior of executives when they scan the business environment. The framework could be especially useful in designing research to investigate some basic questions about executive scanning behavior. These questions could address issues such as what information about the environment do executives require, which sources are used by them to obtain the information, and how is environmental information used in decision making.

The framework is synthesized from two streams of research: management theory (the study of managerial behavior), and information science (the study of information seeking and information use). It draws on the small number of scanning studies done by management scientists, and introduces an information science perspective that highlights information needs, information seeking, and information use.

RESEARCH QUESTIONS

Today's business organizations thrive in increasingly turbulent environments. The environment is the source of resources, energy, and information, all of which are vital to the survival of the enterprise. The growing complexity and dynamism of the environment continually presents new challenges that the firm must respond to. Seeking information about the environment and understanding its strategic implications becomes a primary responsibility of top managers in every organization.

A study of how executives in business enterprises seek and use information about the external environment would need to address basic research questions such as:

- What information do executives need to have concerning the environment?
- How much scanning of the environment is done by executives?
- Which sources are used by executives to acquire information about the environment?
- How do executives make use of information gained from scanning the environment?

THE CONTEXT OF PAST RESEARCH

The executive constantly seeks information about the environment, to analyze the impact of external events and trends, in order to formulate courses of action which ensure the long-term survival of the organization. Aguilar in his 1967 landmark study defines this activity of **environmental scanning** as:

"... scanning for information about events and relationships in a company's outside environment, the knowledge of which would assist top management in its task of charting the company's future course of action." [1]

Scanning for information involves both the perception of information and simply being exposed to information. From the point of view of the individual manager, environmental scanning is often a personal, informal activity that is an intrinsic part of the managerial function. Scanning can be both active and passive, formal and informal - the manager may gain information about the environment by doing a market research study, attending conferences, having lunch with a well-informed business associate, or simply by reading the newspaper. Aguilar describes the complex character of environmental scanning:

"In its general sense, scanning is a familiar activity and easy enough to recognize. A more considered look at scanning, however, shows it to be a difficult process both to isolate and to analyze. It is difficult to isolate because it is so intimately involved in the overall decision-making process. It is difficult to analyze because it represents a basic behavioral aspect of everyday activity, and is thus not always done with the conscious awareness of the scanner." [2]

(1) What information do executives need to have concerning the external environment?

Past research has studied an organization's environment as comprising a number of *sectors*, each of which represents a major area of concern for the organization. For example, the customer sector of the environment consists of the buyers of products and services provided by the organization; the competitor sector consists of other firms which are vying for the same market; the technology sector consists of advances in the methods and tools of production and administration; and so on. Aguilar's study found that the sector of "market tidings" was of overwhelming importance for his sample of mainly chemical manufacturing companies [3]. Kefalas and Schoderbek observed that executives of all functional specialties scanned the market sector to a considerable extent [4]. Hambrick's study of organizations in three industries concluded that there was a strong connection between the

industry that the organization is in and the focus of scanning: hospitals stressed the engineering environment, while insurance firms stressed the entrepreneurial environment [5].

(2) How much scanning of the environment is done by executives?

Aguilar observed that the amount of scanning increased with the size of the firm [6]. Kefalas and Schoderbek found that executives in their sample did an average of nearly 2 hours of scanning each day [7]. Keegan stressed that the flow of environmental information within a company, and consequently the amount of scanning was constrained by intra-organizational boundaries [8]. Hambrick found that organizational strategy alone did not affect the amount of scanning. He postulated that firms in the same industry shared a 'common body of knowledge'. Furthermore, the scanning of executives did not vary significantly with their hierarchical level or functional specialization [9]. Daft et al showed that chief executives scanned more frequently as a result of higher levels of perceived strategic uncertainty in the environment [10].

(3) Which sources are used by executives to acquire information about the external environment?

Aguilar found that personal sources of information were far more important than impersonal sources [11]. Keegan observed that for multinational companies, sources outside the organization were more important than inside sources [12]. Culpnan showed that the complexity of the task to be performed may lead the individual to use sources which were perceived as being less accessible [13]. Daft et al found that chief executives reacted to higher perceived uncertainty with greater scanning using all sources, implying that they employed multiple and complementary sources to interpret an uncertain environment [14].

(4) How do executives make use of information gained from scanning the environment?

The question of what happens to information gained from scanning the environment has not been a focus of past research. Milliken argues that when managers try to perceive, interpret, and respond to environmental changes they encounter three types of uncertainty: they are not confident that they understand the environmental changes ('state uncertainty'); they are unsure about the effects of the changes ('effect uncertainty'); and they are not sure about the how to respond to these changes ('response uncertainty') [15].

PRINCIPAL ELEMENTS OF THE CONCEPTUAL FRAMEWORK

Duncan defines the environment as "the totality of physical and social factors that are taken directly into consideration in the decision-making behavior of individuals in the organization." [16] For this study, the **environment** is viewed as a source of information, where events and trends continually create signals and messages that organizations attend to [17, 18]. The environment is conceptualized as comprising six sectors: customer, competition, technological, regulatory, economic, and sociocultural sectors [19].

Managers perceive uncertainty in the environment because there is a lack of information about the organizations, activities and events in the environment [20]. Duncan found that the level of perceived uncertainty depends on how dynamic and complex the environment is. A dynamic environment is one in which the rate of change alters frequently and rapidly. A complex environment requires that numerous and dissimilar environmental factors have to be taken into account in decision making. The perceived uncertainty increases with the complexity and dynamism of the environment. [21]

The **acquisition of information** involves the selection and use of a variety of sources. The proposed research investigates the notion that the manager selects a source based on the perceived cost associated with using that source, compared with the perceived benefit or value offered by the source [22, 23, 24]. Allen reported on studies of scientists and technologists which applied the framework that users select information sources based on the perceived cost and the perceived value of utilizing a particular source [25]. More recent research by for example, Swanson [26] and Hardy [27] continue to pursue this approach. Swanson studied 186 users of management information systems reports in four organizations and found that information use is significantly explained by the attributed information value and attributed accessibility of the information channel. Hardy surveyed 968 Forestry Service professionals and found that these information seekers did evaluate sources on the basis of both their costs and benefits. Cost is indicated by the *accessibility* of the source, and includes the effort, time, and financial outlay needed to use it. Value is indicated by the *quality* of the source, and this in turn depends on the quality of information provided by the source. Drawing on the research of Zmud [28], Nilan et al [29] and Halpern and Nilan [30], the most important information quality dimensions would include relevancy, accuracy, quantity, and timeliness. Thus, research could investigate the notion that an executive chooses from among various information sources by evaluating their relative accessibility and quality.

The use of **environmental information** by managers in organizational decision making has not been well addressed. Mintzberg developed a theoretical model, based on detailed field observations, about the informational, interpersonal, and decisional roles that top managers play [31]. The model is robust, and Mintzberg's findings have been confirmed in a number of subsequent studies by other researchers [32]. His differentiation of four decisional roles - the manager as entrepreneur, resource-allocator, disturbance-handler, and negotiator - may be used as a framework for analyzing the use of environmental information in these decision making activities.

OPERATIONALIZING THE FRAMEWORK

(1) Environmental sectors

The business environment of an organization is divided into six environmental sectors, as defined by Daft et al in their study of CEO scanning [33].

- Customer sector refers to those companies or individuals that purchase the products made by the respondent's firm, and include companies that acquire the products for resale, as well as final customers.

- Competition sector includes the companies, products, and competitive tactics: companies that make substitute products; products that compete with the respondent firm's products; and competitive actions between the respondent's firm and other companies in the same industry.
- Technological sector includes the development of new production techniques and methods, innovation in materials and products, and general trends in research and science relevant to the respondent's firm.
- Regulatory sector includes federal and provincial legislation and regulations, city or community policies, and political developments at all levels of government.
- Economic sector includes economic factors such as stock markets, rate of inflation, foreign trade balance, federal and provincial budgets, interest rates, unemployment, and economic growth rate.
- Sociocultural sector comprises social values in the general population, the work ethic, and demographic trends such as an increasing number of women in the work force.

External published sources:
 Newspapers, periodicals
 Government publications
 Conferences, trips
 External libraries
 Reports from research companies
 Electronic information services^b

Internal personal sources:
 Superiors, board members
 Subordinate managers
 Subordinate staff

Internal printed sources:
 Internal memoranda, circulars
 Internal reports, studies
 Company library
 MIS reports

(a: suppliers, distributors, bankers, lawyers, financial analysts, other executives, etc.

b: newswires, online databases, electronic news bulletin boards, etc.)

These sources are selected from a number of previous scanning studies, especially the work cited earlier by Aguilar, Hambrick, and Daft et al.

(2) Perceived environmental uncertainty

The measurement of perceived environmental uncertainty (PEU) is based on Duncan's model of environmental uncertainty. In his model, two dimensions of the environment are identified: the simple-complex dimension is the number of environmental factors taken into consideration in decision making; the static-dynamic dimension is the degree to which these factors remain the same or change continually over time. Duncan found that decision makers in environments which are dynamic and complex experienced the greatest amount of perceived environmental uncertainty. [34] Duncan's conceptualization of the environment is influential in organization research, and several scanning studies base their measurement of uncertainty on his model [35]. More recently, Daft and associates found that the perceived *importance* of trends and events in each of the various environmental sectors had a major effect on scanning activity. They showed that the notion of *perceived strategic uncertainty* was a significant predictor of scanning: perceived strategic uncertainty is a combination of uncertainty as measured by the complexity and dynamism in an environmental sector, and the importance of events in that sector to the organization. [36] Boyd confirmed Daft et al's findings, and further found that measuring environmental uncertainty as a multi-dimensional construct provided a better linkage between perceived uncertainty and scanning activity [37].

(3) Information sources

Eighteen information sources are identified which may be grouped into four categories: external personal contacts, external published sources, internal personal sources, and internal printed sources.

External personal sources:
 Customers
 Competitors
 Business/professional associates^a
 Government officials
 Other outside persons

(4) Perceived source characteristics

This study investigates the effects of two broad categories of information source characteristics: perceived source *accessibility*, and perceived source *quality*. On source accessibility, past user studies concentrated on the physical accessibility of sources. In studying executives' selection of information sources, the relevant accessibility dimensions could include the following: the physical accessibility or proximity of the source; the time and effort required to make contact with or use the source; the financial cost of using the source; and the ease of using the source.

Zmud reviews the literature on the dimensions of information and identifies the following characteristics: quantity (measured by adjectives such as 'complete' or 'sufficient'), reliability ('true', 'accurate'), timeliness ('current'), and format quality ('readable', 'clear'). In his empirical study to validate these dimensions, four classes of information traits were derived: (1) the overall *quality* of information in terms of applicability, usefulness and so on; (2) the *relevancy* components comprising accuracy, factualness, quantity, and reliability/timeliness; (3) the quality of *format*; and (4) the quality of *meaning* in terms of its reasonableness ('logical', 'sensible'). [39] More recently, Nilan and his colleagues investigated the same issue from a different point of view. They interviewed subjects about the sequences of information seeking and use events that they have experienced. The transcripts were then content-analyzed to extract the criteria that the subjects applied to evaluate their information sources. The initial research has identified a number of criteria for the acceptance or rejection of information, sources, and information seeking strategies. [40] To summarize the foregoing, it would appear that the most important information quality traits would include: relevancy (needed or useful information); accuracy (error-free or reliable information); quantity (comprehensive or sufficient information); and timeliness (current or early information). Thus, a valuable source is defined as one that provides information which is relevant, reliable, comprehensive, and

timely.

O'Reilly developed and used a set of ten questions to assess the quality and accessibility of information sources, in order to examine their effect on use of information sources by decision makers. These questions measured the accessibility, accuracy, specificity, timeliness, relevance and amount of information obtained from four groups of sources. Respondents rated the information sources on five-point scales for each of these source facets. [40]

It may be useful to identify two sets of source characteristics, one relating to the perceived source accessibility factor, and the other relating to the perceived source quality factor. Research may then analyze how well these characteristics represent these source dimensions, and how important they are in predicting source usage. A tentative list is suggested below:

Perceived source accessibility characteristics:

- Time and effort to access source
- Physical proximity of source
- Financial cost of using source
- Ease of use of source

Perceived source quality characteristics:

- Relevance of information from source
- Reliability of information from source
- Comprehensiveness of information from source
- Timeliness of information from source.

(5) Scanning behavior

Scanning behavior is measured using multiple indicators, as in Hambrick's study. The three methods to measure scanning are: the interest method assesses the executive's level of interest in keeping abreast of trends; the frequency method assesses the frequency with which information comes to the executive's attention; and the hours method assesses the time that the executive spends scanning each trait [41]. Farh, Hoffman and Hegarty conducted a large-scale field study of 108 European manufacturing firms to verify Hambrick's multi-trait multi-method approach. They applied confirmatory factor analysis to test the convergent and discriminant validity of Hambrick's constructs. (Convergent validity requires that the correlations between different methods designed to measure a common construct should be significantly high. Discriminant validity requires that the methods designed to measure a common construct should correlate more highly among themselves than with scales designed to measure other constructs.) After analyzing the data, they concluded that [42]:

- Two methods of measuring environmental scanning, namely the interest method and the frequency method, should *both* be used.
- The third method of measuring scanning, the hours method, contained an excessive amount of error, probably because it was very difficult for executives to judge the time spent scanning each trait/sector. If such a measure is needed, then it should be redesigned so that it requires a simpler judging task.

Research on environmental scanning should thus ask the respondents to indicate the level of interest they have in scanning, and the frequency with which they scanned. In addition, a simplified question on the total amount of time spent scanning may be included.

(6) Use of environmental information

In order to provide a general indication of the use of information about the environment, Mintzberg's categorization of four decisional roles that managers have to perform is used. The four managerial roles are: the manager as entrepreneur initiates new projects such as new lines of business or joint ventures; the manager as resource-allocator plans budgets and distributes resources; the manager as disturbance-handler deals with unexpected events which can have an important effect on the organization; and the manager as negotiator makes decisions during negotiations about the organization's commitments. [43] McLeod and Jones applied Mintzberg's four managerial roles as an empirical framework to examine the information transactions of chief executive officers [44].

Research on environmental scanning could investigate the use of external information in relation to Mintzberg's categorization of four types of managerial work. A possible research question could be how frequently do executives make use of environmental information when they perform decision making activities relating to each of the four managerial roles?

SUMMARY

This paper proposes a conceptual framework for studying environmental scanning as a form of information seeking behavior by executives. The framework suggests that it would be useful to examine the importance of three sets of factors – perceived environmental uncertainty, perceived source accessibility, and perceived source quality – as independent variables that influence the scope and amount of scanning done by executives. Other variables such as organizational characteristics and personal traits may also affect scanning behavior, but our framework deliberately focuses on “informational” variables that are concerned with the perceived uncertainty or lack of information about the environment, and the perceived accessibility and quality of sources used to scan the environment. Scanning behavior, the dependent variable, is analyzed in terms of the scope of scanning, amount of scanning, and use of environmental information.

	Scope of Scanning	Amount of Scanning	Use of Information
Perceived Environmental Uncertainty			
Perceived Source Accessibility			
Perceived Source Quality			

Principal variables of a conceptual framework for studying environmental scanning

Scope of scanning identifies which aspects of the environment are of greatest concern to the executive when scanning. Amount of scanning is indicated by the time spent scanning, frequency of scanning, and the level of interest. Finally, use

of environmental information looks at the types of decision-making activities which utilize information about the external milieu.

The proposed framework is a synthesis and extension of research that has been done in management theory (the study of managerial behavior), and information science (the study of information seeking and information use). It draws on the small number of scanning studies done by management scientists, and introduces an information science perspective that highlights information needs, information seeking, and information use.

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NOTES

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