

Perception and Use of Information Sources by Chief Executives in Environmental Scanning

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This article reports a study of the information sources used in environmental scanning by chief executives of the Canadian telecommunications industry. Environmental scanning is the acquisition and use of information about events and trends in a firm's external environment, the knowledge of which would assist management in planning the firm's future courses of action. Chief executives use information sources that they perceive to be of high quality to scan the environment. Specifically, they prefer sources that they perceive to be reliable and that provide relevant information. Among the wide range of sources that they use, internal and personal sources appear to be more important than external, impersonal sources. Few chief executives personally use the company library and online database services.

Today's organizations are continually challenged to adapt to environmental changes in customer preferences, competitor strategies, technological advancements, government regulations, and social and economic conditions. Senior managers who are responsible for the survival and performance of their organizations must be well informed about developments in the environment. Environmental scanning is the acquisition and use of information about events and trends in an organization's external environment, the knowledge of which would assist management in planning the organization's future courses of action (Aguilar, 1967; Choo & Auster, 1993). Scanning involves *searching* for information about a specific question, as well as *viewing* information or being exposed to information without there being a specific information need (Aguilar, 1967). Scanning could range from a chance observation of an angry customer complaining to a market research study to determine product demand. Although scanning is evidently a form of information seeking practiced by managers, few studies in information science have analyzed environmental scanning.

As information users, chief executives face a dilemma. On the one hand, because of their position and authority as heads of firms, chief executives have access to a wide range of sources that provide information about the external environment. On the

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other hand, they do not want to be overwhelmed with too much information, especially unreliable or irrelevant information (Choo & Auster, 1993; Katzer & Fletcher, 1992). The present study, which focuses on chief executives' use of information sources to learn about events and trends in the external business environment, addresses four research questions:

- What information sources do chief executives use in scanning?
- What information sources do they perceive to be of quality?
- What is the relationship between perceived source quality and source use?
- What are the chief executives' perception and use of the company library and electronic information sources?

LITERATURE REVIEW

Past Research on Use of Sources in Scanning

Aguilar (1967), one of the earliest studies on environmental scanning, found that for managers, personal sources greatly exceeded impersonal ones in importance. The most important personal sources were subordinates and customers, and the most important impersonal source was publications. Managers of large companies tended to rely more on internal sources. Information from outside sources was mostly unsolicited, whereas information from inside sources was mostly solicited. Another early study on the environmental scanning of multinational companies concluded that sources outside the organization were more important than sources inside the organization, with the former accounting for two-thirds of information from all sources. Furthermore, intraorganizational, departmental boundaries strongly constrained the flow of information within the company (Keegan, 1974).

O'Connell and Zimmerman (1979) compared how policy-level executives and planning staff managers in 100 U.S. and European multinational corporations scanned the international environment. Both groups identified persons in their own positions as the chief sources of environmental information. The most important sources were "home office top management" and "home office staff," both of which were internal sources (O'Connell & Zimmerman, 1979). Kobrin, Basek, Blank, and Palombara (1980) surveyed nearly 500 large U.S. international firms about how they assessed foreign social and political environments. The information sources considered important by a majority of the firms were internal: subsidiary and regional managers, and headquarters personnel. Banks were clearly the most important external source. There was a preference for obtaining environmental assessments directly from people whom the managers know and trust. They relied on their subordinates, colleagues in other firms, banks, and personal observations during frequent trips to other countries (Kobrin et al., 1980). Daft, Sormunen, and Parks (1988) found that chief executives responded to greater perceived environmental uncertainty with higher scanning frequency using all available categories of information sources, including a somewhat larger use of personal compared to written sources. In other words, chief executives employed multiple and complementary sources to interpret an uncertain environment.

Smeltzer, Fann, and Nikolaisen (1988) analyzed the scanning practices of small business managers in the Phoenix and Kansas City metropolitan areas. Personal sources were significantly more important than impersonal sources. Family members and customers were the most prevalent personal sources, while magazines and journals were the most prevalent impersonal sources. A study of planning managers of seven large U.K. companies found that traditional sources, such as libraries, were felt to be tedious and frustrating to use. Respondents were also skeptical about the value of information-brokering services, and they preferred raw to refined data. Furthermore, there was great interest in, and in some cases considerable usage of, online information services. Generally, the use of formal, published resources was ad hoc, informal, and low key (Lester & Waters, 1989). The overall pattern of source usage in scanning that emerges from the literature is that while both internal and external sources are frequently used, personal sources such as customers, associates, and staff are more important. In contrast, libraries and online databases are not often used in scanning.

Typology of Sources

Studies commonly classify sources according to whether they are internal or external to the organization and whether they are personal or impersonal. The internal and external source categories are self-explanatory. Following the classification adopted by Aguilar (1967) and Keegan (1974), personal sources are those that communicate information personally to the manager whereas impersonal sources are those that communicate information to broad audiences or through formalized, group-communication activities. Impersonal sources would include publications, conferences, company library, and online databases. The information sources in this study are grouped into four categories: All External, All Internal, All Personal, and All Impersonal (Table 1). With this classification, it is possible to compare differences in the perception and use of sources.

Dimensions of Perceived Source Quality

Zmud (1978), in a theoretical review and an empirical validation study, derived four classes of information traits: (1) an overall view of the quality of information consisting of a measure of *relevancy*; (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"). The concept of information *relevance* is fundamental in the development of information science. Saracevic (1975) compared various different views of information relevance, including a pragmatic view that considers "the relation between the immediate problem at hand and the provided information, involving utility and preference as the base for interference" (p. 338). Eisenberg and Schamber (1988) defines relevance as "a measure of utility existing between a document and a question as judged by a requester" (Eisenberg & Schamber, 1988, p. 166). In his study comparing the impact of source accessibility and quality on the use of information sources by decision makers, O'Reilly (1982) determined that relevance is a main dimension of perceived source quality (the other dimensions being accuracy, reliability, and timeliness).

TABLE 1
Source Categories

	<i>Personal</i>	<i>Impersonal</i>	<i>All External/ Internal</i>
<i>External</i>	Customers	Newspapers, periodicals	
	Competitors		
	Business/professional associates	Government publications	[A] + [B]
	Government officials	Broadcast media	
	[A]	Industry, trade associations	
		Conferences, trips	
		[B]	
<i>Internal</i>	Superiors, board members	Internal memo, circulars	
	Subordinate managers	Internal reports, studies	[C] + [D]
	Subordinate staff	Company library	
	[C]	Electronic information services	
		[D]	
<i>All Personal/ Impersonal</i>	[A] + [C]	[B] + [D]	

Taylor (1986) proposes that the *reliability* of a source represents the summation of many of the values of that source. He defines reliability as "the trust a user has in the consistency of quality performance of the system and its outputs over time." The system or source is "consistent in maintaining its accepted level of accuracy, of currency, of comprehensiveness (or selectivity as the case may be), and it can be relied upon to do so in the future" (Taylor, 1986, p. 64). Halpern and Nilan (1988) and Nilan, Peek, and Snyder (1988) investigated the source evaluation criteria that information seekers apply to accept or reject information, sources, and information

seeking strategies. Among the 15 source criteria that were reported most frequently, the top five were "Authority or expertise based on credentials," "Authority or expertise based on experience," "Only perceived source," and "Trust." The present study includes reliability as the second dimension of the quality of an information source.

PROCEDURES

Population

The telecommunications industry is vital to the Canadian economy. It contributes significantly to the Gross Domestic Product, provides essential infrastructural services, and exports high-technology goods and services to the international market. At the same time, the industry thrives in a turbulent environment marked by rapid and complex changes in the competition, technology, government regulation, economic conditions, and social trends. The telecommunications industry is defined using four-digit Standard Industrial Classification Codes (SIC). Establishments in four SIC groups with current annual sales of C\$5,000,000 and greater were identified by searching the Cancorp and Canadian Dun's Market Identifiers online databases. A study population of 113 Chief Executive Officers (CEOs) from across Canada was identified.

Data Collection

The method of data collection was the mail questionnaire, supplemented by follow-up personal interviews. The questionnaire is an efficient way of covering a study population that is geographically dispersed, and because the study is concerned with the *perceptions* of information sources, a questionnaire survey in which respondents report their perceptions is appropriate. In the questionnaire, respondents indicated their frequency of using each of 16 information sources, and evaluated the quality of these sources by answering two questions:

- How relevant is the information from each source about the environment? Relevant information is information that is *needed* and *useful* with respect to the goals and activities of the firm.
- How reliable is the information from each source about the environment? Information is reliable when it is *authoritative* and *dependable*. It is information that they personally *trust*.

Of the 113 CEOs in the study population, 67 returned completed questionnaires, for a response rate of 59.3%.

Follow up interviews collected detailed information about specific instances of acquiring and using environmental information from respondents who had answered the questionnaire and who were willing to be interviewed. Interviews were requested with the 11 respondents in the province of Ontario who agreed to be interviewed. The decision to interview in Ontario was based on geographical proximity and on the fact that almost half of the firms in the industry are located in the province. In the interviews, respondents related two recent "critical incidents" of receiving information

about the external environment (Flanagan, 1954). They described the substance of the information received, the issue or problem that it addressed, the sources for the information, how the information was made use of, and what the end results were of acquiring and using the information. Over a 10-week period, eight respondents were interviewed.

FINDINGS

Profile of Respondents

Over one-third of the firms whose CEOs responded (35%) report annual sales between \$10 million and \$50 million. Another 32% have sales between \$50 million and \$500 million. The respondents' firms collectively generate annual sales of over \$14.7 billion and employ nearly 103,000 people. All respondents were male. The "typical" respondent is in his late forties or early fifties, has a bachelor's or master's degree, worked in the marketing area before becoming the chief executive, has been CEO for the past 2 to 5 years, and has worked for the firm between 11 and 20 years.

The eight interview respondents manage firms that report annual sales of between \$5 million and \$100 million, and employ between 10 and 500 persons. The firms include Canada's second largest reseller of long-distance telecommunications services, second largest supplier of real-time financial information and communication networks, largest private paging company, and one of Canada's largest cable television operators. The other firms are mainly manufacturers and suppliers of telecommunications and data communications equipment and services.

Use of Information Sources in Environmental Scanning

Questionnaire respondents were asked about the frequency with which they use each source to scan the environment. Table 2 reports the results. Newspapers, periodicals; subordinate managers; and subordinate staff are the most frequently used sources in scanning. Broadcast media; customers; and internal memoranda, circulars are next most frequently used. The least frequently used sources are government officials; conferences, trips; the company library; and electronic information services.

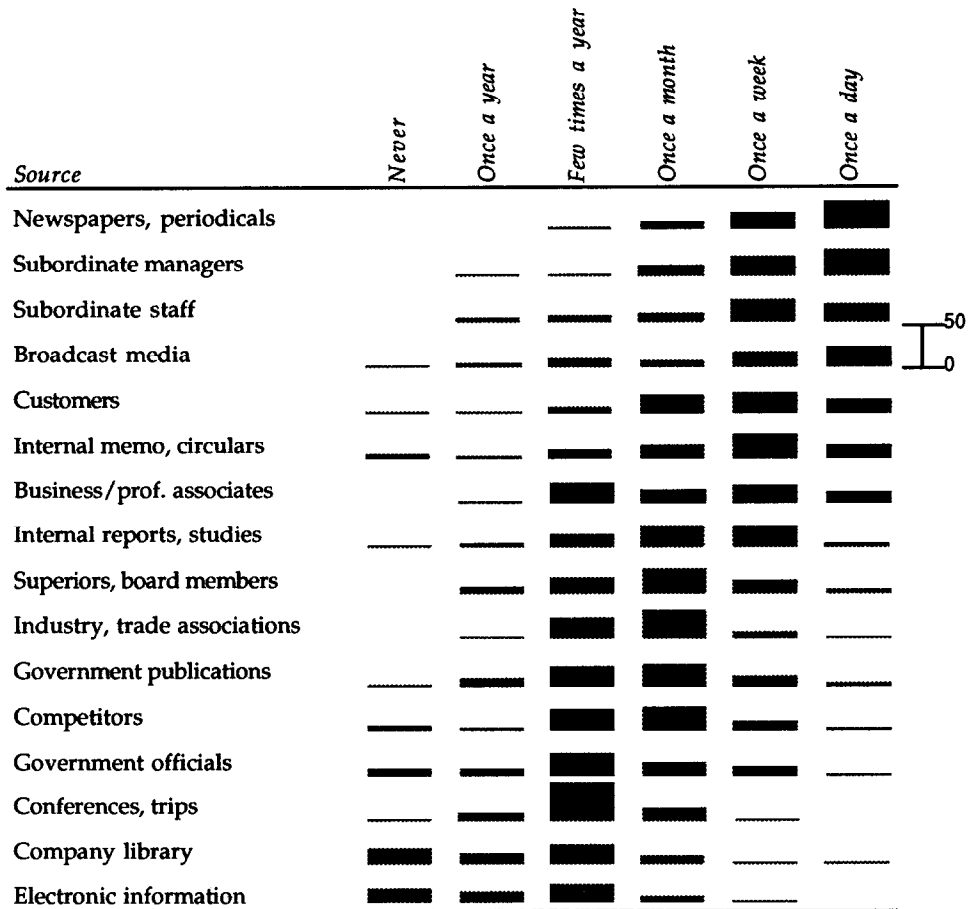
Table 3 shows mean usage frequencies by source category. Interestingly, the mean usage frequencies of the All External and All Internal source categories are the same. Within the All External source category, the difference between the Personal and Impersonal source subcategories is not statistically significant (Students' *t*-test; this test was used throughout the study to test for statistical significance). Within the All Internal source category, the Personal source subcategory is used significantly more frequently. The All Personal source category is used significantly more frequently than the All Impersonal source category.

Perceived Source Quality

Questionnaire respondents rated the quality of the 16 sources by answering two questions on source reliability and information relevance. For each source, responses to the "relevance" and "reliability" questions are summed to give an index of the overall Perceived Source Quality (PSQ). Table 4 shows the mean and standard deviations of

this index for the 16 sources. The perception is that subordinate managers, customers, subordinate staff, internal reports and studies, and superiors and board members provide information of the highest quality. The company library, electronic information services, and broadcast media offer information of the lowest quality.

TABLE 2
Histogram of Respondents Indicating Frequency of Using Information Sources in Environmental Scanning



Note: The maximum height of each column represents 50 respondents; *N* = 67.

TABLE 3
Frequency of Using Source in Scanning by Source Category
(Mean Respondents and Standard Deviations^{*})

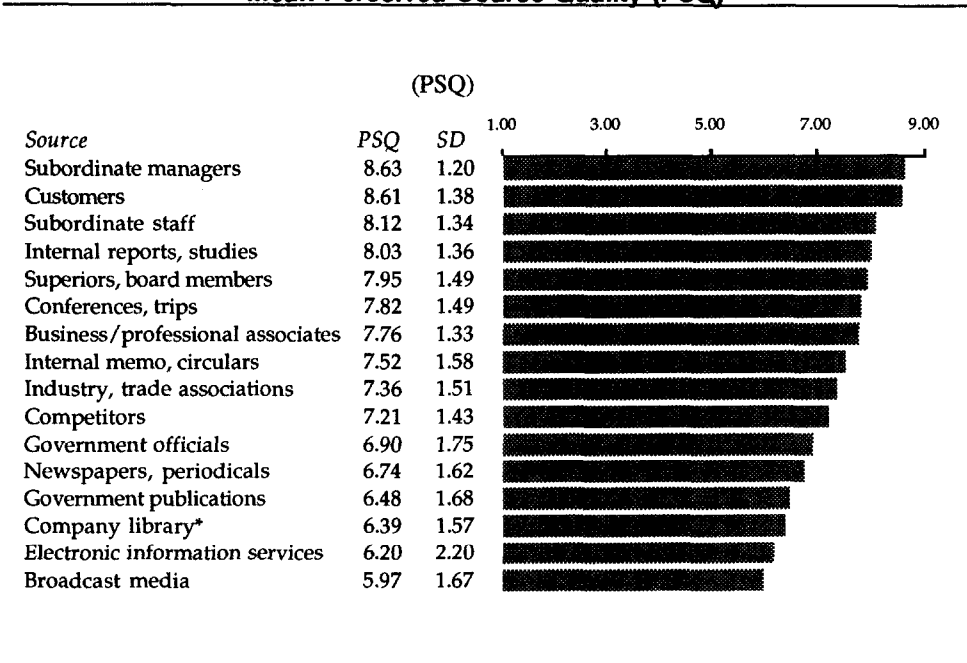
	<i>Personal</i>	<i>Impersonal</i>	<i>All External/ Internal</i>
<i>External</i>	3.88 (0.84)	4.03 (0.71)	3.97 (0.69)
<i>Internal</i>	4.57 ¹ (0.95)	3.51 ¹ (0.95)	3.97 (0.85)
<i>All Personal/ Impersonal</i>	4.18 ² (0.80)	3.80 ² (0.71)	

^{*} Standard deviations in parenthesis.

¹ Personal is significantly greater than Impersonal ($p < .001$).

² All Personal is significantly greater than All Impersonal ($p < .001$).

TABLE 4
Rank Order of Sources According to
Mean Perceived Source Quality (PSQ)



^{*} Includes only respondents who indicated that there is a library in the firm.

Table 5 shows the mean values of the PSQ index by source category. The perceived quality of the All Internal source category is significantly higher than the All External source category. Within the All Internal and All External source categories, information from the Personal source subcategory is of significantly higher quality than that from the Impersonal source category. Furthermore, the perceived quality of the All Personal source category is significantly higher than the All Impersonal source category.

TABLE 5
Perceived Source Quality by Source Category
(Mean Responses and Standard Deviations^a)

	<i>Personal</i>	<i>Impersonal</i>	<i>All External/ Internal</i>
<i>External</i>	7.62 ¹ (0.74)	6.88 ¹ (1.09)	7.21 ² (0.77)
<i>Internal</i>	8.24 ¹ (1.14)	7.01 ¹ (1.32)	7.56 ² (1.06)
<i>All Personal/ Impersonal</i>	7.88 ³ (0.77)	6.94 ³ (0.98)	

^a Standard deviations in parenthesis.

¹ Personal is significantly greater than Impersonal ($p < .001$).

² All Internal is significantly greater than All External ($p < .01$).

³ All Personal is significantly greater than All Impersonal ($p < .001$).

Perceived Source Quality and Source Use

Pearson's product moment correlation coefficients are computed between Perceived Source Quality and Frequency of Using a Source in Scanning for each of the 16 sources (see Table 6). Correlation coefficients are positive and statistically significant ($p < .05$) for all 16 sources. Five sources show moderately strong associations with coefficients between .50 and .65: Government officials; subordinate managers; internal memoranda, circulars; company library; and electronic information services. Among these sources, electronic information services and company library have the highest coefficients, .63 and .57, respectively. Another set of five sources shows moderate associations with coefficients between .40 and .49: Customers; newspapers, periodicals; superiors, board members; subordinate staff; and internal reports, studies. The remaining six sources have coefficients between .30 and .40. All coefficients are highly significant statistically, mostly at $p < .001$ and $p < .01$. Perceived Source Quality

positively correlates with Frequency of Using a Source in Scanning for all the sources considered in this study.

TABLE 6
Correlations between Perceived Source Quality
and Frequency of Using Source in Scanning
(Pearson's Correlation Coefficients)

<i>Information Source</i>	<i>Perceived Source Quality</i>
Customers	.49 ³
Competitors	.31 ¹
Business/professional associates	.39 ³
Government officials	.56 ³
Newspapers, periodicals	.41 ³
Government publications	.32 ²
Broadcast media	.32 ²
Industry, trade associations	.38 ²
Conferences, trips	.39 ²
Superiors, board members	.48 ³
Subordinate managers	.52 ³
Subordinate staff	.46 ³
Internal memo, circulars	.57 ³
Internal reports, studies	.41 ³
Company library	.57 ³
Electronic information services	.63 ³

¹ $p < .05$; ² $p < .01$; ³ $p < .001$.

Use of Personal Sources by Those Interviewed

Thirteen of the 16 critical incidents described involved information from personal sources. In four cases, the personal source was the sole source of the information that led to decision making. The most often cited personal sources were business associates, customers, and internal staff (managers and subordinates). Specific personal sources identified in the interviews include suppliers, customers, distributors, marketing staff, marketing or account managers, and former colleagues. Three interview respondents also mentioned that information was received as a result of their participation in industry or trade associations, where the respondent was on the board of directors or was active in one of its project committees.

Use of Internal Sources by Those Interviewed

Interview respondents gave examples of their use of internal sources. Three of the eight respondents related critical incidents in which information from internal staff played an important part. One respondent described how he relies upon his account managers for detailed information about his 15 major customers, while another described how he and a few managers formed a strategic planning committee to exchange and evaluate information about the external environment.

Perception of Environment by Those Interviewed

CEOs view the external environment to be highly dynamic and uncertain. One interview respondent observed that it was very important for him to keep track of many sectors of the environment because any one of them could have a significant impact on his firm. Another said that environmental information is used to make decisions that are "high risk" and "high stakes". Altogether, six of the eight interview respondents related incidents in which the use of environmental information led to strategic consequences, such as competitive repositioning of the firm, and decisions to introduce new products. The quality of information about the environment is also a key issue. Three interview respondents felt that there was too much irrelevant environmental information that was just "rumor" or "garbage," so that filtering the information and evaluating its reliability became necessary and important.

Perception and Use of the Company Library

Among the 67 questionnaire respondents, 50 indicated that there was a company library in their firms. Subsequent telephone calls revealed that only 15 of the 67 firms actually had a formal library staffed by a librarian, while another 35 firms kept informal collections of printed materials (Table 7). Out of the 15 firms with libraries, 12 of the chief executives personally used the company library. Out of the 35 firms with informal collections, only 14 of the chief executives personally used the collection.

Interview respondents were asked to elaborate on their perceptions of a company library and their use of the library or an informal collection. One respondent, who manages one of Canada's largest private paging and cable television firms, reported a relatively high frequency of using the company library ("at least once a month") in the questionnaire. He explains the role of his company library as follows:

One of our key sources of information is the written word—we spend a lot of time assessing literature. There are several reasons for this. We are a technology-oriented company, the market is technology driven. The technology itself is changing at a great speed. Furthermore, we are a relatively small firm—we don't have the 9,000 engineers that [a large Japanese firm] hires for instance. Our response is therefore to use the printed word to keep up with the rapid rate of technical change. Every department head reads two to twelve journals. Interesting articles are selected and redirected to other managers. These are accompanied by executive summaries which describe in two to three paragraphs why the content is important and should be read. Given this kind of scenario, the company library becomes important and frequently used.

TABLE 7
Use of Company Library
(N = 67)

	Company has formal Library	Company does not have Library, but an Informal Collection	Company does not have Library, nor Informal Collection	Total
CEOs use Library/ Informal Collection	12 (18%)	14 (21%)	—	26
CEOs do not use Library/ Informal Collection	3 (5%)	21 (31%)	17 (25%)	41
Total	15	35	17	

A second respondent felt that for his firm a technical library would be useful and he plans to set up one in the near future. The main justification here is that the technical library would provide reference materials and save the time of the engineering staff. This may be contrasted with another respondent who did not see a role for a company library because he felt that engineers, behaving as "competitive squirrels," would prefer to use their own private collections.

The general impression from the interviews is that the library is perceived as a place where publications like trade journals, magazines, newsletters, reports, and the like are simply stored after the staff have finished reading them. In the words of one chief executive, the company library is the "final resting place for used publications." Another executive felt that his firm already had the "essence of a library" in that publications and documents are "circulated and filed away for future reference." It seems that the chief executives have a limited view of the function of a company library. None of the executives interviewed mentioned the need for an information professional nor seemed aware of the services such an individual could provide.

Perception and Use of Electronic Information Services

In this study, Electronic Information Services as information sources include online databases, electronic mail, newswires, and related services. Among the 67 questionnaire respondents, 26 use one or more of these sources "at least once a month" or more frequently. Subsequent telephone calls to the questionnaire respondents revealed that 75% of the firms did not subscribe to online database services. Only 3 respondents used online databases personally.

Two of the eight interview respondents used information from online databases. One of them heads a firm that supplies online information, while another manages a firm that provides data network services. A third respondent had recently cancelled subscriptions to online database services. The chief executive who was most satisfied with online information describes his use of electronic information as follows:

I get a lot of information electronically, from two sources: the internal e-mail system, and an in-house product for accessing newswire services. I use that product to scan the newswires: I enter my own keywords, typically the names of customers, competitors, my own firm, and the product would automatically retrieve relevant articles from services such as AP, UPI, and Reuters. These articles are sent to me via e-mail, which I would check every night. This method has worked very well for me.

Another executive who recently cancelled his firm's subscriptions to online databases said that he had done "a cost-benefit assessment, and found that the information in the databases was too general, and that the cost was just outrageous relative to the value." He now prefers to gather his own information on competitors from distributors and customers.

DISCUSSION

Use of Personal Sources

Information about the external environment is often equivocal. Some of it may concern events or trends that are still evolving, some of it may be based on conjecture or opinion, some of it may be inaccurate or incomplete, and almost all of it may be subject to multiple interpretations. The processing of environmental information aims at lowering its inherent equivocality (Weick, 1979). Furthermore, the information task of reducing equivocality may depend on hierarchical level: Top managers may need to confront and evaluate ambiguous environmental messages more often than middle-level managers. Equivocality is reduced by using sources of high *information richness* (Daft & Lengel, 1986). Personal sources are rich because they transmit their information typically through rich media, such as face-to-face meetings and telephone conversations, that allow chief executives to observe additional information cues, get feedback immediately, and receive personalized information. It is the richness of information conveyed by personal sources, a richness that is needed to interpret equivocal environmental information, that accounts for the chief executive's preference for personal sources in scanning.

Use of Internal Sources

When scanning, chief executives use internal sources as frequently as they do external ones. Firms establish organizational boundaries and specialize in certain activities and in doing so evolve local norms, languages, and conceptual frameworks (Lawrence & Lorsch, 1967; March & Simon, 1958). While this specialization increases the efficiency of information processing within the firm, it also creates obstacles to information processing between the firm and the external environment. As a result, it becomes

necessary to recode information messages at the firm's boundaries. Boundaries can be spanned effectively only by individuals who understand the coding schemes used on both sides of the boundary, enabling them to search out relevant information on one side and disseminate it on the other side—a process called *informational boundary spanning* (Tushman & Scanlan, 1981). Chief executives prefer environmental information from internal sources that are informational boundary spanners because they translate external information into terms that are more meaningful within the firm.

A second reason may be that decision makers in organizations tend to prefer information sources which have a capacity to *absorb uncertainty*, that is, derive inferences from a body of data and communicate these inferences rather than the raw data (March & Simon, 1958). External as well as internal sources can perform uncertainty absorption. However, internal sources have the additional capability to absorb uncertainty in a way that addresses the specific information needs and task situation of the firm. For example, an internal source may summarize voluminous incoming information, filter out irrelevant data while highlighting important items, and discuss implications. Receiving such processed information assists the chief executive in assessing issues and making decisions. This capability of internal sources to absorb external uncertainty *and* to adapt the information according to the firm's needs accounts for the importance of these sources.

Use of Information Sources That Are Perceived to Be of High Quality

Source use positively correlates with perceived source quality. The *turbulence and equivocality* of the external business environment, the *strategic role* of scanning, and the special character of the *information use contexts* of managers, all combine to help explain why information quality is associated with source use when chief executives scan the environment.

Today's managers face a business environment that is increasingly complex and turbulent. A survey of 12,000 managers in 25 countries by *Harvard Business Review* identifies a wide array of forces of change including "globalizing markets, instantaneous communications, travel at the speed of sound, political realignments, changing demographics, technological transformations in both products and production, corporate alliances, flattening organization . . ." —all of which cause the traditional walls of business boundaries to crumble (Kanter, 1991, p. 151). As information seekers, executives would have to attend selectively to and interpret the numerous signals created by a dynamic and equivocal environment (Weick, 1979). Furthermore, they would have to use the acquired environmental information to make decisions about company strategy and long-term plans (Aguilar, 1967, pp. 5-6). The scanning process thus consists of not only the gathering and analyzing of information but also "the use of this analyzed intelligence in strategic decision making" (Lester & Waters, 1989, p. 5). Managers receive more information from more sources than almost anyone else in an organization, and they face the dilemma of receiving too much information but not necessarily enough of the right information (Katzer & Fletcher, 1992). As a result of the nature of problems they face and the organizational contexts of their work, managers as information users would rely heavily on evaluated, aggregated data; operate on a good deal less than total information; seek options and alternatives, rather than answers; and require different configurations and quality of information to

make a variety of decisions (Taylor, 1986). In summary, because chief executives have to formulate long-term, consequential plans for their firms' growth in a dynamic and equivocal environment and because they have to filter, analyze, and interpret large amounts of information, it might be expected that when they seek environmental information, they favor relevant and reliable sources which they perceive to be of high quality.

Use of Company Library and Electronic Information Services

Company librarians can enhance the breadth and depth of environmental scanning by managers. Chief executives do use formal or printed sources intensively in scanning. At the same time, many CEOs decry the overabundance of irrelevant information and point up the need to filter and evaluate information. Company librarians and other information professionals can fill such needs: They should know how to identify what users need; develop systems to organize all types of information for retrieval; analyze, synthesize, and disseminate relevant information; and, in general, work together with other professionals to process information.

Few CEOs indicated frequent use of online databases—those who do are likely to be in the business of providing online information and information services. The study suggests three reasons for the low usage: They are too complex to use, requiring substantial time and effort to learn; their information is too general to be useful; and they are not cost-effective. Two ways to increase executive usage of online services would be for the service to filter incoming information, tailoring it according to the executive's priorities, and to reduce the learning effort by, for example, providing an intuitive yet powerful interface.

IMPLICATIONS

What is the role of information professionals in the environmental scanning process? A recent study on environmental scanning in seven large UK firms prepared for the British Library concludes that librarians and information scientists should *not* get involved in information analysis and judgement, but rather "direct their energies to trying to improve the general accessibility and availability of publicly available information of relevance to business activity" (Lester & Waters 1989, p. 61). They should restrict their contribution to those areas in which they are trained and qualified to practice, such as cataloging, classifying, and indexing. They should not involve themselves in executive decision making because they are unable or unwilling to know and understand the detailed decision-making situations in which the information will be used.

The findings of the present study lead to a different set of recommendations. Chief executives use printed sources to perform general, wide-area viewing of the external environment before they home in on particular issues of concern; they use printed sources to scan the technological, regulatory, and economic environmental sectors where large amounts of factual information or numerical data have to be taken in efficiently and accurately. At the same time, chief executives lament that too much of the environmental information is of little value so that it becomes necessary to filter and evaluate the information. As a result, chief executives prize relevant information from trusted sources highly. Chief executives prefer environmental information that has

been translated into terms that are meaningful internally (informational boundary spanning) and information that has been summarized and filtered according to internal needs (uncertainty absorption). There is a good match between these requirements and the skills of special librarians and information professionals in acquiring, organizing, analyzing, synthesizing, and disseminating information to meet identified needs. Chief executives could extend the reach and effectiveness of their environmental scanning by calling upon the specialized skills of librarians and information professionals. A more systematic approach to information gathering and organization could also avoid information gaps that may result from simply relying on personal memory or serendipitous encounters to supply information about environmental change. Unfortunately, as already noted earlier, chief executives seem to have a limited view of the company library ("a final resting place for used publications") and seem unaware of the services that information professionals could provide.

The first implication is to increase the awareness of chief executives and managers in industry about the professional skills of special librarians and how these may be brought to bear on improving the acquisition and use of environmental information. Schools of library and information science may take the initiative and develop seminars for business executives that discuss information management, information resources, information seeking behavior, and the role of librarians in business organizations. Alternatively, business schools may work with library schools to design and implement teaching programs that encompass and enlarge these topics.

There are a number of attributes that special librarians and information professionals need to develop if they are to become effectual information providers to top executives. First, they would have to establish themselves as dependable information sources whom chief executives trust personally. The perceived quality of a source, in terms of its trustworthiness and information relevance, is a significant factor in predicting source use. Second, this reputation as a trusted source has to be built upon a close understanding of the business activities, competitive conditions, and short- and long-term goals of the firm. This understanding enables special librarians and information professionals to act as informational boundary spanners who translate environmental information for internal consumption and absorb external uncertainty by selecting and organizing external information so that they fit internal work contexts and information needs. Third, special librarians and information professionals need to develop personal contact with executive users. Face-to-face contact is necessary if they are to become trusted sources. Chief executives prefer rich, verbal information exchanges during which they can seek clarification, obtain feedback, and receive informal signals. Information professionals should consider communicating their information through personal briefing sessions in addition to printed reports. During these direct interactions, they can deepen their understanding of the executives' information needs and acquire more detailed knowledge of the business environment.

FURTHER RESEARCH

Information is the raw material of managerial work: Managers spend much of their time seeking and processing information and using it to develop decisions and plans that shape their organizations' future. Yet, in library and information science, we do not know enough about managers as a distinctive group of information users. Compared with the rich body of research on scientists and engineers as information

users, studies on managers are few and far between. A large part of the manager's information comes from or concerns the external environment. Environmental scanning is a special case of managerial information seeking that is especially in need of study because the use of environmental information often carries strategic, longer-term consequences for the firm and because information professionals seem well-prepared to enhance the scanning process and so enable the organization to adapt more effectively to their changing environments. For special librarians and information professionals to make a larger contribution they need to know more about environmental scanning as an information-seeking activity—what information is needed, where do managers look for or view information, why are some sources favored while others are ignored, how do managers make use of information, and so on. In particular, there should be more research on how to add value to the information for managerial use. The present study suggests that reliability and relevance are important information attributes; future research could identify other dimensions of information quality.

CONCLUSION

In environmental scanning, chief executives' use of information sources is significantly associated with the perceived quality of information from the sources. Chief executives value information quality because they have to react to an increasingly volatile and uncertain environment in order to ensure their organizations' viability and because they have to filter, analyze, and interpret large amounts of environmental information. Although one might expect the company library and online databases to be helpful for scanning the external environment, they are not frequently used by the chief executives. The lack of information relevance, source trustworthiness, and face-to-face personal contact are contributory factors.

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