



## HOW SENIOR MANAGERS ACQUIRE AND USE INFORMATION IN ENVIRONMENTAL SCANNING

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**Abstract**—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. This paper reports a study of how 13 chief executives in the Canadian publishing and telecommunications industries scan their environments and use the information in decision making. Each respondent was asked to relate two critical incidents of information use. The incidents were analyzed according to their environmental sectors, the information sources, and their use in decision making. The interview data suggest that the chief executives concentrate their scanning on the competition, customer, regulatory, and technological sectors of the environment. In the majority of cases, the chief executives used environmental information in the Entrepreneur decisional role, initiating new products, projects, or policies. The chief executives acquire or receive environmental information from multiple, complementary sources. Personal sources are important for information on customers and competitors, whereas printed or formal sources are also important for information on technological and regulatory matters.

### 1. INTRODUCTION

Information is the raw material of managerial work. A large part of the manager's information comes from or concerns the environment external to the organization. Customer preferences, competitor strategies, technological advancements, government regulations, and social and economic conditions are all in a constant state of flux. Learning about developments in the environment thus becomes a critical activity of senior managers responsible for the survival and performance of their organizations. *Environmental scanning* is defined as 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 (Choo & Auster, 1993; Aguilar, 1967). Environmental scanning drives an organization's strategic planning process—the quality of the planning depends on the quality of the scan. Yet the scanning manager faces many challenges: The external environment is changing rapidly in complex ways; information is available from numerous sources; information about external developments is often ambiguous; and the information is to be used to make consequential decisions or long-term commitments by the organization. Although there is general agreement that the acquisition and processing of information is central to managerial work, there is a relative lack of research in the information science literature on managers as a distinct group of information users. The present study focuses on senior managers' use of information about the external business environment. Specifically, our purpose is to understand how CEOs in two Canadian industries acquire information about the environment and then use this information in their decision making.

Scanning involves several modes of information seeking. Aguilar (1967) usefully differentiates between *searching* for information about a specific question, and *viewing* information or being exposed to information without a specific information need in mind.

Scanning could range from a casual conversation at the lunch table or a chance observation of an angry customer dumping a product, to an extensive market research programme to identify business opportunities. At a conceptual level then, environmental scanning may be seen as an extended case of information seeking, in that scanning not only includes searching for particular information, but also simply being *exposed* to information that *could* impact the firm.

## 2. CONCEPTUAL FRAMEWORK

Research on environmental scanning began in the 1960s with pathfinding studies by Aguilar (1967) and Keegan (1968). Since then, most of the studies have revolved around a few research themes: the effect of perceived environmental uncertainty on scanning; the focus of scanning; information sources used; and scanning methods. In each of these areas, it is possible to discern a consistent picture of how managers scan. With regard to environmental uncertainty, most studies found that managers who perceive greater environmental uncertainty tend to do more scanning (see, for example, Nishi *et al.*, 1982; Daft *et al.*, 1988; Auster & Choo, 1992, 1993). The focus of scanning is on market-related sectors of the external environment, with information on customers, competitors, and suppliers being the most important (Jain, 1984; Ghoshal & Kim, 1986; Lester & Waters, 1989). The information sources most often used are personal sources, especially managers and staff within the organization, whereas sources such as the company library and online databases were less frequently used (O'Connell & Zimmerman, 1979; Kobrin *et al.*, 1980; Auster & Choo, 1992, 1993). Scanning methods can range from ad hoc, informal activities to systematic, formalized efforts, depending on the organization's size, experience, and perception of the environment (Thomas, 1980; Klein & Linneman, 1984; Preble *et al.*, 1978). (A more detailed discussion of past research on environmental scanning is in Choo & Auster, 1993). One of the gaps in the research is the relative lack of attention to how information gained from environmental scanning is actually used by the managers.

The present study examines environmental scanning by chief executive officers in two Canadian industries, and addresses three research questions:

1. What environmental sectors are scanned by the CEOs?
2. What information sources do they use in the environmental scanning?
3. How do they utilize the environmental information in decision making?

The study thus builds upon past research by investigating the focus of scanning, and the information sources used in scanning. At the same time, it extends past research by analyzing the ways that the environmental information is actually used in decision making.

### 2.1 *External environment*

Duncan (1972) 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" (p. 314). For the purpose of this study, the environment is viewed as a source of information, continually creating signals and messages that organizations should attend to (Dill, 1962; Weick, 1979).

The external business environment of a firm is divided into six environmental sectors, as defined by Daft *et al.* (1988) in their study of CEO scanning:

1. *Customer* sector refers to those companies or individuals that purchase the products made by the respondent's firm, and includes companies that acquire the products for resale, as well as final customers.
2. *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.

3. *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.
4. *Regulatory* sector includes federal and provincial legislation and regulations, city or community policies, and political developments at all levels of government.
5. *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.
6. *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 (Daft *et al.*, 1988, pp. 137–38).

This environmental typology is similar to those proposed in recent works on strategic management. For example, Jauch and Glueck (1988) identify six environmental sectors as follows: customers, suppliers, competition, socioeconomic, technological, and governmental. Fahey and Narayanan (1986) distinguish between a macroenvironment comprising social, economic, political, and technological sectors, and a task/industry environment comprising mainly the customer and competitor sectors.

## 2.2 Managerial decision roles

Mintzberg (1973) proposes a model of the managerial *use of information* that includes information acquired from the external environment. In his conceptualization of top managers as information processing systems, the manager's interpersonal roles provide access and exposure to information from a large number of external and internal information sources. The manager in the informational role of *monitor* "continually seeks and receives information from a variety of sources in order to develop a thorough understanding of the organization and its environment" (Mintzberg, 1973, p. 97). Access to information combines with positional authority to empower the manager to perform four decisional roles. As *Entrepreneur*, the manager initiates "improvement projects" such as new lines of business or joint ventures that exploit an opportunity or solve a problem. As *Resource Allocator*, the manager controls the distribution of all forms of organizational resources through, for example, budget allocations and setting of targets. As *Disturbance Handler*, the manager deals with unexpected but important events. Finally, as *Negotiator*, the manager engages in major negotiations with other organizations or individuals. In the present study, we investigate the use of environmental information within Mintzberg's decisional roles framework.

## 3. METHOD

### 3.1 Sample

The study is based on personal interviews with 13 CEOs in the Canadian publishing and telecommunications industries. Both industries are vital to the Canadian economy and thrive in volatile business environments characterised by technological advances, intense competition, new business structures, population growth, and changing social preferences. The industry sectors were defined by four-digit US Standard Industrial Classification Codes. Using these codes, online searches were done in the Canadian Dun's Market Identifiers and the Cancorp Canadian Corporations databases to identify 207 firms with annual sales equal to or greater than C\$5 million. As part of an earlier questionnaire survey (Auster & Choo, 1993), CEOs of these firms were asked if they were willing to be interviewed. Interviews were then requested with the 22 respondents in the province of Ontario who agreed to be interviewed. The decision to interview in Ontario is based on geographical proximity and on the fact that a large fraction of firms in both industries is located in the province. Eventually, 13 respondents were interviewed (most of the others were out of town during the three-month interviewing period).

### 3.2 Interview method

The interview format is based on the *focused interview* as described by Merton and Kendall (1956), and Judd *et al.* (1991). Originally, Merton and Kendall described two requirements for this type of interview: the persons interviewed have to be involved in a particular situation, and the interviewer has to theoretically analyze the situation beforehand. Judd *et al.*, broaden the definition of a focused interview to include any interview in which interviewers know in advance what specific aspects of an experience they wish to have the respondent cover in their discussion, whether or not the investigator has observed and analyzed the specific situation. For this study, interview respondents are asked to recall their experiences and behaviours in specific incidents (situations) of receiving and using environmental information. The interviewer, on the other hand, knows what aspects of the incident are to be pursued, as well as what topics or what aspects of a question are to be addressed.

The interview design is also based on the principles of *Critical Incident Technique* (CIT). The CIT was developed by Flanagan at the American Institute for Research in 1947, where it was used in studies to determine critical requirements for the work of pilots, air force officers, scientists, air traffic controllers, and hourly wage employees (Flanagan, 1954). The 'incident' to be studied should be a complete, recent incident that had clear consequences. The CIT seems well suited to studies of information-seeking behaviour, and has been applied in several information needs and uses studies (Martyn & Lancaster, 1981). Because we wish to analyze complete sequences of acquiring and using environmental information, and to understand some of the cognitive processes that underlie this process, the CIT is selected as an appropriate data-collection strategy. Two classic scanning studies have also employed this method (Aguilar, 1967; Keegan, 1974).

In summary, the personal interviews are designed to *focus* discussion on *critical incidents* of acquiring and using environmental information. Specifically, each respondent related two 'critical incidents' of receiving information about the external environment in reply to the following question:

Please try to recall a recent instance in which you received important information about a specific event or trend in the external environment – information that led you or your firm to a new initiative, a change of direction, or some significant action.

Would you please describe that incident for me in enough detail so that I can visualize the situation?

Probes were used to prompt respondents to describe the substance of the information received, the issue or problem 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.

## 4. FINDINGS

### 4.1 Profile of respondents

Thirteen CEOs in the publishing and telecommunications industries who were located in the province of Ontario were interviewed over a three-month period. A profile of the respondents is in Table 1.

### 4.2 Critical incidents

The 13 respondents related a total of 25 critical incidents of using environmental information to make significant decisions for the firm. These incidents are summarized in Table 2, which shows the content of the information acquired, the environmental sector it concerned, the decisional role the respondent was acting in, and the sources of the information. Interview respondents identified seven information sources in the incidents they recalled: Customers; Business Associates (suppliers, distributors, bankers, lawyers, etc.); Government Sources; Newspapers, Journals, and External Reports; Trade Associations;

Table 1. Profile of firms and CEOs interviewed

CEO name	Business	Sales/ employees	CEO age	Years as CEO	Previous function	Highest education
Albert	Supplier of real time financial information & communications networks	\$21M/ 197 emp.	35-44	4 years as CEO, 8 years in firm	Operations	Others (technology)
Ben	One of Canada's largest cable television operators and the largest private paging company	\$64M/ 450 emp.	35-44	5 years as CEO, 15 years in firm	Finance	Bachelor's degree, CA
Chris	Supplier of data communications equipment and services for LAN, WAN interconnection	\$15M/ 65 emp.	35-44	1 year as CEO, 1 year in firm	Marketing & Sales	Bachelor Commerce (Hon.)
Dan	Manufacturer and distributor of network analysis products	\$13M/ 40 emp.	45-54	Founded firm 15 years ago	Finance, marketing	High school diploma
Ed	Manufacturer of telecommunications components and devices	\$5M/ 60 emp.	>65	Founded firm 20 years ago	Marketing	Bachelor's degree (Engineering)
Frank	Second largest reseller of long distance telecommunications services in Canada	\$40M/ 47 emp.	35-44	1 year as CEO, 1 year in firm	Sales	Bachelor's degree
George	Manufacturer of multiplexing and switching equipment for common carriers, interexchange carriers	\$29M/ 60 emp.	39	3 years as CEO, 4 years in firm	Marketing	Business administration certificate (community college)
Harry	Provider of packet switching data network services, providing access to cities across Canada and worldwide	\$8M/ 10 emp.	35-44	2 years as CEO, 6 years in firm	Sales	Bachelor's degree (electronics engineering)
Peter	Developer and provider of online databases, document management services, and reference tools	\$12M/ 120 emp.	45-54	Founded firm 20 years ago	—	Bachelor's degree
Quint	Wholesale distributor of books	\$14M/ 135 emp.	55-64	3 years as CEO, 3 years in firm	'Supplier'	Bachelor's degree
Rob	Publishing firm involved with printing, publication, and wholesale of books	\$45M/ 100 emp.	35-44	1 year as CEO, 1 year in firm	Marketing	Master's degree
Steve	Publisher and printer of a wide range of magazines and periodicals	\$115M/ 1500 emp.	45-54	2 years as CEO, 2 years in firm	Marketing	Master's degree
Tom	Wholesale distributor of books	\$17M/ 100 emp.	45-54	5 years as CEO, 5 years in firm	Marketing	Bachelor's degree

Internal Staff (including subordinate managers and staff); and Electronic Information.\* (This grouping of information sources is consistent with that used in past research on scanning; see Aguilar, 1967; Keegan, 1974; Daft *et al.*, 1988.)

We do not have space to discuss each incident, but we select four to illustrate the use of environmental information in each of the four decisional roles.

*Entrepreneur decisional role.* Ben is CEO of one of Canada's largest cable television operators and the largest private paging company. The incident Ben described was a recent decision to participate in a joint experiment to use a new technology, Digital Video Compression (DVC), to transmit programs to pay-tv customers. According to Ben, this was the

\*Electronic information sources include online databases, electronic mail, and office automation systems. Only one incident involved the use of Electronic Information, and this was related by a CEO whose firm is in the business of online financial information services.

Table 2. Summary of critical incidents

Incident	Information	Environmental sector	Decisional role	Sources of information						
				Customers	Business associates	Government sources	Newspapers, Journals, Reports	Trade associations	Internal staff	Electronic information
A1	Merger of 2 major customers, creating Canada's largest retail brokerage	Customer	Disturbance handler	•						•
A2	Deregulation of financial industry allowing banks to compete	Regulatory	Entrepreneur				•			
B1	Use of digital video compression to provide greater program flexibility	Technology	Entrepreneur	•	•	•	•	•		
B2	Assessment of competitors' strengths in the Canadian paging market	Competition	Entrepreneur	•	•			•	•	
C1	Identification of a market for smaller network routing systems	Customer	Entrepreneur	•						
C2	Firm's competitive position after entry to generic markets	Competition	Entrepreneur	•						
D1	News that a manufacturer wished to discontinue a product	Competition	Negotiator		•					
D2	Perception of an unfavourable political climate in Canada	Regulatory	Disturbance Handler				•			
E1	Identify component suppliers in Shanghai, after a visit to PRC	Competition	Negotiator	•				•		
E2	Customer expresses demand for a new coaxial cable switch	Technology	Entrepreneur	•						•
F1	Bell Canada's filing with CRTC to lower long-distance WATS rates	Regulatory	Disturbance Handler		•	•				
F2	New parliamentary bill on national telecommunications policy	Regulatory	Negotiator		•	•		•		
G1	Information on Process Management	Technology	Entrepreneur				•			•
G2	News about economic downturn	Economic	Resource Allocator	•			•	•		
H2	Information about exhibition on video conferencing systems	Customer	Entrepreneur	•						
P1	News that a legal information service firm was selling its indexing service	Competitor	Entrepreneur	•						•
P2	Joint venture offer by competitor to merge two databases	Competitor	Entrepreneur	•						
Q1	Customers buying from off-shore rather than domestic Canadian sources	Customer	Disturbance Handler	•	•	•		•		
Q2	Information on in-house desktop publishing	Technology	Entrepreneur				•			•
R1	Changes in consumer buying trend—consumers concerned with price	Customer	Resource Allocator	•	•		•	•		
S1	Re-acquiring printing business from publishing conglomerate	Competition	Negotiator	•			•			
S2	Assessing the sale of one of the firm's assets to a major customer	Competition	Negotiator	•						
T1	Opportunity for a joint venture with a US-based company	Competition	Entrepreneur				•			•
T2	Market trends in different sectors of the publishing industry	Customer	Entrepreneur					•	•	

world's first commercial application of DVC technology. Ben identified the main sources of information as: his own reading of current engineering articles on DVC; his participation in the strategic planning committee of the Canadian Cable TV Association; suppliers; marketing staff; and government regulatory agencies. Ben recalled that

information from these various sources had to come together for us to decide to go ahead with the project. The technology was first assessed to be ready and stabilized. Suppliers had to be prepared to experiment. Marketing people had to see the possibility of a viable market. Regulators must support the project. All these were integral to the decision making process to go ahead with the experiment.

In this incident, Ben was making decisions in the Entrepreneur role, initiating a new project that applies recent advances in the Technology sector of the environment.

*Resource Allocator decisional role.* Rob is CEO of a publishing firm involved with the printing, publication, and wholesale of books. The incident that Rob described concerned declining book sales. Based on information from newspapers, business magazines, retail trade journals, as well as information from business surveys, conversations with retailers, and market analysts, Rob concluded that the main reason for falling sales was that customers had become very sensitive to price because of the prolonged economic recession, the introduction of a Goods & Services Tax that taxed book sales for the first time, and the Iraqi war. In order to lower book prices, Rob decided to close down the warehousing and distribution system in Canada, and to have the US-based system undertake these functions. In this incident, Rob was making decisions in the Resource Allocator role, deciding to close the Canadian distribution system in order to respond to an increased price sensitivity in the Customer sector of the environment.

*Disturbance Handler decisional role.* Frank is CEO of the second largest long-distance telecommunications reseller in Canada. The incident Frank described concerned Bell Canada's response to the entry of telecommunications resellers in the Canadian market. Resellers buy leased lines from the carriers, and use their own multiplexing and switching equipment to create their own long-distance services. In 1991, Bell Canada filed for new, significantly lower tariffs for its own Wide Area Telecommunication Service (WATS) long-distance services. Frank's first source of information about Bell's rates filing was the regulator, with additional information from his contacts at a customer company. As a result of the filing, Frank decided to base his pricing structure on telephone Area Codes rather than WATS zones. This gave greater pricing flexibility, and customers could compute their savings more clearly. When the regulator finally approved Bell's new rates, Frank was able to adjust prices in less than a week to match the new rates. In this incident, Frank was making decisions in the Disturbance Handler role, responding to challenges in the Regulatory sector of the environment.

*Negotiator decisional role.* Steve is CEO of a large firm publishing and printing a wide range of magazines and periodicals. The incident Steve described concerned the acquisition of the publishing business that was sold to a major Canadian newspaper publishing conglomerate. Steve recalled that during a meeting with banks involved in the transaction,

I gave them my view of why the transaction from our own end wasn't as interesting as I hoped it would be and one of the bankers let slip, "Oh, we were afraid of that." Once I heard that, I knew that the presumption that I had just made was correct. That was a multi-million dollar bit of information—that slip of someone's lips. It was a perfectly normal reaction to what I had said, but what it served to do was confirm something that I was really speculating about.

Together with additional information from the national newspaper and asking other people, Steve was finally able to complete the purchase of the printing business at less than half of the original price. In this incident, Steve was making decisions in the Negotiator role, and was responding to information concerning the Competition sector of the environment.

## 5. ANALYSIS AND DISCUSSION

5.1 *Scanning and use of environmental information*

In Fig. 1 below, each critical incident is represented by a circle placed within a matrix formed from the four decisional roles and six environmental sectors. Thus, each circle relates two aspects of each critical incident: the decisional role the respondent was acting in, and the environmental sector concerning which information was acquired and used.

Of the 25 critical incidents, 14 are associated with the Entrepreneur decisional role. This number is much larger than the number of incidents reported in the other decisional roles (5 in the Negotiator role, 4 in the Disturbance Handler role, and 2 in the Resource Allocator role). In other words, *respondents use environmental information mainly in the Entrepreneur decisional role*—they were deciding about ‘improvement projects’ such as introducing new products, and formulating market strategies (Mintzberg, 1973). Seven of the thirteen respondents indicated that environmental information was used in ways strategic to the firm. This linkage between scanning activity and the Entrepreneur decisional role is predicted by Mintzberg (1973). In the Entrepreneur role, the manager initiates improvement projects to exploit opportunities or to solve problems. According to Mintzberg (1973, p. 78), “Entrepreneurial work begins with scanning activity,” where the manager uses information from scanning the environment to identify opportunities or problems, and then to design and select improvement projects. The chief executive who scans a greater amount would therefore have more information about developments in the external environment, including information about opportunities or problems, as well as possible solutions or alternatives. As a result, the executive who scans more would have more environmental information to call upon and to use when deciding about improvement projects in the Entrepreneur role. The interview data are consistent with this interpretation. Two respondents (Ben and Dan) indicated that they regularly scan the environment

Sector Role	Customer	Competition	Technological	Regulatory	Economic	Sociocultural
Entrepreneur	C1 H2 T2	B2 C2 P1 P2 T1	B1 E2 G1 Q2	A2 H1		
Resource Allocator	R1				G2	
Disturbance Handler	A1 Q1			F1 D2		
Negotiator		E1 D1 S1 S2		F2		

Fig. 1. Decisional role—Environmental sector matrix.

for new business opportunities; one scans for new ideas about how technology is being applied in other countries, while the other reads accounts of how new products have been developed successfully elsewhere.

Twenty-four of the twenty-five incidents were spread over four environmental sectors: Competition, Customer, Technological, and Regulatory. No incident was recalled for the Sociocultural sector, and only one touched on the Economic sector. The distribution of incidents related suggests that the *respondents concentrate their environmental scanning on the competition, and customer sectors; followed by the technological and regulatory sectors*. This is in line with past research on scanning, which found that executives are most concerned about the market and competitor sectors of the environment when they scan (see earlier section and Choo & Auster, 1993). Furthermore, CEOs in this study were also making use of environmental information on the technological and regulatory sectors. The fact that virtually no incidents were recalled concerning the Sociocultural and Economic sectors seems to suggest that the CEOs are more concerned with short-term developments that affect their business directly than with longer-term trends whose impact may be difficult to predict.

5.2 Use of information sources in decisional roles

In Fig. 2 below, each critical incident is placed within a matrix formed from the six environmental sectors and seven information sources identified by interview respondents. Thus, each circle relates two aspects of each critical incident: the environmental sector concerning which information was acquired or received, and the source from which information was acquired or received. Where information came from a number of sources, an equivalent number of incident circles are drawn, linked by a dashed line.

The distribution of incidents in the matrix suggests that *respondents use personal sources frequently in their scanning and decision making*. The three most frequent sources of environmental information for decision making are Business Associates; Newspapers, and

Source Role	Customers	Business Associates	Government Sources	Newspapers Journals External reports	Trade Associations	Internal Staff	Electronic Information
Entrepreneur	C1 C2 E2	B1 B2 P1 P2 H2	B1 B2	A2 Q2 B1 G1 T1 H1	B1 B2 T2	P1 Q2 E2 B1 B2 G1 T1 T2	
Resource Allocator	R1 G2	R1		R1 G2	R1 G2		
Disturbance Handler	A1 Q1	F1 Q1	F1 Q1	D2 Q1		Q1	A1
External Negotiator		E1 F2 S1 D1 S2	F2	S1	E1 F2		

Fig. 2. Decisional role – Information source matrix.

Journals, External Reports; and Internal Staff. Two of these are personal sources, and the importance of personal sources may be interpreted as follows. 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 must therefore aim 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 considered rich because they transmit their information typically through rich media, such as face-to-face meetings and telephone conversations, that allow chief executives to seek instant feedback, observe additional cues, and receive personalized messages. It is the richness of information conveyed by personal sources, a richness needed to interpret equivocal environmental information, that accounts for the chief executive's reliance on personal sources in scanning and decision making. The finding that personal sources are important sources in scanning is consistent with past research.

*Respondents acquire or receive environmental information from multiple, complementary sources.* For 18 of the 25 incidents reported, information had been acquired or received from between two and as many as five sources. The sources used include both personal and impersonal sources, which may be internal or external to the firm. One respondent (Ben), when asked to identify his most critical sources, replied that it was difficult to say which sources are more important. Information from various sources, including the R&D staff, suppliers, marketing staff, industry association, and regulators, had to come together for decisions to be made. Another respondent (George) spoke of blending data from multiple sources, so as "to see or recognize a trend coming," and then solicit more information from additional sources. The interview data, therefore, suggest that the chief executives combined environmental information from several types of sources (personal/printed, internal/external). These sources complement each other. For example, personal sources provide rich information often about specific issues, whereas printed sources provide efficient ways of scanning broadly; external sources may be closer to the environmental news, but internal sources may better interpret their significance.

### 5.3 Use of information sources in relation to environmental sectors

In Fig. 3 below, each critical incident is placed within a matrix formed from the six environmental sectors and seven information sources identified by interview respondents. Thus, each circle relates two aspects of each critical incident: the environmental sector concerning which information was acquired or received, and the source from which information was acquired or received. Where information came from a number of sources, an equivalent number of incident circles are drawn, linked by a dashed line.

For our discussion here, it is instructive to highlight two clusters in the distribution of incidents in the matrix. The first cluster, marked in Fig. 3, indicates that *much of the information on the Technological and Regulatory sectors comes from the printed sources* of Newspapers, Journals, and External Reports. One respondent who heads one of Canada's largest cable television and paging firms said this about his firm:

One of our key sources of information is the written word—we spend a lot of time accessing 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 Japanese multinational] 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 re-directed 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.

Six other interview respondents described critical incidents in which environmental information found in newspapers, business and management periodicals, and government documents was instrumental in their decision making.

Source Sector	Customers	Business Associates	Government Sources	Newspapers Journals External reports	Trade Associations	Internal Staff	Electronic Information
Customer	A1 C1 Q1 R1	Q1 R1 H2	Q1	R1	Q1 R1 T2	T2	A1
Competition	C2	E1 B2 P1 P2 S1 D1 S2	B2	S1	E1 B2	B2 P1	
Technological	E2	B1	B1	B1 G1 T1	B1 Q2 T1	B1 E2 Q2 G1 T1	
Regulatory		F1 F2	F1 F2	A2 D2 H1	F2		
Economic	G2			G2	G2		
Sociocultural							

Fig. 3. Environmental sector – Information source matrix.

We interpret this finding as follows. Because they have limited time and attention, chief executives use printed sources to carry out a general, wide-area viewing of the external environment in an efficient manner. Although printed sources lack information richness compared with face-to-face contact, they convey information using media that communicate accurately and efficiently unequivocal messages such as factual information, numerical data, rules and definitions, and so on. Ghoshal and Kim (1986) detected a differential use of personal and impersonal sources in their study of managers in South Korean firms. Whereas information about the immediate business environment (competitors, markets) is usually obtained from personal sources, information about the broader environment (general social, political, and technological changes) is usually obtained from impersonal sources such as publications and reports. In the present study, 10 of the 25 incidents related involved information from printed sources; 7 of them concerned developments in the Technological and Regulatory sectors. Thus, the interview data appear consistent with Ghoshal and Kim's (1986) finding that impersonal sources are used more often when executives seek information on the broader environmental sectors for long-term planning.

The second cluster is centred on the Competition-Business Associates cell, and reveals how the respondents get their information about the Competition sector. None of the respondents related incidents in which they obtained information directly from their competitors. Figure 3 shows that *respondents obtain information on the competition sector most frequently through Business Associates*. The Business Associates mentioned by the respondents include suppliers, distributors, and bankers, but did not include any executives or competitor firms.

6. SUMMARY

In summary, our study of how chief executives use environmental information in decision making suggests several features of their scanning behavior. First of all, the chief

executives seem to focus their scanning on the competition, customer, regulatory, and technological sectors of the environment. Much less importance seems to be given to the economic and sociocultural sectors. In most cases, the chief executives used environmental information in the Entrepreneur decisional role, initiating new products, projects, or policies. The chief executives acquire or receive environmental information from multiple, complementary sources. Among these sources, personal sources are used very frequently in their scanning and decision making. The most heavily used personal sources are Business Associates and Internal Staff. At the same time, printed sources such as Newspapers, Journals, and External Reports are also highly used, especially for information on the Technological and Regulatory sectors. There is some evidence to suggest a differential usage of information sources—information on the Customer and Competition sectors seems to be obtained mainly from personal sources, whereas information on Technological, Regulatory, and Economic sectors seems to come also from printed and formal sources.

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