Environmental Scanning by CEOs in Two Canadian Industries

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The work of managers is information-intensive. Managers receive a huge amount of information from a wide range of sources and use the information to make day-to-day decisions and to formulate longer-term strategies. Yet much remains to be learned about the information behavior of managers as a distinct user group. This article reports on how top managers acquire and use information about the external business environment. Today's firms have to adapt to turbulent environments in which the competition, market, technology, and social conditions are constantly changing. Environmental scanning is the activity of gaining information about events and relationships in the organization's environment, the knowledge of which would assist management in planning future courses of action. We present the findings of a survey of the environmental scanning behavior of 207 CEOs in two Canadian industries—publishing and telecommunications. The CEOs indicated their perceptions of the level of uncertainty in the external environment, which sources they used to scan the environment, and their perceptions of the accessibility and quality of various sources. The survey found that the amount of scanning increases with perceived environmental uncertainty, and that the CEOs use a mix of internal and external, as well as personal and impersonal sources, to scan the environment. Analysis suggests that between environmental uncertainty, source accessibility, and source quality, source quality is the most important factor in explaining source use in scanning. This runs contrary to earlier user studies, particularly those of engineers and scientists, which concluded that perceived source accessibility was the overwhelming factor in source selection. A number of plausible explanations for this difference are discussed.

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Introduction

The acquisition and use of information is at the center of managerial work. One of the clearest articulations of the function of information in managerial work is by Mintzberg (1973) who describes a set of interlocking managerial roles, and concludes that "it is the informational roles that tie all managerial work together" (pp. 71–72). Because of a unique access to external information and an all-embracing access to internal information, the manager functions as an "information processing system" that receives information, directs its flow, and takes action based on information assimilated. While the importance of information is unequivocal, there is a dearth of knowledge in the literature of information science about how managers acquire and use information in their work.

This article reports on how top managers acquire information about the external business environment, an activity known as environmental scanning. Today's business organizations face an increasingly volatile environment that is marked by rapid change in the competition, market, technology, government regulation, and economic and social conditions. Learning about events, trends, and relationships in the external business environment thus becomes a critical information activity of chief executive officers planning for their firms. Aguilar, in his 1967 landmark study, defines this process of scanning the business environment 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." Scanning not only concerns seeking information to address a specific question (for example, 'How big is this market?'), but also includes doing a broad sweep of the horizon to look for signs of change and opportunities ('Where are the new markets?'). Scanning activities could range from gathering data deliberately such as by doing market research, to informal conversations with other executives, or reading the newspaper.

In this study, we focus on the selection and use of information sources by chief executive officers (CEOs) to scan

the environment, and we examine how their perceptions of environmental uncertainty, source accessibility, and source quality influence their use of information sources.

Conceptual Framework and Research Questions*

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). Uncertainty is inherent in the environment, and Duncan found that the level of perceived uncertainty increases with the complexity and rate of change of the environment. For the purpose of this study, the environment is viewed as a source of information, continually creating signals and messages to which organizations attend (Dill, 1962; Weick, 1969). The environment is analyzed as comprising a number of sectors that managers monitor in order to plan strategically. For example, Glueck and Jauch (1984) analyze the environment as comprising five sectors: socioeconomic, technological, supplier, competitor, and government.

Past research examines executives' scanning behavior in terms of the use of information sources and the amount of scanning done. Aguilar (1967) found that personal sources of information were far more important than impersonal sources. Keegan (1974) observed that for multinational companies, sources outside the organization were more important than inside sources. Hambrick (1979) measured the amount of executive scanning by analyzing the executive's level of interest in keeping abreast of trends; the frequency with which information comes to the executive's attention; and the time that the executive spends scanning. Daft, Sormunen, and Parks (1988) found that chief executives reacted to perceived uncertainty with greater scanning using multiple, complementary sources to interpret an uncertain environment. Generally, past studies on environmental scanning have found that managers who perceive greater uncertainty in the external environment tend to scan the environment more.

Question 1: *Is the executive's perceived uncertainty of the environment positively related to the amount of environmental scanning done?*

Acquisition of information involves selection and use of sources. Past studies on the information needs and uses of scientists, technologists, and social scientists have found that these users tend to prefer information sources which are perceived to be more accessible. Several studies have found that the accessibility of an information channel has a far greater effect than its quality [see, for example, the classic studies of Rosenberg (1967), Gertsberger & Allen (1968), and Allen (1977)]. In past user studies, perceived accessibility of a source is typically operationalized as the

physical proximity of the source, as well as the time and effort needed to access it. As for perceived source quality, the research of Zmud (1978), Taylor (1986); Nilan, Peek, and Snyder (1988); and Halpern and Nilan (1988) suggest that the most important information quality dimensions would include relevance, reliability, accuracy, quantity, and timeliness. It would be useful to re-examine, for the case of executives seeking information about the environment, the relative influence of these perceived source characteristics of accessibility and quality.

Question 2: *Is the perceived accessibility of an information source positively related to the frequency of using that source in environmental scanning?*

Question 3: *Is the perceived quality of an information source positively related to the frequency of using that source in environmental scanning?*

Question 4: *Is the perceived accessibility of an information source a better predictor of the frequency of using the source in scanning, than either the perceived quality of the source or the perceived uncertainty of the environment?*

Method

Study Population and Data Collection

The study population consists of CEOs in the Canadian publishing and telecommunications industries. Both industries are vital to the Canadian economy and thrive in dynamic business environments in which the drivers of change include increased competition, technological progress, new business structures, population growth, and shifting social preferences. Seven industry groups were defined based on U.S. Standard Industrial Classification Codes. Using these codes, online searches were done in the Canadian Dun's Market Identifiers database and the Cancorp Canadian Corporations database. Companies with annual revenues equal to or greater than C$5 million were selected. This procedure yielded a total of 207 CEOs—94 in publishing and 113 in telecommunications. Data were collected by a mail questionnaire that was sent to every one of the executives identified. The design of the questionnaire and implementation of the survey followed Dillman's (1978) Total Design Method. The questionnaire survey involved three mail follow-ups sent one, three, and seven weeks after the initial mailing. Each follow-up letter conveyed a progressively increasing intensity in the appeal. Finally, a fourth appeal was made by telephone. From the population of 207 CEOs, 115 returned questionnaires, giving a response rate of 56%.

Measurement of Variables

1. *Environmental uncertainty.* In organizational research, perceived environmental uncertainty is often analyzed using Duncan's (1972) two dimensions of environmental complexity and variability. A complex environment requires

that numerous environmental factors be taken into account in decisionmaking. A variable environment is one in which these factors change frequently and rapidly. The perceived uncertainty thus increases with the complexity and variability of the environment. More recently, Daft et al. (1988) developed the Perceived Strategic Uncertainty construct and found it to be a better predictor of scanning amount. They measured Perceived Strategic Uncertainty by combining the perceived complexity and variability of each environmental sector, and then weighting the sum with the perceived importance of that sector. Boyd (1989) applied the same procedure in his study and again found that Perceived Strategic Uncertainty was correlated with scanning. In the present study, we use Perceived Strategic Uncertainty (PSU) to measure perceived uncertainty of each environmental sector. Overall, Perceived Environmental Uncertainty (PEU) is measured by the mean PSU score over six environmental sectors defined below.

2. *Environmental sectors.* In order to measure its perceived uncertainty, the external business environment is divided into six sectors: customer, competition, technology, regulatory, economic, and sociocultural sectors (Daft et al., 1988, pp. 137–138).

(a) 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.

(b) 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.

(c) 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.

(d) Regulatory sector includes federal and provincial legislation and regulations, city or community policies, and political developments at all levels of government.

(e) 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.

(f) 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.

3. *Information sources.* Sixteen information sources are selected for the questionnaire, based on sources studied in past research on environmental scanning, notably in Aguilar (1967); Keegan (1974); Culnan (1983); Preble, Pradeep, and Reichel (1988); and Daft et al. (1988). Following the classification scheme used by Aguilar (1967), sources are grouped into two categories, external and internal, and further subdivided into personal and impersonal sources. Personal sources communicate information personally to the executive, whereas Impersonal sources communicate information to broad audiences or through formalized, group-communication activities.

By this definition, impersonal sources would include sources such as newspapers, periodicals; conferences, trips; industry, trade associations; and the company library. Following Culnan (1983), electronic information services are classified as internal impersonal sources because databases or information services are accessed directly within the organization. Although there is no universally accepted way of classifying information sources, we have grouped sources so as to facilitate comparison of results with past studies on environmental scanning. Table 1 shows the sixteen sources in their classification categories.

4. *Perceived source accessibility.* In the questionnaire, respondents answer two questions on the accessibility of each source:

(1) How much of your time and effort is needed to approach, contact, or locate each information source?
(2) After contacting or locating the source, how easy is it to get the desired information from that source?

For each of the 16 sources, respondents indicate their responses to these questions on five-point ascending scales. Each point on the scale is defined with a short description. The response scores from these two questions are summed into an index of the perceived accessibility of each source.

5. *Perceived source quality.* In the questionnaire, respondents answer two questions on the quality of each source:

(1) How relevant is the information from each source about the environment? Relevant information is defined as information that is needed and useful with respect to the goals and activities of the respondent's firm.
(2) How reliable is the information from each source about the environment? Information is reliable when it is authoritative and dependable. It is information that you personally trust.

For each of the 16 sources, respondents indicate their responses to these questions on five-point ascending scales. Each point on the scale is defined with a short description. The response scores from these two questions are summed into an index of the perceived quality of each source.

TABLE 1. Information sources used in environmental scanning.

External personal sources	External impersonal sources
Customers	Newspapers, periodicals
Competitors	Government publications
Business/professional associates[a]	Broadcast media (radio, TV)
Government officials	Industry, trade associations
	Conferences, trips
Internal personal sources	Internal impersonal sources
Superiors, board members	Internal memoranda, circulars
Subordinate managers[c]	Internal reports, studies
Subordinate staff[c]	Company library
	Electronic information services[b]

[a]Suppliers, distributors, bankers, lawyers, financial analysts, consultants, other CEOs, etc.
[b]Newswires, online databases, electronic news bulletin boards, etc.
[c]Includes salespeople.

6. *Amount of scanning.* Hambrick (1979) analyzed the amount of scanning by measuring the frequency of receiving environmental information, the level of interest, and the time that is spent scanning. Subsequently, Farh, Hoffman, and Hegarty (1984) conducted a confirmatory factor analysis of Hambrick's multimethod measurement of scanning using data from a field study of European manufacturing firms. Their results supported Hambrick's use of the frequency and interest methods of measuring scanning, but they recommended against the time method because respondents found it difficult to estimate hours spent scanning. In the present study, respondents are asked to indicate, for each environmental sector, the frequency with which information comes to their attention; and their level of interest in keeping informed of trends in that sector.

7. *Information source use.* The second dependent variable is the frequency with which each information source is used in environmental scanning. Each respondent is asked to indicate how frequently he or she uses each of the 16 sources to scan the environment. The response is indicated on a descending scale with five categories: "At least once a day," "At least once a week," "At least once a month," "Few times a year," "Less than once a year," and "Never."

Results*

Profile of Respondent CEOs and Firms

Of the 207 CEOs in the study population, 115 CEOs returned completed questionnaires (56%). Sixty-seven of the respondents are CEOs of telecommunications companies (60%), with the remaining 48 being CEOs of publishing firms (51%). The 115 firms have a combined annual turnover of over C$18 billion and employ a total of over 132,000 people. The smallest firms had an annual sale of C$5 million, while the largest has sales of over C$7.3 billion and hires 50,000 staff. On the whole, the distribution of respondent firms by size is similar to that of the study population. Among the respondents, 43% fall in the age group 45–54, while another 28% are between 35 and 44. In terms of length of tenure as chief executive, the mean number of years as CEO is 6.5. The mean number of years with the firm is 12. Before becoming CEO, over 49% of the respondents were in the marketing functional area, with another 15% in production. As for educational background, nearly 42% have a Bachelor's degree, and another 26% have a Master's degree.

Perceived Strategic Uncertainty and Amount of Scanning

For each of the six environmental sectors, the CEOs assessed its relative importance, complexity and variability on five-point ascending scales. The complexity and variability scores were summed and multiplied by the importance score to give an overall index of Perceived Strategic Uncertainty

(PSU). Figure 1 shows the environmental sectors in order of descending mean PSU. The customer and technological sectors are seen to be the most important and uncertain, followed by the competition and regulatory sectors.

Figure 2 shows the mean amounts of scanning of each environmental sector by the CEOs. As discussed earlier, two measures of the amount of scanning are used: the frequency with which information comes to their attention (FRSE), and their level of interest in keeping informed about that sector (INSE). By the frequency measure, the customer, economic, and technological sectors are scanned most frequently. By the interest measure, the customer, competition, and technological sectors are those about which the CEOs have the greatest desire to be well-informed.

Next, the amount of scanning of each environmental sector is correlated with the PSU of that sector. Results are presented in Table 2. All the correlation coefficients are positive and statistically significant ($p \leq .001$ with one exception at $p \leq .01$). The correlation coefficients between PSU and FRSE (frequency measure of scanning) range from 0.30 to 0.46, with an average value of 0.37. The correlation coefficients between PSU and INSE (interest measure of scanning) range from 0.36 to 0.58, with an average of 0.44. These correlations are comparable to but slightly lower than those found by Daft et al. (1988) and Boyd (1989) using a similar measure of PSU.

Sources Used Most Frequently to Scan the Environment

Figure 3 shows the mean frequency with which the CEOs collectively use each source to scan the environment. A high numerical score indicates a frequently used source. (In the questionnaire, 6 = >once a day, 5 = >once a week, 4 = >once a month, 3 = >few times a year, 2 = <once a year, and 1 = never.) Newspapers and periodicals are the most frequently used source, followed by subordinate managers, subordinate staff, broadcast media, and internal memoranda, and circulars. Thus, the CEOs use both internal and external sources, as well as personal and impersonal sources to scan the environment. As was found in other studies on scanning, personal sources are among the most important. The most frequently used personal sources are subordinate managers, subordinate staff, customers, and business associates. Other personal sources like competitors and government officials are less used. The least frequently used sources are conferences/trips, government officials, and electronic information services.

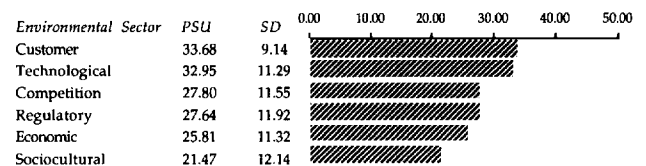| Environmental Sector	PSU	SD	0.00	10.00	20.00	30.00	40.00	50.00
Customer	33.68	9.14						
Technological	32.95	11.29						
Competition	27.80	11.55						
Regulatory	27.64	11.92						
Economic	25.81	11.32						
Sociocultural	21.47	12.14						

FIG. 1. Perceived Strategic Uncertainty (PSU) of environmental sectors (mean response scores and standard deviations).

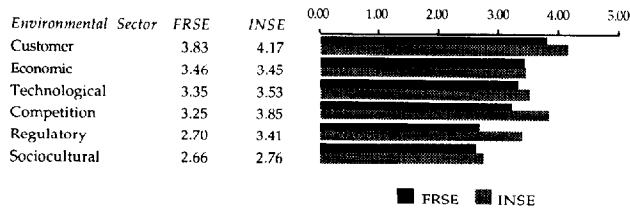| Environmental Sector	FRSE	INSE
Customer	3.83	4.17
Economic	3.46	3.45
Technological	3.35	3.53
Competition	3.25	3.85
Regulatory	2.70	3.41
Sociocultural	2.66	2.76

■ FRSE ▓ INSE

FIG. 2. Amount of scanning of environmental sectors (mean response scores).

Perceived Accessibility of Sources

Figure 4 shows how the CEOs collectively perceive the accessibility of each information source. The higher the numerical score (Perceived Source Accessibility or PSA), the more accessible the source is seen to be. Not surprisingly, internal memoranda and circulars are perceived to be the most accessible source, followed closely by subordinate staff, and subordinate managers. The most accessible sources are from two categories: internal impersonal sources, and internal personal sources. The least accessible sources are competitors, government officials, and customers. As a category, external personal sources are seen to be the least accessible. Interestingly, the company library is placed at the middle of the ranking order, while electronic information services is ranked three places lower.

Perceived Quality of Sources

Figure 5 shows how the CEOs collectively perceive the quality of each information source. The higher the numerical score (Perceived Source Quality or PSQ), the higher is the perceived quality of the source. Information from subordinate managers and customers are seen to be of the highest quality, measured in terms of their perceived relevance and reliability. The next best regarded sources are subordinate staff and internal reports and studies. With the exception of customers, these top four sources are all in the internal source category. Broadcast media and electronic information services have the lowest mean quality scores, implying that information they provide is seen to be less relevant and reliable.

Correlation between Frequency of Source Use and Source Accessibility and Quality

The frequency of using each source to scan the environment is separately correlated with Perceived Source Accessibility and Perceived Source Quality, as shown in Table 3. Question 2 suggests that source use may be significantly correlated with source accessibility. The survey data show that this is the case with four of the 16 sources covered by this study: namely, superiors and board members, subordinate managers, company library, and electronic information services. However, the correlation coefficients are small, and for two sources, the correlation is significant only at $p \leq .10$. We conclude that there is weak evidence that source use is positively related with Perceived Source Accessibility.

Question 3 suggests that source use may be significantly correlated with source quality. This is borne out by positive, significant correlation coefficients (all at $p \leq .001$, with one exception at $p \leq .01$) for all 16 information sources. Furthermore, most sources have medium to high coefficient values, indicating medium to strong correlations. We conclude that there is clear evidence that source use in environmental scanning is positively related to Perceived Source Quality.

Table 3 also shows the correlations between source use and Perceived Environmental Uncertainty. (The Perceived Environmental Uncertainty score is the mean Perceived Strategic Uncertainty scores over six environmental sectors.) With the exception of broadcast media and company library, use of all the other sources is positively correlated with Perceived Environmental Uncertainty ($p \leq .01$ or better, with two exceptions at $p \leq .05$). The coefficients range from 0.19 to 0.35, indicating weak to moderate associations. We conclude that for most of the sources investigated, source use increases with Perceived Environmental Uncertainty.

Regression to Explain Source Use Based on Source Accessibility and Quality, and Environmental Uncertainty

Regression models are computed for each information source to analyze the relationship of source accessibility, source quality, and environmental uncertainty with source

TABLE 2. Correlations between PSU and amount of scanning (Pearson's correlation coefficients).

	Amount of scanning	
Environmental sector	Frequency of information coming to attention	Level of interest in keeping informed
Customer	.32[b]	.40[b]
Technological	.38[b]	.36[b]
Competition	.30[a]	.44[b]
Regulatory	.46[b]	.46[b]
Economic	.35[b]	.42[b]
Sociocultural	.42[b]	.58[b]

[a] $p \leq .01$; [b] $p \leq .001$.

FREQUENCY OF USING SOURCE TO SCAN

| Source	Mean	SD
Newspapers, periodicals	5.32	1.04
Subordinate managers	5.05	1.14
Subordinate staff	4.78	1.20
Broadcast media	4.64	1.49
Internal memo, circulars	4.45	1.34
Customers	4.43	1.21
Business/professional associates	4.13	1.18
Internal reports, studies	4.04	1.13
Superiors, board members	3.75	1.20
Industry, trade associations	3.75	0.91
Competitors	3.68	1.12
Government publications	3.44	1.18
Company library	3.32	1.00
Conferences, trips	3.09	0.82
Government officials	3.03	1.08
Electronic information services	2.93	1.79
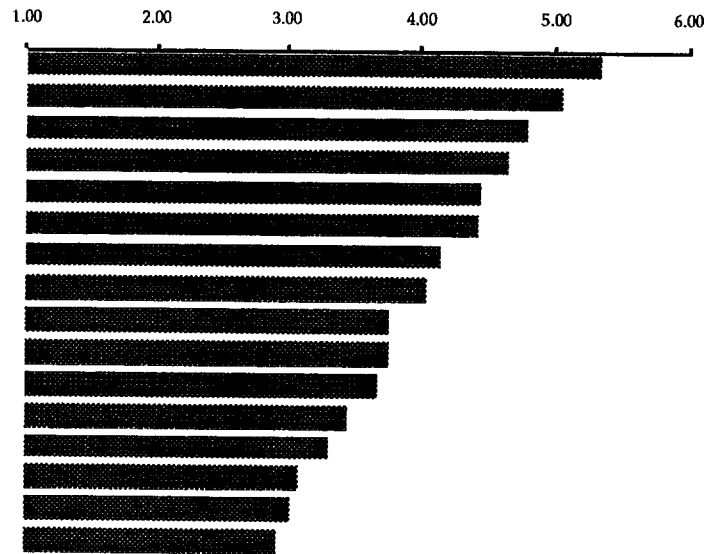
FIG. 3. Frequency of using information source to scan the environment (mean response scores and standard deviations).

use. Results are presented in Table 4. All 16 equations are significant at $p \leq .001$, with one exception at $p \leq .01$. However, for nearly all the sources, the standardized partial regression coefficients (Std β) for Perceived Source Accessibility are not significant. In only two sources, electronic information services and business associates and professionals, are the coefficients for accessibility significant. In contrast, for all sources, the standardized partial regression coefficients (Std β) for Perceived Source Quality are significant (mostly at $p \leq .001$) Finally, the regression coefficients for Perceived Environmental Uncertainty are significant ($p \leq .05$ or better) for 10 of the 16 sources. The adjusted R^2 value indicates the proportion of the variance in source use that is explained jointly by Perceived Source Accessibility, Perceived Source Quality, and Perceived

Environmental Uncertainty. For electronic information services, these three variables account for 48% of the source use variance. For government officials and publications, conferences/trips, superiors, subordinate managers, internal memos, and the company library, they account for approximately 30% of the source use variance. For the other sources, the regression models account for less than 25% of the source use variance. The relatively low values of R^2 are not surprising because the models focus only on source and environmental characteristics and do not include for instance, organizational, and personal variables. For most of the sources, a very large part of the explanatory power of the regression model is due to Perceived Source Quality: the adjusted R^2 value is due largely to the squared semipartial correlation (sR^2) of the Perceived Source Quality variable.

PERCEIVED SOURCE ACCESSIBILITY

| Source	PSA	SD
Internal memo, circulars	7.95	1.38
Subordinate staff	7.92	1.47
Subordinate managers	7.83	1.53
Broadcast media	7.76	1.51
Internal reports, studies	7.74	1.39
Newspapers, periodicals	7.71	1.57
Superiors, board members	7.68	1.34
Company library	7.49	1.72
Government publications	7.26	1.48
Industry, trade associations	7.23	1.19
Electronic information services	7.09	2.01
Business/professional associates	7.08	1.27
Conferences, trips	6.68	1.39
Customers	6.58	1.77
Government officials	6.20	1.67
Competitors	5.74	1.61
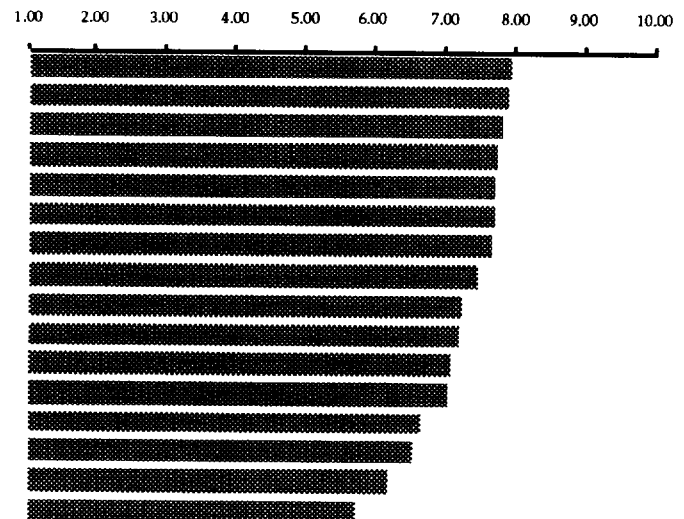
FIG. 4. Perceived source accessibility (PSA) (mean response scores and standard deviations).

PERCEIVED SOURCE QUALITY

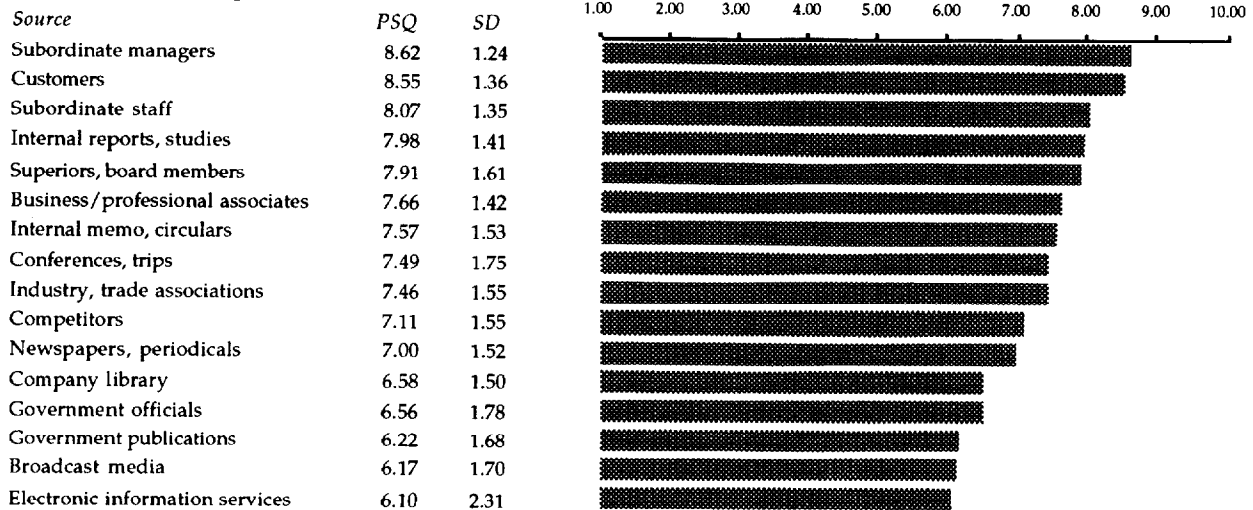| Source	PSQ	SD
Subordinate managers	8.62	1.24
Customers	8.55	1.36
Subordinate staff	8.07	1.35
Internal reports, studies	7.98	1.41
Superiors, board members	7.91	1.61
Business/professional associates	7.66	1.42
Internal memo, circulars	7.57	1.53
Conferences, trips	7.49	1.75
Industry, trade associations	7.46	1.55
Competitors	7.11	1.55
Newspapers, periodicals	7.00	1.52
Company library	6.58	1.50
Government officials	6.56	1.78
Government publications	6.22	1.68
Broadcast media	6.17	1.70
Electronic information services	6.10	2.31

FIG. 5. Perceived Source Quality (PSQ) (mean response scores and standard deviations).

We conclude that the data in this study do not harmonize with past user studies that found perceived source accessibility to be a stronger predictor of source use. Instead, there is evidence that perceived source quality accounts for a greater part of the variance in source use.

Discussion

We may now summarize our findings with respect to the research questions we raised near the beginning. For the group of CEOs we study, the level of perceived uncertainty in the environment is positively correlated with the amount of environmental scanning. The association is moderately strong and is in line with the findings of past studies of executive scanning. In scanning the environment, the CEOs use a complementary mix of information sources: internal and external, personal and impersonal sources. Personal sources rank among the most important, and these are the subordinate managers, subordinate staff, customers, and business associates. The company library and electronic information services are not frequently used in their scanning. The use of all 16 information sources investigated is positively correlated with the perceived quality of these sources, measured in terms of their perceived relevance and reliability. On the other hand, source use is positively correlated with perceived accessibility in only four of the 16 sources. Furthermore, regression analysis shows that Perceived Source quality is a more important factor in explaining source use than either Perceived Source Accessibility or Perceived Environmental Uncertainty.

TABLE 3. Correlations between information source use and Perceived Source Accessibility/Quality, and Perceived Environmental Uncertainty (Pearson's correlation coefficients).

Frequency of using source to scan	Perceived Source Accessibility	Perceived Source Quality	Perceived Environmental Uncertainty
1. Customers	−.03	.40[d]	.26[c]
2. Competitors	−.03	.30[c]	.34[d]
3. Business/professionals	.15	.38[d]	.30[c]
4. Government officials	.00	.53[d]	.28[c]
5. Newspapers, periodicals	.15	.32[d]	.31[c]
6. Government publications	.11	.49[c]	.23[b]
7. Broadcast media	.02	.42[d]	.15
8. Industry, trade associations	−.06	.45[c]	.19[b]
9. Conferences, trips	.08	.55[d]	.31[d]
10. Superiors, board members	.16[a]	.52[d]	.33[d]
11. Subordinate managers	.16[a]	.50[d]	.35[d]
12. Subordinate staff	.10	.45[d]	.31[d]
13. Internal memo, circulars	.06	.52[d]	.28[c]
14. Internal reports, studies	.14	.42[d]	.35[d]
15. Company library	.26[b]	.54[d]	.14
16. Electronic information	.33[d]	.70[d]	.29[c]

[a] $p \leq .10$; [b] $p \leq .05$; [c] $p \leq .01$; [d] $p \leq .001$.

TABLE 4. Regression models to explain frequency of using information source to scan based on Perceived Source Accessibility, Perceived Source Quality, and Perceived Environmental Uncertainty.

Frequency of using source to scan the Environment	Model F	Adj. R^2	Perceived Source Accessibility		Perceived Source Quality		Perceived Environmental Uncertainty	
			Std β	sR^2	Std β	sR^2	Std β	sR^2
Customers	9.20[d]	.18	−.05	.00	.37[d]	.16	.22[b]	.05
Competitors	6.62[d]	.14	.03	.00	.20[b]	.07	.31[c]	.09
Business/professionals	10.56[d]	.21	.19[b]	.02	.30[d]	.14	.27[c]	.07
Government officials	18.51[d]	.33	−.08	.01	.54[d]	.28	.22[c]	.05
Newspapers, periodicals	6.23[d]	.13	.09	.01	.27[c]	.09	.21[b]	.04
Government publications	15.83[d]	.29	.03	.00	.52[d]	.29	.13	.02
Broadcast media	7.60[d]	.15	−.04	.00	.40[d]	.17	.07	.01
Industry, trade associations	9.78[d]	.19	−.12	.02	.44[d]	.19	.09	.01
Conferences, trips	17.19[d]	.31	−.01	.00	.51[d]	.29	.21[b]	.04
Superiors, board members	16.21[d]	.30	.05	.00	.47[d]	.28	.19[b]	.03
Subordinate managers	16.91[d]	.30	.05	.01	.43[d]	.25	.26[c]	.02
Subordinate staff	11.21[d]	.22	.03	.00	.40[c]	.21	.19[b]	.03
Internal memo, circulars	14.83[d]	.28	−.04	.00	.49[d]	.27	.15[a]	.02
Internal reports, studies	12.32[d]	.24	.07	.01	.35[d]	.18	.27[c]	.07
Company library	10.99[d]	.28	.11	.01	.50[d]	.29	.05	.00
Electronic information	31.28[d]	.48	.15[a]	.02	.62[d]	.47	.11	.01

Model F: value of F-statistic for model R^2; Adj. R^2: adjusted squared multiple correlation; Std β: standardized partial regression coefficient; sR^2: squared semipartial correlation coefficient.
[a] $p \le .10$; [b] $p \le .05$; [c] $p \le .01$. [d] $p \le .001$.

This last finding, that perceived source quality is more important than perceived source accessibility in the selection and use of information sources, is contrary to the classic studies of Rosenberg (1967), Gertsberger and Allen (1968), and Allen (1977) which showed the overwhelming importance of source or channel accessibility. Below we present research that offers alternative views to the accessibility model, and discuss the special nature of environmental scanning and the information use context of managers that may help us interpret this difference.

Past Research on Source Accessibility and Quality

Orr (1970) made one of the first attempts to outline a global conceptual model that describes both the source selection and the information use behavior of the scientist as an information processor. In evaluating the studies by Rosenberg (1967) and Gertsberger and Allen (1968), Orr concludes that their evidence of cost minimization based on accessibility is due to a situation where users are choosing from alternative sources which are similar to each other, and which are equally probable in being able to provide the information required. Orr believed that the quality of the information is the most important consideration in selecting the information source.

Culnan (1983) found that the process of information acquisition in environmental scanning is not entirely a

function of perceived source accessibility. Her study of information sources used by business professionals shows that a significant factor influencing source use is the complexity of the individual's task, measured by the extent that environmental dimensions (customers, competitors, technology, etc.) are relevant to the conduct of the job. Culnan found that a complex job task may necessitate the use of less accessible sources.

Swanson (1987) investigated the use of 10 management reports by 186 users in four organizations. He found that source use can be explained partly by the individual's attitude toward the quality of the source, a conclusion that is again opposite to earlier studies which emphasized accessibility. He explains this in two ways. First, the demand for information obtainable from management reports may be more differentiated than their supply. Second, the ability of one source to substitute for another is relatively low, because specific reports are seen to be authoritative in their domains. In the case of interpersonal sources studied by Allen and others, demand for information obtainable from various sources may be less differentiated, and channel substitutability may be relatively high for the information needed, so that source use may not then vary substantially with perceived accessibility, given the quality of information obtainable.

Pinelli et al. (1991) reported from their national survey of the information seeking behavior of U.S. aerospace

engineers and scientists sponsored by NASA and the U.S. Department of Defense. They investigated the influence of seven selection factors on the use of four published sources. Their data show that accessibility does not appear to be the most important variable. While accessibility does exert influence, relevance seems to be the single most important determinant. They conclude that the accessibility model may not be as pertinent in the 1990s.

The Turbulent Business Environment and the Strategic Role of Scanning

Today's managers face a business environment that is increasingly complex and turbulent. In reporting a survey of 12,000 managers in 25 countries by the *Harvard Business Review*, Kanter (1991, p. 151) 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 are said to cause the traditional walls of business boundaries to crumble. The managers in the survey indicated that change is a fundamental part of corporate life everywhere, and that fostering closer relationships with customers and suppliers is a critical issue. From an information perspective, every change or development in the external environment creates signals and messages that managers may need to heed (Dill, 1962). Some of the signals would be weak (difficult to detect), many would be confusing (difficult to analyze), and others would be spurious (not indicative of a true change). As an information seeker, the manager would have to attend selectively to numerous signals created by a dynamic environment, interpret often confusing messages, and make sense of cues in relation to the firm's goals and activities. Weick (1979) suggests that a central information task of managers is to interpret equivocal information about the external environment. Information from environmental scanning also has a strategic role. We have defined scanning as acquiring information about events and relationships in a company's outside environment, the knowledge of which would assist top management in charting the company's future course of action. Aguilar (1967) underscores this close connection between scanning and strategic planning, so that scanning is the acquiring of external strategic information that is useful for making decisions about company strategy and long-term plans.

Information Use Context of Top Managers

To understand the information behavior of managers, we need to understand the contexts in which managers seek and use information. Taylor (1986) and more recently Katzer and Fletcher (1992) analyzed past research on the information environment of managers to identify the special information requirements of executives. In his summary, Taylor (1986) notes that:

- Managers rely heavily on evaluated, aggregated data.
- They make a variety of decisions, each needing different configurations and quality of information.
- They operate on a good deal less than total information.
- They suffer from an abundance of irrelevant information.
- They seek options and alternatives, rather than answers.
- Subjective judgment plays an important role in executive decisionmaking.
- They strongly favor verbal media.
- External information, often unpredictable in occurrence or impact, is critical.
- They use formal information systems through assistants who act as preliminary filters.

Taylor also observes that when managers seek information to make unstructured decisions about unpredictable situations, the factor of "physical accessibility" may be less important than other traits (e.g., noise reduction, data quality). Since strategic planning in response to external change would often have to deal with new, unpredictable situations, we may expect that accessibility is not a major concern in these conditions.

Summary

Our study investigated how CEOs in the Canadian publishing and telecommunications industries acquire and use information about the external business environment. We found that the amount of environmental scanning increases with the level of Perceived Environmental Uncertainty. The CEOs view the customer and technological sectors of the environment as being the most uncertain and strategic. When scanning, the CEOs use multiple, complementary sources: internal and external sources, as well as personal and impersonal sources. Personal sources (managers, staff, customers, associates) are among the most frequently used, while the company library and electronic information services are not frequently used. The use of information sources is positively correlated with their perceived quality measured in terms of their relevance and reliability. A weak positive correlation between Perceived Source Accessibility and source use exists in four of the 16 sources. Our analysis shows that, at least for this group of CEOs, Perceived Source Quality is a more important factor in explaining source use than either Perceived Source Accessibility or Perceived Environmental Uncertainty. The importance of Perceived Source Quality contradicts past user studies, and we suggest that the turbulence of the external business environment, the strategic role of scanning for information about environmental change, and the special nature of the information use contexts of managers, all combine to help explain why information quality may be more important than source accessibility when managers scan the environment.

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