

ENVIRONMENTAL SCANNING BY CANADIAN CEOs

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ABSTRACT

CEOs scan the external environment for information about events and trends in order to plan the organization's future courses of action. This study investigates how CEOs in the Canadian telecommunications industry acquire and use information about the business environment. The amount of scanning was found to be related to the perceived uncertainty of the environment. CEOs use a range of sources to scan. The perceived quality of a source and the perceived uncertainty of the environment are good predictors of source use in scanning.

INTRODUCTION

The purpose of the present study is to investigate how chief executive officers (CEOs) in the Canadian telecommunications industry seek and use information about the external business environment, an information activity known as environmental scanning. 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 (Aguilar, 1967; Choo & Auster, 1993). Scanning includes both general viewing of or exposure to information, and purposeful searching for information to address particular issues.

Research on environmental scanning, which first appeared in the 1960s with two studies by Aguilar and Keegan (Aguilar, 1967; Keegan, 1968), has found that managers who perceive greater environmental uncertainty tend to do more scanning (see for example, Nishi *et al.*, 1982; Daft *et al.*, 1988; and Auster & Choo, 1992, 1993). Scanning concentrated on market-related environmental sectors, with information on customers, competitors, and suppliers being the most important (Jain, 1984; Ghoshal & Kim, 1986; and Lester & Waters, 1989). Information sources most heavily used are personal sources, especially managers and staff within the organization, while sources such as the company library and online databases were less used (O'Connell & Zimmerman, 1979; Kobrin *et al.*, 1980; and Auster & Choo, 1992, 1993). Scanning methods can range from informal to systematic, formalized efforts, depending on the organization's size and history, and its perception of the environment (Thomas, 1980; Klein & Linneman, 1984; and Preble *et al.*, 1988). (For an in-depth review of research on environmental scanning see Choo & Auster (1993).)

The conceptual framework for investigating these research questions is based on theoretical foundations in organization theory and information needs and uses studies. As noted above, the perceived uncertainty of the environment is related to the amount of scanning done (Choo & Auster, 1993). Uncertainty arises because of a lack of information about a complex and fast-changing environment.

In addition, the more strategic that environmental change is perceived to be, the greater the scanning. Thus, the present study investigates a possible relationship between perceived strategic uncertainty and amount of scanning. Information seeking involves the selection and use of sources which in turn depends on the user's perception of source traits. Several classic studies found that users prefer more accessible sources than sources that are perceived to be of higher quality (see for example Rosenberg, 1967, Gertsberger & Allen, 1968, and Allen, 1977). Some recent studies have examined how the perceived quality of information from a source may influence its use (Halpern & Nilan, 1988; Nilan, Peek, & Snyder, 1988; Taylor, 1986; Zmud, 1978). The present study investigates a possible relationship between perceived source accessibility and quality and source use in scanning.

METHOD

The study population consists of CEOs in the Canadian telecommunications industry. The telecommunications industry is vital to the Canadian economy and thrive in dynamic business environments in which the forces of change include increased competition, technological progress, new business structures, population growth, and shifting social preferences. Four industry groups were defined based on US 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 113 CEOs. Data were collected by a mail questionnaire that was sent to every one of the executives identified. From the population of 113 CEOs, 67 returned questionnaires, giving a response rate of 59 percent.

The external business environment of a firm is divided into six environmental sectors, as defined by Daft, Sormunen and Parks (1988) in their study of CEO scanning: Customer, Competition, Technological, Regulatory, Economic, and Sociocultural. The measurement of perceived environmental uncertainty is based on Duncan's (1972) model and the more recent work of Daft,

Sormunen and Parks (1988) and Boyd (1989) who applied a measure of Perceived Strategic Uncertainty. *Perceived Strategic Uncertainty* has three dimensions: the rate of change and complexity of an environmental sector, and the relative importance of the sector. Questionnaire respondents assessed each of the six environmental sectors according to their relative importance, rate of change, and level of complexity.

Sixteen information sources are selected for the questionnaire, based on sources studied in past research on environmental scanning: Customers; Competitors; Business and professional associates (including other executives, bankers, lawyers, financial analysts, and consultants); Government officials; Newspapers and periodicals; Government publications; Broadcast media (radio and television); Industry and trade associations (publications and reports); Conferences and trips; Superiors and board members; Subordinate managers; Subordinate staff; Internal memoranda and circulars; Internal reports and studies; Company library; and Electronic information services that include news wire services and online databases.

Perceived Source Accessibility is measured as the amount of effort needed to locate a source and then to get the needed information from that source (Allen 1977, Culnan 1985, and O'Reilly 1982). Respondents rated each source on five-point scales according to two source accessibility questions:

- (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?

Perceived Source Quality is measured as the perceived relevance and reliability of the information provided by the source (Saracevic 1975, Zmud 1978, Taylor 1986, O'Reilly 1982, Nilan, Peek and Snyder 1988 and Halpern and Nilan 1988). Respondents rated each source on five-point scales according to two source quality questions:

- (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.

Amount of scanning is measured using a frequency method and a level of interest method (Hambrick 1979, Farh et al 1984). Two questions measure the amount of scanning:

- (1) How frequently does information about each environmental sector come to your attention?
- (2) To what extent do you keep yourself informed about developments in each environmental sector?

The second dependent variable is the *frequency* with which each source is used in scanning. In the questionnaire, each respondent indicates how frequently each of the 16 sources is used 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."

FINDINGS

Profile of Respondents

Of the 113 CEOs in the study population, 67 CEOs returned completed questionnaires (59%). The 67 firms have a combined annual turnover of over C\$14.7 billion and employ a total of over 100,000 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. The 'typical' CEO respondent is in his late forties or early fifties, has a bachelors or masters degree, and has worked in the marketing area before becoming the chief executive. He has been CEO for the past two to five years, and has worked for the firm between eleven and twenty years. All CEOs in the study population are male.

Environmental Uncertainty and Amount of Scanning

Respondents assessed each of the six environmental sectors according to its complexity, variability and importance 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. Table 1 shows the environmental sectors in order of descending mean Perceived Strategic Uncertainty. The Technological and Customer sectors are perceived to be the most strategically uncertain, followed by the Competition and Regulatory sectors.

In terms of amount of scanning, respondents indicated that information about the Customer, Technological, and Competition sectors came most frequently to their attention (Table 1). Respondents were most interested in keeping themselves informed about the Customer, Competition, and Technological sectors.

The amount of scanning is correlated with Perceived Strategic Uncertainty (Table 1). All correlation coefficients are positive and statistically significant ($p \leq .01$ with one exception at $p \leq .05$). Correlation coefficients between uncertainty and the frequency measure of scanning range from .27 to .51, with an average value of .37. Correlation coefficients between uncertainty and the interest measure of scanning range from .35 to .61, with an average of .50.

Table 1. Perception and Amount of Scanning of Environmental Sectors

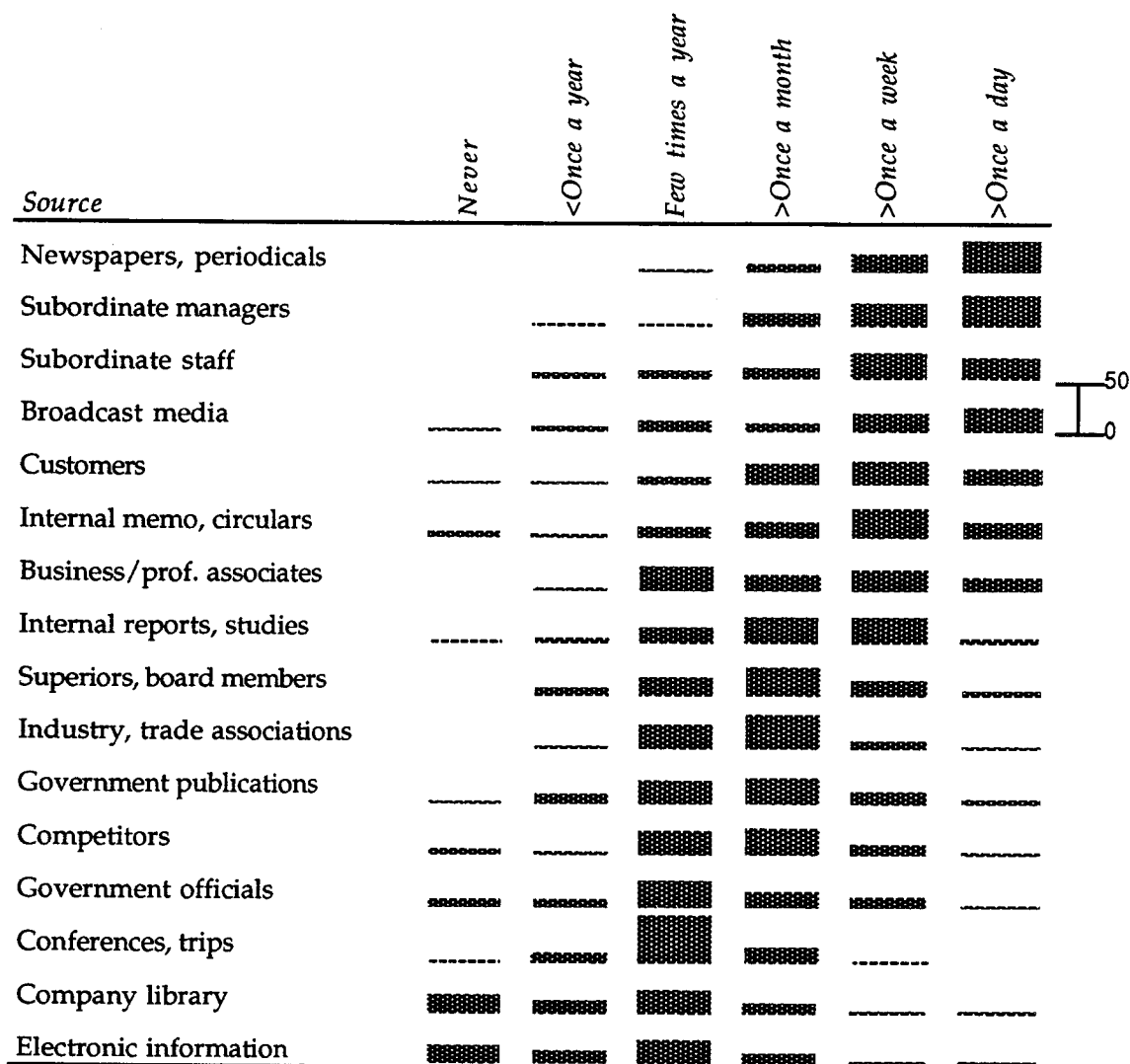
Environmental Sector	Perceived Strategic Uncertainty	Frequency of Information about Sector Coming to Attention		Level of Interest in Keeping Informed about Sector	
		Frequency	Correlation ¹	Interest	Correlation ¹
Technological	37.36	3.46	.36	3.73	.48
Customer	34.10	3.83	.37	4.10	.44
Competition	30.34	3.35	.36	3.87	.35
Regulatory	29.90	3.25	.51	3.52	.61
Economic	25.23	2.70	.27*	3.33	.51
Sociocultural	18.91	2.66	.37	2.45	.60

1: All Pearson's correlation coefficients are statistically significant, $p \leq .01$; except *: $p \leq .05$.

Perception and Use of Information Sources

Table 2 shows the frequency with which respondents use each source to scan the environment. 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 Electronic information services; the Company library; Conferences, trips; and Government officials. As was found in other scanning studies, personal sources are very important: the most frequently used personal sources are Subordinate managers, Subordinate staff, Customers, and Business associates. However, other personal sources like Competitors and Government officials are less used. The least frequently used sources are Electronic information services; the Company library; Conferences, trips; and Government officials.

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



(The maximum height of each column represents 50 respondents. N = 67.)

In terms of accessibility, Internal memoranda, circulars, and Subordinate staff are perceived to be the most accessible sources, followed closely by Newspapers, periodicals, and Subordinate managers (Table 3). The least accessible sources are Competitors, Government officials, and Conferences, trips.

Interestingly, the Company library is ranked eighth among the sixteen sources, while Electronic information services is ranked twelfth.

Table 3. Rank Order of Sources according to Mean Perceived Source Accessibility

<i>Source</i>	<i>PSA</i>	<i>SD</i>	1.00	2.00	3.00	4.00	5.00	6.00	7.00	8.00	9.00	
Internal memo, circulars	8.00	1.43	[Bar extending to 8.00]									
Subordinate staff	8.00	1.45	[Bar extending to 8.00]									
Newspapers, periodicals	7.89	1.48	[Bar extending to 7.89]									
Subordinate managers	7.88	1.54	[Bar extending to 7.88]									
Broadcast media	7.85	1.51	[Bar extending to 7.85]									
Internal reports, studies	7.80	1.37	[Bar extending to 7.80]									
Superiors, board members	7.73	1.35	[Bar extending to 7.73]									
Company library	7.54	1.89	[Bar extending to 7.54]									
Government publications	7.32	1.51	[Bar extending to 7.32]									
Business/professional associates	7.20	1.28	[Bar extending to 7.20]									
Industry, trade associations	7.14	1.29	[Bar extending to 7.14]									
Electronic information services	6.83	2.17	[Bar extending to 6.83]									
Customers	6.74	1.88	[Bar extending to 6.74]									
Conferences, trips	6.49	1.47	[Bar extending to 6.49]									
Government officials	6.20	1.76	[Bar extending to 6.20]									
Competitors	5.58	1.73	[Bar extending to 5.58]									

In terms of quality, Subordinate managers and Customers are perceived to provide information of the greatest relevance and reliability (Table 4). The next best regarded sources are Subordinate staff and Internal reports and studies. 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.

Table 4. Rank Order of Sources according to Mean Perceived Source Quality

Source	PSQ	SD	1.00	3.00	5.00	7.00	9.00
Subordinate managers	8.63	1.20	[Bar extending to 8.63]				
Customers	8.61	1.38	[Bar extending to 8.61]				
Subordinate staff	8.12	1.34	[Bar extending to 8.12]				
Internal reports, studies	8.03	1.36	[Bar extending to 8.03]				
Superiors, board members	7.95	1.49	[Bar extending to 7.95]				
Conferences, trips	7.82	1.49	[Bar extending to 7.82]				
Business/professional associates	7.76	1.33	[Bar extending to 7.76]				
Internal memo, circulars	7.52	1.58	[Bar extending to 7.52]				
Industry, trade associations	7.36	1.51	[Bar extending to 7.36]				
Competitors	7.21	1.43	[Bar extending to 7.21]				
Government officials	6.90	1.75	[Bar extending to 6.90]				
Newspapers, periodicals	6.74	1.62	[Bar extending to 6.74]				
Government publications	6.48	1.68	[Bar extending to 6.48]				
Company library	6.39	1.57	[Bar extending to 6.39]				
Electronic information services	6.20	2.20	[Bar extending to 6.20]				
Broadcast media	5.97	1.67	[Bar extending to 5.97]				

Our findings indicate that both environmental uncertainty and source characteristics influence source use in scanning. To test this, regression models are computed for each source. An overall measure of environmental uncertainty (Perceived Environmental Uncertainty) is obtained by summing the Perceived Strategic Uncertainty values over the six environmental sectors. Results are presented in Table 5. All 16 equations are significant at $p \leq .05$. The adjusted R^2 value indicates the proportion of the variance in source use that is explained jointly by Perceived Environmental Uncertainty, Perceived Source Accessibility, and Perceived Source Quality. For Government officials and Electronic information services, these three variables account for 40% of the source use variance. For Internal memos and circulars, Customers, Company library, and Subordinate managers, they account for approximately 30% of the source use variance. For the other sources, the regression models account for between about 10 and 25% of the source use variance. These values of R^2 suggest that environmental uncertainty and source characteristics can account for a significant proportion of the total variance in source use frequency.

The squared semipartial correlations (sR^2) of the independent variables compare the unique contributions of each independent variable in explaining the total source use variance. sR^2 is the proportion of the total variance accounted for by the independent variable beyond that accounted for by the other independent variables (Cohen & Cohen, 1983). For most of the sources, a very large part of the explanatory power of the regression model is due to Perceived Source Quality and Perceived Environmental Uncertainty: the adjusted R^2 value is due largely to the squared semipartial correlations (sR^2) of the Perceived Source Quality and Perceived Strategic Uncertainty variables (Table 5). For five information sources – Competitors, Customers, Conferences and trips, Business associates, and Government officials – Perceived Environmental Uncertainty accounted for a substantial part of the total source use variance. However, for every source except Competitors, the greatest part of the variance is accounted for by Perceived Source Quality.

DISCUSSION

Respondents indicated that as a group, they perceive the Technological sector to have the highest Perceived Strategic Uncertainty, followed by the Customer and Competition sectors. The importance of the Customer and Competition sectors is in line with past research – many studies have found that business executives were most concerned with the market and competitor sectors of the environment (Choo & Auster, 1993). The perceived importance of the Technological sector is probably due to the recognition that technology is developing at a rapid pace and in ways that can radically alter how businesses operate in the telecommunications industry.

Table 5. Explaining Frequency of Source Use using Perceived Source Accessibility and Quality, and Perceived Environmental Uncertainty

	Variance Accounted For	Contribution of Perceived Source Accessibility ¹	Contribution of Perceived Source Quality ²	Contribution of Perceived Env. Uncertainty ³
	<i>Adj. R²</i>	<i>sR²</i>	<i>sR²</i>	<i>sR²</i>
Customers	.30	.01	.23	.09
Competitors	.23	.00	.10	.17
Business/professionals	.17	.04	.14	.03
Government officials	.40	.02	.31	.09
Newspapers, periodicals	.17	.02	.16	.02
Government publications	.22	.00	.25	.00
Broadcast media	.08	.02	.10	.01
Industry, trade associations	.10	.02	.12	.00
Conferences, trips	.22	.01	.15	.10
Superiors, board members	.22	.00	.24	.02
Subordinate managers	.27	.01	.27	.02
Subordinate staff	.19	.00	.22	.01
Internal memo, circulars	.31	.00	.33	.02
Internal reports, studies	.20	.04	.17	.03
Company library	.29	.01	.32	.00
Electronic information	.41	.03	.40	.00

All models are statistically significant at $p \leq .001$.

Adj. R^2 : Adjusted squared multiple correlation.

sR^2 : Squared semipartial correlation.

1: All standardized partial regression coefficients are nonsignificant, except for the sources Internal reports, studies, and Electronic information significant at $p \leq .05$.

2: All standardized partial regression coefficients are significant, at $p \leq .05$ or better, except for the source Competitors, significant at $p \leq .10$.

3: Four standardized partial regression coefficients are significant, at $p \leq .05$ or better. These are for the sources Customers, Competitors, Business/professional associates, and Conferences, trips.

Analysis of the questionnaire data shows that there is a positive correlation between respondents' Perceived Strategic Uncertainty of each sector and the amount of scanning of that sector. For a sector that is perceived to be strategic, the executive feels a need to be well-informed about trends and developments in that sector which may affect the firm in some fundamental way. Furthermore, for a sector perceived to be changing rapidly and in which many different factors have to be taken into account, the executive feels a need for more information in order to keep up-to-date with the latest developments and to understand cause and effect chains linking the factors. In sum, our analysis suggests that it is the combined effect of an environmental sector's strategic importance, variability and complexity that influences the amount of scanning of that sector.

Data analysis also suggests that environmental uncertainty (operationalized as Perceived Environmental Uncertainty) and source characteristics (operationalized as Perceived Source Accessibility and Quality) are able to account for a significant proportion of the total variance of source use frequency. The impact of Perceived Environmental Uncertainty was most marked for the use frequency of five sources, namely, Competitors, Customers, Conferences and trips, Business associates, and Government officials. These are all outside sources which are close to events and developments in the external environment. We may reasonably expect executives to use these sources more frequently when they perceive environmental uncertainty to be high.

The contribution of Perceived Source Accessibility in explaining source use variance was in most cases very small, and not statistically significant. On the other hand, the impact of Perceived Source Quality is much greater, and accounts for the largest part of the source use variance. This dominant importance of source quality appears to contradict well-known studies of engineers and scientists as information users which concluded that source accessibility was a more important factor in source use than source quality (Allen, 1977; Gerstberger & Allen, 1968;

Rosenberg, 1967). The contradiction may be explained by considering the special nature of environmental scanning as an information seeking activity.

When scanning, the executive would have to attend selectively to numerous signals created by an increasingly complex and 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. Eventually, information from scanning is used by management to chart the company's future course of action (Aguilar, 1967), to make decisions that could have long-term consequential implications for the firm. Taylor (1986) 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 (eg. 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. In summary, we suggest that the turbulence of the external environment, the strategic use of information acquired by scanning, and the special demands of information needed to deal with unstructured situations, all combine to help explain why source quality may be more important than source accessibility when managers scan the environment.

SUMMARY

The purpose of the present study has been to investigate how CEOs in the Canadian telecommunications industry acquire and use information about the external business environment. We examined the relationship between environmental uncertainty and the amount of scanning, and compared the effect of environmental uncertainty and source characteristics on source use. Our findings suggest that CEOs who experience greater environmental uncertainty tend to do a greater amount of scanning. CEOs use a range of sources to scan. The perceived quality of a source and the perceived uncertainty of the environment are good predictors of source use in scanning.

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