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## **Monitoring environmental complexities and changes: some lessons from small firms**

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**Abstract:** The process of gathering and interpreting pertinent information from the environment and introducing the results into the business planning process is referred to as environmental scanning. This paper investigates the practices and perceptions of Small and Medium Enterprises (SMEs) in monitoring environmental complexities and changes through the use of different scanning sources and frequency. Data were collected from 44 SMEs in Botswana through questionnaire and analysed using simple descriptive statistics.

The findings indicated that SMEs in Botswana do monitor their environment and use all the major scanning sources with different degrees of frequency. Though more importance is attached to the customer/market, competition and economic sectors, owner-managers in Botswana tend to rely more on impersonal (written) and internal sources as opposed to personal (informal) and external sources to analyse an increasingly uncertain sector. This is in contrast to previous findings, since information from these sources is less reliable for analysing unstable, turbulent and hard-to-measure sectors than personal and external sources. The use of inappropriate scanning sources could be partially attributed to the fact that most SMEs in Botswana do not have an integrated management information system designed to capture, store and analyse environmental data for use in strategic decision-making processes. Further implications for SMEs and future research are highlighted.

**Keywords:** developing countries; environmental complexities; strategic uncertainty; environmental scanning; Small and Medium Enterprises (SMEs); Botswana.

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## **1 Introduction**

Today's turbulent and dynamic business environment brings both opportunities and threats to firms, particularly to smaller firms. Although the study of environmental complexities, uncertainties and changes is a key area in management research, its application and importance particularly in the context of small firms are not well investigated. Researchers in strategic management have paid only a little attention to the study of the environmental scanning behaviour of small firms in developing economies. Managing complexities and changes enables small firms to reap the benefits of future opportunities and minimise external threats. Surviving and growing in this turbulent and dynamic business environment requires strategic thinking and decision-making. Strategic planning is a vital means of meeting these challenges, as it deals with assessing the internal and external business environment for the purpose of identifying organisational strengths and weaknesses as well as external opportunities and threats. It is based on this assessment that firms establish organisational goals, and determine the strategies to achieve them. Firms require information about customers, products, processes and factors in the external environment. Strategic advantage and long-term competitiveness are therefore largely affected by the ability of firms to systematically gather and process relevant, timely and reliable information about customers, suppliers, competitors, changes in technology and market place, and socioeconomic, political and legal conditions.

Information is the lifeblood of all organisations. No firm can operate properly without having information about the environment in which it is operating. The information required for running a business can broadly be broken down into three:

- 1 information required for regulatory, financial and tax reporting
- 2 information required to manage day-to-day situations and decisions
- 3 information required to support long-term decision-making and strategy formulation.

The environment can create problems and opportunities for organisations, which depend on it for scarce and valued resources. It affects, perhaps more than any other factor, organisational structures, internal processes and managerial decision-making. It is important both from an information-processing perspective and in its role in creating uncertainty for managers. Environmental uncertainty increases information processing within organisations because managers must identify opportunities, detect and interpret problem areas, and implement strategic or structural adaptations. An important competitive weapon for firms is therefore to acquire superior information about the environment. An information advantage about environmental opportunities and problems depends on management's perception of signals that other organisations miss (Duncan, 1972).

Managers and executives study their environment in different modes and frequency. Information could be obtained about the environment through different sources and analysed irregularly or continuously, or regularly on a daily, weekly, monthly, quarterly or yearly basis.

## 2 Monitoring complexities and changes

The major justification for managing and monitoring environmental complexities and changes is based on two assumptions. First, environmental scanning is the first link in the chain of perceptions and actions that permits an organisation to adapt to its environment. Scanning provides the external intelligence that firms use in planning, decision-making and strategy formulation. Second, managers are responsible for the organisation-environment alignment by bringing together specialised information from both internal and external sources (Daft *et al.*, 1988).

As managers have limited time and cognitive capacity to comprehensively and completely understand the environment, they must choose among alternative approaches to scan the environment (Elenkov, 1997). They may choose to study broadly across the general environment or focus narrowly on sectors in the task environment. Firms may attain a strategic information advantage or disadvantage depending on how environmental scanning is conducted. There is also a continuing puzzlement about written versus personal approach to the study of the environment in organisations. A complex environment would seem to call for an increased use of sophisticated systems. Managers have access to a variety of formal and informal media. But most information at the corporate level is obtained through *ad hoc*, human sources (Duncan, 1972) and the study process tends to be irregular rather than systematic. Thus, an examination of the scanning sources can shed some light on the behaviour of firms in managing complexities.

Monitoring environmental complexities is not an end in itself. It should serve as input for strategic business planning, which is an active process of continuously determining what an organisation is able or intends to carry out with respect to its future, and how it expects to do this (Mintzberg, 1994; Ansoff, 1975). Strategic business planning sets organisational goals and determines the means by which to achieve the goals. The environment in which strategic planning takes place may have an important effect on how it is conducted (Lindsay and Rue, 1980; Ansoff, 1975). Firms today, more than ever before, are profoundly sensitive to changes in the environment. While environmental changes and complexities may be felt throughout the industry, the impact mostly affects the strategic planning processes of each firm.

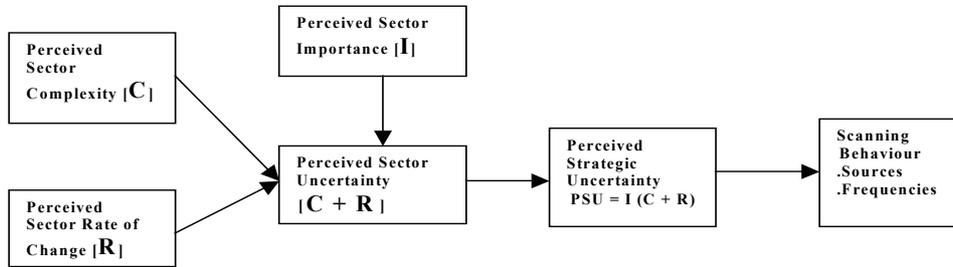
Thus, firms must monitor the relevant changes in the environment and meet the challenges presented by these changes. As firms begin to depend more on formal strategic planning to pursue their goals, their need for a systematic approach to monitoring environmental complexities increases. In other words, to cope with the changing and shifting environment, the strategic planning process must find new ways of exploring the shape of things to come and of analysing strategic alternatives. The effectiveness of strategic planning is directly related to the capacity for gathering and analysing information from the relevant environment. Accurate analysis provides the best framework for maximising opportunities and allocating resources for the anticipated future. There is, therefore, an overwhelming consensus in the literature (Daft and Weick, 1984; Mintzberg, 1994; Hambrick, 1981a; Ansoff, 1975; Aguilar, 1967) that environmental scanning is a basic input for formal strategic business planning.

### **3 Measuring strategic uncertainty**

The environment is defined as the relevant physical and social factors outside the boundary of an organisation that are taken into consideration during organisational decision-making. Several studies on environmental scanning (Daft and Weick, 1984, Elenkov, 1997; Sawyer, 1993; Hambrick, 1983) conceptualised the environment as having several sectors that exist in two layers – the task and the general environment. The task environment involves environmental elements that are commonly defined to include competitors, suppliers, customers and technological factors. The general environment refers to sectors that affect organisations indirectly and include economic, political, demographic, cultural, regulatory and social sectors. These sectors are expected to influence scanning sources and frequency because they differ in uncertainty. Thus, it is critical that Small and Medium Enterprises (SMEs) be aware of the characteristics of sectors in the task and general environment that it currently faces and anticipates facing (Ansoff, 1975).

Environmental scanning is the means through which SMEs perceive external factors, events and trends. It represents a difficult organisational problem because the environment is vast, complex and changing. As managers have limited cognitive capacity to comprehensively understand the environment (Elenkov, 1997), they must find scanning mechanisms that yield adequate information displays of external events. While a number of studies (Hambrick, 1981b; Thomas, 1980; Ansoff, 1975; Daft and Langel, 1986) have explored the fit between organisation and environment, there is less knowledge, particularly in SMEs in developing countries, about how impressions of the environment are formed among managers who are responsible for responding with new strategies and structures. Perceived environmental uncertainty is the absence of information about organisations, activities and events in the environment. It is the difference between available and derived information (Rhyne, 1985).

As shown in Figure 1, two environmental characteristics, complexity (C) and rate of change (R), influence perceived environmental sector uncertainty. Complexity refers to the heterogeneity of external events that are relevant to the organisation. The larger the number and diversity of external events, the higher the complexity. Rate of change refers to the frequency of changes that occur in the organisation's environment. When rate of change is high, external activities and events shift rapidly so that decision-makers do not have accurate information about them. As the rate of change increases, perceived environmental uncertainty of the sector also increases. As both complexity and rate of change increase, the amount of uncertainty perceived by firms also increases (Duncan, 1972).

**Figure 1** A scanning framework

Source: Daft *et al.* (1988)

Complexity and rate of change have traditionally been integrated as an indicator of perceived sector uncertainty ( $C + R$ ). However, as shown in Figure 1, perceived sector uncertainty by itself will not lead to perceived strategic uncertainty and scanning behaviour unless the external events are perceived important ( $I$ ) by managers. Perceived sector importance ( $I$ ) is related to the notion of resource dependency, which is the extent to which the environmental sector provides resources for the attainment of organisational goals. Perceived sector uncertainty ( $C + R$ ) and perceived importance ( $I$ ) of the sector together create Perceived Strategic Uncertainty (PSU) for firms. Their combination is expected to generate a need for managers to scan events in selected environmental sectors (Hambrick, 1983). Sector complexity ( $C$ ) and rate of change ( $R$ ), therefore, lead to perceived sector uncertainty ( $C + R$ ), which creates PSU for firms if the sector is perceived to be important in providing resources for the achievement of organisational goals. Although sector importance is combined with environmental uncertainty as a predictor of need for information of firms, PSU is assumed to be a multiplicative rather than a linear function of importance and environmental uncertainty. Thus, perceived strategic uncertainty is the product, rather than the sum, of environmental uncertainty and sector importance, *i.e.*,  $PSU = I (C + R)$ . For instance, if  $I$  and  $C + R$  are both low, then PSU is also low. However, if  $I$  and  $C + R$  are both high, PSU will be several times greater for firms than when  $I$  and  $C + R$  are both low (Daft *et al.*, 1988).

Thus, as shown in Figure 1, the degree of perceived strategic uncertainty of the sector determines the types of scanning sources and the frequency with which these sources should be used to scan the environment. Some scanning sources are used more frequently than others depending on the degree of perceived strategic uncertainty in the sectors. Therefore, sectors characterised by low perceived strategic uncertainty are found to be associated with infrequent scanning and greater use of impersonal (written or published) rather than personal sources of information.

#### 4 Frequency of monitoring sources

Globalisation and technological advancements have made firms profoundly sensitive to social, economic, political and technological changes. Firms, regardless of their size or industry, must monitor the relevant changes in the environment and meet the challenges presented by these changes. Managers can learn about the environment in many ways. They may study the environment directly or learn from others in the organisation. They

may choose single or multiple sources of information. They may increase or decrease the frequency with which they study the environment. Scanning frequency is the number of times managers receive data about the environment. Depending on the nature of the environment, managers may process data irregularly, regularly or continuously depending upon the perceived need for data about external events.

Scanning source pertains to the medium through which managers learn about the environment. It is therefore expected that frequency of scanning will differ by sector and will be related to strategic uncertainty (Daft *et al.*, 1988). As strategic uncertainty reflects the strategic value of information for organisational performance, managers will more frequently acquire data about strategically uncertain sectors (Hambrick, 1981a). Managers use different information sources, including personal, written, internal and external sources of information. Personal sources refer to direct human contacts typified by face-to-face and telephone media. Impersonal sources are written, and include formal reports, newspapers, survey results and the output of management information systems. Personal versus impersonal is, therefore, analogous to the human versus documentary sources (Elenkov, 1997). But which sources – personal or impersonal – are better suited for interpreting an uncertain environment? Personal sources of information have been found important to managers and are consistent with the informal and irregular scanning that typifies many organisations in developed western countries (Thomas, 1980). Although the ability to condense a broad base of data into written form also makes impersonal sources useful for environmental scanning, personal sources of information are content rich and face-to-face, and telephone information exchanges provide multiple cues and allow for rapid feedback, thereby facilitating understanding when uncertainty is high. As Elenkov (1997) argues, personal communications are content rich and enable managers to detect weak signals. Written sources are appropriate when environmental events are discrete and analysable. When strategic uncertainty is very low, impersonal or written sources may provide sufficient data (Daft and Langel, 1986).

Scanning information could be internal or external to the firm. Internal information pertains to data, reports, memos or discussions with internal managers and employees about the external environment. External sources include personal tours, telephone discussions with peers in other companies, trade magazines, newspapers, information services, and attendance at association meetings outside the organisation (Daft *et al.*, 1988). Since many people within the organisation scan parts of the environment, managers will tend to use both internal and external sources of information. However, as strategic uncertainty increases, it is expected that managers will want to form their impression through direct contact with key environmental sectors. Direct contact means that data are undiluted and do not suffer from the loss of meaning associated with passing information through intermediaries (Tan and Litschert, 1994). Moreover, internal information tends to be distorted as it is passed up the hierarchy. Although internal sources may still be used by corporate leaders to supplement external sources, top executives are expected to respond to strategic uncertainty in the environment through more frequent use of direct external sources, and less frequent use of internal sources (Elenkov, 1997).

## 5 Survey design

This paper is extracted from a major research project on the business planning behaviour of SMEs in Botswana, which was based on a semi-structured questionnaire containing three groups of data – demographic, scanning and planning. This paper is based on the scanning data. A descriptive survey research was designed to study the scanning practices of SMEs based on the original works of Daft *et al.* (1988), as validated in a developing and transitional economy context by Sawyer in Nigeria (1993), Elenkov in Bulgaria (1997) and May *et al.* in Russia (2000). Three factors have contributed to the replication of the Daft *et al.* (1988) approach:

- 1 The absence of consensus in the management literature on how environment and uncertainty should be conceptualised and operationalised.
- 2 The shortage of empirical studies on scanning frameworks for SMEs, particularly in Africa.
- 3 The scope of the major research project from which the scanning data is extracted. The selected research design is therefore aimed at achieving comparability with previous research constructs.

Following these studies, the paper conceptualised the environment as having three perspectives – sectors, attributes and perceptions. In the first perspective, the environment is conceptualised as having several sectors in the task environment (customer, competitor and technology sectors) and the general environment (economic, regulatory and socio-cultural sectors). In the second perspective, the sector characteristic is defined by its complexity, rate of change and importance. In the third perspective, scanning intensity and frequency is based on managerial perceptions of strategic uncertainty.

Accordingly, two groups of scanning data were collected through questionnaire. The first group of data was designed to describe the characteristics of environmental sectors and to measure management perceptions of their strategic uncertainty. The respondents were provided with explanations of each environmental sector and asked to rate the degree of complexity, rate of change and importance of each sector using a 5-point scale ranging from very high (5) to very low (1). The second group of data was aimed at analysing whether scanning source frequency changes with management perception of strategic environmental uncertainty. The respondents were given examples of Personal External (PE), Personal Internal (PI), Written External (WE) and Written Internal (WI) sources of information, and asked to rate, with a five-point scale ranging from most frequently used (5) to least frequently used (1), the frequency with which these sources have been scanned. The two sets of data were also intended to determine the extent to which PSU is associated with scanning mode or source frequency.

The questionnaire was administered to a convenience sample of 74 firms selected from the Botswana Confederation of Commerce, Industry and Manpower (BCCIM) membership list based on three criteria:

- 1 firms with a single business
- 2 firms with different legal form of ownership
- 3 gender of owner-managers.

A single business means the firm has a defined task environment, which is not the case when the firm is responsible for multiple businesses operating in multiple environments. Since the selected firms were independent businesses, environment-monitoring behaviour would be related to environmental forces rather than to the policy of a parent company, and environmental sectors could be clearly defined. Mixed legal forms of ownership are used to evaluate the planning and scanning behaviour of sole proprietorships, partnerships and corporations. The third criterion is used to evaluate the planning and scanning behaviour of firms owned and/or managed by men and women.

## **6 Findings and discussion**

The findings of the study are reported under four major issues:

- 1 characteristics of the sample firms
- 2 characteristics of environmental sectors and perceived strategic uncertainty
- 3 frequency of monitoring sources
- 4 the relationship between perceived environmental uncertainty and frequency of monitoring sources.

### *6.1 Characteristics of sample SMEs*

Although 56 out of 74 questionnaires were returned, only 44 were found complete and usable for the study. The sample firms are fairly distributed over three industries. Thirty-two percent of them are operating in the manufacturing industry; 43% in the merchandising (wholesale and retail business) industry; and the remaining 25% in the service industry. The sample firms are dominated by corporations (58%), compared to 29% sole proprietorship and 13% partnership/joint venture firms. The majority of executives (84%) are men and only seven (16%) small firms were managed by women. Owner-managers of the sample SMEs have, on average, 5.6 years of general managerial experience and 4.2 years as manager or director of the firm under consideration, which shows that they have years of experience with the task and general business environment in which they are operating.

### *6.2 Sector characteristics and PSU*

Characteristics refer to the nature of the sector in terms of complexity, rate of change and perceived importance for the attainment of organisational goals. The profile of sector characteristics is reported in Table 1. The mean scores in Table 1 are based on 5-point Likert scales that range from 1 (very low) to 5 (very high) and should be interpreted as indicators of rate of importance, complexity, rate of change, and perceived strategic uncertainty of each of the six environmental sectors. The ranks in Table 1 suggest that some sectors have greater perceived importance, complexity, rate of change and strategic uncertainty than others.

**Table 1** Mean rankings for sector characteristics and perceived strategic uncertainty

<i>Environmental sectors</i>	<i>Sector characteristics</i>						
	<i>Importance (I)</i>		<i>Complexity (C)</i>		<i>Changes (R)</i>		<i>PSU</i>
	<i>MN</i>	<i>SD</i>	<i>MN</i>	<i>SD</i>	<i>MN</i>	<i>SD</i>	<i>I(C+R)</i>
Task environment							
Customer	4.0	0.8	3.8	1.1	2.7	1.0	26.3
Competitor	3.8	0.9	2.5	1.5	2.6	1.4	19.5
Technological	2.6	1.1	2.1	1.1	2.3	1.3	11.4
<i>Total</i>	3.5	0.9	2.8	1.2	2.5	1.2	19.1
General environment							
Economic	3.7	1.0	2.4	1.4	2.9	1.2	19.8
Regulatory	2.2	1.2	1.7	1.3	1.8	1.0	7.8
Socio-cultural	1.7	1.1	1.2	1.1	1.5	1.1	4.7
<i>Total</i>	2.5	1.1	1.8	1.2	2.1	1.1	10.8

The customer sector is rated first in sector importance (mean = 4.0), complexity (mean = 3.8), rate of change (mean = 2.7) and eventually in perceived strategic uncertainty (mean = 26.3), indicating that information about customers (their buying behaviour, preferences, tastes, trends, *etc.*) is perceived to be exerting high strategic uncertainty for firms as a result of increased importance, complexities and rates of change. This was supported by lower standard deviation for the rating of the customer sector's importance (SD = 0.8), complexity (SD = 1.1) and rate of change (SD = 1.0). The lower the SD is, the closer individual observations will be to the mean.

The competitor and technological sectors in the task environment were rated second and third, respectively, in their importance (mean = 3.8 and 2.6), complexities (mean = 2.5 and 2.1), rate of change (mean = 2.7 and 2.6) and perceived strategic uncertainty (PSU = 19.5 and 11.4), which shows the need to minimise strategic uncertainties in these sectors by gathering and analysing information about trends and changes in competitors and technology.

Comparison of factors in the general environment shows that economic factors (mean = 2.7) are considered more important (mean = 3.7), complex (mean = 2.4), changing (mean = 2.9) and uncertain (19.8) than regulatory and socio-cultural issues. Comparison of the two environments shows that information about factors in the task environment (mean = 3.5) are perceived more important than information about factors in the general environment (mean = 2.2).

The task environment was also perceived to be more important (mean 3.5 > 2.5), more complex (mean = 2.8 > 1.8), rapidly changing (mean = 2.5 > 2.1) and more uncertain (PSU = 19.1 > 10.8) than the general environment. This could be related to the ever-increasing intensity of the competition and globalisation of markets. The strong economy of Botswana (based on abundant mineral resources) coupled with the political, social and legal stability has been attracting competition from abroad, particularly from South Africa and Zimbabwe. This can eventually increase the perceived importance of information about competition, competitor's products, strategies and so forth.

It is interesting to note that although the economic sector is considered to be part of the general environment, it was ranked first for rate of change (mean = 2.9) and fairly high for importance (mean = 3.7) and complexity (mean = 2.4). This indicates that economic factors such as price, interest rates, inflation, exchange rates and so on are changing rapidly and putting greater uncertainty on the performance of firms. Regulatory and socio-cultural sectors were perceived to create low uncertainty (mean = 7.8 and 4.7) because they are rated low in importance, complexity and rate of change. This could be partially attributed to the existence of political and social stability in Botswana. Firms seem not tightly controlled or regulated at the local or national level. Sawyer's study (1993) revealed that the high rate of change and complexities were observed in the regulatory sectors owing to political and social instability in Nigeria in 1992.

Since the technological sector (task environment) has lesser perceived importance (mean = 2.6), rate of change (mean = 2.5) and perceived strategic uncertainty (mean = 11.4) than the economic sector (general environment) (mean = 19.8), the generalisation that task environment exerts more uncertainty than the general environment would be misleading. In general, the environmental monitoring efforts of SMEs in Botswana were directed more towards gathering and processing information about customers, competitors, economic trends and technological changes. The regulatory and socio-cultural sectors of the general environment were perceived to exert relatively little environmental uncertainty on the performance of SMEs.

### *6.3 Frequency of monitoring sources*

Managers use different information sources to study their environment. Table 2 shows that the four major scanning sources have been scanned with varying degrees of frequency to gather information about factors in the task and general environments. The respondents indicated that written external sources have been used more frequently to study the customer sector. In other words, information pertaining to customers was gathered more frequently through the use of written external sources (mean = 3.2) than written internal sources (mean = 2.8) or personal internal sources (mean = 2.6) or personal external sources (mean = 2.5). This is different from the findings of previous studies by Daft and Langel (1986), Elenkov (1997) and Sawyer (1993), which found that personal external or personal internal sources were most frequently utilised to get information related to customers and markets. From this, we can infer that SMEs in Botswana depend on published materials such as newspapers, statistical reports and bulletins to get information about customers, markets and demand data. This could also be attributed to the fact that SMEs cannot afford to conduct formal customer surveys to regularly gather relevant market and customer data. This dependence on the use of written external sources was supported by the low standard deviation for written external sources frequency (SD = 0.9). Lower standard deviations suggest low variations in the respondent's perception of the frequency of using written external sources compared to other scanning sources.

SMEs must therefore be assisted to focus on more frequent use of personal external sources to get relevant information about the various aspects of their customers. Information about competitors was obtained more frequently from personal internal sources (mean = 2.9 with SD = 0.9) than personal external sources (mean = 2.2 with SD = 0.9), compared to written external (mean = 1.7 with SD = 1.1) and written internal

(mean = 1.4) sources. This is different from the findings of previous studies, which claim external sources to be the most frequently used scanning modes for information about competitors. This difference could be attributed to the tendency of SMEs to depend on the scanning service of other organisational members, or else the responsibility of scanning competitors has been delegated to other managerial personnel.

**Table 2** Mean rankings for scanning source, frequency and correlation coefficients

<i>Environmental sectors</i>	<i>Scanning source and frequency</i>							
	<i>WE</i>		<i>WI</i>		<i>PE</i>		<i>PI</i>	
	<i>MN</i>	<i>SD</i>	<i>MN</i>	<i>SD</i>	<i>MN</i>	<i>SD</i>	<i>MN</i>	<i>SD</i>
Task environment								
Customer	3.2	0.9	2.8	0.9	2.5	1.1	2.6	1.1
Competitor	1.7	1.1	1.4	1.1	2.2	0.9	2.9	0.9
Technological	1.4	1.3	2.4	1.0	1.4	1.0	2.1	0.8
<i>Total</i>	2.1	1.1	2.2	1.0	2.0	1.0	2.5	0.9
General environment								
Economic	3.2	0.8	2.2	0.9	2.3	1.0	2.3	0.9
Regulatory	3.5	0.9	1.6	1.2	1.2	0.8	1.2	1.1
Socio-cultural	1.6	1.1	1.0	1.3	1.3	0.9	1.1	1.2
<i>Total</i>	2.8	0.9	1.6	1.1	1.6	0.9	1.5	1.1
Correlation, PSU	58%		57%		56%		43%	

It is interesting to note that written internal sources (company memo and reports) (mean = 2.4) and personal internal sources (employees, managers, *etc.*) (mean = 2.1) are more frequently used than written external (mean = 1.4) and personal external (mean = 1.4) sources to study technological changes and trends. This is radically different from the findings of most previous studies. The external sources were less frequently used than internal sources, which is contrary to the practice of most firms in the developed countries. Usually, information about expected changes and trends in technology are obtained from sources external to the firm. It is through personal contacts outside the organisation, by attending workshops and trade fairs, that companies collect and process information about competitors and technological changes.

From the general macro-environment, the written external sources were used most frequently for scanning of the economic (mean = 3.2) and regulatory (mean = 3.5) sectors, perhaps because most data about the economy and government policies and regulations come in the form of published reports. The socio-cultural sector becomes important and will be studied most frequently if the work ethics and culture are considered critical for organisational profitability and success. Comparison of the two environments shows in Table 2 that all the four scanning sources are used more frequently to study the task environment than the general environment, with the exception of the written external sources, which have been more frequently used to study the general environment rather than the task environment. Although this could be attributed to the fact that economic and regulatory data are available for SMEs in a written format, SMEs in Botswana are generally using inappropriate scanning sources to study some sectors. Given that SMEs lack integrated information management

systems, the relevance of internal data to analyse competitors and technological trends will be questionable. SMEs can reap the benefits of scanning if they can develop a management information system that captures, stores and analyses data for managerial decision-making purposes.

#### 6.4 Relationship between source and PSU

The last line in Table 2 shows a statistically significant association between PSU and the major scanning sources at  $P < 0.01$  level of confidence. All correlation coefficients are positive and statistically significant. This means that SMEs increase the degree of scanning frequency when perceived strategic uncertainty increases. It can therefore be inferred from this that strategic uncertainty is a predictor of the frequency with which SMEs scan environmental sectors. However, it is interesting to note that SMEs are using less effective scanning sources to monitor perceived environmental uncertainty. A stronger association is observed with written external ( $r = 58\%$ ) and written internal ( $r = 57\%$ ) sources than with personal external ( $r = 56\%$ ) and personal internal ( $r = 43\%$ ) sources. The higher the uncertainty in environmental sectors, the more frequently SMEs rely on written modes both within ( $r = 0.57$ ) and outside ( $r = 0.58$ ) the organisation. This could be attributed to two causes. First, most managers seem to prefer to give the job of monitoring the environment to other staff members in the firm. Second, there seems to be a lack of well-organised scanning systems as well as the necessary scanning- and information-processing skills and knowledge.

The relationship between perceived strategic uncertainty and the frequency with which the personal internal sources are used is relatively weak ( $r = 0.43$ ). This implies that frequency of personal internal sources does not increase as rapidly with perceived strategic uncertainty. This excessive reliance on written as opposed to personal sources to minimise environmental uncertainty could be dangerous for SMEs, as they do not generate relevant data for strategic planning and decision-making purposes. Many research findings (Bourgeois, 1980; Hambrick, 1983; Tan and Litschert, 1994) indicated that as environmental uncertainty increases, managers rely more heavily on personal sources than on written sources, and on external rather than internal sources. Studies by Smeltzer *et al.* (1988), Elenkov (1997) and Aguilar (1967) concluded that as strategic uncertainties increase, the scanning mode shifts towards personal, informal and external sources of information.

To sum up, as summarised in Table 3, SMEs in Botswana perceive the customer sector as having greater strategic uncertainty than other sectors in the environment. All the four sources of information have been used with reasonable frequency to scan the customer sector. The highest source frequency ( $WE = 3.5$ ) is observed for the regulatory sector, which is perceived to have low strategic uncertainty. This is in contrast to the claim that uncertain sectors are scanned more frequently and could be attributed to the high dependence of SMEs on written external sources to study the regulatory environment.

Table 3 also summarises the relationship between the overall perceived strategic uncertainty of the environment and the frequency with which the four scanning sources have been used. As strategic uncertainty increases, SMEs use written sources more frequently than personal sources. Although this is in contrast to previous studies, it shows that SMEs seem to lack expertise or systems to collect information from informal sources through personal contacts, trade fairs, exhibitions, customers, competitors and so forth.

Compared with written sources, the frequency of personal sources ( $r = 43$ ) does not increase rapidly with perceived strategic uncertainty, which shows that impersonal sources are preferred when strategic uncertainty is high. From this, one can safely infer that SMEs in Botswana need assistance in identifying the most appropriate sources of information to be used when strategic uncertainty increases and decreases.

**Table 3** Summary mean rankings for sector characteristics and source frequency

<i>Sectors</i>	<i>Sector characteristics</i>				<i>Source frequency</i>			
	<i>Importance</i>	<i>Complexity</i>	<i>Change</i>	<i>PSU</i>	<i>WE</i>	<i>WI</i>	<i>PE</i>	<i>PI</i>
Customer	4.0	3.8	2.7	26.3	3.2	2.8	2.5	2.6
Competitor	3.8	2.5	2.6	19.5	1.7	1.4	2.2	2.9
Technological	2.6	2.1	2.3	11.4	1.4	2.4	1.4	2.1
<i>Total</i>	3.5	2.8	2.5	19.1	2.1	2.2	2.0	2.5
Economic	3.7	2.4	2.9	19.8	3.2	2.2	2.3	2.3
Regulatory	2.2	1.7	1.8	7.8	3.5	1.6	1.2	1.2
Socio-cultural	1.7	1.2	1.5	4.7	1.6	1.0	1.3	1.1
<i>Total</i>	2.5	1.8	2.1	10.8	2.8	1.6	1.6	1.5
Correlation-PSU					58%	57%	56%	43%

## 7 Conclusions and implications

The external environment is a significant contingency for SMEs in Botswana. The paper analysed the perceptions of SMEs about the characteristics of environmental sectors and perceived strategic uncertainties; the scanning source frequency with which SMEs in Botswana scan and interpret the environment; and the relationship between perceived strategic uncertainty and scanning source frequency. The findings indicated that environmental sectors differ widely in the amount of strategic uncertainty they exert on SMEs. Customers, competition, economic and technological sectors had relatively greater complexity, rate of change, perceived importance and strategic uncertainty than regulatory and socio-cultural sectors. In line with previous studies, the task environment creates more uncertainty for SMEs in Botswana than does the general environment with one exception. The economic sector is part of the general environment. However, it is perceived by SMEs to be more turbulent, volatile, dynamic and uncertain than the technological sector. Thus, SMEs should study and monitor both the task and general environments based on their perceptions of strategic uncertainty.

The findings showed that perceived strategic uncertainty across sectors determines the degree of frequency of selected scanning sources. SMEs use different sources of scanning with varying degrees of frequency depending on their perceptions of strategic uncertainty in each environmental sector. As perceived strategic uncertainty increases, the intensity and frequency of scanning also increases. However, this is not true for all environmental sectors. Written external sources are, for example, used with high frequency to study the regulatory sector, which has the least strategic uncertainty (mean = 7.8). This discrepancy could be attributed to differences in SMEs' perceptions

and definitions of sector importance. The findings confirmed the assumption that complexity and change alone will not lead to strategic uncertainty unless SMEs perceive the sector important for accomplishing their goals and objectives.

The sample SMEs are using a variety of scanning sources with varying degrees of frequency. This suggests that SMEs use multiple sources to interpret and study their environment. SMEs valued both personal and written sources and frequently used both internal and external sources, indicating that multiple sources are the appropriate information system for SMEs in Botswana. But, in contrast to previous findings, written sources are used more frequently than personal sources as the perceived strategic uncertainty of a sector increases. The greater preference for written sources as uncertainty increases reflects the inability of SMEs to acquire new and unique data from their environment through impersonal modes. The implication is that scanning systems in SMEs should not be locked into continuous data on limited sectors of the environment. Since SMEs do not have the resources and organisational capability to effectively use all possible sources of scanning information, they must be assisted through business development support and training programmes to improve their information gathering, processing and analysing capability. Written and personal sources may complement one another to give a better view of an uncertain environment. Personal sources are important because their richness enables subtle signals to be detected. Although the use of personal sources requires interpersonal, technical and analytical skills which are rare in SMEs, greater reliance on written sources will have strategic disadvantages for SMEs in the future. Management information systems tend to provide periodic information of a repetitive nature which may be valuable for perceiving stable elements in task sectors but may not be valuable for unstable or hard-to-measure sectors. However, SMEs must reexamine the degree of importance they are attaching to each source of scanning, because there is no one best source that could be universally applied to the analysis of environmental sectors. Future research on management information systems in SMEs should examine whether designers of information systems in SMEs in developing economies should try to provide only certain types of data through formal channels, and the extent to which the best view of the environment comes from multiple information sources.

SMEs in developing countries should be supported in developing the skills of capturing relevant environmental data, processing and analysing them for the purposes of improving their strategic decision-making process. One common problem with SMEs is the inability to correctly interpret environmental data and prioritise sectors according to their degree of influence on the SMEs' performance. It is worthwhile for SMEs to attempt to weigh the influence of each environmental sector on their performance and address them in a step-by-step and cost-effective manner. Although the prime requirement is for formulation of broad strategies and long-term policies, SMEs can also use scanning results for other purposes, such as organisational design, development of action plans, operating programmes and a frame of reference for annual or interim budgets.

A review of the scanning literature shows a growing need for a framework for conceptualising and measuring the environmental scanning construct in the context of SMEs in developing countries. The use of mixed sample firms from different industries will make the findings difficult for generalisation. Mechanisms should be developed to separate the perceived from the objective environment for the purpose of scanning. Different data collection instruments should be combined to reduce heavy reliance on self-reported items on a single questionnaire.

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